

AN ASSESSMENT ON THE USAGE OF INFORMATION, COMMUNICATION TECHNOLOGIES (ICTs) IN THE DELIVERY OF QUALITY EDUCATION: A COMPARATIVE STUDY OF HILCREST NATIONAL SCHOOL AND DAVID LIVINGSTONE SECONDARY SCHOOL IN LIVINGSTONE.

BY

Siyomunji, Phyllis

Syomunjip@yahoo.com

and

Hamooya, Chrispin

chrismooya@yahoo.com

The University of Zambia; School of Education ; Department of Library and Information Studies. P.O box 32379 LUSAKA

Abstract

ICTs have been found to be a very important step in education around the world. The study aimed doing a comparative assessment on the usage of ICTs in the delivery of quality education; at Hillcrest National School and David Livingstone Secondary School in Livingstone. The objectives were to identify the usage and benefits of using ICTs in Schools, challenges faced by both teachers and pupils and lastly suggest measures towards improvement of ICTs. The sample firstly considered Grade 12 the pupils of these schools as these seen to have been at these school of long period. Then the teachers as well as the ICTs Co-ordinators were considered. The sample size consisted eighty (80) pupils, forty (40) pupils from each school and twenty (20) teachers which was ten (10) from each school and two (2) ICT coordinators meaning one (1) from each school. The sampling frame used was the establishment registers for 2014 while simple random sampling was used as a sampling technique. Eighty (80) questionnaires were distributed to pupils while twenty-two (22) semi-structured questionnaires were prepared for teachers and ICT coordinators to supply key information about the institutional framework. There was a 100% response rate in all categories. The study revealed that 100% respondents s at Hillcrest used ICTs as a source of information while only 50% used it at David Livingstone. Additionally, 100% at Hillcrest saw

ICTs as a need in their studies while only 80% at David Livingstone thought so. The findings further reveal that 77.8 % of respondents at Hillcrest used ICTs for academic purposes while only 48.5 % at David Livingstone used it for such purposes. The findings of the study reviewed that benefits were enormous. In terms of challenges, 85% of respondents at Hillcrest thought time allocated for the usage of ICTs was not enough while at David Livingstone the lack of adequate ICTs was seen as a challenge. It was thus concluded that the use of ICTs at Hillcrest was better than David Livingstone. Majority of the pupils at Hillcrest used computers because they were adequate as compared to David Livingstone which had very few computers. It was thus recommended that more time be allocated for ICT usage at Hillcrest while David Livingstone secondary School should improve on ICT facilities .

1.0 Introduction

Information and communication Technologies (ICTs) are powerful enabling tools for educational change and reform. When used appropriately, different ICTs help expand access to education, strengthen the relevance of education. According to Morrison, (1999) when used appropriately, ICTs have the potential to enhance learners' achievement and assist them in meeting their learning objectives. Similarly, Branson (1991) argues students can learn much more than what the teacher teaches in conventional learning environment because they can learn independently having a wide choice information and knowledge. Haddad and Draxier (2002) indicated that ICTs contribute to effective learning through expanding access, promoting efficiency, improving the quality and quantity of teaching, learning and research. In this vein students can be involved in skill oriented activities in group learning environments for accumulated knowledge. They can interact and share learning experiences with their teachers and fellow learners' in knowledge construction and dissemination process. They can receive and use information of all kinds in more constructive and productive way, rather than depending upon the teacher. Cuban (1996), noted that in recent years there has been a groundswell of interest in how computers and the internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings

It is in this regard that this research was carried out at Hillcrest National Technical School and David Livingstone Secondary School in 2014. These schools are both in Livingstone.

1.1 Hillcrest National Technical Secondary School

Hillcrest Technical School, in Livingstone, Zambia, was opened on the 3rd of October 1956 with a register of ninety nine pupils and a total of ten staff. The school became a technical and a national high school in 1969. Since then it has continued to hold and enjoy a rich reputation owing to its excellent academic performance in as far as School Certificate Examinations are concerned. Most of the school leavers then either went to the University of Zambia or abroad for further studies. Hillcrest was a co-educational school in 1956 to 1972, later became a boys' school in 1973 and then became a co-education again 1992. The school became a senior technical school with Grades 10 to 12 only, in 1985. In terms of ICTs, the school have computer Laboratory with 80 computers and offers lessons to all students at the School. Teachers have also access to the computer laboratory and wireless internet network is available for both teachers and pupils to do their research. The school has a total of 74 teachers and total pupil enrolment of about 2300.

1.2 David Livingstone Secondary School

David Livingstone Secondary School was opened in 1956 after a split from the first Government school in Livingstone which is Hillcrest National Technical School. It started as a Junior Secondary School then later became a primary school. With the growing number of secondary going students Livingstone, David Livingstone was the turned into a secondary school in the year 1999. In 2003 the school was later changed to a High School due to Government policy. In 2014, the school started offering Grade 8-12 due to yet again the change of Government policy.

