



Embracing Computer Networking in the Primary and Secondary Schools Clusters of Harare Northern Central District

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Abstract: *The importance of computer networking in schools cannot be overemphasised and yet most schools are not properly computer networked. Students and teachers are expected to work with network software applications like web browsers and email clients. To support these applications, schools must first put several other technologies in place. Collectively these components are sometimes called the architecture, framework, or infrastructure necessary to support end-user networking, computer hardware, network operating systems and networking hardware. Contrary to the above, most schools in Zimbabwe do not possess the networking capacity expected of them. Computer network embraces the Local Area Networks, or LANs which are the physical networks that provide the connection between machines within say a home, a school or corporation. Computer Networking is the practice of connecting computers together to enable communication and data exchange between them. In general, Computer Network is a collection of two or more computers.*

Keywords: *Networking primary schools, secondary schools, clusters, technologies*

1. INTRODUCTION

Netherlands launched the Better Schools Programme of Zimbabwe (BSPZ) in 1993. It was meant to maintain quality in both the primary and secondary schools by pooling resources together. A traditional approach like face-to-face interaction was set between the primary and the secondary school teachers and heads for e.g., workshopping within each circuit. The interaction also roped various other stakeholders from the business fraternity. The ingenuity was meant to improve the quality of education in schools amid several environmental factors exerting pressure on educational institutions, and they needed to respond and reach a state of equilibrium (Ludwig von Bertalanffy (2016). An overview of Information Communication Technology (ICT) and the user system in the primary and secondary school sector will be dispensed with specific reference to clusters within the Zimbabwe's Harare Northern Central District. The research problem will be enunciated in conjunction with the aim of the study. Subsequently, the rationale of the study will be expressed preceding a review of related literature that systematically takes cognisance of how previous researchers have undertaken comparable areas of study before. An effort to trail gaps or apertures will be pursued to fill the gaps. A philosophy guiding the study will be underscored under the methodology section.

As a government-to-government arrangement, the Netherlands in 1993 launched the Better Schools Programme of Zimbabwe (BSPZ), whereby both primary and secondary schools within vicinity were congregated into circuits as a ministerial policy. Kanyongo (2005) hinted that the main purpose of circuit formation was the in - service training of teachers and school heads with an emphasis on quality improvement through cluster-based staff development. Dondofema (2016) reiterated that, educational resource centers were set up in the ministry's district structures countrywide ensuring connectivity and dissemination of skills. From this study's perspective, it meant a form of networking had been designed as a spider web, allowing links between teacher to teacher, pupil to pupil, teacher to school heads, school heads to various stakeholders like the business fraternity, across the divide linking the circuit albeit in an analogue era. The programme pooled talent as highlighted by the Herald, of 12 October 2012 which reiterated in a case of Gutu BSPZ that, "The cooperation we see

among stakeholders in this programme is highly appreciated as it helps to pool talent, skills and resources that help to promote school development. The BSPZ also acquired laptops for the district office which were used to produce reports, graphs, early childhood development kits for primary schools in the district and teaching and learning textbooks.” The standing question is how much of the computerized networks were put to practice within the circuits.

The Nziramasanga Commission of Inquiry into Education and Training (CIET) of 1999, ushered in the need to reform education policies through developing skills required to make the most of the information and communications technologies which is changing our lives and the way we do our work. In addition, Hwande and Mpofu (2017) in their paper, amplified the CIET Report of 1999 as recommending a shift from a predominantly theoretical curriculum to a hands-on curriculum that emphasises the development of vocational technical skills making ICT application imminent.

Controversially, between 1999 and 2015, the recommendations from CIET (1999) lied idle, while technology unabatedly advanced globally. Clusters of schools were set through the (BSPZ) in 1993, but this study envisages their invigoration through improved and elevated computer networking. To gain further insight from similar cases where computer networking has been applicable, this study briefly focuses on cases from the United Kingdom, Singapore, and Botswana and the Zimbabwean situation in relation to computer networking.

