


September 2015

One Laptop Per Child Policy in Ghana: Any Impact on Teaching and Learning?

Samuel Owusu-Ansah

University of Ghana, samsfire55@gmail.com

Follow this and additional works at: <http://digitalcommons.unl.edu/libphilprac>

 Part of the [Information Literacy Commons](#), and the [Scholarly Communication Commons](#)

Owusu-Ansah, Samuel, "One Laptop Per Child Policy in Ghana: Any Impact on Teaching and Learning?" (2015). *Library Philosophy and Practice (e-journal)*. 1290.

<http://digitalcommons.unl.edu/libphilprac/1290>

One Laptop Per Child Policy in Ghana: Any Impact on Teaching and Learning?

By

Asante, Edward

Assistant Librarian

Koforidua Polytechnic, P.O.Box KF 981, Koforidua Ghana

eddieasante59@gmail.com

and

Owusu-Ansah, Samuel

Assistant Librarian

University of Ghana, Legon Balme Library

P. O. Box LG 60, Legon Accra

sowusu-ansah@ug.edu.gh

Abstract

This paper assesses the impact of “One Laptop Per Child Policy” on teaching and learning in basic schools in Ghana. Specifically, 500 students were randomly selected together with 10 information and communication technology (ICT) instructors in the Eastern Region of Ghana. Both questionnaire and in-depth interviews were used for gathering data. The data collected were analyzed using Statistical Package for Social Science (SPSS). Findings of the study showed that stringent criteria are used to assess the needs of students and in the distribution of the laptops. The use of user-friendly laptops and qualified instructors has significantly improved the students’ knowledge in ICT. However, lack of infrastructure, power supply and qualified tutors were notable challenges that hindered the attainment of the goals of the policy. To ensure equity and quality ICT education, recommendation were given in the study.

Keywords: ICT; Computer literate; Teaching and Learning; One Laptop Per Child Policy; Basic Schools.

Introduction

Information and Communication Technology (ICT) is perceived to drive the growth of modern economies. To enhance its ability to achieve fundamental and sustainable improvement, Ghana like other countries has made huge investment and drafted policies that help the country utilize technology for its economic growth (Hitachi, 2009). As a result, ICT is now part of the Strategic Plan of Ghana Education Service. The Government of Ghana (GoG) has also introduced an intervention programme dubbed “One Laptop Per Child Policy ”(OLPCP) to sustain the interest of pupils in ICT as well as enhance teaching and learning in basic schools. Several basic schools have already benefited from this policy, the programme which started in 2008 (ICT in Education Policy, 2008).

As Ololube et al. (2007) observed, the introduction of ICT usage, integration and diffusion at such level has initiated a new age in educational methodologies, thus it has radically changed traditional method of information delivery and usage patterns in the domain as well as offering contemporary learning experience for both instructors and students. It can be concluded that the deployment of ICT contributes to effective learning through expanding access, promoting efficiency, improving the quality of learning and improving management systems (Draxier and Haddad, 2002).

Ghana is however yet to derive the maximum benefit most of the developed economies have gained from investing in ICT. The perceived problem appears to be on the ground is that the academic performance of the beneficiaries of the laptops may not necessarily improve because there are no qualified teachers, modems, accessories, maintenance, electricity as well as infrastructure to enhance the teaching and learning of ICT in the communities the policy has been introduced.

The rapid development of technology globally has affected all spheres of life- notably in agriculture, medicine, education, communication, records keeping and management, etc. In an attempt to embrace this global phenomenon and to build the capacity of its human capital, the GoG has instituted a policy of a laptop per child in basic schools. This seeks to support teaching and learning, as capped in Ghana's ICT Education Policy of 2008. Several studies (Draxier and Haddad, 2002; Mangiatordi and Pischetola, 2010) have been conducted on this policy, but they seemed not to have covered the effect on teaching and learning of beneficiaries in developing countries like Ghana. It is against this backdrop that further empirical findings were necessary to fill the gap and add to the body of knowledge on the impact of academic performance (dependent variable) of beneficiary students using “One Laptop Per Child Policy” as an independent variable.

