

**INFORMATION AND COMMUNICATION TECHNOLOGY AS A PANACEA TO
POOR ACADEMIC PERFORMANCE OF CHILDREN AGED 2 TO 9 YEARS OF
AGE IN AKWA IBOM STATE**

Charity O. IGBOKWE
Michael Okpara University of Agriculture
Umudike, Abia State;

Boniface S. AKPAN
Akwa Ibom State College of Education
Afaha Nsit, Nsit Ibom LGA

AND

Samuel Sunday DUNCAN
Department of Educational Technology and Library Science
University of Uyo

ABSTRACT

The study sought to examine information and communication technology as a panacea to poor academic performance of children aged 2 to 9 years of age. A correlational survey design was adopted for the study. The study was conducted in Akwa Ibom State. The population of the study comprised children from 2–9 years old in both nursery and primary schools in Akwa Ibom State. A stratified random sampling technique was used to select three senatorial districts. Each senatorial district has two local governments with three schools. From each of the schools, 10 children were randomly selected, giving a total of 180 respondents, which comprised the sample size used for the study. The instrument titled "Information and communication technology and poor academic performance of children Questionnaire (ICTPAPCQ)" was used for data collection. Face and content validation of the instrument was carried out by one expert in test, measurement, and evaluation from University of Uyo to ensure that the instrument had accuracy, appropriateness, and completeness. The Cronbach Alpha technique was used to determine the level of reliability of the instrument. In this case, the reliability coefficient obtained was 0.89, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as percentage analysis, used in answering research questions, and simple regression in testing the hypotheses. The test for significance was done at 0.05 alpha levels. The study concluded that utilisation of ICTs has 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, and to strengthen teaching and student performance in academics, helping schools change to modern ways of learning. One of the recommendations made in the study was that the state government should establish ICT centres that students can access at their convenient times and that the services should be extended outside the school environment.

KEYWORDS: Information and Communication Technology, Panacea, Academic Performance

Introduction

Information and communication technology (ICT) has become an important source of innovation and improvement in efficiency for many sectors across the globe. In the educational sector in particular, the application of ICT has become a critical part of the learning process for primary school students both outside and inside the classroom setting. Information and communication technology (ICT) has turned the whole world into a global village, which has also influenced all spheres of life positively. Researchers are of the opinion that ICT as well as more traditional computer-assisted instructional applications are positively influencing students' learning processes and academic performance. Isoun (2003) stated in his study that information and communication technology (ICT) has comprehensively impacted its benefits on every society as the utmost change agent of human development. It is difficult for people the world over today to think of any aspect of human life that is not ICT driven, such as education, communication, research, banking, medicine, trade, culture, among others, that is not ICT driven. In the education sector, in particular, the application of ICT has become a critical part of the learning process for all students, both outside and inside the classroom setting. The government and other stakeholders in the education sector, such as school management and researchers, have invested millions of dollars in adopting ICT in the education system during the last two decades (Lawrence, 2015). Most schools that have fully adopted ICT have recorded immense advancements in the application of ICT for the improvement of learning methods, teaching, research development, and academic performance. A study was conducted by Nketiah et al. (2017) on 320 undergraduate students in Ghana to find the impact of some selected ICT devices on students' academic performance. They have conducted statistical experiments such as descriptive statistics and regression in their study and found that tools such as email intensify the student's academic performance. The practise of presenting ICTs in the classroom and other academic situations all over the world for a long time indicates the potential and effective utilisation of ICTs in education (Valasidou & Bousiou, 2005). With the wide ranged use of ICT, it has a great impact on students' academic performance. ICTs assist them to get an increase in education, make stronger the implementation of education in the progressively virtual place of work, and raise instructional standards.

Statement of Problem

ICT has made the world a global village where the exchange of information is carried out within seconds. It is the use of ICT that determines the countries that will be leaders and those that will be followers, those that will be powerful and those that will be weak. The way it is, our pre-primary school pupils will be lacking in spite of the rate of ICT development in Akwa Ibom state, which is yet to catch up with the developed world. Since western education has been embraced by Nigeria as an instrument for national development, there has to be adequate steps taken to ensure its development by keeping abreast with what is happening in the educational sector globally. ICT has to be embraced and fully developed. There are many gadgets and programmes meant for children in the early childhood education stages in the country. These facilities should be made available to young children, and computer education has to be taught in these schools so that, from their very tender age, children are made conversant with the use of ICT. The Akwa Ibom State government has not established a sufficient number of ICT centres in some public schools in the state.

