



CONSTRAINTS OF TEACHING COMPUTER STUDIES IN SECONDARY SCHOOLS IN MAIDUGURI METROPOLIS, BORNO STATE, NIGERIA

EMMANUEL P. MUSA¹, DR BITRUS GLAWALA AMUDA²

¹Department of Computer Science, Ramat Polytechnic Maiduguri, Borno State, Nigeria. ²Department of educational Psychology, Guidance and Counselling, Kashim Ibrahim College of Education Maiduguri, Borno State, Nigeria.

Abstract

The study examined the Constraints of Studying Computer Science in Secondary Schools in Maiduguri Metropolis, Borno State, Nigeria. There are five objectives raised in the study, which include to ascertain if there are competent teachers to teach computer science in secondary schools in Borno State. A sample of, two hundred (200) participants were selected from eight (8) sampled secondary schools in Maiduguri Metropolis, Borno state. The data collected were analysed using percentage. The results revealed that 57% said there are no in-service training for the ICT teachers in Borno State secondary schools, 65% said there are no internet facilities in the secondary schools in Borno state and 59% said there are not enough computers in the computer/ICT laboratory. The researchers recommended that the secondary schools in Maiduguri Metropolis, Borno state should be equipped with enough computers in the Computer laboratory, the ICT teachers should be sent on in-service training and that internet facilities be provided for the teaming youths in Maiduguri Metropolis, Borno State secondary schools.

Keywords: *Constraints, Teaching, Computer Studies, ICT.*

Introduction

During the 32nd ministerial council meeting of the National Council on Education in 1987, the Federal government of Nigeria decided to introduce

computer education into the nation's secondary school system. This was followed by the inauguration of the National Committee on Computer Education the same year (1987). The functions of the committee include "planning for a dynamic policy on computer education and literacy in Nigeria as well as devising clear strategies and terminologies to be used by the Federal and State governments in the objectives of the policy include:

1. Bring about a computer literate society in Nigeria by the mid-1990s.
2. Enable present schoolchildren to appreciate and use the computer in various aspects of life and in future employment.

ICT is a generic term referring to technologies used for collecting, storing, editing and passing on information in various forms. Across the past twenty years, the use of ICT has fundamentally changed the practices and procedures of nearly all forms of Endeavour within business and governance. Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. The use of ICT in education lends itself to more student-centered learning settings. However, with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century.

The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research. ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change. In a rapidly changing world, basic education is essential for an individual be able to access and apply information. Such ability must find include ICTs in the global village.

ICT is changing processes of teaching and learning by adding elements of vitality to learning environments including virtual environments for the 6 purpose. ICT is a potentially powerful tool for offering educational opportunities. It is difficult and maybe even impossible to imagine future

learning environments that are not supported, in one way or another, by Information and Communication Technologies (ICT) (Marshall, 2002) Telia, Toyobo, Adika and Adeyinka (2007) reported that the issue of assessment in Nigerian schools on the use of ICTs was examined. Many different types of technology can be used to support and enhance learning. Everything from video content and digital moviemaking to laptop computing and handheld technologies has been used in classrooms. Similarly, new uses of technology such as pod casting are constantly emerging.

Across Africa and most developing countries, there are many challenges in bringing ICTs into the education process in general. Anderson (1997) have identified a range of physical and cultural factors that affect ICT use by teachers, including lack of reliable access to electricity, limited technology infrastructure (especially internet access, bandwidth, hardware and software provision), language of instruction and available software; geographical factors such as country size, terrain and communications; demographic factors such as population size, density and dispersion. In addition, educational factors including levels of teachers' own education and literacy rates, and access to professional development play an important role. Indeed, many studies indicate that it is teachers' attitudes, expertise, lack of autonomy and lack of knowledge to evaluate the use and role of ICT in teaching (or technophobia in teachers) that are the prominent factors hindering teachers' readiness and confidence in using ICT support.

