EMERGING TECHNOLOGIES' IMPACT ON FEMALE AND MALE PUPILS' ACADEMIC PERFORMANCE: A CASE OF ZEDUPAD COMPUTER TABLET

[1]WILLIAM PHIRI, [2]DR RICHARD SILUMBE

[1,2]Information and Communication University Zambia Research and Development Centre (Zrdc) School of Education
P.O.Box 30226 Lusaka, Zambia
E-mail: William77734@yahoo.com

Abstract- The study investigated the impact of emerging technologies (i.e. ZEDUPAD computer tablets) on female and male pupils' academic performance in Mathematics. The study being a longitudinal, followed a total of one hundred (100) grade six pupils of which fifty-eight (58) were females while forty-two (42) being male. While St Pauls Primary school was purposively selected because of its nature of being a rural school, the pupils were however randomly chosen. Data was collected using questionnaires, direct observation of Mathematics lessons taught using ZEDUPAD computer tablets, mid-term, end of term and grade final examinations results. The analysis of data was done thematically for qualitative data while quantitative data, SPSS was used. One of the main finding of the study is that although the use of emerging technologies (i.e. ZEDUPAD computer tablets) helped both female and male pupils' academic performance improve, the males however benefited more than female pupils. The study further noted that differences in academic performance are not innately caused but largely as a result of cultural, social and economic facets. Among the recommendations that emerged, school authorities, teachers and parents needed to provide equal opportunities to both genders in terms of access, application and exposure to emerging education technologies.

Key Words- Emerging technologies, ZEDUPAD computer tablet, Academic Performance

I. INTRODUCTION

Zambia got her independence from the British colonialism on the 24th October 1964. Soon thereafter, the country was hit with serious lack of qualified human resource to drive sectors of the economy once occupied by the whites. It was quickly realised by our founding fathers that education was the only sustainable solution to the many challenges Zambia faced at the time, hence prioritising education. Since independence, many education policies have been formulated, reviewed and reformed. However, despite such efforts, the quality and relevance of the Zambian education in the 21st century and technological era has remained a challenge. As the global turns to the use and implementation of the ICTs for sustainable development, Zambia has not remained behind in its quest to provide quality education to the general citizenry (Phiri and Silumbe, 2015).[22] Indeed, ICTs play a critical role in the effective and efficient teaching and learning processes at all levels of education. It is further argued that information and access to ICTs are no longer a luxury but a human need and basic right (Chisenga and Brakel, 2003; Mulauzi, 2007; Adoni and Kpangban 2010). [4, 18, 1]
Although studies conducted in the recent past have shown that the use of ICTs impacts positively on the academic performance of pupils, the effectiveness of emerging technologies especially in rural schools has remained unexploited in terms of research. Nevertheless, a longitudinal study conducted by Phiri and Sillumbe (2016)[23] which sampled the use of the ZEDUPAD computer tablet as an emerging technology, revealed a positive correlation among the grade six pupils' academic performance in mathematics. The improvement in academic performance recorded was general as the study did not analyse how the ZEDUPAD as an emerging technology approved by the Ministry of General education to be used in Zambian schools impacted on male as compared to female pupils. This paper therefore, critically analysed which of the two genders (male and female) were impacted more than the other by emerging technologies.

II. STATEMENT OF THE PROBLEM

The outcome of studies conducted in the recent past have consistently revealed that adopting technology in the teaching and learning process offers great benefits to both teachers and learners in that it encourages self-directed learners and reduces on teacher centred approaches (Phiri and Silumbe, 2015; MoGE, 2015; Moongwa, 2014; UNESCO, 2013; Mtanga, Imasiku, Mulauzi and Wamundila, 2012, Adoni and Kpangban, 2010; Mulauzi, 2007).[22,15,16,28,17,1,18] Another most recent study by Phiri and Silumbe (2016)[23] further explored the impact of emerging technologies on pupils' academic performance in rural schools indicated a positive correlation between the two variables.

However, these studies did not compare how emerging technologies impacted on males and female learners comparatively. Therefore, the study sought to address this gap using a case study of ZEDUPAD computer tablets which has been approved by Ministry of General Education to be used in all the Zambian public schools.