Objectives

1. To find out the relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State.
2. To determine the relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State.
3. To examine the relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State.

Research Questions

1. What is the relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State?
2. What is the relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State?
3. What is the relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State?

Hypotheses

1. There is no significant relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State.
2. There is no significant relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State
3. There is no significant relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State.

Concept of Information and Communication Technology

Information and communications technology (ICT) is an extensional term for information communication technology (ICT) that stresses the role of unified communications (Murray, 2011) and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage, and audiovisual equipment that enables users to access, store, transmit, understand, and manipulate information. There is evidence that, to be effective in education, ICT must be fully integrated into the pedagogy. Specifically, when teaching literacy and math, using ICT in combination with writing to learn produces better results than traditional methods alone or ICT alone. Wikipedia, (2016). The United Nations Educational, Scientific and Cultural Organization (UNESCO), a division of the United Nations, has made integrating ICT into education part of its efforts to ensure equity and access to education. The following, taken directly from a UNESCO publication on educational ICT, explains the organization's position on the initiative. Information and communication technology can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development, and more efficient education management, governance, and administration. UNESCO takes a holistic and comprehensive approach to promoting ICT in education. Access, inclusion, and quality are among the main challenges they can address.

The organisation's intersectoral platform for ICT in education focuses on these issues through the joint work of three of its sectors: Education, Communication and Information, and Science (Unesco, 2016). Despite the power of computers to enhance and reform teaching and learning practices, improper implementation is a widespread issue beyond the reach of increased funding and technological advances, with little evidence that teachers and tutors are properly integrating ICT into everyday learning. Intrinsic barriers such as a belief in more traditional teaching practises and individual attitudes towards computers in education, as well as the teachers' own comfort with computers and their ability to use them all, result in varying effectiveness in the integration of ICT in the classroom (Blackwell, 2014).

Concept of Academic Performance

Academic performance is the measurement of student achievement across various academic subjects. Teachers and education officials typically measure achievement using classroom performance, graduation rates, and results from standardised tests. It is the extent to which a student, teacher, or institution has attained their short-term or long-term educational goals. Academic achievement is represented by the completion of educational benchmarks such as secondary school diplomas and bachelor's degrees. When people hear the term "academic performance," they often think of a person's GPA. However, several factors indicate a student's academic success. Academic achievement is commonly measured through examinations or continuous assessments, but there is no general agreement on how it is best evaluated or which aspects are the most important: procedural knowledge such as skills or declarative knowledge such as facts. Annie, (2006). Furthermore, there are inconclusive results over which individual factors successfully predict academic performance. Elements such as test anxiety, environment, motivation, and emotions require consideration when developing models of school achievement. Now, schools are receiving money based on their students' academic achievements. A school with more academic achievements would receive more money than a school with fewer achievements (Ziedner, 2008). Academic performance extends to achievement outside the classroom. Some of the brightest students don't earn straight but are extremely well-rounded, succeeding at everything from music to athletics. The ability to master a diverse set of skills illustrates intelligence, curiosity, and persistence, qualities attractive to universities and employers. Some colleges will admit and even award scholarships to students who earn average grades but display a pattern of achievement by consistently learning new skills. Many businesses also see this as a selling point, thinking these candidates are eager to learn and will be easy to train (Chron, 2017).

Availability of ICT and Academic Performance

In recent times, education systems have participated in the sweeping changes brought about by the global dissemination of new information and communications technologies (ICT). The exponential growth of information that is available anywhere to anybody and the ability to access and share this information regardless of the user's physical location have transformed the way in which people work, organize, socialize, create, participate in public forums, and use their free time (Castells, 2009, in Claro and others, 2011). Information and Communication Technology (ICT) is the means of accessing, receiving, storing, and processing processes from being highly teacher-dominated to student-centered, and this will result in increased learning in students and make learning permanent for students. It will also allow opportunities for students to develop their creativity, problem-solving abilities, informational reasoning skills, communication skills, and other higher-order thinking skills. There is widespread belief that ICTs can and will empower teachers and learners,

transforming teaching and learning processes from being highly teacher-dominated to student-centered, and that this transformation will result in increased learning gains for students, creating and allowing for opportunities for learners. Ensuring equity in the availability of ICTs is a basic condition for reducing the gap in access, which is the first digital divide (Claro, 2011). Student use of ICTs not only depends on the available opportunities, but also on the type of activity that the new technologies are supporting in the school environment. Learning models that develop cognitive skills and allow for educationally relevant use should be created and implemented. This leads to the second digital divide, which has to do not with differences in access but rather with differences in uses of information and the ability to benefit from them (Hargittai, 2002; Robinson, DiMaggio, and Hargittai, 2003).