The school has about 10 computers and an enrolment of about 80 teachers and 3000 pupils.

1.3 Statement of the problem

These schools have tried to put in certain measures in order to improve the impact or use of ICTs, through purchasing more computers and scheduling computer lessons as a subject especially with the coming of the new curriculum, as a subject for each class, and lobbying for skilled manpower to handle computer classes. All teachers who are illiterate on the use of ICTs are encouraged to undergo training through workshops organized by schools. Despite these measures put across by schools to improve the negative impact of these ICTs in most schools, it appears ICTs has not

brought about the widespread changes in teaching methodologies to enhance quality education that was initially hoped for and also learning processes. As noted in the world Educational Report (UNESCO,1998), education worldwide is facing a significant challenge in preparing students and teachers for “our future” during a time when most teachers are not prepared to use ICT and “the majority of existing school buildings, even in the most developed countries, are not equipped to integrate the new information and communication technologies.” The few schools that have proper ICT facilities do well in the delivery of quality education. This study therefore, investigated the use of ICTs in the delivery of quality education at Hillcrest National Technical School and David Livingstone Secondary School in Livingstone.

1.4 Research objectives

The general objective of the research was investigate the usage of ICTs in the delivery of quality education at Hillcrest National School and David Livingstone secondary School in Livingstone with the following specific objectives

- i. To establish usage of ICTs as means of accessing academic information in schools.
- ii. To identify the benefits of application of ICTs in schools.
- iii. To discover the challenges faced accessing ICTs in schools
- iv. To suggest measures towards improvement of the status and use of ICTs in schools.

2 .0Literature review

The literature review specifically look at the need and usage of ICTs as a means of accessing academic information, benefits associated to ICTs, challenges and later look at measures to improve these ICTs.

2.1Needs and usage of ICTS

Students need ICTS in their education for a number of academic reasons like research, preparing for assignments and exams and generally to improve the standard of education. Becta,(2003) indicated that broadly speaking the research into the use of ICT in teaching and learning is fairly consistent in finding that ICT helps improve writing and reading skills, supports collaboration and develop speaking and listening skills. In this vein, Becker,etal (1999) conducted a study in selected senior High Schools in the Tema Metropolis in Ghana and it was revealed that those who used ICT

facility attested to the fact that Internet and computers had helped them to achieve new things which they could not have done . According to a study done by Condie and Munro (2007) done in India, on the use of ICTs in teaching and learning ,they concluded that the use of ICTs has had positive effects in a number of subjects, as well as being constructive in assisting students that are marginalized as a result of personal issues.

2.2 Benefits of application of ICTs in school

The use of technology in the learning environment has become an unstoppable force in recent years. . The uses of ICTs are making major differences in the learning of student and teaching approaches. According to Volman and Eck, (2005) Schools in the western world invested a lot in the ICTs infrastructure over the last 20years, and students used computers more often and for a larger range of applications. The studies review those teachers who use ICTs facilities mostly show higher teaching gains than those who do not use. Kulik's (1994) finding across 75 studies in the United States showed the following: teachers who used computer tutorials in mathematics, natural sciences and social sciences scored significantly higher on their student's exam results subjects. Teachers who use simulation software in science also produced higher results. As put by Volman and Eck, (2005), there is a common belief that the use of ICTs in education contributes to a more constructivists learning and an increase activity and better responsibility of students. In this line Diaz (2002) conducted a study in Wales were it was discovered that teachers made significant progress where schools rated ICTs use and its perceived impact as significant or substantial. One component of the report found out that ICT use led to increased commitments to the teaching task, enhanced enjoyment and interest in teaching, an enhanced sense of achievement in teaching, and enhanced self-esteem. It was noted Schools with good ICTs in science related subjects achieved on or above standards, while schools with no satisfactory use of ICTs scored below set standards

2.3 Challenges in the usage of ICTS in schools

A study by the Organization for Economic Cooperation and Development (OECD), (2009), involving 14 countries, confirmed that there were a number of challenges inhibiting the use of ICTs in education. These challenges included an inconsistent number of computers to students, a deficit in maintenance and technical assistance and finally, a lack of computer skills and or knowledge among teachers, lack of confidence, accessibility, and lack of time, fear of change, poor appreciation of benefits of ICTs and the age

Frederick and Manion (2006), in his study on challenges associated with ICT use in Nigerian schools showed that student mobility, special needs, and anxiety over standardized test results are the main challenges associated with ICT use. Whelan (2008) also identified more barriers from the student perspective in his study in Egypt's school as including, subpar technical skills that reduce access to ICT in classroom, an insufficient number of academic advisors and lack of timely feedback from instructors, reduced interaction with peers and instructors and lastly lack of ICT equipment to use.

