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Information communication technology policy and public primary schools' efficiency in Rwanda

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Teaching and learning processes have been developed through different methods and materials; nowadays the introduction of computers and other ICT tools in different forms and levels of education have been found to be highly influential in education system of different countries. The main objective of this study was to correlate Information Communication Technology with public primary schools' efficiency in Rwanda. The study employed the descriptive survey and descriptive co-relational design. One hundred and forty-four primary teachers participated in the study. The level of ICT was poor (M = 1.72); and the level of primary schools' efficiency (external and internal) was satisfactory with an average mean of 2.53. The relationship between ICT and public primary schools' efficiency was significant (r-value = 0.56, sig = 0.029). The study recommended that the government ought to distribute enough ICT equipment equally to all primary schools, promote the One Lap Top Per Child Programme in all primary schools, and provide trainings to teachers and head teachers.

Keywords: computers in primary schools; ICT policy; primary schools' efficiency; vision 2020

Introduction

The requisite changes and innovations in societies all over the world are transmitted and implemented through different forms and levels of education. However, this can be achieved if there is a combination of different efforts in education system. For this reason, many countries consider human resource development as a key element in developing the whole nation. Information Communication Technology (ICT) is among the key elements in developing manpower through the improvement of education sector. Education, as a fundamental human right, is crucial to bolstering human resources (Lawrence, 2004). Countries ought, in response to this imperative, to ensure that all citizens, including children, are placed in a position to meet their basic learning needs. Information and communication technology has proven to be a powerful tool for the betterment of the pedagogical process; catalyses radical change when it comes to existing school practices, making students ready to face their futures (Yusuf, 2005). Nowadays technology has, in many parts of the globe, become central to teaching and learning. For example, in South Africa, teaching and learning through technology is obliged to take into account the unique challenges of the classroom context in South African schools. There is a challenge posed by both a lack of technology to facilitate the blended learning perspective, and the use of multiple languages of learning and instruction (Jantjies & Joy, 2015). Rwanda as a developing country has adopted the introduction if ICT in education system to enhance the efficiency of education, towards its 2020 vision of development. Besides Rwanda, other countries including South Africa have been adopted the use ICT tools in education (Jantjies & Joy, 2016). Jantjies and Joy, in their study carried out in South Africa regarding lessons learnt from teachers' perspectives on the cultural and linguistic constraints observable in mobile learning in South Africa, found that mobile technology can perform a fuller role, when relevant consideration is given to the context of the learning environment. The will of Rwanda to develop its citizens has led the country to invest in considering different reforms for better achievement of its 2020 Vision, and to meet the needs of the country. The integration of Information and Communication Technology (ICT) Policy in all levels of education in Rwanda was one of the major goals in raising the standards of ineffective centralised education system. The Government of Rwanda aims to achieve middle-income status by 2020, modernising ICT towards an information-rich, knowledge-based society and economy. This long-term vision has been developed in a national consultative process commencing in 1998, extends policy development across government ministries and public institutions, along with their development partners. The national ICT policy saw its advent in 2000. It was based on a document for national debate and consultation that was released in 1999, "ICT-Led Integrated Socioeconomic Development framework." The policy was set out in four consecutive five-year phases, referred to as the National Information and Communications Infrastructure (NICI). Phase One of NICI began in 2001 and was concluded in 2005, and whose achievements led to the Phase Two Plan launched in 2006. Its sub-plans are constituted by 10 pillars, namely: ICT in education, human capacity development, infrastructure, equipment and content, economic development, social development, e-government and e-governance, private sector development, rural and community access, legal, regulatory, and institutional provisions and standards and national security, law and order. The Government of Rwanda collaborated on these plans amongst others with the Economic Commission for Africa, United States Agency for International Development (USAID), United Nations Development Programme (UNDP), and the Carnegie Foundation. These include the National Information Technology Commission (NITC) and the Rwanda Information Technology Authority (RITA). The first, the NITC, chaired by the President, aims to achieve Rwanda's 2020 Vision. From above government