Objectives of the study

The study assesses the impact of the OLPCP on teaching and learning in basic schools in the Suhum Municipality, a suburb of the Eastern Region of Ghana. Specifically the study sought to find out the criteria used for the distribution of the laptops to the beneficiary students, assess the impact of the OLPCP on the academic performance of the beneficiary students and ascertain the challenges that hinder the attainment of the goals of the policy.

To explore the objectives of the study, the following specific questions were asked: What criteria are used in the distribution of the laptops?; Has the policy led to an improvement in the academic performance of the beneficiary students? and What challenges hinder the attainment of the goals of the policy?.

Literature Review

Introduction of ICT in education

Information technology (IT) refers to all equipment, processes, procedures and systems used to provide and support information systems (both computerized and manual) within an organisation and those reaching out to customers and suppliers (Shelly, et al., 2006). The term information and communication technology (ICT) was coined to reflect the seamless convergence of digital processing and telecommunications (Negroponte, et al., 2006). ICTs include hardware, processes and systems that are used for storing, managing, communicating and sharing information (ICT in Education Policy, 2008). ICTs are indispensable and have been accepted as part of the contemporary world especially in the industrialized society (Hawkins, 1998).

The pervasiveness of ICT has brought about rapid change in technology, social, political and global economic transformation thus, cultures and societies must be adjusted to meet the challenge of the knowledge age (Yusuf, 2005). It is widely acknowledged that ICTs can be used to improve the quality of teaching and learning in schools (Owusu-Ansah, 2013).

A study by Amenyedzi et al. (2011) conducted a study in Tema metropolis to assess the computer and Internet usage as supplementary educational material to enhance quality education; help improve educational management and planning; how students use the computers and internet to facilitate their learning. The Stratified sampling method was used to select students and teachers. The results showed that a significantly high percentage of respondent teachers (92%) were computer literate and 78% of respondent students also had basic knowledge in computer. However, less than 15% of these teachers used the internet as an innovative way of improving teaching and learning. Over 30% of the teachers also used the computer mainly for

research work. Despite the limited use of computers by teachers in their teaching, many agree that the computer has changed the way students learn. One fourth of teachers have received some form of training in the use of computers, with quite minimal training in the pedagogical integration of ICT. It appears that integration of ICT in Ghanaian school systems is a major step in promoting innovation. From the on-going discussions, it can be concluded that the adoption of ICT in education has become a necessity rather than a choice. This suggests that the present and future academic global community will utilize ICTs to a higher degree. In other words, it is imperative for both teachers and students not to only know how to use ICTs, but they need to become comfortable with using them.

The role of ICT in teaching and learning

As noted by Swarts (2006) ICTs are powerful and essential tools for learning, understanding, interpreting and communicating about the real world or they can be black holes into which we pour our money, intelligence and time, getting very little in return. Effectively used, ICTs can amongst other things: Provide multiple avenues for professional development of both pre-service and in-service teachers, especially through distance education. This means as the teachers acquire the skills of using the ICT related tools they would be able to impact it on the pupils (Amoafu, 2011). The application of ICT also help to improve educational management processes because all the core activities would be managed with the use of management information systems (Swarts, 2006).

In addition, the use of ICT could improve the consistency and quality of instruction, both for formal and non-formal education, and increase opportunities for more student centred pedagogical approaches that is promoting education by addressing inequalities in gender, language, disability among others (Pallof and Pratt, 2005). Furthermore, the use of ICT has

widen the traditional sources of information and knowledge by fostering collaboration, creativity, higher order thinking skills and providing flexibility of delivery of lessons as well as reaching student populations outside traditional education systems (Ebner, et al., 2011).). However, effectively integrating ICTs into educational planning and delivery can be a complicated process, leading to further disparities and challenges in the system. These may include lack of focus on educational objectives where ICTs are seen as an end itself, rather than a means (tools) to an end. Towards this end, the inclusion of ICT in Education Policy can help implement solutions within a coordinated end to end system- by looking at the combined inputs of educational objectives and multi-stakeholder (Swarts, 2006).

