COMPUTERIZATION OF RURAL SCHOOLS IN ZIMBABWE: CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE DEVELOPMENT: THE CASE OF CHIPINGE DISTRICT, SOUTH-EAST ZIMBABWE

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Abstract
In this paper we seek to explain the relevance of introducing Computer Studies in Zimbabwe's rural schools as a means to reduce the access to Information and Communication Technology (ICT) gap between rural and urban schools. We acknowledge the efforts of various stakeholders in education in introducing the Information and Communication Technology curriculum in rural schools in the last ten or so years as a commitment to bringing Science and Technology to the rural pupil. In addition, we further explore the progress that has been made by rural schools that received computers from the Government over the years. In the process, however, we observe that most rural schools have not fully embraced the ICT curriculum owing to a number of challenges. Thus, we contend in this paper that most rural schools that received donated computers had not been capacitated to fully utilise the new technology for the benefit of students, teachers and the community. As a result, most of the gadgets have been lying idle in classrooms due to lack of either proper infrastructural facilities such as computer laboratories and electricity as well as lack of trained ICT teachers. In the final submission, we implore stakeholders in education to facilitate ICT development in rural schools in Zimbabwe so as to increase access, quality and equity in education for sustainable rural development in Southern Africa. The study was qualitative in nature and relied on interviews, observations and use of the questionnaire. Using the theoretical paradigm of curriculum change and innovation, the study revealed that the use of computers for pedagogical purposes is very low in rural schools in Zimbabwe. Basing on this, the research recommends a multi sectoral approach involving government, private sector,

parastatals and other stake holders to ensure that students in rural schools benefit from the new technology.

Keywords: Information and Communication Technology, Computer Studies, rural schools.

Introduction and Background to the Study

The Millennium Development Goals (MDGs) put in place by the United Nations in 2000 highlighted the importance of Information and Communication Technology (ICT) in the global development agenda. The last of the MDGs, goal number eight, implies the need to ensure that the benefits of new technologies, especially ICTs, are made accessible to all for the success of sustainable development. Production of information and knowledge is growing at a tremendous pace and ICT serve as a transmission belt in generation, dissemination and sharing of knowledge (Anderson, 2008). The education sector plays a key role in information and knowledge production hence the need to ensure that all teachers and students are part and parcel of this trend. Zimbabwe, as a developing nation, needs to be part of this new dispensation and this means integrating ICT processes into the education system. There is little doubt that Zimbabwe's education sector is missing out on the benefits of ICT, especially in the rural areas. As the country lags behind in the adoption, use and innovation of ICT, Kachembere (2011), observes that many students and teachers are losing out on better education and well-paying ICT jobs. It is through this realisation that some schools in Chipinge district in Zimbabwe are striving to seize this opportunity to exploit the benefits of ICT for the purpose of teaching and learning. Their efforts are informed by the understanding that ICT in education is a significant key driver for pupil achievement through enhanced production of information and knowledge. The effective use of ICT in education also has the potential to enhance achievement among students through greater collaboration, improved communication and opening of wider opportunities to share information (Victoria, 2011).

From a broader perspective, the benefits from advances in ICTs could also mean an acceleration of economic and social development and greater inclusion of isolated, particularly rural populations, into the mainstream of society (Kabanda 2012). In Zimbabwe, ICT in education is not a very widespread phenomenon, particularly considering rural settings where most schools are not connected to electrical power supply and where some schools hardly have any buildings to house the computers. In fact, Zimbabwe remains at the bottom ten of ICT Network Readiness Index (Reddi, 2004). Chipinge district is largely rural with the majority of the schools unable to offer Computer Studies due to non-connectivity to electrical power supply. This therefore means that teaching and learning has largely remained rooted in the traditional models of delivery. However, traditional systems of teaching and learning have long been outpaced and outstripped by new and dynamic trends. The traditional concept of schooling inside the walls of brick and mortar has been superseded by the spectacle of schooling without walls. Conventional learning set-ups have been overtaken by digital environments and the face-to-face mode of tuition delivery is fast being replaced by online articulated learning and knowledge delivery methods (Kachembere 2011). Education experts however argue that bringing ICT into the learning environment will create opportunities for broader education initiatives that will bring all students into the information era. In an effort to bring the potentially empowering benefits of ICT to the students, the government of Zimbabwe embarked on a massive drive to turn around the education sector by donating state of the art computers to many schools around the country mainly in the rural areas. Connected with that was an effort to train Computer Studies teachers who were badly needed in the schools. To that end, many teacher training colleges, both primary