III. RESEARCH OBJECTIVES

The following specific research objectives guided the study:
1.   To ascertain the extent to which female and male pupils at St Pauls Primary school   access emerging technologies (i.e. ZEDUPAD computer tablets)
2.   To determine the impact of emerging technologies (i.e. ZEDUPAD computer tablets) on female and male pupils' academic performance comparatively in Mathematics

IV. RESEARCH QUESTIONS

1.   What is the extent to which female and male pupils access emerging technologies (ZEDUPAD computer tablets) at St Pauls Primary school?
2.   How do emerging technologies (i.e. ZEDUPAD computer tablets) impact on female and male pupils' academic performance comparatively in Mathematics?

V. PURPOSE OF THE STUDY

The main aim of the study was to compare the impact of emerging technologies on pupils' academic performance in Mathematics using a case of the ZEDUPAD computer tablets. In other words, the purpose of the study was to establish comparatively the impact of using ZEDUPAD in the learning and teaching of mathematics between female and male learners in schools: A case of St Pauls Primary school in Kapiri-Mposhi district of Central province, Zambia.

VI. SIGNIFICANCE OF THE STUDY

Studies have shown that access to new technologies is a far away reality for under developing countries like Zambia, particularly for females, who experience socio-cultural and economic inequalities in their education and use of emerging technologies (Mahmood and Bokhari, 2012).[13] Given the lack of basic infrastructure, high cost in ICT installation and availability, lack of necessary operational skills, dogma that technology is 'men' sphere, a significance portion of population especially from rural areas remain deprived of using ICT possessing even more challenges for female learners (Phiri and Silumbe, 2016).[23] Even when females are educated, they still lag behind males related to utilisation of ICTs. Therefore, the knowledge generated from this study on the impact of emerging technologies on female and   male   learners'   academic   performance comparatively in mathematics would be helpful for future planners that set patterns for coming generations and plan different techniques and approaches in the implementation of emerging technologies in the education sector. This study also provides an opportunity for curriculum developers to include practical topics related to emerging technologies in education. Further, the study was thought to be useful as well for educational policy makers to understand the actual position of gender biases regarding using emerging technologies.

VII. THEORETICAL FRAMEWORK

The study triangulated theoretical with conceptual framework as a way of providing an enhanced understanding on how emerging technologies such as the ZEDUPAD computer tablets impacted on female and male pupils' academic performance. Firstly the constructivist   theory   guided   this   study. Constructivists suggests there are two types of constructivism, one proposed by Jean Piaget, which is individualised and based on personal self-concept, belief system and experience while the other one is based on social interaction and focused on views sharing among peers presented by levy Vygotsky (Kalpana, 2014). [8] It is argued that learner-centred education is core in the teaching and learning processes (Slavin, 2006). [27] According to the constructivists' theory, the reality is a multitude in the learners' minds and each learner is unique. Learning therefore takes this into consideration and allows learners to explore and use their abilities to process information in order to create the personalised knowledge which makes more sense to them (Woolfolk, 1995).[32] This can be done through the learners' interaction with peers and environment but based on their own experience. In this regard, learning could be better defined as meaning-making rather than memorising what was imposed by others (Nawaz, 2012).[19]This sense making could be facilitated by the inclusion of emerging technologies in education as a way to apply the underlying principles of the constructivism.

According to Kalpana (2014), [8] in the constructivist class, the environment is democratic and centred on the learner, where the curriculum is negotiated and not imposed. Learners participate freely in the creation of the knowledge either individually or through interaction with the peers or significant others or even environment, but based on their prior experiences. The teacher in this environment just facilities the activity and guides the learners on their journey to discovery of new experiences. The emerging technologies such as the ZEDUPAD computer tablets come in constructivism as a medium to facilitate the learning-how-to learn process by eliciting learners' curiosity which leads them into critical and analytical thinking, thereby resulting in discovery (Kharade and Thakkar, 2012). [10]The principles underlying the constructivist theories, aim at promoting learner's activity in any teaching-learning process through the use of emerging technologies.

VIII. LITERATURE REVIEW

ICT can broadly defined as technologies that facilities, by electronic means, the acquisition, storage, processing, transmission, and disseminating of information in all forms including voice, text, data, graphics and video (Kapesa and Katulwende, 2015; Michielsand and Van Crowder, 2001).[9,14] It is clear the definition focuses on the importance of the intersection of information technology, information content and telecommunications in enabling new forms of knowledge production and interactivity. It should also be noted that education technology is not restricted to individual computer use only; It can involve other equipment and application such as video conferencing, digital television where by learners are allowed to interact with programs at their own pace, electronic white boards, science calculators and others. Locally, the integration of ICTs in the Zambian education system remains very low, despite efforts put in place by the government (Shafika, 2007).[25] According to ICT policy of 2006, ICT education faces a number of challenges to effectively integrate ICT in the Zambian education sector. The following were some of the challenges identified: 1.Non availability of computers in most rural learning institutions. 2. ICT illiteracy among teachers and administrators of learning institution.