initiatives of promoting ICT and its integration in all education systems specifically in primary schools, the ministry of education has started different programmes including One Lap Top Per Child Programme in primary schools to enhance learning and teaching in primary schools. The programme consists of distributing laptops in public primary schools. Rwanda believes that integrating ICT in the teaching and learning process have many beneficial effects like higher student's achievement and motivation as well as greater differentiation, interactivity and individualisation (Rwanda vision 2020, Ministry of Finance and Economic Planning, Republic of Rwanda, 2000). ICT does not only intervene in enhancing teaching and learning processes but is also crucial in reducing costs during the processes of providing reading material and other related necessities at schools. For this reason, it was also necessary for the country to revise the curriculum and train teachers to cope with changes and integrates new teaching methodologies centered to learners of all levels. Besides all these efforts that have been put into consideration, researchers have criticised their implementation. Mukama noted that the plan to deploy computers in schools has been challenged by the lack of expected funds from donors, as well as the fact that most remote areas in Rwanda lack electricity. Hayman, as cited in Mukama and Andersson (2008) criticised the policies based on assumptions, rather than on the context of the country.

The Influence of ICT to Enhance Schools' Efficiency

Schools' efficiency has been described as the ability to perform well or to achieve a result ergonomically, without wasted resources, effort, time, or money (De Grauwe & Naidoo, 2004). As defined, the schools' efficiency relies on different factors, such as learners' perceptions, teachers' abilities, adequacy of teaching and learning material, physical facilities, and family background (De Grauwe & Naidoo, 2004). Despite these challenging factors, nowadays the adoption and integration of ICT has been found to be helpful in increasing and enhancing the schools' efficiency, because through its integrations teachers, learners, parents and other stakeholders in education system may benefit from ICT's application to attain the greatest schools' efficiency in different levels and forms of education (Beauchamp & Parkinson, 2008).

Applying ICT skills in education system is necessary because it has been found to be influential among skills required for 21st century (Burkhardt, Monsour, Valdez, Gunn, Dawson, Lemke, Coughlin, Thadani & Martin, 2003). In past centuries, literacy was favoured by reading the printed material and nowadays, the use of existing techniques to afford reading material are changing due to the integration of ICT (Lankshear & Knobel, 2003). ICT tools are excellent in enhancing repetitive, didactic teaching and individualised learning (Beauchamp & Parkinson, 2008).

Mukama and Andersson (2008) note that ICTs may potentially be a robust means by which to extend educational opportunities across all levels of formality to previously underserved constituencies. The authors consider that this may be of benefit to groups traditionally excluded from education due to geography, culture, socio-economics, or other basic practical constraints. Additionally, ICTs can enable remote contact across disparate geographies in real time, opening the gates to an abundance of online resources that overcome the dearth of other learning materials in remote or impoverished areas (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2003). The use of ICT tools is the one technique that may impact teaching and learning process in Rwanda as for other developing countries, because it can help schools with limited and out-dated library resources. Access to resource persons, mentors, experts, researchers, professionals, business leaders, and peers all over the world is expanded through ICTs.

Significantly, the most commonly cited reason for using ICTs in the classroom is to prepare learners for the ubiquity of technology in the age of the internet. Despite the role of ICT in education, its successfulness requires teachers to have various types of knowledge required to integrate ICT in teaching and learning process.

Pedagogical Requirements to Integrate ICT into Teaching and Learning Processes

There is technological pedagogical content knowledge (TPACK) required to integrate ICT into teaching and learning processes (Koehler, Mishra, Kereluik, Shin & Graham, 2014). These came along with pedagogical requirements for ICT integration, including technological knowledge (TK), pedagogical knowledge (PK) and content knowledge (CK) (Koehler et al., 2014). In order to adapt the way in which ICT is used, a teacher should have the knowledge to use different technological tools, to include the digital technologies, such as the internet, digital video and software programmes (Schmidt, Baran, Thompson, Mishra, Koehler & Shin, 2009). Pedagogical knowledge refers to how a teacher uses methodology to teach and manage the classroom. It also includes the knowledge that teacher ought to have in assessing learners and the development lesson plan to reach the overall objectives set (Mishra & Koehler, 2006). Content knowledge refers the extent to which teachers master the content necessary to be delivered to learners in teaching and learning processes (Koehler et al., 2014; Mishra & Koehler, 2006; Schmidt et al., 2009).