David (2005) ascertains that, students become more aware of how to learn when using ICT because they must interact with the computer. ICT has also changed the relationship between students and lecturers and has made it open and intimate. The idea of sharing knowledge and the capability of using new sources for learning are enhanced by using ICTs. This is due to the fact that there is a national policy supporting ICTs in schools, lecturers and students will then fall closer to the rest of the world (Heeks, 2008). ICT has enhanced students' curiosity, motivation and preparedness to seek further education while it has compelled lecturers to seek more knowledge so that they can impact it on their students. it is of the above premise that the hypothesis of this study was coined

Ho: There is no association between the introduction of ICT facilities and improved academic performance.

H1: There is a relationship between the introduction of ICT facilities and improved academic performance.

Challenges of deploying ICT in the educational sector

Planning for the effective use of these technologies is crucial if they are to have the positive impact expected. Investing in ICTs is a costly decision for any country, whether developed or developing. For developing countries such as Ghana, investing in ICTs presents the dilemma of spending scarce/valuable resources on ICTs or consequently suffering from widening technological gap (Yusuf, 2005).

The ultimate objective of the Ghana ICT for Accelerated Development (ICT4AD) is to ‘accelerate Ghana’s socio-economic development process towards the realization of the vision to transform Ghana into a high income economy and society that is predominately information-rich and knowledge-based within the next two to three decades or less’(Ghana ICT4AD Policy, 2008).

In the Ghanaian basic and secondary levels of education, conventional teaching practices are still a deep-seated menace. “But if you were to compare the classroom of a hundred years ago with an average classroom today, you would recognize it immediately: students lined up in rows, paper and pencil in hand; a teacher at the blackboard jotting down important facts; students furiously copying all that is written and said, expecting to memorize the facts and spit them out on an exam’. While much has been changed by the introduction of ICT and the way that students learn and teachers’ teach have remained largely unchanged” (Hawkins, 2009).

Another challenge is Teacher training. Hawkins states that the failure of many past programs was that schools were provided with expensive equipment but with little or no support for teachers’ professional development, national ICT-in-education policies, or community involvement.’

Teachers are also not conforming to the changing trends of ICT integration into schools. It is only the ICT teachers that are conforming to change.

Inadequate supply of computers and laboratories in schools in both the urban and rural areas. Government should make more ICT facilities available and ensure smooth implementation. In a recent survey of teachers in developing countries conducted by SRI International for World Links, the majority of teachers in African and Latin American countries reported that the lack of adequate hardware and software as well as unreliable Internet access were significant barriers to using computers in instruction (Bjorn, et al., 2007). This report reflects the fact that many schools in developing countries including Ghana have a student-teacher ratio as high as 80:1, and must contend with a computer lab often to twenty computers for the entire school if they are lucky.’ Lack of adequate hardware and software reduces the whole objective of Ghana’s ICT4AD to absurdity. Because, it is absurd to think of integrating ICT as a subject into the basic school curriculum, without necessarily providing the basic resources that will expose children to the ‘know-how’ i.e. the practical aspects. The result is that students come out of school without the requisite skills required for productivity. This goes a long way to affect productivity (Simon, 2008).

Brief history of the “One Laptop Per Child Policy” in Ghana and its challenges

The mission of One Laptop per Child (OLPCP) is to empower the children of developing countries to learn by providing one connected laptop to every school-age child. In order to

accomplish this goal, people need to believe in and prioritize education for the world's children (www.laptop.org)

In Ghana, OLPCP's mission is to provide a means for learning, self-expression, and exploration to the nearly two billion children of the developing world with little or no access to education. While children are by nature eager for knowledge, many countries have insufficient resources to devote to education; sometimes less than \$20 per year per child (compared to an average of \$7,500 in the United States). By giving children their very own connected XO laptop, they are opened to a window to the outside world by accessing information, a way to connect with each other, and a springboard into their future (Leeming, 2008).