A similar study by Mtanga, Imasiku, Mulauzi and Wamundila (2012)[17] on the use of ICTs revealed that: 1.Computers were the mostly used ICT tool in schools and most high schools in Zambia are using ICTs in teaching and learning activities. 2. The use of ICTs was found to be very low among both teachers and learners. 3. Most of the schools had inadequate ICTs facilities. Another study conducted by Phiri and Silumbe (2015)[22] on the extent to which ICTs are being used in the teaching and learning of mathematics in selected secondary schools in central province: 1.The findings indicated that majority of the learners do use ICTs in one way or another but not for learning purposes. 2. As regard to internet access at schools, majority strongly disagree having access. 3. With regard to mathematics, very few agreed using computers for mathematics lessons.

While this has been a status quo, a study conducted by Bame and Dugger (1989) [2] on pupils' attitudes towards use of technology in mathematics, the findings suggested that female and male learners perceived some aspects of technology differently. Female learners perceived technology to be less interesting than did male learners. Another study by Boser (2010) [3] gave an overall picture indicating that males had positive and higher abilities, and that they used computer more. Dorup (2004) [5] in his study added that males had more favourable attitudes toward computers than female students. Male students manifested their desire to change traditional learning methods with better information and communication technology. Ibid (2004) [5] also found

that females exhibited negative attitudes towards computers. They also discovered that females possessed less experience of computer usage than males. There were also found prominent differences regarding computer literacy and between males and females. Research consistently showed that boys were more likely to be engaged in extracurricular activities with computers, such as using a computer at home and play computer games. It is also indicated that stereotypical male images found in computing magazines (Ware&Stuck, 1985) [30] acted as deterrents for female involvement in technologies. Gender and ICT interact in complex ways but in the aggregate, females are much less likely to participate in ICT courses, careers and leadership (Withers, 2000).[31] Research has also showed that gender inequity persists both in access to and experience of learning opportunities with ICT. It is clear that most of the studies reviewed above generally concentrated mostly on the use of ICTs and the extent to which learners use technology in the learning process. These studies however did not explore the impact emerging technologies (i.e. ZEDUPAD computer tablets) exert on female and male learners comparatively, hence this study.

IX. RESEARCH METHODOLOGY

The study utilised a mixed method approach by combining qualitative and quantitative research techniques. A descriptive and case study research designs were triangulated and employed to collect data needed to determine if there are differences in academic performance between female and male pupils in Mathematics using emerging technologies. Direct Mathematics lessons taught using the ZEDUPAD computer tablets were observed and weekly, mid-term and end of term test results were used to collect data. This was done for the period of over six (6) months. The targeted population were rural primary schools of which St Pauls Primary School in Kapiri-Mposhi District of Central Province, Zambia was purposively selected and studied as a case study because of its nature of being a rural school.

A sample of one hundred (100) grade six pupils were randomly selected and participated in the study. Out of the total of one hundred (100), fifty-eight (58) were female pupils and forty-two (42) being males. The Statistical Package for Social Sciences (SPSS, version: 20) was used to analyse quantitative data, generate Chi-square values which compared the means and standard deviations between female and male academic performance in Mathematics respectively.

X. FINDINGS AND DISCUSSION

The findings and discussion are done according to the research objectives and other emerging themes. These

include but not limited to the following as presented below:

10.1 Pupils' access to emerging technologies (i.e. ZEDUPAD computer tablets)

At the time of the study, it was revealed that the entire school had only one (1) ZEDUPAD tablet against a total population of 588 pupils from grade one to grade seven. This represents a pupil-tablet ratio of 1:588 or 1: 100 if the ZEDUPAD computer tablet was to be used only by grade six pupils who participated in the study. These ratios are statistically and practically very high and alarming. This is against the government policy on education which has made ICTs compulsory in all public schools. The situation at the time of the study was even worse in that the only tablet that was available in school was not functional and it was just kept in the head teachers' office. Therefore, in order to obtain reliable and valid results from the study, the researcher under the sponsorship of Zambia Research and Development Centre (ZRDC) in conjunction with Information and Communication University (ICU) bought additional ZEDUPAD tablets for the grade six pupils who took part in the study.