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and secondary were mandated to train Computer Studies teachers or to offer computer appreciation courses to their student teachers among the programmes they offered. It should be noted, however, that for the past decade or so, Zimbabwe has been limping under the effects of an economic recession which seriously crippled the education sector and also made the country lag behind in this vast digital revolution (BWPI, 2009). Some schools have, however, made significant progress towards harnessing computer technology for the purpose of teaching and learning. This effort has not been without its challenges. Some of the major challenges that schools in the district and Zimbabwe in general are facing are largely associated with the prohibitive costs of purchase and maintenance of computers in the schools. Some schools located in the remote parts of the country have also generally failed to attract not only qualified Computer Studies teachers but qualified teachers for other disciplines as well. After graduating from high school or from tertiary institutions worldwide, graduates are expected to join the working fraternity which hitherto has seen a rise in the demand for computer skills It is vital therefore, that all students, whether in urban or rural settings, are equipped with the necessary ICT skills to fully empower them to participate in the highly digitalised world from a young age. All sectors of education from primary, secondary to university as well as vocational and skills-based education need to harness ICT.

This study therefore sought to ascertain the level of computer use among students in the district as well as to examine whether teachers and heads appreciated the rationale of introducing computer studies in their schools. In most developing countries, educational institutions are facing increasing demand to produce intellectual skills that meet the challenges and goals of a rapidly changing and globalized world order. In Zimbabwe, the Presidential Commission of Inquiry into Education and Training, headed by Nziramasanga (1999) endorsed that, as Zimbabwe enters into the third millennium which is dominated by economic competitiveness and communication technology, the State is required to revamp or change and innovate its educational curriculum and provide relevant technological equipment to enable students to develop skills that are essential for a technological age. For any curriculum to remain relevant to the people it serves, it has to continue to serve the needs and interests of those people. If the curriculum of Zimbabwe endeavours to remain relevant to the people of Zimbabwe, it should embrace the technological change brought about by ICT that is prevalent in the society.

Conceptual Framework
The study concerns itself with curriculum issues: change or innovation and curriculum content organization. For any curriculum to remain relevant to the people's expectations, it has to continue to serve the needs and interests of its beneficiaries (Fullan 1993). In the case of Computer Studies, rural secondary school students are the beneficiaries. Arguments were often advanced concerning whether the curriculum should continually change or remain static. Two contrasting theories emerge to this end. Some notable classical educationists like Plato were of the idea that the curriculum was a fixed and static device for bringing about the desired educational processes. During his era (and to a certain extent even today), there were in-built devices to ensure permanence rather than to permit or promote change and this has always presented threats and challenges to curricula reform.

On the other hand, modern times have witnessed shifts and turns in the curricula provision in different education systems. The justification presented being that society is in a constant state of flux. It is not static, but is ever changing in terms of value, belief, and knowledge systems, and a host of contemporary pressures that demand change in society. Fullan

(1991, p. 3) supported the need for change when he said, "Everything must change at one time or another or else a static society will evolve." The support for a static curriculum has long been dispensed with in all the progressive societies, though there still remain products of arguments in support of the traditional view of an absolutist stable curriculum as opposed to a relativist curriculum. Based on the view that curriculum is relative to the needs of the society and should seek to change as those needs change, the theory underlying change is, therefore, justified and curriculum change, like any other change in any other sphere of life, is as necessary as it is inevitable. This view provides the theoretical background of this study on the computerisation of the rural secondary school curriculum. If the secondary school curriculum is to remain relevant, it should embrace the technological change in the society by equipping its products (students) with the relevant computer skills so that they fit well in the labour market and in industry and commerce.