Information and communication technology have been introduced in schools to transform teaching and learning processes and improve strategies for academic achievement (Kozma, 2008, Rodriguez et al., 2013). Accordingly, a number of studies have looked at the effect of these technologies on school performance (Carrillo et al., 2010). Researchers observed that to improve student academic achievement, it is not enough for schools to provide access to ICTS; they must also provide real opportunities to use the technologies as well as adequate quality of access (Selwyn, 2004). Opportunities to use ICTs mean giving students a real chance to interact with the technology, which depends on multiple factors, including the number of Internet-enabled computers that are available to them. The degree to which available technology is simple to use, as well as how quickly and smoothly it operates, determines access quality. This is measured by indicators such as real Internet connection speeds and the ease of startup operations, data exchange, and backups of personal data. The availability of ICT encourages students and improves their academic performance. The use of ICT in the educational system is emphasised due to two primary objectives: First, ICT can alternate the lesson speed; they specify that kids want to broaden their adequate capacities and talents from the new potentials provided by the use of ICT. Secondly, a huge number of students have the interest in contributing to research and want to learn how to operate new technologies that can improve the quality of teaching and learning in an educational environment, so this might help inexperienced people attain higher results "(Lawsent & Vincent, 2005).

Accessibility of ICT and Academic Performance

One of the most vital contributions of ICT in the field of education is easy access to learning. According to the European Commission (2006), the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication for underserved populations. With the help of ICT, students can now browse through e-books, sample examination papers, previous year papers, etc. and can also have easy access to resource people, mentors, experts, researchers, professionals, and peers all over the world. This flexibility has heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other commitments (Young, 2002). Hence, there is a need to offer full support to students' access to ICT as it has the potential to improve their academic performance. ICT provides opportunities to access an abundance of information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments. ICT may also make complex processes easier to understand through simulations that, again, contribute to authentic learning environments. Thus, ICT may

function as a facilitator of active learning and higher-order thinking (Alexander, 2009). The use of ICT may foster co-operative learning and reflection on the content (Susman, 2008). It is therefore necessary to encourage students to make adequate use of the available ICT resources for effective performance in their academic activities.

Simond (2008), in his study on the influence of the Internet on the education system, reported that the Internet is making large amounts of information available at an unprecedented speed and that if computers and the information super highway are fully utilised in schools, teachers and students will have virtually instantaneous access to a vast amount of information and a wide range of learning tools. He also stated that education is a fundamental human process; it is a matter of values and action. Information and communication technology enables collaborative learning with little indication of the isolated learner and encourages use of peer coaching and peer reviews. It develops communication skills and awareness of different audiences, has an impact on resource-based learning and access to real world information through the web, increases information reliability and accuracy, adding to the authenticity of learning tasks with realistic and up-to-date information. ICT allows students to produce high-quality multimedia products, changes teacher practices, planning tools, and assessment rubrics, and increases opportunities for classes to evolve and for student experiences to shape academic performance. It also has the ability to motivate students to learn and participate in learning activities, which has improved students' quality of work and given them the confidence to perform enhanced learning. Some ICT seems to correlate positively with performance, while some does not affect performance positively. It has been observed that the use of ICT in students' learning process will produce a better learning output, and it will also enhance effective teaching and encourage independent learning on the part of the students.

Youssef and Dahmani (2008) stated that the use of ICT can help students exploit enormous possibilities for acquiring knowledge for schooling purposes and can increase learning through communication. It should be noted that when ICTs are used appropriately to supplement a teacher's existing pedagogical philosophies, positive ICT usage can have a positive effect on student performance. It has been discovered that computer-aided instruction (CAI) has been seen to slightly improve students' scores on multiple-choice standardised testing in some areas, particularly test scores on reading and mathematical skills. ICTs are used in a variety of ways in science and mathematics, including simulations and modeling, as well as word processing and communication software in the development of students' language and communication skills. ICT is an important tool that enhances the academic performance of all students, especially those with visual impairment. It is a necessary condition for the development of the digital proficiency required of today's citizens and, on a more basic level, must consist of the use of multimedia technologies to recuperate, evaluate, store, produce, present, and exchange information. The expansion of new technologies has made computers accessible to today's students.