The importance of emerging technologies and ICT facilities in schools cannot be overemphasised. This is so because emerging technologies promotes learner-centred teaching and learning methodologies, encourages interactive learning and engages pupils throughout the learning process (MoGE, 2015).[15] This is further argued and supported by the constructivist theory that in the constructivist classroom, learners have an opportunity to explore and use their abilities to process information in order to create personalised knowledge which makes sense to them through interaction and experiences (Woolfolk, 1995; Vygotsky, 1978).[32, 29] Slavin (2006)[27] is equally of the view that learner-centred education is critical in the teaching and learning process as it promotes critical thinking and reasoning among pupils. In this regard, emerging technologies and in this case the ZEDUPAD computer tablets performs such functions thereby helping pupils improve in acquiring pedagogical skills hence an improvement in academic performance. Despite many benefits that come along with emerging technologies, sadly access to such technologies by pupils especially in rural areas remains a challenge. Some of the factors contributing to lack of access to emerging technologies (ZEDUPAD computer tablets) in rural schools include the following: High poverty levels, high cost price, erratic or no funding to rural schools by government and generally lack of prioritising ICT activities by school administrators.

Moreover, the accessibility of the ZEDUPAD computer tablets in public schools is largely dependent on the memorandum of understanding signed between government and the ischool.zm, an online organisation. The ischool.zm was engaged to provide computer tablets with pre-loaded teaching and learning lesson plans which is a welcome and progressive move in that private sector in involved. However, this is short term measure in that IT sector is a dynamic field that keep on evolving because of emerging technologies that are being developed every day. The challenge that government is likely to encounter with this intervention is that by the time these tablets reaches the intended pupils especially in rural areas, the content contained in the ZEDUPAD tablets would have become obsolete. Our hope is that these ZEDUPAD computer tablets have a provision of updating the content contained otherwise; it may be a costly exercise to keep on replacing the tablets time and again. In the article titled "Africa still behind in ICT progression", Nkana (2015: 12) [20] in Phiri and Silumbe (2015) [22] laments how a desktop which was acquired meant to help teach ICTs at a named rural school in Zambia become outdated:

...a teacher heading the ICT department...spoke of the challenges he faces conducting computer lessons without power and PCs...Mr Banda...he uses his laptop to teach computer lessons to 50 pupils...To complete teaching 50 pupils with one laptop is a toll order...because it is time consuming and he also worries that results will be poor when the learners sit for exams next year..Knowing the importance of ICT in schools, Mr Banda is determined to teach the subject that demands he charges his laptop battery at the head teacher's home because he has no power at his home...But before the lesson is over, the battery goes flat, and frustrated, Mr Banda has to stop teaching...When computer studies were first introduced at the school, a desktop computer was purchased but it is not compatible with the generator hence my using a personal laptop whose battery has now become faulty.

It is clear from the above that implementation of ICTs and later on emerging technologies in Zambian schools remain a big challenge especially in rural areas such that distributing ZEDUPAD computer tablets may help provided they don't require being regularly charged with electricity or solar. It seems there is political will in the project of distributing ZEDPUD computer tablets with pre-loaded lessons to at least 50% of the pupils by 2017 because the Zambian Republican President made mention of the initiative during his special speech to the national assembly in September 2015. The other hope is that the project has an inclusion of Zambian experts because the person who was instrumental in this project (Mr Mark) died. In other words, the sustainability of the initiative should be assessed before being adopted in the schools. This is because most donor driven projects die a natural death once the donor stop funding such a project or the founder dies.

10.2 Impact of emerging technologies (i.e. ZEDUPAD computer tablets) on female and male pupils' academic performance comparatively

In an effort to ascertain the impact of emerging technologies (i.e. ZEDUPAD computer tablets) on male and female pupils' academic performance at St Pauls Primary School, the pupils were asked to answer a questionnaire by indicating whether they agreed or disagreed to the statements provided. The responses on likert scale are presented below:

Table 1: Opportunities offered to both female and male pupils in the use of emerging technologies (ZEDUPAD)