Based on the ongoing argument, implementation of Computer Studies as a subject in rural secondary schools as a curriculum reform or innovation is justified provided it is done in line with these principles of change. However, the tendency in post independence Zimbabwean curriculum reform is that it tends to be piece-meal and spontaneous (Nkomo 1995), resulting in what "pot hole sealing" or what curriculum experts identify as stop gap measures. Curriculum that comes out of such circumstances tends to be disjointed, poorly organised and often lacks proper rationalisation, leading to passive resistance or total "tissue rejection" by the user community.

This article is also rooted in the issue of equity and equality of provision of educational resources and access to the same curriculum implementation by all Zimbabwean secondary school students. It also seeks to explore the rationale behind the introduction of Computer Studies as a curriculum improvement for rural secondary schools in Zimbabwe. It articulates as well as defends the relevance of Computer Studies to students attending rural secondary schools, arguing that these students from poor backgrounds should also have access to Information and Communication Technology (ICT) in the same way as their urban counterparts. Feldman (1993) maintains that the 20th century has largely been dominated by a techno-centric educational paradigm shift for most countries in the world. This is particularly true in the case of the use of computers, with emphasis on learning about technology in order to meet the perceived needs of contemporary life. Thus, the rural and urban students have to face this reality inevitably, hence the need for students attending poor rural schools to access knowledge of ICT as well.

Statement of the Problem and Research Questions
The knowledge of Information and Communication Technology (ICT) has become the *must-have* breed of knowledge for many a school leaver in the recent years. This was comparatively easy for the pupil in an urban environment owing to his/her closeness to a number of institutions offering Computer Studies. The pupil in a rural setup has lagged behind in accessing ICT knowledge because computers are not readily available. This has greatly disadvantaged the rural school pupil, hence the underlying principle behind the introduction of Computer Studies as a subject in rural secondary schools. However, the following research questions became critical as they formed this study's basis for considering the extent to which the computerisation of the rural secondary school was feasible:

- What is the level of Chipinge district rural secondary schools' preparedness to include or add Computer Studies to their curriculum?

- How many student teachers per intake take up Computer Studies as a subject/course of study at teacher training colleges and how many of these teachers are deployed to rural secondary schools?
- What is the perception of school heads, teachers and the community towards Information and Communication Technology (ICT) in general and Computer Studies in particular?
- How does the Ministry of Education, Sport, Art and Culture promote the implementation of Computer Studies in rural secondary schools?
- What is the role of politicians in promoting the teaching and learning of Computer Studies in rural secondary schools?
- Who are the beneficiaries of the introduction of Computer Studies in rural secondary schools?

The above research questions were carefully raised to inform the study's quest to explore the rationale behind the introduction of Computer Studies in the rural secondary school curriculum. The questions are also set to unearth some of the underlying issues that affect the implementation of computer studies in most rural secondary schools.

Research Design

The success of any research depends on the choice of the methodological framework and the research design used to carry out that research. This is further emphasised by Mavhunga (2000) when he says that an appropriate research design provides a systematic strategy and plan for selecting, rationalising and organising the sequence of procedures for collecting and handling the evidence or information relevant to solve the research problem. For this article, we chose the case study methodology framework which lends itself more to the qualitative research paradigm or design. We have the confidence of Hitchcock and Hughes (1995, p. 26) who maintain that:

> …the process of education, teaching and learning are so complex and multifaceted that to focus only upon cause and effect, products, outcomes or correlations on research in schools is of limited value. The complexity of the education process demands the use of a variety of techniques and the qualitative research design becomes the most appropriate paradigm.

Of the same perspective are Cohen, Manion, and Morrison (2007) who expound that educational phenomena, by their nature, lend themselves more to interpretive analyses, hence are best explored by use of case studies. Yin (1994) further argues that a case study is most suitable as a research design in education for it is an enquiry into the real life issues as opposed to the contrived contexts of an experiment or a survey. Furthermore, the case study design was employed in this article because it is the only qualitative research design that displays the belief that human systems develop a characteristic wholeness or integrity and are not simply loose connections of traits. As a result of this belief, researchers who use case studies hold that to understand a case, to explain why things happen as they do, and generalise or predict with certainty from a sample of cases, require an in-depth investigation of the interdependencies of parts or samples and of the patterns that emerge thereof.