High furlong School in Blackpool, (2018) has provided with technologically based tools from simple switches to eye -tracking technology, or student controlled sensory rooms to assist in communication promoting computerized communication networks. In Singapore, Cher Ping Lim (2007) reports that research was done on 10 schools in the Singapore education system focusing on the need to engage students in higher order thinking activities using ICT as per policy design. From this end, this study focuses on how embracing of computer networking by schools could impact on functionality of school circuits.

In the Paper, the Current Status of Information Technology in Education- The Case of Japan- the Ministry of Education from 1994 -1998 p.2, introduced the Internet to a 100-school networking project connecting them as technically advanced schools and implemented research on using the Local Area Network, (group of computers connected locally) and the Wide Area Network (connections not limited to a geographical location) through the Internet effectively. A WAN connects several LANs, and may be limited to an enterprise, a corporation, or an organisation. The technology is high speed and relatively expensive. Kanji Aklahori says that by 1994, some researchers and teachers in Japan education, realised that the Internet had potential application in the design of learning environments leading to a national school networking bolstering e communication instead of face-to-face communication.

Today the 2021 Index of Economic Freedom states that Japan is ranked 6th among 40 countries in the Asian Pacific Region and its overall score is above the regional and world averages and there could be a correlation between computer networked education and development of the economy since they computerized their education system in the early 1990's. The 2021 Index of Economic Freedom points to Japan as a free market. This basically refers to an economic system in which economic decisions and the pricing of good and services are guided solely by the aggregate interactions of a country's citizens and businesses, Chikozho and Mapedza (2017). The Japanese transformed its education system through improved information systems and such level of economic development triggers and motivates the need to recuperate the already existing cluster operations in the Zimbabwean schools towards building of the economy.

Botswana, though a Third World country, has made inroads into computer networking in schools. The Universal and Access Service Fund (UASF 2018) project brings together local communication industry players and government authorities to ensure that everyone in Botswana has access to essential communications at affordable prices. By 2018, “Phase 1 of the School's Connectivity Project has covered government schools in Ghanzi, Kgalagadi and Southern districts. Mascom and BTC have upgraded more than 30+ base station from 2G to 3G and LTE networks to provide schools with at least 5Mbps of broadband connectivity. This is enabling access to communication services to move ICT education forward in these rural areas”. Such developments probe this study on how computer

networking through incrementalism can be revamped to meet the global trends from e learning effectively. The study continues amid numerous challenges amid the current COVID-19 Pandemic. Fred Davies, (1985) vigorously argues on how acceptance to technology by the user system can be a cause of concern.

Computer Networking in Zimbabwe Schools under National Development Strategy 1 (NDS 1); the first 5-year Medium Term Plan (Government of Zimbabwe 2021-2025)

NDS 1 is aimed at realizing the country's Vision 2030, while simultaneously addressing the global aspirations of the Sustainable Development Goals (SDGs) and Africa Agenda 2063. NDS 1 has made a provision for ICT developments and to date Zimbabwe has witnessed the launch of the Zimbabwe Learning Passport by UNICEF in conjunction with the Ministry of Education Government of Zimbabwe (2021). It “Focuses on initiatives around inclusive education as well as innovative technologies that support alternative learning approaches from Early Childhood Development upward, said the Minister of Primary and Secondary Education, Honourable N.C.G Mathema. Government of Zimbabwe NDS 1”

The provision ICT resources to the education sector in Zimbabwe has been growing in leaps and bounds since 2002, (Nyandoro et al (2013). From previous studies done in Zimbabwe (Unwin, 2005. p 117) argued that there should be a shift from an emphasis on “Education for ICT to the use of ICT for education”. Tubin (2006) highlighted how teachers were unwilling to embrace ICT in their various subject areas as they believed that ICT was to be a responsibility of the ICT personnel and examined independently. It is from this assessment that the current study envisages reinvigoration of school clusters through advancing computer networking. From a critical point of view, it may be noted that, despite the global use of school clusters, there are still many controversial issues regarding their utility and efficacy, regarding their claims as vehicles for instructional delivery in schools (Jones 2009).