S/N	Statement	Option	SA	A	ND	DA	SDA	Chi-Square	Mean
A	Male pupils are given more opportunities than female in using emerging technologies (i.e. ZEDUPADs)	Female	22	17	8	3	8	44.8	2.9
		Male	4	14	5	13	6	65.4	2.8
B	Female pupils are reluctant using emerging technologies (i.e. ZEDUPADs)	Female	20	19	6	6	7	154.6	3.4
		Male	3	24	4	6	5	63.2	3.8
C	Equal opportunities are given to both female and male pupils in the use of emerging technologies (ZEDUPADs)	Female	12	24	13	4	5	234.1	3.7
		Male	4	28	5	2	3	69.3	3.6

Source: Field Data 2016

Key SA - Strongly Agree; A – Agree; ND – Not Decided; DA – Disagree; SDA – Strongly Disagree

Table 1 indicates that the calculated value of Chi Square respectively of statement 'A' of female (44.8) and male (65.4), statement 'B' of female (154.6) and male (63.2), and statement 'C' of female (234.1) and male (69.3) is greater than the tabulated value 9.5 of Chi Square. Therefore it is concluded that all the statements are significant for both female and male pupils. The mean score of statement 'A' of female pupils (3.8) is greater than mean score of the male pupils (2.9). This reveals that females were more agreed with the statement 'A' whereas male showed disagreement to statement 'A'. This difference of mean scores of male and female pupils indicates the gender differences found between male and female pupils in the way emerging technologies impacted on their academic performance. The mean score of statement 'B' of male pupils (3.4) and the mean score of the female pupils (3.8) is approximately the same. This reveals that female pupils hesitate to use emerging technologies (i.e. ZEDUPAD computer tablets). The mean score of statement 'C' of male pupils (3.7) and the mean score of the female pupils (3.6) is almost same. It also reveals that both female and males were agreed to the statement 'C'.

Table 2: Emerging technologies (i.e. ZEDUPAD computer tablets) impact on female and male pupils' academic performance in Mathematics

	N	MEAN SCORE	STD DEVIATION
Female Pupils	58	60.3	15.43
Male Pupils	42	67.4	10.02
Total	100		

Source: Field Data 2016

The mean score of male pupils increased from 59% to 67.4% representing 14.24% while the standard deviation dropped from 13.12 to 10.02 which further suggest a significance improvement of male pupil's academic performance in mathematics generally. Although the mean score for the female pupils equally posted an increase, the improvement however was very minimal (2.55%) as compared to that recorded by male pupils. Therefore the academic performance in mathematics by female pupils was not as impressive as that of the male pupils. This is confirmed by an increase in the standard deviation of female pupil's academic performance in mathematics as compared to the male pupils' academic performance.

This study which compared the academic performance in mathematics by female pupils and male pupils using ZEDUPAD computer tablets also revealed a remarkable improvement in both genders. Although male pupils outweighed female pupils, there was however an improvement in both genders' academic performance in Mathematics. This is an indication that emerging technologies (i.e. ZEDUPAD computer tablets) impacted positively on

both male and female pupils' academic performance. This outcome is in agreement with the research conducted by Ministry of General Education (2015) that revealed that the use of ZEDUPAD in piloted few urban schools helped in reducing absenteeism, increased academic performance, acquainted and oriented pupils to technology at a tender age (Kalila, 2015).[7]

Other factors that contributed to the ZEDUPAD as a case study of emerging technologies being used to improve pupils' academic performance in mathematics are that these tablets are highly interactive, engaging, had multiple languages of instruction, provided self-taught tutorials to pupils, all the preloaded educational materials and lessons were voiced, encouraged pupils develop critical and logic thinking and reasoning. This is in line with the observation made by Koory (2003) [11] who argued that technology being used in learning and teaching must be placed into an educational context. However, as revealed by the study by Phiri and Silumbe (2015) [22] that such positive gains posted were however being eroded by the challenges faced by rural schools as already discussed above. The study therefore, recommended that unless these challenges were addressed with the seriousness they deserve, the dream of using emerging technologies will remain an academic exercise without bearing tangible fruits.