Additionally, Baylor and Williams (2002), in an examination of a number of American public schools, discovered that teacher related issues were crucial in determining ICTs use in the classroom..Gressard and Loyd (1985) asserted that teacher altitude towards ICTs was one of the key factors which determined successful use, while Baskins and Williams, (2006) indicated that substantial body of research identifies time constraints as an important challenge to the use of ICTs in teaching. Becta (2004) in particular, found that teachers who failed to fully use technology were often restrained by lack of time. Among the major concerns expressed by teachers were the time needed to: locate internet advice, prepare lessons, explore and practice using the technology, deal with technical issues and receive adequate training

On the other hand, Castro and Law (2011) asserted that teacher competence refers primarily to the ability to integrate ICTs into pedagogical practice. Pelgrum (2001) found that lack of knowledge/competence in technology, among teachers in developing nations was the primary obstacle so the uptake of ICTs in education. In relation to the lack of knowledge is the lack of training opportunities among teachers. One finding from Pelgrum's (2001) study was that there were not enough training opportunities for teachers in the use of ICTs in the classroom.. Similarly, a study conducted by Cox et al (1999a), argues that ICTs training for teachers need to incorporate pedagogical aspects

Additionally, a study done by Deanes ,(2003) in Southern African countries noted that one of the major constraints of ICT development has been the lack of adequate ICTs infrastructure.. UNESCO (2004) also added that, the effective use of ICTs would require the availability of equipment, supplies of computers and other proper maintenance including other accessories. Most of the rural areas in Africa do not have electricity and therefore one cannot even run a computer

in the first place. The development of the ICTs infrastructure in a country is dependent on the availability of a reliable electricity supply.

3.0 Research methodology

The research design used in this research was a comparative study as it helped describe two units in detail, in context and holistically. It should be noted that in a comparative study, a great deal can be learned from new examples of the phenomenon under study. It can allow an in-depth investigation on the problem at hand. It brought about deeper insights and better understanding of the problem faced by students. The sample firstly considered Grade 12 the pupils of these schools as these seen to have been at these school of long period. At Hillcrest a total of 120 grade 12s and David Livingstone a total of 130 grade 12s. The second group included teachers at these schools as they are the ones that are supposed to use ICTs in their teaching and learning process. The school personnel establishment for Hillcrest National School is 74 while at David Livingstone Secondary School there were 78 teachers. The third group comprises of 2 ICT co-coordinators. The sample size was 80 pupils, forty (40) pupils from each school and twenty (20) teachers which was ten (10) from each school and two (2) ICT coordinators meaning one (1) from each school. The sampling frame used was the establishment registers for 2014 while simple random sampling was used as a sampling technique. Primary data was collected using questionnaires and interview guides. The analysis of quantitative data was done using Statistical Packages for Social Sciences to come up with frequency distribution, percentages and graphic presentation in form of tables. The qualitative data was analyzed manually though content analysis, categorization and coding of themes.

4.0 Presentation and Discussion of findings

4.1 Introduction

At each schools a total of forty (40) Questionnaires will distributed to grade twelve (12) pupils and all the 40 questionnaires were completed and returned. In the other two groups, that is the teachers

and ICT coordinators, a total of twenty two (22) semi-structured questionnaires were distributed and there was a 100% response rate.