Utilization of ICT and Performance

Information and communication technologies are becoming increasingly widespread, influencing many aspects of our social and work lives as well as students' academic performance. The utilisation of ICT in Nigerian schools enhances classroom teaching-learning through flexible classroom pedagogical interaction (Dike, 2000). Students report higher attendance, motivation, and academic performance as a result of ICT programmes (Dzidonu, 2010). Students are able to reach their teachers through the internet in that

assignments and submissions can be carried out via the Internet. The utilisation of ICTs has the potential to accelerate, enrich, and deepen skills; to motivate and engage students; to help relate school experience to work practices; to create economic viability for tomorrow's workers; as well as strengthen teaching and student performance in academic subjects, helping schools change (Davis and Tearle, 2009; Lemke and Coughlin, 2008). The use of ICT in educational settings by itself acts as a catalyst for change in this domain. ICTs, by their very nature, are tools that encourage and support independent learning. The use of ICT in schools helps to develop a future workforce that can effectively participate in the increasing academic performance and the emerging knowledge of students and the economy (Mingaine, 2013). Students using ICT for learning purposes become immersed in the process of learning, and as more and more students use computers as information sources and cognitive tools, the influence of technology in supporting how students learn will continue to increase. The successful implementation of educational technologies depends largely on the utilisation of ICT resources, which eventually determine the effectiveness of the staff. Information and communications technologies (ICTs) are transforming societies and fueling the growth of the global economy. ICTs can also expand the reach and effectiveness of social development projects and have already yielded important benefits in such areas as healthcare, education, and environmental preservation. The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research (Yusuf, 2005). The ELNORD (2006) asserts that pupils at home use ICT for educational purposes as a collaborative tool. They use e-mail, chat, and mobile phones to communicate with classmates, giving and receiving help when doing their homework. Since the advent of information and communication technology, the education sector has been transformed a lot in the use of ICT (Wittwer & Senkbeil, 2008). One more advantage of introducing ICT in schools is that learners who do not have access to ICT at home may have the opportunity to utilise it in schools. It can be used as a learning device to give instructions to enhance the students' learning and retention (Aslan & Dogdu, 2013). This technology motivates and conveys dynamism to the classroom, reducing time spent on learning. Aslan & Dogdu (2013) suggest that ICT can upgrade the nature of instruction by intensifying learner inspiration and instructor training, which are the establishment of higher-order thinking aptitudes (Aslan & Dogdu, 2013).

Methods

Correlational survey design was adopted for the study. The study was conducted in Akwa Ibom State. The population of the study comprised children from 2–9 years old in both nursery and primary schools in Akwa Ibom State. Stratified random sampling technique was used to select three senatorial districts. Each senatorial district has two local governments with three schools. From each of the schools, 10 children were randomly selected, giving a total of 180 respondents, which comprised the sample size used for the study. The instrument titled "Information and communication technology and poor academic performance of children Questionnaire (ICTPAPCQ)" was used for data collection. Face and content validation of the instrument was carried out by one expert in test, measurement, and evaluation from University of Uyo to ensure that the instrument had accuracy, appropriateness, and completeness. Cronbach Alpha technique was used to determine the level of reliability of the instrument. The reliability coefficient obtained was 0.89, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as Pearson Product Moment

Correlation analysis in testing the hypotheses. The test for significance was done at 0.05 alpha levels.

Results and Discussions

Hypothesis One

The null hypothesis states that there is no significant relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. In order to answer the hypothesis, Pearson Product Moment Correlation analysis was used to analyze the data (see table 1).