Research Methodology

The study used a cross-sectional descriptive survey design to provide a general framework for the collection of appropriate data (Aina, 2004). This helped to collect data for inferences about the population of interest (universe) at one point in time (Hall, 2008). One thousand three hundred and forty-seven (1,347) students from selected basic schools in the Suhum Municipality in the Eastern Region of Ghana constituted the target population. The selected schools had benefited from the OLPCP. The database of the schools was obtained from the Suhum Municipality Ghana Education Service Office. Fifty percent (50%) of the students (Six hundred and seventy four (674) student were selected through random sampling technique to ensure that the sample used was highly representative (Levin, 2006). A standardized questionnaire, comprising both open and close ended questions was administered to the respondents. The close ended questions were measured on the five point likert scale (strongly agree- strongly disagree) to capture the critical success areas spelt out in the objectives of this study.

In addition to the student respondents, ten (10) ICT teachers were purposively selected and interviewed because of their particular knowledge and understanding the nature of the problem and their tendency to recommend solutions to the problem being explored (Dzisi and Ofosu, 2014; The Access Project, 1996; USAID Centre for Development and Information Evaluation, 1996). Using the Statistical Package for Social Sciences (SPSS) as an analysis tool or software, 74.1% assumed the response rate, that is five hundred (500) respondents.

Results and Discussion

This study explored three major objectives on the impact of the introduction of the OLPCP on teaching and learning. Majority of the respondents 264 (52.8 %) were male as against 236 (47.2%) who were female. The implication could be that, the selected schools had more males than males in terms of enrolment.

Table 1: Criteria for Distribution of the Laptops

Questionnaire Item	N	Mean	Standard deviation	Rank
Performance of the school	500	3.3284	1.00355	1
Government Decision	500	3.8141	1.06629	3
Population of the school	500	3.1598	.88751	2
Selected Pilot communities (schools)	500	4.2583	1.27624	5
Infrastructure of the school	500	3.7786	.92839	4
Any other factors (Influence of assembly or district, Member of Parliament ...)	500	2.9631	1.35487	6

Source: Field Survey, 2013

Nonetheless, the respondents were required to use a 5-point Likert scale anchored on *Strongly agree (1), Agree (2), Neutral (3), Disagree (4) and Strongly disagree (5)* to measure the criteria for Distribution of the Laptops in the various basic schools. The variables measured were Performance of the school, Government Decision, Population of the school and Selected Pilot communities (schools). The total number of means and standard Deviations are presented in Table 1.

According to the results in Table 1, it could be concluded from the value of means generated that, ‘Selected Pilot communities (schools)’ scored the highest mean of (4.26) per student among other factors. However, the ‘Any other factors (Influence of assembly or district, Member of Parliament ...)’ was rated the lowest with a mean score of 2.96. Thus, the selected basic schools in the Suhum Municipality in the Eastern Region of Ghana do not agree to the influence of assembly or district, Member of Parliament as criteria for distribution of the Laptops. From the results it could be inferred that, the beneficiaries were not in any position to confirm the criterion for the distribution of the laptops.

Table 2: Improvement of Performance of Beneficiaries

Response	Frequency(n=500)	Percentage (%)
Strongly Agree	152	30.4
Agree	152	30.4
Disagree	104	20.8
Strongly Disagree	92	18.4

Field Survey, 2013

Table 2 show that, out of the total respondents of 500, 152 (30.4%) strongly agreed that the introduction of the OLPCP had not improved their knowledge in ICT, 152 (30.4%) also agreed,

104 (20.8%) disagreed while 92 (18.4%) strongly disagreed on the same issue. The implication was that the policy had improved the ICT knowledge of the students. The interview conducted among the IT teachers revealed that most of the students are now far better in the use of ICT related tools, since the introduction of the OLPCP was implemented. This was in line with the findings of Hawkins (1998) that ICTs are indispensable and have been accepted as part of the contemporary world especially in the industrialized society. Again these findings concur with that of Swartz (2006) who had a strong view that, the benefits of ICT cannot be over-estimated in all spheres of life.