4.1 Pupils source of information

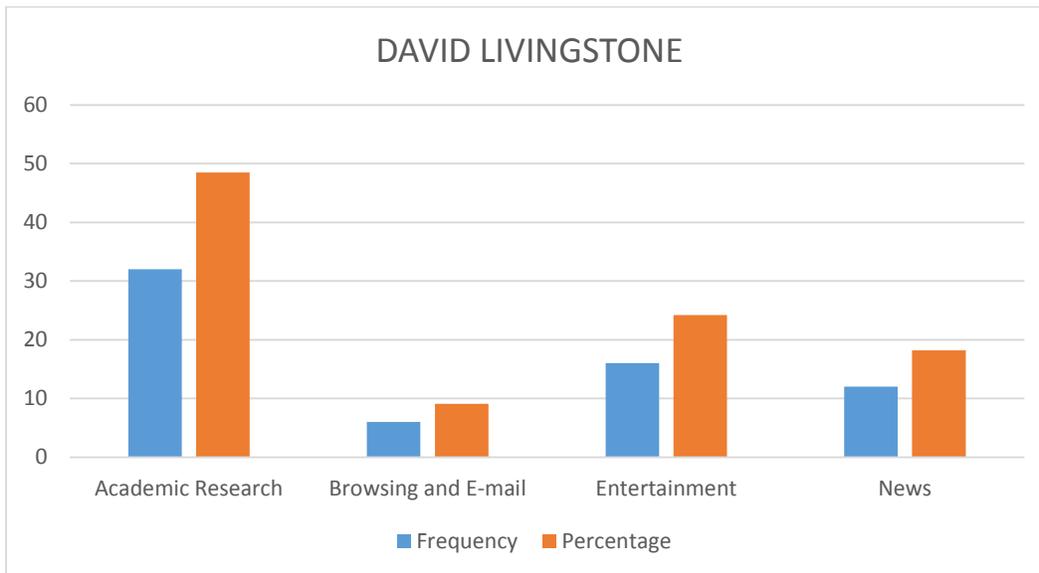
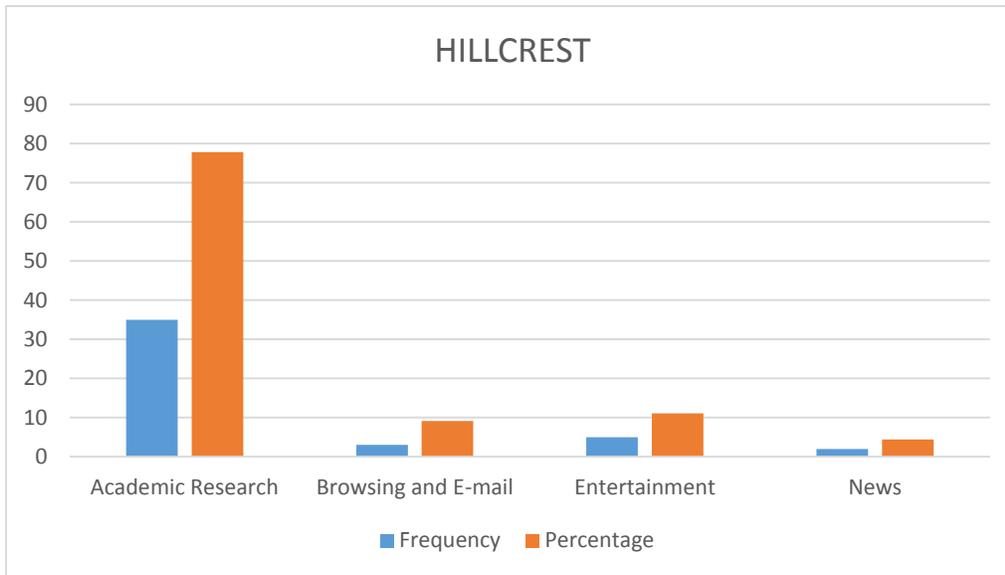
From the findings of the study, 100% of the respondents at Hillcrest indicated that they accessed information that they used in their studies mostly from the Internet. In this regard, internet is seen as the best source of information. This is in agreement with Sivin (1998), who said that the majority of the pupils appreciate the usefulness of Internet in accessing information for academic purposes. David Livingstone's case is different where 50% of the respondents indicated that they accessed information from their friends, then, 30% and 20% indicated that they accessed information from the library and internet respectively.

4.2 Pupils ICTs needs

In relation to pupils ICTs needs, 100% of respondents from Hillcrest stated that they needed both computers and internet while 80% and 20% of respondents from David Livingstone indicated that they needed computers and Internet respectively. Evidently, pupils at the two schools have appreciated the role ICTs can play in enhancing their learning and improving their performance in school. This is in line by Cuban (1996) who noted that there had been a groundswell of interest in how computers and internet can best be harnessed to improve the efficiency and effectiveness of education at all levels. The findings are further supported by Haddad et al (2002) who discovered that computers have become motivating tools for teaching and learning in schools. This is also in line with Sivin (1998) who observed that, the use of the internet in accessing information on various subject areas is imperative as it makes valuable contribution towards the quality of students learning. The observation is also put forward put by Morrison (1999), who said that when used appropriately, ICTs have the potential to enhance learner's achievement and assist them in meeting learning objectives. The findings of the study also correspond to that of Shelly, Cashman (1999), who explained that computers can provide many unique, effective and powerful opportunities for teaching and learning. These opportunities include skill- building, practicing real world problem solving, interactive learning, discovery learning and linking learners to instructional resources.