The lack of incentives and support for teachers are other factors hindering their use of ICT. The SRI-World Links evaluation (Kozma, 2004) shows that teachers enthusiastically engage in collaborative projects and often portray constructivist pedagogy. However, school administrators offer very little structural support and few incentives to use the technology effectively in the classroom. Too often, the curriculum in developing countries is rigid and overloaded, leaving little time for innovative classroom practices. National policies need to make more commitment to helping teachers effectively integrate computers and internet technologies

into the classroom by aligning curricula, exams, and incentives with the educational outcomes that they hope to gain. In the end, computers by themselves bring very little to the learning process - they are only tools for teaching and learning.

Much research into the barriers to the integration of ICT into education found that teacher' attitudes and an inherent resistance to change was a significant barrier (Cox, Preston, & Cox, 1999a; Watson, 1999; Earle, 2002; Becta, 2008; Gomes, 2005 & Schoepp, 2005). At a broader level, Becta (2008) argued that resistance to change is an important barrier to teachers' use of new technologies in education.

Watson (1999), an Australian researcher, argued integrating the new technologies into educational settings requires change and different teachers will handle this change differently. According to him, considering different teachers' attitudes to change is important because teachers' beliefs influence what they do in classrooms. Becta (2008) claims that one key area of teachers' attitudes towards the use of technologies is their understanding of how these technologies will benefit their teaching and their students' learning. Schoepp (2005) found that, although teachers felt that there was more than enough technology available, they did not believe that they were being supported, guided, or rewarded in the integration of technology into their teaching. According to Empirica (2006), teachers who are not using new technology such as computers in the classroom are still of the opinion that the use of ICT has no benefits or unclear benefits.

Resistance to change seems not to be a barrier itself; instead, it is an indication that something is wrong. In other words, there are reasons why resistance to change occurs. In Earle (2002) the change from a present level to a desired level of performance is facilitated by driving (encouraging) forces such as the power of new developments, rapid availability, creativity, Internet access, or ease of communication, while it is delayed by resisting (discouraging) forces such as lack of technical support, teacher expertise, or time for planning. In their study, Cox (1999a) found that teachers are unlikely to use new technologies in their teaching if they see no need to change their professional practice. They showed that

teachers who resist change are not rejecting the need for change but lack the necessary education in accepting the changes and given insufficient long-term opportunities to make sense of the new technologies for themselves.

Teachers interviewed by Sicilia (2005) commented that "the constraints of different class schedule [sic] contributed to the lack of time they spent together to work on planning classroom activities". Supporting this finding, the most significant constraint on use quoted by 86-88% of primary and secondary science teachers surveyed by (Osborne., & Collins, 2000) was lack of time (as cited in (Osborne, & Hennessy, 2003). Gomes (2005) concluded that one of the main reasons that science teachers do not use ICT in the classroom is lack of the time necessary to accomplish plans.

According to Becta (2008), the issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training. These were time for training, pedagogical training, skills training, and an ICT use in initial teacher training. Correspondingly, recent research by Gomes (2005) relating to science education concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom, and lack of training concerning the use of technologies in science specific areas were obstacles to using new technologies in classroom practice. Some of the Saudi Arabian studies reported similar reasons for failures in using educational technologies: the weakness of teacher training in the use of computers, the use of a "delivery" teaching style instead of investment in modern technology (Alhamd, Alotaibi, Motwaly, & Zyadah, 2004), as well as the shortage of teachers who are qualified to use the technology confidently (Sager, 2001).

The various research studies indicated several reasons for the lack of access to technologies occurred. In Sicilia (2005), teachers complained about how difficult it was to always have 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".

Statement of the Problem

Globally the world has gone computerized and almost every sector has employed computer to enhance productivity and effectiveness for better competing environment, the employees use different types of computer to work in an organisations, as such a computer literate will have an upper hand employed in the modern organisation today worldwide. The researchers have observed that the Borno state in particular has a wide problem in the area of implementing the curriculum on the use of ICT in her secondary schools. The researchers at different points in time have come up with the following problems of teaching of ICT lesson in secondary schools. Such as Lack of time to include ICT/computer studies lesson on the teachers' timetable, effective training of the staff, lack of accessibility to ICT/Computer resource as other teachers may also need these resources to teach during their lessons and lack of technical support to maintain the systems as they are used. However, none of the researchers have given conclusive answers or solutions to the problem. Therefore, this study will fill a gap. It is against this background that the researchers attempted to investigate the constraints of teaching of Computer Studies in Secondary Schools in Maiduguri Metropolis, Borno State, Nigeria