TABLE 1: Pearson Product Moment Correlation Analysis of the relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State

Variable	$\sum x$	$\sum x^2$	$\sum xy$	r
	$\sum y$	$\sum y^2$		
Availability of ICT (x)	2844	45828	227292	0.95*
Academic Performance (y)	14208	1143504		

***Significant at 0.05 level; df =178; N =180; critical r-value = 0.197**

Table 1 presents the obtained r-value as (0.95). This value was tested for significance by comparing it with the critical r-value (0.197) at 0.05 levels with 180 degree of freedom. The obtained r-value (0.95) was greater than the critical r-value (0.197). Hence, the result was significant. The result therefore means that there is significant relationship between availability of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. The result is cognate to the research findings of Lawsent & Vincent, (2005) argue that the availability of ICT encourages students and improves the academic performance. The use of ICT in educational system is emphasized due to two primary objectives, First, ICT can alternate the lesson s' speed: they specified that kids want to broaden adequate capacities and talents from the new potentials provided by the use of ICTs. Secondly, a huge number of students are who has the interest to contribute in research and want to learn how to operate new technologies that can expand quality of teaching and learning at educational environment so this might help the inexperienced persons to attain higher results. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

Hypothesis Two

The null hypothesis states that there is no significant relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. In order to answer the hypothesis, Pearson Product Moment Correlation analysis was used to analyze the data (see table 2).

TABLE 2: Pearson Product Moment Correlation Analysis of the relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State

Variable	$\sum x$	$\sum x^2$	$\sum xy$	r
	$\sum y$	$\sum y^2$		
Accessibility of ICT (x)	2700	41508	216432	0.75*
Academic Performance (y)	14208	1143504		

***Significant at 0.05 level; df =178; N =180; critical r-value = 0.197**

Table 2 presents the obtained r-value as (0.75). This value was tested for significance by comparing it with the critical r-value (0.197) at 0.05 levels with 180 degree of freedom. The obtained r-value (0.75) was greater than the critical r-value (0.197). Hence, the result was significant. The result therefore means that there is significant relationship between accessibility of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. The result is cognate to the research findings of Young, (2002) who asserted that flexibility has heightened the availability of just in time learning and provided learning opportunities for many more learners who previously were constrained by other commitments. Hence, there is need to offer full support to students' access of ICT as it has the potential to improve their academic performance. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

Hypothesis Three

The null hypothesis states that there is no significant relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. In order to answer the hypothesis, Pearson Product Moment Correlation analysis was used to analyze the data (see table 3).

TABLE 3: Pearson Product Moment Correlation Analysis of the relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State

Variable	$\sum x$	$\sum x^2$	$\sum xy$	r
	$\sum y$	$\sum y^2$		
Utilization of ICT (x)	3048	52224	244224	0.99*
Academic Performance (y)	14208	1143504		

***Significant at 0.05 level; df =178; N =180; critical r-value = 0.197**

Table 3 presents the obtained r-value as (0.99). This value was tested for significance by comparing it with the critical r-value (0.197) at 0.05 levels with 368 degree of freedom. The obtained r-value (0.99) was greater than the critical r-value (0.197). Hence, the result was significant. The result therefore means that there is significant relationship between utilization of ICT and academic performance of children aged 2-9 years in Akwa Ibom State. The result is cognate to the research findings of Dike, (2000) stated that ICT is becoming increasingly widespread, influencing many aspects of our social, work lives and student academic performance. The utilization of ICT in Nigerian school enhances classroom

teaching-learning through the flexible classroom pedagogical interaction. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

Conclusion

The study concluded that utilisation of ICTs has 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, and to strengthen teaching and student performance in academics, helping schools change to modern ways of learning. One of the most vital contributions of ICT in the field of education is easy access to learning and with the help of ICT, students can now browse through e-books, sample examination papers, previous year papers, etc. and can also have an easy access to resource persons, mentors, experts, researchers, professionals, and peers all over the world.

Recommendation

1. The state government should establish ICT centres that students can access at their convenient times and that the services should be extended outside the school environment.
2. Constant power supply should be made available or standby generator should be put in place for adequate use of ICT facilities by the students.
3. Adequate security measures should be put in place to enhance the sustainability of those ICT facilities.