Statement of the Problem

The role of Information Communication Technology on all education levels is nowadays remarkable. ICT is very important in primary schools, because it helps pupils to achieve better results in other subjects and helps them to find what they need and how to use that information. Because of that, pupils become familiar with ICT at an early age, and indeed they need those skills for their future education and in adult life found in BECTA (2001, as cited in Beauchamp & Parkinson, 2008). The use of ICT is very crucial in promoting the efficiency of education in different forms and levels of education specifically pre-primary education, primary, secondary and tertiary education (UNESCO, 2003). Despite the introduction of ICT across different levels of the education system in Rwanda, there are still many challenges, such as lack of adequate well-trained teachers and head-teachers and inadequate ICT equipment. The recommendations from earlier studies by Mukama has suggested a need when it comes to the development of school-based curricula, appropriate pedagogy, and professional teacher development in the area of ICT literacy, which allows teachers to develop the use of new pedagogical tools (Mukama & Andersson, 2008). Because of this, it has been alleged that ICT has not helped much in improving the efficiency of schools in Rwanda. This study was therefore carried out to investigate how ICT policy affects public primary schools' efficiency in the country.

Purpose of the Study

The purposes of the study are as follows:

1. To test the hypothesis of no significant relationship between the level of ICT and the level of efficiency public primary schools in Rwanda.
2. To validate the following theories: behaviour conditioning theory and the constructivist theory to which the study was based.
3. To generate new knowledge.
4. To bridge the gaps from the reviewed literature.

Objectives

General objective

The study correlated Information Communication Technology with public primary schools' efficiency in Rwanda.

Specific objectives

1. To determine the profile of respondents in terms of age, gender, working experience and working years in the present school;
2. To determine the level of Information Communication Technology in selected public primary schools in Rwanda;
3. To determine the level of public primary schools' efficiency in Rwanda; and
4. To determine whether there is a significant relationship between the level of Information Communication Technology and public primary schools' efficiency in Rwanda.

Research Questions

This research concerned about sought to answer the following:

1. What are the profiles of the respondents in terms of age, gender working experience and working years in the present school?
2. What is the level of Information Communication Technology in selected public primary schools in Rwanda?
3. What is the level of public primary schools' efficiency in Rwanda?
4. Is there any significant relationship between the level of Information Communication Technology and public primary schools' efficiency in Rwanda?

Hypothesis

There was no significant relationship between the level of ICT and public primary schools' efficiency in Rwanda.

Scope

Geographical scope

The study was conducted in Nyagatare District, which is one of seven district of the Eastern Province of Rwanda. The eight selected public primary schools where the study was conducted from are outlined in Table 1.

Theoretical scope

This study was based on the importance of ICT in strengthening two different major theories on learning, viz. the behaviour conditioning theory of Skinner (1938) and the constructivist theory of Seymour Papert (Papert & Haral, 1991). The influence of ICT in different forms of education can ballast Skinner's argument that a carefully controlled environment can lead to better learning. He developed the principles of operant (behaviour) conditioning that dictate that strength increases where the occurrence of a given operant is followed by the presentation of a reinforcing stimulus (Skinner, 1938). This outlines the basic principles of responding to behaviour using reward or dismissal, which has led to the use of computers as teaching tools (Skinner, 1938). Technological tools such as computers and projectors create the possibility for stimulating learners in their learning. Today, many educational computer programmes depend on such means, e.g. images or games, to help pique learner interest. The role of ICT is frequently observed to corroborate the work of Papert concerning the constructivist approach (Papert & Haral, 1991). Seymour's view about computers being used in education has proved that ICT is highly influential, and crucial to both teaching and learning activities. Constructivism holds a learner to be participant in structuring their own learning experiences. Papert and Piaget have emphasised the structural and organisational aspects of knowledge, noting the influence of learners' prior experience on their learning as paramount. The use of ICT may help learners in

self-coaching process, where ICT tools such as computers and use of internet can assist in developing their knowledge content in different subjects.