Objectives

1. To investigate if there are enough ICT equipments in secondary schools in Maiduguri metropolis to cater teaching of computer studies.
2. To find if there are enough trained work force to teach computer studies in Maiduguri metropolis secondary schools.
3. To find out the readiness of Borno state government to teach computer studies courses in her secondary schools.
4. To find out the problems of teaching ICT/computer science in Secondary schools of Maiduguri metropolis of Borno state.
5. To find out if teachers are sent for training to teach computer science in secondary schools in Maiduguri metropolis, Borno state.

Research questions

1. Are there enough ICT equipments in secondary schools in Maiduguri metropolis?
2. Is there enough trained manpower to teach computer science in in Maiduguri metropolis secondary schools?
3. Is the Maiduguri metropolis ready to teach computer science in her secondary schools?
4. Are there problems of teaching computer science in Maiduguri metropolis secondary schools?
5. Are teachers sent for training to teach computer science in Maiduguri metropolis secondary schools?

Methods

Research Design

The research design adopted for this study is survey design. Survey design was adopted because the researchers have sought the opinion of the respondents, which are students in SS3 in senior secondary schools in Maiduguri metropolis, Borno state. Kerlinger (1979) defined survey method as a process that involves large and small population, samples selected and studied, in order to discover relative incidence of distribution, interrelations of sociological and psychological variables.

Population and Sample

The population of this study includes seven senior secondary schools in Maiduguri Metropolitan Council and Jere Local Government of Borno State. The SS 3 students to be specific are the ones involved, as they were the only ones met writing their final SSCE exams. The population involved is 1500, out of these population, 200 participants were selected through stratified random sampling technique to participate the study whose candid opinions were sampled.

Research Instrument

The research instrument used was a self-designed questionnaire. The questionnaire contains 13 items and each item has two options and the researcher demanded circling of the correct option from the respondents. The school heads were interviewed asking some basic questions on ICT such as the availability of ICT laboratory. Experts validated the questionnaire where effective corrections, suggestions and constructive criticisms were made before taking it to the field.

Method of Data Analysis

The data collected were analysed using frequencies and percentages. The data were lumped together and the tally method was used to process the responses and into frequencies. The percentages of each item of responses were calculated using a calculator.

Results

Research Question One: Are There Enough ICT Equipments in Secondary Schools in Borno State?

Table 1.1: Shows the Percentage of the Availability of Computer Laboratory, Computers and Accessories in Maiduguri metropolis Secondary Schools.

Item no	Statement	Responses		
		Yes	No	Total
1	Are there computer laboratories in your school?	106 (75.2%)	35 (24.8%)	100
2	Are computers available in your laboratory?	102 (72.3%)	39 (27.7%)	100
3	Are the computers in the laboratory functioning well?	94 (66.7%)	47 (33.3%)	100
4	Are the computers in the laboratory adequate?	68 (48.6%)	72 (51.4%)	100
5	Do you have internet for browsing in your school laboratory?	49 (35%)	91 (65%)	100

6	Do you have computer textbooks available in your school library?	82 (58.6%)	58 (41.4%)	100
---	--	---------------	---------------	-----

From the table 1.1 item 1 above, one hundred and six (106) representing 75.2% say yes there is computer laboratory in their schools, while thirty-five (35) representing 24.8% say no computer laboratory in their school. This shows that majority responses say there are computer laboratory in the schools, the minority responses are saying they have no Computer/ICT laboratory in their schools.

From the table 1.1 item 5 above forty-nine (49) representing 35% say yes, there is internet facilities for browsing in school computer laboratory, while ninety-one (91) representing 65% say no there are no internet facilities for browsing in school computer laboratory. This shows that majority responses say there are no internet facilities for browsing in the school laboratory.

Research question Two: Is There Enough Trained Manpower to Teach Computer Science in Borno State Secondary Schools?

Table 1.2: Shows Percentage of Trained Manpower to Teach Computer Education in Maiduguri metropolis, Borno State Secondary Schools.