Population and Sampling

The study population consisted of 100 teachers and ten (10) school heads from which a sample

of 50 teachers and five (5) school heads was chosen. The five schools were purposively chosen on the basis of their different responsible authorities and the fact that the schools are located in reasonably different geographical areas. Two government day schools (urban and peri urban), one rural council day school, one rural mission boarding school, and one rural private boarding school formed the sample. This was meant to provide diverse views regarding the level of computer use in the schools because as conditions differ geographically or otherwise, experiences are also bound to differ. These five schools were considered to be relatively well established schools in Chipinge district and therefore were in a position to provide traceable records of computer establishment processes in their schools. It was also noted that the schools were examination centres for the Zimbabwe Schools Examination Council (ZIMSEC) subject examinations, excluding Computer Studies. Schools which offered Computer Studies but were not host to ZIMSEC examinations in Computer Studies did not qualify to be part of the sample.

Schools were put into tiers based on their geographical location and responsible authority and one school was randomly chosen from each stratum. At each school, the names of the teachers were put into two separate boxes one for males and the other for females, the names were then picked at random. Four males and four females were selected for questionnaires. Using the same method, one male and one female were selected for interviews. This brought the total number of respondents to ten teachers per school. Stratified random sampling was thus very useful in ensuring gender balance. The researchers chose to interview two teachers per school, that is, one Computer Studies teacher and a non-Computer Studies teacher. This was meant to validate some of the information gathered from the questionnaire. It was hoped that more detailed information could be solicited from computer literate teachers who were charged with the task of teaching Computer Studies on a daily basis.

Research Methodology and Data Collection
The research was qualitative and heavily relied on interviews and use of the questionnaire. In order to understand the determinants of computer use for teaching and learning, the feelings, opinions, attitudes and perceptions of the participants in the study, had to be taken into account. Teachers and heads as human beings have feelings, emotions, and perceptions and the qualitative research model is suitable to probe such inner feelings. Through interviewing both the teachers and the heads, the study was thus able to gather in-depth data on the level of computer use, impediments to effective implementation of computer studies subject in some schools, and the extent to which teachers and heads appreciated the need to offer the subject in their schools. The data obtained through interviews was analysed manually. Although the study preponderantly used the qualitative model, quantitative data was also collected in the process. This in line with Cohen *et al* (2007) who assert that a number of social researchers have since realised the need to use both types of data (mixed methods approach) if a true picture about a phenomenon is to be revealed. In this research, quantitative data that was gathered included statistics relating to classes taking computers, number of computers in the respective schools, number of qualified ICT teachers, and the ratio of students to computers. This was meant to generate a hypothesis on the extent to which computers were used for teaching and learning in the schools. The data collected using the questionnaires was analysed using the Statistical Packages for Social Scientists (SPSS) Version 16.0.

Data Collection Instruments
The research made use of three instruments to collect the data for this article, namely interviews,

document analysis, and observation strategy. The instruments were used concurrently in order to increase the validity of the research outcome. This is in line with Cohen *et al* (2007)'s contention that if two or more different data collection instruments are used, then the validity of the research results is not only increased but assured. A brief presentation of how each of the three instruments was used is included below.

Interviews. Each of the identified participants was approached by the authors with interview protocols or set of interview questions which were open-ended. The interview protocols had spaces at the end of each question to allow the authors to write down reflective notes on how the participant responded. At the same time, the open-ended questions had the advantage of offering the participants a wider scope of flexibility. For each question, the authors had an opportunity to follow up on any revealing leads given by the participants. In this respect, Mavhunga (1998) posits that probing the participants further may help clear the misunderstandings and misconceptions that may arise.

Document Analysis. We visited all the five participating rural secondary schools and asked to look at all documents related to infrastructural developments, curricula, enrolment patterns, and pass rates. The documents identified provided additional information regarding the level of preparedness to offer Computer Studies prior to receiving the computers.

The Observation Strategy. During the visits to the five rural secondary schools we also had the advantage and opportunity to record information picked up through the participant observation strategy. We were able to identify the attitude of various participants towards the introduction of Computer Studies and the availability of computers at their school.