The content scope

The study focused on the relationship between the level of ICT (independent variable) and public primary schools' efficiency (dependent variable) in the selected public primary schools in Nyagatare district, Rwanda.

Significance of the Study

The findings of this study are useful to different categories of people who contribute in educational activities in one way or another. The government of Rwanda and other countries that are willing to increase and enhance the quality of education through the use of ICT will be informed about the level and the relationship between the ICT application and primary schools' efficiency. The findings will also be the key element to show the progress of its initiatives about promoting Information Communication Technology in the education system to the government. The study will be a useful tool to illustrate difficulties that Rwandan public primary schools face while implementing ICT Policy in primary schools. The study will also be a helpful source of information to the Ministry of Education in Rwanda, who would gain insight into the actual level of ICT in public primary schools. Based on the findings of this study, the ministry is informed of its strengths and weaknesses, which will help in future projection for educational activities. Educational planners will be aware of the extent of ICT in public primary schools, and this study will help in ICT redesigning programmes in order to promote public primary school efficiency. This study will be of great importance to Non-Governmental Organizations (NGOs) and other stakeholders contributing to educational activities. The study will also help other researchers interested in carrying out research on ICT and Public primary schools' efficiency, not only in Rwanda, but also other countries willing to increase their quality Education through empowering the introduction of using ICT in all levels of education.

Methodology

Research Design

The study was designed as a descriptive survey. It also took on a descriptive co-relational design, focusing on the relationship between the independent variable and the dependent variable, that is, Information Communication Technology and the efficiency of selected public primary schools in Rwanda.

Research Population

The population of this study comprised 144 teachers from eight selected public primary schools in Rwanda.

Sample Size

A sample refers to a small amount or part of something, used as an example of the character, features, or quality of the whole. It is representative when its units were chosen in the process such that all selected respondents of the population have the chance to be the part of sample (Munyengabe, He & Yiyi, 2016). In this study, a sample of 144 respondents, all of whom were teachers, was taken from eight public primary schools as shown in Table 1.

Procedure

Sampling is a process involving the analysis of a relatively small number of individuals, objects or events (Amin, 2005). There were about 80 primary schools in the whole district at the time of the study. The schools were selected by using simple random sampling technique. Regarding the respondents of the study universal sampling was used. This was due to a small number of teachers in the selected schools. Both male and females participated in the study.

Research Instrument

Questionnaires were used to collect data from respondents. It was composed by questions in three parts, that is firstly, determining the profile of respondents; and secondly, a questionnaire was used to determine the level of ICT, as well as to determine the level of primary schools' efficiency in Rwanda specifically Nyagatare District. The levels of ICT and Primary Education Efficiency were determined by using different rating items such as strongly agree (SA), agree (A), disagree (DA) and strongly disagree (SD) (see Table 2b**)**.

Validity and reliability of the instrument

To ensure the validity of the provided questionnaire it has made different suggestions, corrections and adjustments from different experts in questionnaire designing. To determine whether the questionnaire was valid, the calculated content validity index (CVI) was compared to the minimum content validity index of 0.7 suggested by Amin (2005) and Munyengabe et al. (2016) as shown in Table 2a. CVI=R/N: Where R refers to the number of questions declared valid, and *N* is the total of items. Table 2a indicates the content validity index of 0.8 on questionnaire used to determine the level of ICT and it was proved valid compared to Amin's formula of content validity index calculation. The same calculations used to

determine the level of primary school efficiency in Nyagatare District, Rwanda was made to verify whether the questionnaire was valid; it was declared valid observing the CVI of 0.75.