Item no	Statement	Responses		
		Yes	No	Total
1	Do you have qualified teachers to teach computer education?	36 (24.5%)	104 (75.5%)	100
2	Are there other teachers willing to teach the subject in the school?	102 (72.3%)	39 (27.7%)	100
3	How many teachers employed Computer studies/ICT teachers in the last five years?	30 (21.3%)	111 (78.7%)	100
4	Do you have part time teachers to help taking ICT courses in the school?	25 (17.7%)	126 (82.3%)	100
5	Do you have Corpers (NYSC) posted to your school to teach computer studies/ICT in the school?	77 (55.6%)	64 (45.4%)	100

From the table 1.2 item 1 above one hundred and five (105) representing 75.5% say no there are no enough qualified computer education teachers in their schools, while thirty-six (36) representing 24.5% say yes there are qualified computer education teachers in their school. This shows that majority responses say there are no enough qualified computer education teachers in their school.

From the table 1.2 item 5 above one seventy-seven (77) representing 55.6% say yes there are Corpers (NYSC) who are sent to teach the subject in the school, while thirty-five (64) representing 45.5% say no there Corpers (NYSC) who are sent to teach the subject in their schools. This shows that majority responses say there Corpers (NYSC) sent to teach the subject in their school. This indicates that there is need to employ or recruit more teachers for computer studies/ICT in the schools

Research question Three: Is The Borno State Government Ready to Teach Computer Science in Her Secondary Schools?

Table 1.3: The Readiness of Borno State Government to Teach Computer Science/ICT in Secondary Schools in the State.

Item no	Statement	Responses		
		Yes	No	Total
1	Is computer studies on the School timetable?	122 (86.5%)	19 (13.5%)	100%
2	Is computer studies or ICT Given the same number of Given the same number of hours per week as other subjects in the schools timetable?	85 (60.3%)	56 (39.7%)	100%
3	Is computer timetabling Given priority in the School?	88 (62.4%)	59 (37.6%)	100%
4	Do you register for External examination?	73 (51.8%)	68 (48.2%)	100%

From Table 1.3 item 1 one hundred and twenty-two (122) representing 86.5% say yes computer studies is on their school timetable, while

nineteen (19) representing 13.5% say no there are no computer studies on their school timetable. This reveals majority responses say computer studies is on their school timetable.

From Table 1.3 item 4 From the table above seventy-three (73) representing 51.8% say yes their schools register for external examination in computer studies, while sixty-eight (68) representing 48.2% say no their schools do not register for external examination in computer studies. These show that majority responses say their schools have registered for external examination in computer studies.

Research question Four: Are Teachers Sent for Training to Teach ICT/Computer Science in Secondary Schools in Borno state?

Table 1.4: Shows Percentage of the Teachers Sent On Training.

Item no	Statement	Responses		
		Yes	No	Total
1	Are there any in-service Computer? training programme for teachers?	59 (43.1%)	78 (56.9%)	100%
2	Was there any training for the ICT Teachers in past five years?	44 (32.1%)	93 (67.9%)	100%
3	Were the ICT teachers sent on workshop Yearly in the past two years?	32 (23.4%)	105 (76.6%)	100%
4	Are there any ICT teachers on further Studies in computer studies/ICT?	40 (29.2%)	97 (70.8%)	100%
5	Are there teachers who had been trained For MSc or PhD in your school?	20 (14.6%)	117 (85.4%)	100%

From the table 1.4 above item fifty-nine (59) representing 43.1% say yes there are in-service training for computer teachers in their schools, while seventy-eight (78) representing 56.9% say no there are no in-service training rot-computer teachers in their school. This shows that majority

responses say no there is no in-service training for computer teachers in their schools.

From table 1.4 above item 5 indicate twenty representing 14.6% say yes there are teachers who are sent for higher degree in MSc or PhD in their schools, while one hundred and seventeen representing 85.4% say no, there are no teachers sent on higher degree in MSc or PhD in their schools, this indicate that teachers in ICT are not encouraged to go on higher degree studies.