Results and Discussion. On the issue of whether the schools used computers for administrative purposes, all five (5) heads (100%) indicated that use of computers was crucial for the running of the school. The heads cited various areas for which computers were being used in the administration of their schools.

Table 1. Functions of Computers in the School Administration School

Rural School	Number of computers prior to Government donation	Function of computers in the school
School A	1	Keeping financial records and typing administration material like students and staff records.
School B	1	Typing administrative documents like minutes and circulars.
School C	3	Typing examination materials, making exam schedules and the school timetable.
School D	2	Keeping enrolment figures, typing and performing other administrative functions.
School E	2	Typing the timetable, exams and keeping school records.

Sentiments raised by the heads revealed that despite some challenges that the schools were facing, computers were being used to perform administrative work of which the most common was typing and storing administrative and financial records. Heads from two government schools indicated that since they had very few computers and considering the high pupil- computer ratio which stood at about one computer per forty students, it was prudent to allocate most of the

computers to the students and retain only a few for administrative work. The heads also indicated that most schools did not have the resources to purchase enough computers for the whole school. Some schools benefitted from donations made by the Government, their School Development Committees (SDCs), and individual parents.

Use of Computers for Teaching and Learning across the Curriculum
In response to the issue of whether computers were being used across the curriculum, the majority of the interviewed teachers (74%) indicated that computers were not being utilised in all facets of the curriculum. They indicated that the use of the computers must spread across all subject areas, other than just being used as instructional tools in a single subject area. In fact, the teachers observed that computers were being utilised solely for Computer Studies lessons. It should be noted, however, that through utilisation of suitable software, computers could be used to teach subjects like Mathematics, Science, Geography, Art, Physics, Biology and other subjects.

General Trends in Rural Schools
It emerged from the data collected that most of the rural secondary schools that received computers from the Government were not prepared to start offering Computer Studies to students. While the computers were welcome, the school Heads submitted that the computers became a big liability to the schools. The major reason was that the schools had no proper computer laboratories to house the computers. In the majority of the cases a classroom had to be converted into computer laboratory and the school had to spend some money adjusting the rooms to accommodate the computers. At two of the five rural secondary schools electricity was not available in the school buildings. The schools had to expedite the electrification of at least one building or block (room) where the computers would be kept.

All the five rural secondary schools had no qualified Computer Studies (ICT) teacher, let alone the Computer Studies syllabus. This meant that some teachers with basic computer knowledge were asked to chip in and help teach students computer appreciation skills. The Education Officers (staffing) also lamented the situation at most of these schools saying that there was nothing they could do to assist with providing trained Computer Studies teachers apart from waiting for the deployment of such teachers from the provincial office. They said the district office did not receive any Computer Studies specialists deployed to the district year in and year out and that meant the schools had to improvise.

To make the situation worse, most teachers' colleges do not train teachers specifically in Computer Studies. It is only recently that one college, Mutare Teachers' College, began training teachers of Computer Studies. It is hoped that when the first intake of student teachers specialising in Computer Studies complete their teacher training course, the problem of shortage of Computer Studies teachers will be alleviated.

Introducing Computer Studies in Rural Schools: A Technological Imperative
Computer Studies is one of the numerous practical subjects in the Zimbabwean secondary school curriculum. It is regarded as a technical or vocational subject that is taught at poly-technical institutions, colleges, and universities as Information and Communication Technology (ICT) throughout the country. Most of the graduates from these colleges are absorbed by many institutions that deal with ICT as well as industry. Thus, Computer Studies has become one of the many vocational subjects that create employment opportunities for many school leavers.

This is in response to the post-independent Zimbabwean high unemployment rate which was attributed to the failure by the school curriculum to "…reward with opportunities those who went through it" (*The Sunday Mail,* 15 June 1997). The argument was that the school curriculum was too academic and insufficient to foster total human development. To this end, a philosophy purporting that education needs to stress more skills training in order to address manpower shortages in the technical categories of labour has emerged (UNESCO Monograph, 1994; Ndawi 1997). Thus the introduction of Computer Studies in rural secondary schools is relevant as it further buttresses the integration of vocational training in the secondary school curriculum. The following points can also be presented as the rationale behind the introduction of Computer Studies in rural secondary schools:

- To equip rural school leavers with knowledge and technical/vocational skills useful in an age of increasing technological advancement to enable them to contribute to national and international development.
- To transmit knowledge, skills, and attitudes useful in both employment seeking and employment creation. This assists in addressing the wake of unemployment levels for secondary school leavers in many developing countries such as Zimbabwe.
- To re-orient secondary school students' attitude of their rural school setups and communities so that the students become positive about their potentialities, thereby halting the rural-urban migration.