4.3 Use of ICTs

Figure 1. Use of ICTs at Both School



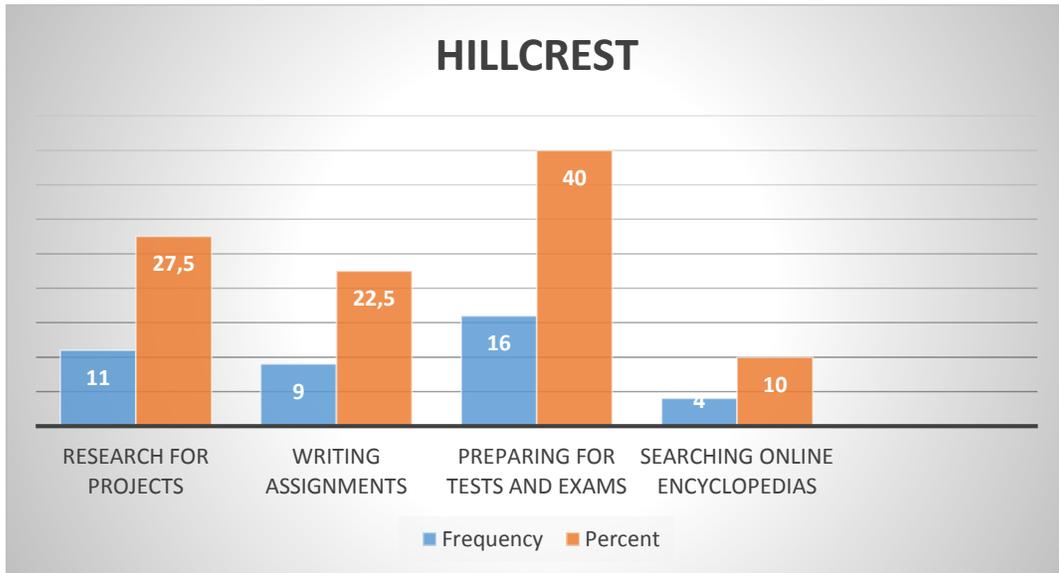
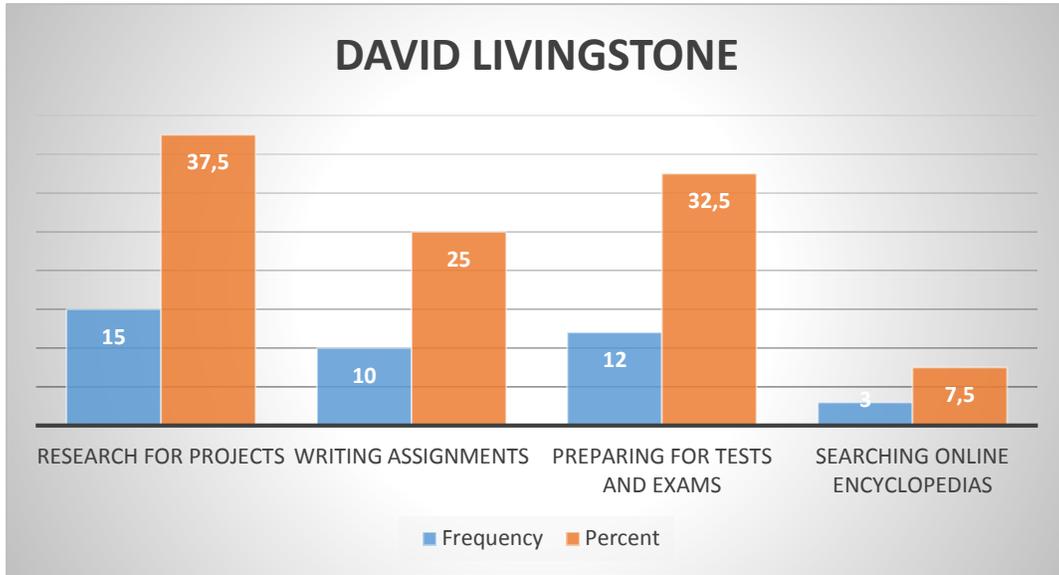
From the finding of the study, it showed that 48.5% of pupils from David Livingstone indicated that they used ICTs for academic research. In contrast, the findings from Hillcrest showed that

77.8% of pupils from indicated that they used ICTs for academic research. Availability of ICTs at Hillcrest makes pupils use more internet than David Livingstone. These findings are similar by those found by Becker, et al (1999), who conducted a study in selected Senior High School in the Tema Metropolis in Ghana consisting of 120 students and it revealed that less than 50% of the students respondents used the computer and internet facility for entertainment, whereas less than 25% used the facility for research and learning. As regards to e-mail usage and browsing, less than 10% of student's respondents used the facility.

On the other findings concerning which subjects they mostly used ICTs for, 50% of pupils from David Livingstone said that they used them for Mathematics while 40% said for Science related subjects. From Hillcrest on the other hand, 55% stated that they used them for Science related subjects while 40% said for Mathematics. This is in line with what was done by Curriculum Online survey (National Center for Social Research, 2006) on the impact ICTs in specific subjects areas who stated that the proportions of primary and secondary teachers considered ICTs as e important in the teaching of specific subjects. Findings in this research are similar to that conducted by Becta (2003) who discovered that in secondary schools, substantial increases were observed in the percentage of teachers who considered ICTs as important aspect of teaching mathematics, science, geography, music and modern languages. In mathematics, the key benefits identified from research into ICTs use have increased pupil's motivation, a more concentrated focus on strategies and interpretation, faster and more accurate feedback to pupils and greater pupil's collaboration and co-operation (Becta, 2003. Additionally Rogers (2003) concluded in his research that the use of ICTs has had positive effects in a number of subjects, as well as being constructive in assisting students that are marginalized as a result of personal issues.