OLPC pilots in a Ghana report positive changes (such as increased enrolment in schools, decreased absenteeism, increased discipline, and more participation in classrooms), but it is not clear as these changes are caused directly due to the OLPC project, as many evaluations are neither independent nor systematic. Generally, there is an enthusiasm among students, teachers and others when XO machines are being distributed. However, some reports suggest the lack of teacher training, and willingness to adopt new pedagogy for learning and teaching based on XO has met resistance (Hewagamage et al., 2011).

Table 3: Level of Skills to Use Laptops

Response	Frequency(n=500)	Percentage (%)
Novice	96	19.2
Intermediate	292	58.4
Professional or Expert	112	22.4

Field Survey, 2013

With regard to Table 3, 96 (19.2%) were of the view they were novice in terms of skills, 292 (58.4%) identified they were in the level of intermediate, while 112 (22.4%) agreed that they were professional knowledge in using the computer. From the results it can be prudent to say that, the beneficiaries have some level of skills in the use of the laptops. On the contrary, an

interview with the IT teachers revealed that the students are now catching up with the skills to use the laptops given. This finding was in agreement to David's (2005) who found out that students become more aware about how to learn when using ICT because they must interact with computer.

Table 4: Qualified ICT Teachers

Response	Frequency(n=500)	Percentage (%)
Strongly Agree	248	49.6
Agree	130	27.2
Disagree	72	14.4
Strongly Disagree	44	8.8

Field Survey, 2013

From Table 4 out of the total respondents of 500, 248(49.6%) strongly agreed when questioned if they had qualified ICT teachers, 130(27.2%) agreed, 72(14.4%) disagreed, while 44(8.8%) strongly disagreed on the same issue. From the results it is realistic to say that, the respondents agreed that, they had qualified ICT teachers to aid the students, in using the laptops. The IT teachers interviewed confirmed that, most of them have practical experience in hardware and software and were able to assist the students. This revelation by the IT teachers were to the fact many IT teachers had been attending workshops to enable them assist the students. This findings was the exact platform which the Ghana ICT for Accelerated Development (ICT4ad) Policy, 2003) was geared towards.

Teacher quality in this study was conceptualized in terms of preparation for class, teacher commitment, managing and monitoring pupils learning and teacher experience. According to the findings of the study it was established that teacher quality significantly affects pupils' performance in schools in Suhum district. It was pointed out by the respondents that prepared teachers adequately deliver in class and thus makes pupils understand the ICT lesson content which positively influence their performance. The respondents also revealed that experience help the teacher to deal with many situations, to have an understanding of the pupils' needs and to cater for them, as well as creating conducive environment for learning. Thus generally teacher quality was taken to affect performance.

Table 5: Challenges hindering attainment of the goals

Response	Frequency(n=500)	Percentage (%)
Infrastructure	72	14.4
ICT Personnel	52	10.4
Power cut	208	41.6
Non interactive learning activities	168	33.6

Field Survey, 2013

The majority of the respondents identified Power cut 208 (41.6%) and 168 (33.6%) as the challenges hindering the attainment of the goals of the policy, which is to promote one-to-one computing at the primary level education. From the results it could be useful to say that, the beneficiaries had the view that they are more challenges hindering the goals of the policy.

Conclusion

This study explored three major objectives on the impact of the introduction of the laptop per child policy on teaching and learning. The study revealed that the government had a unique criterion for the distribution of the laptop. Again, it also came to light that the policy had helped improved the knowledge of beneficiaries of the policy and also there were challenges hindering the attainment of the goals of the policy with respect of funds.

Before launching OLPC project in Ghana, there were number of projects to empower the ICT adaptation in school curriculum. Computer labs in schools started emerging and they have now become more popular than libraries among young learners. In developing countries, having a computer is regarded as a luxury resource rather than a tool for learning. In some cases, there was a fight to access a computer since the ratio of computer: student is high. On other hand,

computing resources are highly underutilized since curriculum is not aligned with computer based learning activities.