Discussions:

The result of the finding in respect of research question one revealed that sixty-eight (68) representing 48.6% say yes the computers in the school laboratory are adequate, while seventy-two (72) representing 51.4% say no computer are not adequate in school laboratory. This shows that majority responses say the computers are not adequate in the school laboratory. This agrees with Sicilia (2005) who states that teachers complained about shortage of computer teachers and how difficult it was to always have access to computers. It then means that the school administration should recommend that the schools should be equipped with enough computers in the computer laboratory and build enough computer laboratory in Maiduguri Metropolis, Borno state schools. The government and the proprietor of the schools should supply computers into the schools adequate for use by the students for acquiring ICT skills.

From Table 1.1 item 5 above forty-nine (49) representing 35% say yes there are internet facilities for browsing in school computer laboratory, while ninety-one (91) representing 65% say no there are no internet facilities for browsing in school computer laboratory. This shows that majority responses say there are no internet facilities for browsing in the school laboratory.

The barriers related to the accessibility of new technologies for teachers are widespread and differ from country to country. (Empirica, 2006) European study found that lack of access is the largest barrier and that different barriers to using ICT in teaching were reported by teachers, for

example a lack of computers and a lack of adequate material. Similarly, (Korte, 2007) found that in European schools there are some infrastructure barriers such as broadband access not yet being available. They concluded that one third of European schools still do not have broadband Internet access. (Pelgrum, 2001) explored practitioners' views from 26 countries on what were the main obstacles to the implementation of ICT in schools. He concluded that four of the top ten barriers were related to the accessibility of ICT.

It then calls on the schools and government to supply or equip the computer centres or ICT laboratory with internet facilities for use by the administration, staff and students of the schools to enable them flow with the world around them in knowledge.

The result revealed that one hundred and five (105) representing 75.5% say no there are no enough qualified computer education teachers in their schools, while thirty-six (36) representing 24.5% say yes there are qualified computer education teachers in their school. This shows that majority responses say there are no enough qualified computer education teachers in their school. Also the result revealed that one hundred and twenty-two (122) representing 86.5% say yes computer studies is on their school timetable, while nineteen (19) representing 13.5% say no there are no computer studies on their school timetable. This reveals majority responses say computer studies is on their school timetable.

In addition, seventy-three (73) representing 51.8% say yes their schools register for external examination in computer studies, while sixty-eight (68) representing 48.2% say no their schools do not register for external examination in computer studies. These show that majority responses say their schools have register for external examination in computer studies. This find agrees with Albirini (2006); Balanskat (2006), Beggs (2000; Ozden (2007); Schoepp (2005); Sicilia (2005) & Toprakci (2006)) who found that there are no enough qualified computer teachers in the schools. In addition, Pelgrum (2001) found that there were no enough training opportunities for teachers in the use of ICTs in a classroom environment. Similarly, Beggs, (2000) found that one of the top three barriers to

teachers' use of ICT in teaching students was the lack of training. Recent research in Turkey found that the main problem with the implementation of new ICT in science was the insufficient amount of in-service training programs for science teachers (Ozden, 2007 & Toprakci, 2006). The issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training. These were time for training, pedagogical training, skills training, and an ICT use in initial teacher training

Conclusion

The results obtained from the analyses of the data gathered in this research indicated that majority of the schools do not have enough computer and related resources. This is because the computer facilities are not available for teacher and student access. The ICT result showed that there is no retraining of computer studies/ICT teachers to teach Computer education as a subject in the schools. The finding further revealed that teachers' lack of computer skills hinders the effective implementation of Computer education in secondary schools. School authority should source for funds, computers, and related accessories from well meaningful citizens. Effective implementation of ICT in secondary schools brings about effective teaching and learning and contributes to the performance of the students. The finding of the study also revealed that few ICT components especially computer supply to the schools are not sufficient to go round the students and this deny the students of ample time to use them.

Recommendations

1. The government and proprietors should provide enough funds for schools to purchase computer resources and make available suitable environment for ICT in our secondary schools.
2. The ministry of education in the state should make it mandatory recommendations for registration of private schools in the state.
3. Curriculum developers should make computer education one of the core subjects to be offered in secondary schools.

4. The state ministries of education should monitor the implementation of Computer education programme in secondary schools in the state.
6. ICT Professionals should organize training for teachers on how to utilize ICT facilities in solving everyday educational problems.