2. PURPOSE OF THE PAPER

The purpose of this academic paper is to explore the significance of computer networking and how schools can implement it.

2.1. Computer Networking

McCauley (2019) defines a computer network as a set of computers that are connected so that they can share information. The network carries out the following tasks; Communicating using email, video, instant messaging and other methods, sharing devices such as printers, scanners and photocopiers, sharing files sharing software and operating programs on remote systems and allowing network users to easily access and maintain information.

2.2. Digital Age

The McCormack (2021) defines digital age as the present time, in which many things are done by computer and large amounts of information are available because of computer technology

2.3. Cluster

In the context of this paper, a cluster refers to the grouping of **schools** within the same geographical location, for economic, pedagogic, administrative and political purposes.

2.4. Teacher

A teacher, also called a schoolteacher or formally an educator, is a person who helps students to acquire knowledge, competence or virtue. A teacher as a person whose job is to engage in instructional delivery on defined teaching loads depending on whether it is in the primary or the secondary schools

2.5. School Head

The head of school is responsible for the effective general management of the school, for ensuring the provision of academic leadership and strategic vision, and for the quality of the student experience. The school head is the accountable person to the Responsible authorities.

2.6. Stakeholders

Makaye (2017) defines stakeholders as persons with an interest or concern in something, especially a business and in this study, it can be teachers, school heads, learners, parents, the Government of Zimbabwe through the Ministry of Primary and Secondary education, Responsible Authorities, customers, suppliers and investors and the community at large who have interest in primary and secondary education within the defined circuit

Computer Networking:

Computer network embraces the Local Area Networks, or LANs which are the physical networks that provide the connection between machines within say a home, a school or corporation. Peter L Dodal (undated) adds that the LANs are, as the name says, “local”; it is the IP, or Internet Protocol, layer that provides an abstraction for connecting multiple LANs into, well, the Internet. Finally, the Transmission Control Protocol (TCP) deals with transport and connections and sending user data. Given the above technology, the current clusters may be found wanting in this technicality adding to the already existing challenges. A stakeholders’ analysis, (stakeholdermap.com) accessed on 02 December 2021 can be of great use for the clusters in the Harare Northern Central District as it can help to dig into the solutions required for escalating clusters performance through computer networking of the various subsystems.

3. THEORETICAL FRAMEWORK

This paper uses the Systems Theory which sees a parallel between biological and human social systems and places dual emphases on organization- environment relationships, Ludwig von Bertalanffy (1940) Muhamadin and Kabir (2016). The structure and patterns and relationships of a system emerge from interactions among components; thus, each system is unique, Chi-Hui Lai and Sapphire Lin, (2017:1). From this perspective, the study intends to examine the interrelationships within the structures of primary and secondary school circuits. The subsystems include teachers, school heads, learners, parents, Ministry of Primary and Secondary education, and other important stakeholders. Relations arise interactions during instructional delivery, planning activities, meetings, purchasing and supply etc. Each cluster’s stakeholder analysis would be of great use in cross pollination of ideas that convalesce the much-needed computer networking.

Chi-Hui Lai and Sapphire Lin, (2017:2) emphasizes the Systems theory, as aiming at explicating dynamic relationships and interdependence between components of the system and the organization – environment relationships. A school circuit is a system of interschool collaboration to develop professional infrastructures for teachers. Makaye, (2011 :1), reported poor implementation of circuits due to several challenges including inadequate funding and management problems. It is against this background that this study seeks to examine computer networking within the clusters in a view to bolster the interdependence and effectiveness of existing relationships among teachers, learners, management, parents, and various other stakeholders of the circuit system.