Children are excited when they receive a laptop but they are confused about the use of machine when there is little guidance. Child ownership also has led many issues in managing machines.

Recommendations

Based on the major findings the researcher enumerated the following recommendations in relation to the objectives of the study:

Since the use of the laptops had a positive effect on the performance of the students. It is also urgent for the Ghana Education Service to put measures in place to sustain such a policy and also extend it to all rural areas in the country through government assistance for implementation. The government should make the communities and schools which benefit from the policy, aware of the criteria used in the distribution of the laptops. This will erase the usual tension and conflicts among the communities who may wish for such facility. The ICT teachers should be engage in more training activities in order to assist the students in the use of the laptops. The students should also be given regular training on the use of laptops to enhance their skills. It is also recommended that the government should make sure that all the laptops provided should be technology compliance, with modern facilities which can support teaching and learning in basic schools in Ghana.

References

Aina, L. O. (2004) *Library and Information Science Text for Africa*. Ibadan: Third World Information Services Ltd, p 339.

Amenyedzi, F. W. K., Lartey, M. N. and Dzomeku, M . B. (2011) *The Use of Computers and Internet as Supplementary Source of Educational Material: A Case Study of the Senior High Schools in the Tema Metropolis in Ghana*, Contemporary Educational Technology, 2(2), 151-162

Amoafu, E. A. (2011) *The use of ICT as a tool for teaching and learning in the University of Ghana, Legon*. (Unpublished Thesis)

Babbie, E. (2005) *The Basics of Social Research*. 3rded, Belmont: Thomson Wadsworth, pp 265,274,279.

Bjorn, E., Herren, M. and Hollow, D. (2007) "Ethiopia Implementation Report", Eduvision, September - December 2007.

Cannel, C., Oksenberg, L., Kalton, G., Fowler, F.J. and Bischooping, K. (1989). *New Techniques for Pretesting Survey Question*, Final Report, pp.15. National Center for Health Services Research and Health Care Technology Assessment.

Creswell, J.W., Klassen, A.C., Plano Clark, V.L. and Smith, K.C (n.d). *Best Practices for Mixed Methods Research in the Health Sciences*. Bethesda: National Institute of Health, Office of Behavioral and Social Sciences Research (OBSSR). Accessed on 6th May, 2014. Available [online] at: http://obssr.od.nih.gov/scientific_areas/methodology/mixed_methods_research/section2.aspx.

David. M. (2005) Three Aspect of I.C.T in Education, Retrieved from <http://otec.illeregen.Edu./I.C.T wo html>.

- Draxier, C. and Haddad, A. (2002), *Technologies for Education: Potentials, Parameters and Prospects*. United Nations, Educational Scientific and Cultural Organization. Paris. pp 3 – 17. Retrieved from [http://www. Knowledenterpris.org](http://www.Knowledenterpris.org).
- Dzisi, S. and Ofofu, D.(2014). Marketing Strategies and the Performance of SMEs in Ghana, *European Journal of Business and Management*, 6 (5), 102-111\
- Ebner, M., Dorninger, J. and Neuper, W. (2011). First experiences with OLPC in European classrooms. *International Journal on E-Learning*, 10(4), 343–364.
- Ford, D. (1984). “Buyer/Seller Relationships in International Industrial Markets”, In: *Understanding Business Markets – Interaction, Relationships, Networks*, London: Academic Press Limited.
- Hall, J.(2008).”Cross-Sectional Survey Design”.In: Paul J. Lavrakas (2008), *Encyclopedia of Survey Research Methods*. Sage. Retrieved 2nd MAY, 2014 [online] at:<http://srmo.sagepub.com/view/encyclopedia-of-survey-research-methods/n120.x>
- Hawkins, R.J. (1998). *Ten Lesson for ICT and Education in Developing World in World Bank Development Indicators*, World Bank, New York, Dover. pp.38-43.
- Heeks, R. (2008). ICT4D 2.0: The next phase of applying ICT for international development. *Computer*, 41(6), 26–33
- Hitachi (2009). *Six Key Trends Changing Supply Chain Management Today: Choosing the Optimal Strategy for Your Business*. White Paper, Tokyo, Japan: Hitachi Consulting Corporation.
- Lederman, D.and Saenz, L. 2005. *Innovation and Development around the World, 1960–2000* (WorldBank Policy Research Working Paper 3774). Washington, DC, World Bank.