REFERENCES:

- Albirini, A. (2006). Teachers' attitudes toward information meaningful learning (5th ed.). Boston, NY: Houghton Mifflin. And communication technologies: The case of Syrian EFL teachers. *Computers & Education*, 47,373-398.
- Alhamd, Alotaibi, Motwaly, & Zyadah (2004). *Education in Saudi Arabia*. Riyadh, Saudi Arabia: Alroshedpress.
- Anderson, J. (1997). Integrating ICT and Other Technologies in Teacher Education: Trends, Issues and Guiding Principles [Electronic Version]. Info share: Sources and Resources Bulletin, pp. 33-35. Retrieved 7 March 2010 from www.unescobkk.org/fileadrnin/user_upload/ict/e-books/.../4integrating.pdf.
- Balanskat, A., Blamire, R., & Kefala, S. (2006). A review of studies of ICT impact on schools in Europe: European Schoolnet.
- Beggs, T. A. (2000, April 9-11, 2000). Influences and barriers to the adoption of instructional technology. Paper presented at the Proceedings of the Mid-South Instructional Technology Conference, Murfreesboro, TN.
- 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>
- Cox, M., Preston, C., & Cox, K. (1999a). What factors support or prevent teachers from using ICT in their classrooms? Paper presented at the British Educational Research Association Annual Conference. Retrieved August 2, 2008. <http://leeds.ac.uk/educol/documents/00001304.htm>
- Cox, M.J., Preston, C., & Cox, K. (1999b). *What Motivates Teachers to use ICT? Paper presented at the British Educational Research Association Conference. Brighton. September.*
- Earle, R. S. (2002). The integration of instructional technology into public education: Promises and challenges. *ET Magazine*, 42(1), 5-13.
- 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.*
- Gomes, C. (2005). Integration of ICT in science teaching: A study performed in Azores, Portugal. *Recent Research Developments in Learning Technologies.*
- Korte, W. B., & Husing, T. (2007). *Benchmarking access and use of ICT in European schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European countries.* *E-Learning Papers*, 2(1),1-6.

- Kozma, R., McGhee, R., Quellmalz, E., & Zalles, D. (2004). Closing the digital divide: evaluation of the World Links Program. *International Journal of Educational Development*, 25(4), 361-381.
- Marshall, J.M. (2002). *Learning With Technology: Evidence that Technology can, and does support learning*. San Diego: State University.
- Newhouse, P. (2002). Literature review: The Impact of ICT on Learning and Teaching, Perth, Western Australia: Department of Education.
- Osborne, J., & Collins, S. (2000). Pupils and Parents' Views of the School Science Curriculum. London: King's College London.
- Osborne, J., & Hennessy, S. (2003). Literature review in science education and the role of ICT: Promise, problems and future directions. London: Futurelab.
- Ozden, M. (2007). Problems with Science and Technology Education in Turkey. *Eurasia Journal of Mathematics, Science & Technology Education*, 3(2), 157-161.
- Pelgrum, W. J. (2001). Obstacles to the Integration of ICT in Education: Results from a Worldwide Educational Assessment. *Computers & Education*, 37, 163-178.
- Sager, A. (2001). Evaluation of educational software for high school students in Saudi Arabia. Unpublished master's thesis, King Saud University, Riyadh, Saudi Arabia.
- Schoepp, K. (2005). Barriers to technology integration in a technology-rich environment. *Learning and Teaching in Higher Education: Gulf Perspectives*, 2(1), 1-24.
- Sicilia, C. (2005). The Challenges and Benefits to Teachers' Practices in Constructivist Learning Environments Supported by Technology. Unpublished master's thesis, McGill University, Montreal.
- Telia, A., Telia, A., TOYOBO, O.3VL, ADIKA, L. O. and ADEYINKA, A. A. The Turkish Online Journal of Educational Technology - TOJET July 2007 ISSN: 1303-6521 volume 6 Issue 3 Article 1.
- 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-IJIST)*, 9(1), 1-16.
- Watson, G. (1999). Barriers to the integration of the Internet into teaching and learning: Professional Development. Paper presented at the Asia Pacific Regional Internet Conference on Operational Technologies.