Data Gathering Procedures

The researcher had two assistants for administering the questionnaires to the respondents. He first briefed them on what to do. During the data collection phase, respondents were asked to give responses to all the items in questionnaires. Thereafter, the filled questionnaires were gathered, collected, organised and encoded into computer by using the statistical package for social sciences.

Data Analysis

SPSS Version 19 was used to analyse data. Data on profile of respondents were analysed by using frequencies and percentage distributions. Means were used to determine the level of ICT and public primary school efficiency. An item analysis helped to identify the strengths and weaknesses of respondents in terms of ICT and public primary schools' efficiency. The following numerical values and response modes were used to interpret the means.

Table 1 Respondents of the study

Name of the school	Population	Sample size
G S Kabare II	30	30
Kiyombe Primary School	16	16
Nkana Primary School	14	14
Cyondo Primary School	16	16
Tovu Primary School	15	14
GS Gitenga	14	14
GS Mukama	19	19
GS Mutumba	20	20
Total	144	144

Note. Source: Primary data 2015.

Table 2a Content validity index

Questionnaire	Number of irrelevant questions	Number of relevant questions	CVI
Questions to determine the level of Information Communication Technology	3	12	0.8
Questions to determine the level of school efficiency	5	15	0.75

Table 2b Interpretation of means

Mean range	Description	Interpretation
3.26–4.00	Strong agree	Very satisfactory
2.51–3.25	Agree	Satisfactory
1.76–2.50	Disagree	Fair
1.00–1.75	Strong disagree	Poor

A Pearson Linear correlation co-efficient (PLCC) was used to determine the significant relationship between the level of ICT and public primary schools' efficiency.

Ethical Consideration

The study considered those respondents who were able to deliver accurate, relevant information. Full confidentiality was thereby assured, and it was achieved by guaranteeing secrecy to all selected respondents and their provided information. To maintain ethical standards, the following was undertaken: (1) respondents' names were not reflected in the study; (2) coding of all questionnaire; (3) respondents signed the informed consent; and (4) findings were presented in generalised manner.

Data Presentation and Discussion

Data are presented in tables. Table 3 shows the profile of respondents; Table 4 indicates the level of Information Communication Technology; Table 5 provides the level of public primary schools' efficiency and Table 6 indicates the relationship between the level of Information Communication Technology and public Primary Schools' efficiency. Table 3 Indicates that the majority of respondents were male (69%), female were only 31%. This indicates that primary schools in Nyagatare District, Rwanda are dominated by male teachers. This could be because until recently, preference of educational opportunity was given to boys over girls. The findings are also in agreement with the government and NGOs, who created different opportunities to support gender equity and equality in schools and promote female education in Rwanda. Regarding age group, a majority (47%) of the respondents were between 20-30 years of age. This shows that many of the teachers in primary schools in Nyagatare District, Rwanda are youth, and therefore are most likely to be vibrant and energetic. Only 4% of the respondents were

aged 51 years and above. This could be the case in in Rwanda because of low salary for primary school teachers where people tend to leave the teaching job to do other trades when they reach early or late adulthood. It is also linked with the reforms done in education for recruiting the qualified teachers and retiring less qualified or unqualified teachers. When it comes to teaching experience, the respondents showed that 42% were eight years and above. This shows that many of the teaching staff in primary school in Nyagatare District, Rwanda were experienced enough in teaching. The findings regarding the teaching experience are also linked with age range, where teachers in primary schools enter teaching career after accomplishing the secondary school studies. Concerning the number of years in the present school, the respondents showed that 36% had spent eight years or more; and 35% of respondents had spent between 1–3 years in the present schools.