REFERENCES

- Alexander, J. O. (2009). Collaborative design, constructivist learning, information technology immersion and electronic communities: A case study. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century*, 7, 1–2.
- Annie, W.; Howard, W. S. and Mildred, M-W (2006). *Achievement and Ability Tests Definition of the Domain*. Educational Measurement, 2, University Press of America.
- Aslan, Z. and Dogdu, S. (2013). *Educational technology applications and educational instruments*. Ankara: Tekisik Ofset.
- Blackwell, C. K., Lauricella, A. R. & Wartella, E., (2014). Factors influencing digital technology use in early childhood education. *Computers & Education*, 77, 82-90.
- Carrillo, P., M. Onofa & J. Ponce (2010). *Information technology and student achievement: evidence from a randomized experiment in Ecuador*.
- Castells, M. (2009). *La era de la información*. Economía, sociedad y cultura, Madrid, Siglo.
- Chron (2017) *What Is the Meaning of Academic Performance*: <https://work.chron.com>
- Claro, M. (2011). *El papel de las tecnologías de la información y las comunicaciones en la educación inclusive*. Project Document (LC/W.434), Santiago, Economic Commission for Latin America and the Caribbean (eclac).
- Cristia, J. (2012). *Technology and child development: evidence from the one laptop per child program* (63)438.
- Davis, N.E. & Teariel, P. (Eds). (2009). *A Core-Curriculum for Telematics in Teacher Training*. Tele-teaching 98 Conference, Vienna.
- Dike, V. W. (2000). *More than computers: Information technology in library and information science education*. A paper presented at the conference of National Association of Library and Information Science Educators, Nigeria (NALISE) held at University of Ibadan.
- Dzidonu, O. (2010). The role of ICTs to achieving the MDGs in education: An Analysis of the Case of African Countries, Accra Ghana. *Computers & Education*, 99: 68–80.
- ELNORD. (2006). *E-Learning Nordic*. www.ranboll-management.com
- Hargittai, E. (2002). Second-level digital divide: difference in people's online skills. *First Monday*, (7)4
- Kozma, R. B. (2008). Comparative analysis of policies for ICT in education. *International Handbook on Information Technology in Primary and Secondary Education*, J. Voogt and G. Knezek (eds.), New York, Springer.;
- Lawsent, I. & Vincent, I. (2005). *Impact of E-Learning on Tertiary Education*. (online) <http://www.info.gov.za/speeches/index.h>

- Lemke, C. & Coughlin, E. C. (2008). *Technology in American Schools*. <http://www.mff.org/pnbs/ME158.pdf>
- Mingaine, L. (2013). Challenges in the Implementation of ICT in Public Secondary Schools in Kenya. *International J. Soc. Sci. & Education*, 4(3), 224-238.
- Murray, J. (2011). *Cloud network architecture and ICT - Modern Network Architecture*. Tech. Target IT Knowledge Exchange.
- Robinson, J. P., DiMaggio, P. and Hargittai, E. (2003). New social survey perspectives on the digital divide. *It & Society*, (1)5.
- Rodríguez, P., Nussbaum, M. and Dombrovskaja, L. (2013). ICT for education: a conceptual framework for the sustainable adoption of technology enhanced learning environments in schools. *Technology, Pedagogy and Education*, 3(1), 21.
- Selwyn, N. (2004). Reconsidering political and popular understandings of the digital divide. *New Media & Society*, (6)3.
- Simond, M. (2008). *Influence of Internet on the Education System*. http://ezinearticles.com/?influence_of_internet_on_the_Education_system.
- UNESCO (2016). *ICT in Education*. UNESCO. <https://en.wikipedia>
- Valasidou, A, Sidiropoulos, D., Hatzis, T and Bousiou-Makridou, D. (2005). *Guidelines for the Design and Implementation of E-Learning Programmes, Proceedings of the IADIS*. International Conference IADIS E-Society, Qawra, Malta.
- Wikipedia (2016). *Improving literacy and mathematics by ICT-enhanced collaboration*. In Wikipedia, The Free Encyclopedia.
- Wittwer, J. and Senkbeil, S. A. (2008). Is student's computer use at home related their mathematical performance at school? *Computer and Education*, 50, 558-1571
- Youssef, B. A. and Dahmani, M. (2008). The Impact of ICT on Student performance in Higher Education: Direct Effects, Indirect Effects and Organizational Change. In the Economics of E Learning (On line Monograph) *Revista de Univeridad Sociedad del Conocimiento (RUSC)*, 5(1), 5
- Yusuf, M. O. (2005). Information and Communication Technology and Education: Analysing the Nigerian National Policy for Information Technology. *International Education Journal*, 6(3), 316-321.
- Ziedner, M. (2008). *Test anxiety: The state of the art*. New York: Plenum Press.