Based on the findings of this study and as already noted, male pupils were more positively impacted by the use of emerging technologies for learning than were female pupils at St Pauls Primary School. Similar findings were reported by other researchers. For example, research conducted by Shashaani and Khalili (2001) [26] revealed that even female students agreed there is gender inequality in the use of emerging technologies and in this case, the ZEDUPAD computer tablets. The study furthermore revealed that female pupils had little confidence in using technology for learning as compared to male pupils. As demonstrated in the conceptual framework, literature equally suggests the reasons for such gender imbalances in using technology are socially constructed and are not related to innate ability (Joiner et al., 2011). [6] In this regard, research has shown that teachers, parents, and peer groups influence student attitudes toward application of technologies in the learning and teaching processes (Shashaani & Khalili, 2001).[26]

Extensive studies have therefore suggested that teachers, parents and the more knowledgeable others (MKOs) to encourage female pupils to use emerging technologies daily, thereby building their confidence in the use of technology for learning. Most pupils in this 21st century are exposed to social media through smart phones with the inclusion of those living in rural areas. This has been made possible because most remote areas have access to telecommunication facilities. In Zambia for example, there are three mobile telecommunications that have relatively covered even parts of rural areas. In areas where such facilities are not available, ZICTA have moved in to fill such a gap. This to a larger extent have enabled pupils from rural areas check their email every day. The other development that has occurred in the recent times is that practically most pupils and teachers use applications such as Microsoft Office to accomplish assignments. They also search for information on the Internet. Research studies have further found that the use of the Internet motivates pupils' learning and provides them with effective learning environments (Langin, Ackerman, & Lewark, 2004; O'Bannon & Puckett, 2010). [12, 21] Nevertheless, the youth tend to abuse these facilities instead of using them productively. It is imperative therefore; both male and female pupils to be positioned in such a way that they have equal access and a positive attitude toward the use of emerging technologies for learning.

CONCLUSION AND RECOMMENDATIONS

The study sought to establish the impact of emerging technologies and in this case the use of ZEDUPAD computer tablets on female and male pupils' academic performance comparatively in Mathematics. What is evident from the study is that access to emerging technologies by pupils from rural areas has remained a problem. Although this is the status quo, male pupils showed greater confidence in accessing the said technologies as compared to female pupils. However, females just as much as men do, have lately shown an interest in technology. This may be enhanced by teachers and parents providing more opportunities for females to use emerging technologies and having female teachers as role models in educational technologies. Additionally, teachers need to help female pupils develop a greater sense of accomplishment in their technology skills. It is also clear from the outcome of the study that despite both genders posting an increase in academic performance, the male pupils however did far much better in comparison with female pupils.

The following recommendations emerged from the study: 1. The ministry of General Education through the curriculum development centre (CDC) should examine the curriculum to determine which emerging technologies would be beneficial for the modern generation of pupils. 2. School authorities and classroom teachers should continue to provide and model emerging technologies within classrooms and both male and female pupils need to see that females can be successful in the field of technology. 3. Schools should provide examples of technology role models for female and male pupils in an attempt to help pupils overcome gender biases that are evident in pupils today. 4. Government and school authorities should create an environment that encourages research and innovations especially from female pupils. 5. Government and school authorities should

facilitate that all pupils in schools regardless of their gender should be able to have access to emerging technologies (i.e. ZEDUPAD computer tablets, electronic devices, updated e-books, and internet.

REFERENCES

[1]. Adoni, E, and Kpangban, E. (2010), Application of ICTs in the Nigerian Secondary Schools; (http://digitalcommons.unl.edu/libhhilprac/345, accessed 02-12-2015 at 22:58

[2]. Bame, A. E., Dugger, W. E. (1989). Pupils' attitudes toward technology–PATT-USA. The Journal of Technology Studies, 19(1), 40–48.

[3]. Boser, R. A. (2010). Students' attitudes toward technology in selected technology education programs: Journal of Technology Education, 10(1), 4–18. Retrieved September 12, 2003, from http:// scholar.lib.vt.edu/ejournals/JTE/

[4]. Chisenga, J. and Brakel, P.A. (2003), Impact of ICT based distance learning: The African story in the Electronic library 21, pp. 476-486

[5]. Dorup, J. (2004). "Experience and Attitudes towards Information Technology Among First Year Medical Students in Denmark": Longitudinal Questionnaire Survey. Journal of Medical Internet Research,6 (1)

[6]. Joiner, R., Iacovides, J., Owen, M., Gavin, C., Clibbery, S., Darling, J., & Drew, B. (2011). Digital games, gender and learning in engineering: Do females benefit as much as males? Journal of Science Educational Technology, 20, 178-185.