The above points justify the introduction of Computer Studies in the rural secondary school curriculum from an instrumental and occupational point of view which is encapsulated in the idea of a worthwhile education as vouched by R.S. Peters (1986).

Recommendations

On the basis of the foregoing research findings, this study proposes the following recommendations for the various stakeholders in education:

School Heads and Teachers. School heads should work out modalities to ensure that all students benefit from the meagre resources available in their schools. Offering computer appreciation evening classes in the case of boarding schools might be one way of going round the challenge. Teachers ought to realise that computers are an inevitable technological innovation which has come in the classroom to stay. As such, teachers need to train, through in-service programs, for proficiency in the use of computers in the teaching process.

Rural Secondary School Students, Computers, and Learning. Students must develop keen interest in Computer Studies in much the same way as any of the traditional practical subjects in the schools. Computer skills acquisition for students in rural schools has attracted a number of stakeholders in education such as politicians and the business community. So, students in these areas must take this as a chance to have access to computer technology and develop computer skills. Students in rural schools should embrace the chance and acquire computer skills through increased interest in ICT programmes.

Curriculum Development Unit (CDU) and Computer Studies in Rural Secondary Schools. The Curriculum Development Unit must clearly articulate the short term, mid, and long term goals for the role and place of computers in the country's education system and share these with all stakeholders in education. This is meant to avoid situations where Computer Studies is

introduced in schools without adequately preparing them to offer it.

The Ministry of Education, Sport, Art and Culture. The Ministry of Education, Sport, Art and Culture (MoESAC), through its district offices, should liaise with ICT departments at poly-technical and teacher training colleges to facilitate the in-service training of teachers from rural secondary schools. This will capacitate most of these rural schools and ensure that the teaching of Computer Studies takes place once such schools are ready to start offering the subject. MoESAC should also work with the Zimbabwe Electricity Supply Authority (ZESA), Rural Electrification Agency (REA), and Tel-One (a telecommunication company) to expedite the connection of electrical power supply to some schools, as well as upgrading telecommunication infrastructures respectively. It is also imperative that the schools engage technical support that will ensure that repair services and technical information is provided. MoESAC should work towards engaging skilled personnel to teach Computer Studies by providing programs for in-service teachers who did not do Computer Studies on basic computer skills to better positioned them to assist their students.

Conclusion
The article has pointed out that computer knowledge is very important for all students regardless of their school location. It has also argued that secondary school students in rural schools have lagged behind in this regard and that there is need to introduce Computer Studies in rural schools as well. There is need to equip the pupils attending rural schools with the same computer skills as their urban counterparts. In the main, the authors argue that while the introduction of Computer Studies in rural secondary schools is a welcome human resource development strategy, its implementation has yet to be properly designed and organised especially for rural secondary schools due to their lower economic status. Hence, there is need for all stakeholders in education to consult and liaise with each other to effectively bring Computer Studies to the rural secondary schools.

Study results in the Chipinge district show that the use of computer technology for the purposes of teaching and learning is still very low and, in some cases, non-existent. Teachers are still largely relying on the traditional talk and chalk mode of delivery. Poor ICT competencies and lack of confidence in using new technology are viewed as determinants based on their low levels of engagement in ICT. This confirms Ndlovu's (2012) observation that though a number of schools in Zimbabwe claim to be offering Computer Studies, it is only a minority who are benefitting. Computer Studies as a subject is still a reserve for very few students, mostly in urban setups. This challenge is a result of the shortage of computer textbooks and trained Computer Studies teachers, as well as a lack of proper facilities to apply the subject. Within the curriculum change and innovation framework it is desirable for Zimbabwe to invest heavily in computer technology so as to create a sustainable computer competent generation.

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