4.4 Benefits of using ICTs

Figure 2 for both Schools



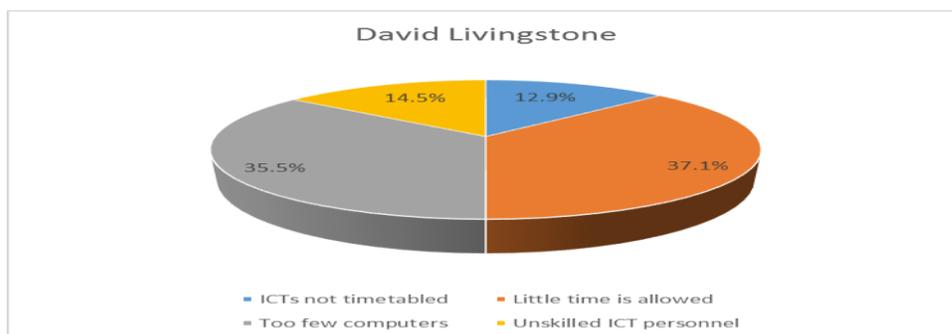
Concerning the benefits pupils derived from the use of ICTs services, the findings from David Livingstone showed that 37.5% of the students stated they benefited from the ICTs when doing research for projects while 32.5% benefited when preparing for tests and exams. From Hillcrest on the contrary, 40% benefited when preparing for tests and exams while only 27.5% benefited

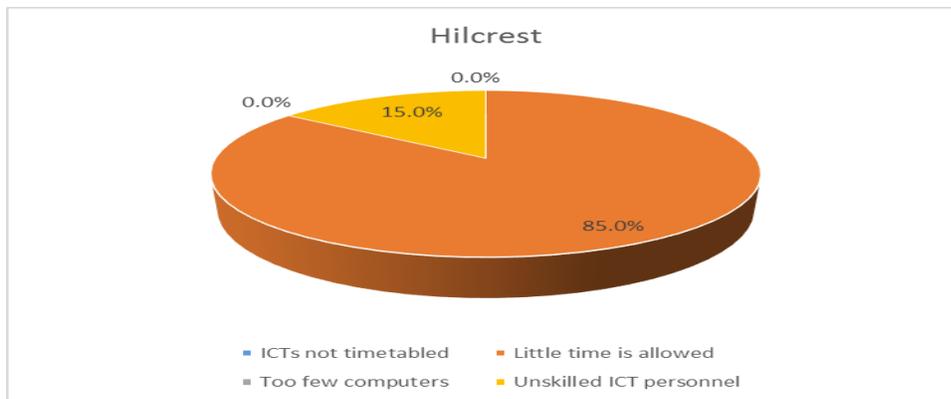
when doing research. A good number of them stated that ICTs enabled them to research widely and write good assignments. These findings is supported by Becta (2004) who discovered that broadly speaking, research into the use of ICTs in learning is fairly consistent in finding that ICTs helps improve writing and reading skills, supports collaboration and develops speaking and listening skills.. On the responses from teachers concerning the benefits of ICTs, teachers from both schools stated that they use them for accessing their lesson materials. Others said that they used them in keeping records, preparing lessons for their classes and preparation of schemes of work/lesson planes. This is in agreement by what was stated by Bush and Mott (2009) that ICTs impacts on a large section of education, from records keeping and school websites to the creation of online learning communities.

The key informant who is the ICT coordinator at David Livingstone indicated that the ICTs benefit that have been observed in both teachers and pupils *included availability of teaching and learning information and also exchange of information with other teachers*. The key informant from Hillcrest who is the ICT coordinator indicated that benefits for teachers *included easier planning and preparation of lessons and designed materials. Then the students gained an understanding of analytical skill, improvement in reading, comprehension and development of writing skills including spelling and grammar to a larger extent exam results had improved as compared to other secondary schools in the province.*

4.5 Challenges in using ICTs

Figure 3 for both Schools.





Pupils from both schools also faced more than one challenge as shown by the findings. It can be concluded that the challenges were enormous especially from David Livingstone. From David Livingstone, 37.1% of the respondents stated that they had little time allowed to use the computers while 35.5% said that the computers were too few. Other challenges faced by some pupils were that the ICTs were not timetabled and the unskilled ICT personnel and hence it was not taught as a subject.

From Hillcrest, 85% of the respondents indicated that there was little time allowed to them when using the ICT facilities while 15% said that there were unskilled ICT personnel at the school thus making the lessons difficult for them. The findings are similar OECD (2009) who conducted a study involving 14 countries, also confirmed that there were a number of challenges inhabiting the use of ICT in education. These challenges included an inconsistency number of computers to students, a deficit in maintenance and technical assistance and, finally, a lack of computer skills and or knowledge among teachers, lack of confidence, accessibility, lack of time, fear of change, poor appreciation of benefits of ICT and age.