To proffer of solutions, the Incrementalism approach is to be adopted in terms of addressing the current problems within the Harare Northern Central District, implying that some of the existing interactive practices will be maintained while the new ones arising from the unveiled innovations and creativity in computer networks will be recommended.

4. THE NETWORKING THEORY

Networking, in brief falls within the social networking theory and is concerned with several principles in terms of how relationships or social networks influence behaviour in organisations, (Wellman, 1988). The following are some of the relationships expounded by the theory; people’s behaviour is determined by a web of relationships, but may cause a strain on people’s behaviour, values relationships between units, rather than units themselves, nothing is understood in isolation, there is an assumption on interdependence of units, groups have fuzzy boundaries, rather than firm boundaries, hence building blocks for organizations have cross cutting relationships among a multiple of groups, (Wellman, 1988). From this perspective the study intends to examine the existing structures as to how they can be boosted in terms of developments in computer networking within clusters in the current global educational environment.

5. THE INCREMENTALISM MODEL, LINDBLOM

Through the Incrementalism approach, Lindblom, (1950') in (Dye 2013) this study will make decisions that bolster computer networking systematically. Olga Bugajenko (2021) stresses the science of muddling through. Hence the researcher intends to examine the current cluster operations and then combine researcher's experience and intuition in terms of what computerised techniques would accelerate the digitalised teaching/learning process. Because the model tends to maintain conflict the researcher will be able to recommend new and innovative at minimum cost, yet with stakeholder involvement that minimizes conflict. This is notwithstanding the model's shortcomings.

6. IMPACT OF TECHNOLOGY ON THE USER SYSTEM

While different cases from different countries present adoption of computer networking, the TAM by Fed Davies, 1985 postulates how adaptation to technology depends upon individuals' perception and of its utility and ease of use (Bagozzi 2007). Anderson and Mangan (undated) applied the theory to the adoption of school networking arguing that adoption would occur when a school perceived pressures from stakeholder groups to obtain networked resources.

In addition, Warschauer (2003) detailed how resources, unique cultural contexts, especially institutional embeddedness, shape how education responds to new digital technology. Warschauer (2003) using data from 82 countries, Drori and Jang (2003) found that national specification in networking was a function of more of international cooperation and scientific growth than of economic development. Lack of well-developed institutional links with other countries account for instance where countries had low penetration of technology despite having the resources to acquire it. Fed Davies, 1985, perceived ease of use and usefulness of a technological tool as determining the extent of consumer acceptance. This study therefore seeks to examine how the BSPZ clusters have been able to embrace computer networking to have sound outputs as reflected in the equilibrium status argued for by the Systems theory, Ludwig von Bertalanffy (1940) perspective.

The TAM, as postulated by Fed Davies, (1985) argues that an older adult who perceives digital games as too difficult to play or a waste of time will be unlikely to want to adopt this technology, while an older adult who perceives digital games as providing needed mental stimulation and as easy to learn will be more likely to want to learn how to use digital games. Besides being criticized, the model serves as a useful general framework, and is consistent with several investigations into the factors that influence older adults' intention to use new technology (Braun 2013). This study therefore questions the current and prevailing attitudes of school leadership and teachers as part of the older people and their response to computer networking among the schools' subsystems as argued by Ludwig von Bertalanffy (1940). In tracing the background of this study, computer networking in Zimbabwe schools is critically observed.

7. CONCLUSION

In today's rapidly evolving technological landscape, computer networking plays a pivotal role in shaping modern education. It serves as the backbone of educational institutions, connecting students, teachers, administrators, and resources in a seamless and efficient manner. Here are some key aspects highlighting the role of computer networking in modern education. Computer networking allows students to access a wealth of information and educational resources with just a few clicks. Through the internet, students can explore a vast array of digital libraries, research databases, and educational websites, expanding their knowledge beyond the confines of traditional textbooks.

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