[7]. Kalila, C. (2015). Parliamentary Committee on Education tour of schools piloting e-learning facilities. Lusaka: PCE

[8]. Kalpana, T. (2014). A constructivist perspective on teaching and learning: A conceptual framework. International research journal of social sciences. ISSN 2319-3565

[9]. Kapesa, J. and Katulwende, M. (2015). Teach yourself computers: A practical guide to microsoftword, excel, powerpoint & Internet applications. Lusaka: Mafinga Publishers Limited

[10]. Kharade, K. & Thakkar, R. (2012). Promoting ICT enhanced constructivist teaching practices among pre-service teachers: A case study: International journal of scientific and research publication. Volume2, Issue 1, January 2012. ISSN 2250-3153.

[11]. Koory, M. (2003). Monitoring and Evaluation of ICT for education impact: review, in: Wagner, D.A., Day, B., James, T., Kozima, R.B., Miller, J. and Unwin, T. (Eds), Monitoring and evaluation of ICT in education projects: A handbook for developing countries. Worldbank/infoev...Retrieved from http://www.infodev.org/en/publication.9.html Accessed on 27/01/2016 at 14:27

[12]. Langin, D. W., Ackerman, P. A., & Lewark. S. (2004). Internet-based learning in higher forestry education. Unasylva, 216(55), 39-44.

[13]. Mahmood, A. and Bokhari, N.H. (2012). 'Use of Information and Communication Technology: Gender Differences among student at tertiary level': Journal of educational and instructional studies in the world; volume: 2; Issue: 4; article: 12; ISSN: 2146-7463

[14]. Michiels, S.I. and Van Crowder, L. (2001).Discovering the "Magic Box": Local appropriation of information and communication technologies (ICTs). Sustainable development Department, Food and Agriculture Organisation of the United Nations.

[15]. Ministry of General Education (MoGE). (2015). The 2014 Grade 12 Examinations Statistics. Lusaka: MoGE

[16]. Moongwa. M (2014), Technology use in Education, 2014,www.postzambia.com/post

[17]. Mtanga, N., Imasiku, I., Mulauzi, F. And Wamundila, S.(2012). Use of ICTs in Education: A case study of selected urban based high schools in Lusaka, Zambia. Nairobi: SCECSAL XXth Conference

[18]. Mulauzi, F. (2007). The role of information and communication technologies (ICTs) in professional women's accessed to development information in Zambia. Thesis; Scheffield.

[19]. Nawaz, A. (2012). Social-constructivism: Futuristic sphere for learning in HELs. Global journal of management and business research. Volume 12, issue 8 Version. Global Journals Inc. (USA). Online ISSN: 2249-4588 & Print ISSN: 0975-5853

[20]. Nkana N. (2015). Africa still behind in ICT progression: Zambia Daily Mail; 21(50):12.

[21]. O'Bannon, B. W., & Puckett, K. (2010). Preparing to use technology: A practical guide to curriculum integration. Pearson.

[22]. Phiri, W. And Silumbe, R. (2015). "An extent to which ICTs are being used in the teaching and learning of Mathematics in selected secondary schools of Central province, Zambia": International Journal of Multidisciplinary Research and Development, Volume 2; Issue 11; November 2015; page No: 411-417

[23]. Phiri, W. And Silumbe, R. (2016). "Impact of E-learning on pupils' academic performance in Rural Zambian Schools". Paper Presentation at 216 International Conference on Research in Development -RiD 2016, Mika Convention Centre, Lusaka, Zambia; 2nd -4th March, 2016

[24]. Richard, A. B (2010), Students Attitudes towards Technology Education programs. A Gender approach in UK. JTE Educational Journal.

[25]. Shafika, I (2007), Survey of ICT and education in Africa: ICT in education in Zambia, UNESCO.

[26]. Shashaani, L., & Khalili, A. (2001). Gender and computers: Similarities and differences in Iranian college students' attitudes toward computers. Computers & Education, 37(3), 363-375.

[27]. Slavin, R. E. (2006). Educational psychology: Theory and practice (8th Ed.). Boston: Pearson.

[28]. UNESCO (2013). 'Survey of ICT and education in Africa': ICT in education in Zambia. UNESCO

[29]. Vygotsky, L. (1978). Mind in Society. Cambridge: Harvard University Press.

[30]. Ware, M. and Stuck, M. (1985). Sex role message vis- vis microcomputer use: A look at the pictures. Sex Roles, 13 (3/4), 205-214.

[31]. Withers, P.(2000). Mismatched? Why so few women seem to be taking advantage of this hi-tech usiness Bonanza. BC Business, 28 (10), 102-111.

[32]. Woolfolk, E.A. (1995). Educational Psychology. Boston: Houston Mifflin.

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