The research findings revealed that teachers from both schools too faced some challenges especially for David Livingstone where teachers indicated challenges that included inadequacy of computers, lack of time, lack of knowledge about ICTs and little previous experience with computers and lack of training.. Few teachers at Hillcrest stated that there was no support if something went wrong with computers, age and also lack of competence to use computers. The challenges stated are in agreement with Pelgrum (2001), who stated that obstacles for ICTs implementation included the insufficient number of computers, teacher's lack of ICT knowledge/skills, difficult to integrate ICT to instruction, scheduling computer time, insufficient

peripherals, not enough copies of software, insufficient teacher time, not enough simultaneous access, not enough supervision staff and lack of technical assistance. On other hand, the ICT coordinator at David Livingstone indicated that the challenges faced were enormous. The Co-ordinator summarized the challenges as

“ the insufficient number of computers to use. Other challenges included lack of training opportunities for teachers, inadequate space to locate computers appropriately, not enough staff for supervising computers/ internet using pupils and lack of interest/willingness of teachers to use computers/the internet, lack of funds, problems scheduling enough computer/Internet time for different classes, lack of interest/willingness of teachers to use computers/the internet, lack of knowledge/ skills of students in handling computers and also teachers felt uncomfortable because some are more competent with ICTs than they are. ’

In the case of the ICT Co-ordinator from Hillcrest the challenges were summarized as ‘ *not enough staff to supervise computers internet using pupils, problem scheduling enough computer/internet time for different classes and also lack of regular in-house training for computer lessons for teachers*’. From the findings, it can thus be conclude that David Livingstone has a lot of problems as compared to Hillcrest which has only two because of the few computers they have.

4.6 Measures to improve ICTs

It was imperative to find out what the respondents thought could be the measures that school management should implement in order to solve the challenges faced. From the findings, majority of the pupils and teachers including key informants (ICT coordinators) from David Livingstone school stated that their school needed to provide more computers. Other measures as indicated by some pupils were providing training in ICTs to them which was to include hands-on training, employ ICT skilled personnel and put up a timetable for computer lessons for all classes and add more periods for those timetabled classes. Teachers and ICT coordinator felt that there was need for in-house training in ICTs focusing on MS Word, MS Power point and Internet Explorer to be provided to them and provide computers in the staff room.

Hillcrest on the other hand had few recommendations from both teachers and ICT coordinator like regular in house training for all teachers and provision of computers in the staff room so they do there research between periods.

The findings from this study also correspond with those of Akbaba-Altum (2004), who discovered that ninety six percent of teachers in his study on teacher preferred training agreed with the provision of informal training in word processing, excel, and power point. He further stated that the study demonstrated that teachers preferred such trainings as opposed to sessions where copious amounts of information are distributed and teachers are sometimes left to wade through it themselves.

4.7 Conclusion

ICTSs have become an integral part of our personal and working lives. The prevalence of ICT requires educators to ensure that all students are capable of full participation in this digital world. The research revealed a positive finding on the respondent's impact of the ICTs as a very important tool for academic purposes and can widen knowledge scope of users. However, it was discovered that a substantial proportion of respondents do not access information using ICTs (computer/Internet) due to various challenges faced. Overall, David Livingstone pupils have less usage of computers than Hillcrest pupils this was due to very few computers in the school. Other challenges included lack of training, little time allowed for use, lack of knowledge, lack of support by management and also ICT not being taught as a subject. Generally, the majority of pupils and teachers do not use ICTs in their teaching and learning process. It was thus recommended that

- ICT training should be provided in the schools, during teaching time, making use of the ICT equipment that teachers themselves use..
- More time should be allocated to ICT instruction for all grades at both David Livingstone and more periods should be added to Hillcrest National School.
- At David Livingstone, the computer laboratory should be expanded, or if possible, establish another one, to make pupils accessibility to ICTs quicker, efficient and effective.

References

Akbaba –Altum, S. (2004) *Information Technology Classroom and Elementary School Principles' Roles: Turkish Experience*, *Education and Information Technologies*, 9(3) 255-270.

Baskin, C. and Williams, M. (2006). 'ICT Intergration in schools: Where are we Now And What Comes Next?' *Australasian Journal of Education Technology*, 22(4) 455-473.

Baylor, A. and Williams, M. (2002). 'What factors facilitate Teacher Skill, Teacher Morale, and Perceived Student Learning in Technology-using Classrooms?' *Computers & Education*, 39(1) 395-414.

Becker, H.J., Ravitz, J.L., & Wong, Y. T. (1999). *Teacher and teacher-directed student use of computers. Teaching, learning and computing national survey* (Report no.2). Irvine, California.

Becta (2003). *What the research says about Barriers to the Use of ICTs in Teaching* [online], available at: http://partners.becta.org.uk/uploaddir/Downloads/page_documents/research/wtrs_barriersinteach.pdf. accessed on 14/02/14.

Becta (2004). *A Review of the Research Says about Barriers to the Use of ICT in Teaching* [Online], available: <http://partners.becta.org.uk/uk/uploaddir/>. accessed on 14/02/14

Branson, R.K. (1991). *The School Year 2000 Concept at Northwestern*. London: London Press.