- Leeming, D., Thomson, I. and Hutak, M. (2008) "Some feedback on Challenges and impacts of OLPC", December 2008.
- Levin, K.A. (2006). Study Design III: Cross-Sectional Studies. *Evidence-Based Dentistry*, 7, 24-25. doi:10.1038/sj.ebd.6400375
- Mangiatoridi, A. and Pischetola, M. (2010). Sustainable innovation strategies in education: OLPC case studies in Ethiopia and Uruguay. In M. D. Lystras et al. (Eds.), pp. 94–104). Berlin, Germany: Springer-Verlag.
- Ministry of Education (2008) *ICT in Education Policy*, Accra: Ghana.
- Negroponete, N., Bender, W., Battro, A. and Cavallo, D. (2006). (No. 23158). Washington, DC: Inter-American Development Bank.
- Neuman, W. L. (2007) *Basics of Social Research: Qualitative and Quantitative Approaches* 2nd ed. Boston: Pearson. p146.
- Newcastle University Library(n.d). *Writing a Literature Review*. [Online Article]. Available at: www.ncl.ac.uk/library/il_files/lit_rev07.doc. Accessed on 5th May, 2014.
- Norton. *The Economic Journal*, 112, 735-765.
- Ololube, N.P., Ubogu, A.E. and Ossai, A.G. (2007) *ICT and Distance Education in Nigeria, A Review of Literature and Accounts*. International Open and Distance Learning (IODL) Symposium.
- Owusu-Ansah, S. (2013), "Application Of Information And Communication Technology (ICT): A Comparative Analysis Of Male And Female Academics In Africa". *Library Philosophy and Practice (ejournal)*. Paper 1087.
- Palloff, R. and Pratt, K. (2005). *Collaborating online: Learning together in community*. San Francisco: Jossey Bass.

- Republic of Ghana (2003), *Ghana ICT for Accelerated Development (Ict4ad) Policy*. Accra: Ghana.
- Republic of Ghana (2008) *ICT in Education Policy*, Accra: Ghana.
- Sharma, R. (2003), 'Barriers in Using Technology for Education in Developing Countries', IEEE0-7803-7724-9103.Singapore schools', *Computers and Education*, 41 (1), 49—63
- Shelly, G. B., Cashman, T. J., Gunter, G. A. and Gunter, R. E. (2006) *Integrating Technology and Digital Media in the classroom*, 4thed, Boston: Thompson Course Technology.
- Simon, S. Laptops may change the way rural Peru learns, Weekend Edition,National Public Radio, Saturday, Dec. 13, 2008.
- Smith, A. K. , Ayanian, J. Z. , Covinsky, K. E. , Landon, B. E., McCarthy, E. P., Wee, C. C. and Steinman, M. A. (2011). “Conducting High-Value Secondary Dataset Analysis: An Introductory Guide and Resources”, *Journal of General Internal Medicine*,.26 (8), 920–929.
- Stiglitz, J. and Walsh, C. (2002). *Principles of Macroeconomics* (3rd ed). New York,
- Ulku, H. and Rand, D. (2004) *Innovation, and Economic Growth: An Empirical Analysis* (IMF
- Waris, N., Nabi, W. A., Dawson, M. (2008) “OLPC Effectiveness Monitoring and Evaluation Plan: Educational Impact Assessment”, June, 2009.
- Working Paper WP/04/185). Washington, DC, International Monetary Fun.
- Yusuf, M. O. (2005) Integrating Information and Communication Technologies in Nigeria Tertiary Education. *An Online Journals of Africa Education Research Network*,pp 43 -50.