Bush J. and Mott W., (2009), *The Transformation of Learning with Technology- Learner Centrality, Content and tool Malleability, and network effects* *Education Technology Magazine* (March- April). www.jonmott.com/blog/wp-content/uploads/2009/05/et-bushmott. accessed on 19/5/ 2009

Cashman, S. (1999). *Teachers Discovering Computers, Integrating Technology in a Connected World*, Los Angeles: Congage Learning:

Castrol L., & Law J. (2011) 'Teachers' Attitudes Towards Information and Communication Technologies: The Case of Syrian EFL Teachers', *Computers and Education*, 47 (4) 373-398.

Condie, R. and Munro, B. (2007). *The impact of ICT in Schools- A Landscape Review*. Coventry: Becta Research.

Cox, M., Preston, C & Cox, K (1999). *What factors Support or prevent Teachers from Using ICT in their Classrooms?* Paper presented at the British Educational Research Association Annual Conference, University of Sussex, Brighton, November.

Cuban,L. (1986). *Oversold and Underused: Computers in the Classroom*. Cambridge; Harvard University Press.

Deaney, R., (2003), *Sustainability and Evolution of ICTs- Supported classroom Practice*, Cambridge: University of Cambridge Press.

Diaz, J. (2002). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Research Council.

Forcier .R.(1999),*The Provision of Information and Communication Technology Resources in the Mpumalanga Department of Education in FET Schools in the Sibande District*, Johannesburg: University of South Africa Press.

Fredrick,L. and Manion,L. (2006). *Research Methods in Education*. London:Routledge.

Gomes, C. (2005). '*Integration of ICT in Science Teaching-A Study Performed in Azores, Portugal*', accepted for International Conference on Multimedia and ICT in Education, 22-24 Apr.

Gressard, C.P and Loyd, B.H. (1985). '*Age and Staff Development Experience with Computers as Factors Affecting Teacher Attitudes Towards Computers*', *School Science and Mathematics* 85(3) 203-209.

Haddad, W.D. & Drexler, A.D. (2002). *The dynamics of technologies for education*. In W. Haddad & Drexler, A.D. (Eds.) *Technologies for education: Potentials, parameters, and prospects*. Washington DC: Academy for Educational Development.

Hussain, I and Safder, M. (2008). *Role of Information Technologies in Teaching and Learning Process; Perception of the Faculty*. Islamabad: International Islamic University Press.

Kozma, R.B. (2005). *Comparative Analysis of Policies for ICT in Education, International Handbook of Information Technology in Primary and Secondary Schools*. New York: Springer.

Kulik,J.A. (1994). *Meta-analytic Studies of Findings on Computer based instruction*. In J.E.L.Baker & H.F.O'Neil (Ed), *Technology Assessment in Education and Training*. Hillsdale, NJ: Lawrence Erlbaun.

Mann, D.; Shakeshaft,C.; Becker, Jonathan & Kattkamp,R. (1999). *West Virginia story: Achievement gains from a statewide comprehensive instructional technology program*. Santa Monica, CA: Milken Family.

Morrison, W.E.V (1999). *Selective Review of Resaerch Studies Showing Media Effectiveness: A premier for Media Directors*. *A.V. Communication review*;22,387-407.

OECD (2006). “*Are Students ready for a technology-rich world? What PISA studies tell us*”, Paris: OECD.

Papert, S. (1993). *The Childrens Machine: Rethinking school in the Age of Computers*. NewYork: HarperCollins.

Pelgrum, W, (2001). *ICT in Education Around the World: Trends, Problems and Prospects*. Paris: UNESCO.

Rogers, E.M.(2003). *Diffusion of Innovation*. New York: Free Press.

Schoep,K. (2005). ‘*Barriers to Technology Integration in a Technology Rich Environment, Learning and Teaching in Higher Education: Gulf Perspective*, 2(1), 1-24.

Shelly,B., , Cashman, B. and Gunter, T. (1999). ‘*A Study on Science Teachers’Attitudes Towards Information and Communication Technologies in Education*’, *The Turkish Online Journal of Education Technology*,8(2) 20-32

Sivin,M. (1998). *Change Forces; The Sequel*. London: The Falmer Press.

Tinio,V.L.(2002). *ICT in Education*. New York: UNDP.

UNESCO (1998). *World Education Report 1998: Teachers and Teaching in a Changing World*. Paris: UNESO.

UNESCO (2004). *Intergrating ICTs into Education: Lessons Learned*. Bangkok: UNESCO.

Volman,M., & Van Eck, E. (2005). *Gender Equity and Information Technology in Education: The Second Decade*. *Review of Educational Research*, 71(4),613-634..

Whelan,S.L. (2008). *The Role of Technology and Computer-based instructions in a Disadvantaged Alternative Schools Culture of Learning*, Computers in the School 28 (1) 39-55