Table 3 Profile of the Respondents

Category	Frequency	Percentage
Gender		
Male	99	69
Female	45	31
Totals	144	100
Age range		
20–30	67	47
31–39	39	27
40–50	33	22
51 and above	5	4
Totals	144	100
Teaching experience		
Less than 1 year	9	6
1–3 years	47	33
4–7 years	28	19
8 years and above	60	42
Totals	144	100
Number of years in the present school		
Less than 1 year	14	10
1–3 years	51	35
4–7 years	27	19
8 years and above	52	36
Totals	144	100

Note. Source: Primary data 2015.

Table 4 reveals that the level of Information Communication Technology (ICT) in the public primary schools of Nyagatare District are poor (*M* = 1.72). This means that many primary schools in Nyagatare District have limited access to ICT and have inadequate or insufficient ICT equipment and skilled manpower. Many items in the questionnaire were ranked as poor by the respondents. These included: the schools making good use of computers (*M* = 1.69); schools having data base management such as Ms Access, SPSS, Ms Excel, Ms PowerPoint (mean 1.66), the schools having good scanners (*M* = 1.66); the school having good electronic bulletin board services, mailing lists (*M* = 1.62). All these indicate that ICT in primary schools under study has not developed much and it is observed that ICT use is at a very low level. This could be because of inadequate resources (financial and material), which the government allocates to the primary schools. The government, due to limited resources, is much more concerned with paying teachers' salaries and constructing buildings for the schools under the universal primary education programme than investing heavily in ICT for schools. The findings however reveal that, many of the schools have e-mail services for sending and receiving messages (*M* = 2.74) and they are aware of the fact the impact of ICT in service delivery has brought faster flow of information (*M* = 2.74), both interpreted as satisfactory. The schools are thus aware of the importance of ICT, and it seems to be limited by economic resources. Respondents ranked some items fair, for example, with schools being aware that the main components of ICT are computer hardware and software, database, telecommunication system, human resources, and procedures (mean = 2.08) interpreted as fair. This shows that in schools under study some respondents (teachers) are computer literate, while others are not. The school under the study having PC printer was ranked fair (*M* = 1.97). This shows some primary schools in Nyagatare District have computers with printers, but others do not have. In addition to the availability of ICT tools, the successfulness of ICT integration requires teachers to have the technological knowledge, pedagogical knowledge and content knowledge (Koehler et al., 2014; Mishra &

Koehler, 2006). If the technological knowledge is missing, ICT tools might not serve, because teachers will not able to handle the required tools (Schmidt et al., 2009).

Table 5 reveals that the level of primary schools' efficiency in Nyagatare, district was satisfactory (M = 2.53). In this study, efficiency was broken into two parts, that is, internal and external. The findings of the study revealed that the internal efficiency of schools under study outweighed the external efficiency, with means of 2.88, and 2.19 respectively. The internal efficiency was found to be satisfactory (mean: 2.88), while the external efficiency was found out to be fair (M = 2.19). The internal efficiency of the public primary schools in Nyagatare District being reported as satisfactory reveals that on average, good teaching and teacher-pupils relationship can be observed. This could be because many of the teachers in the study are experienced in teaching, as Table 3 indicates that many of them (42%) have eight years and above of teaching experience. Regarding the internal efficiency, the elements ranked very satisfactory were: teachers assessing learners very quickly and give them feedback (M = 3.81); teachers considering learners' sentiments and school social situation (M = 3.49); and teachers keeping track of pupils' progress (M = 3.31). All these could be attributed to sufficient experience on the part of teaching staff, as indicated in Table 3, where 42% of teachers had more than eight years' experience. Many items on internal efficiency were ranked as satisfactory by the respondents and these included: training pupils in relevant skills (M = 3.19); confidently giving local and international examples when teaching (mean = 3.15); interacting freely with pupils (M = 3.04); using local resources as teaching and learning aids when teaching (M = 3.03); using guided discovery methods in teaching (M = 2.92); retrieving pupils' records when needed (M = 2.68); and promoting a competitive spirit among learners (M = 2.67). The cause of this satisfactory rank for all these items could be the teaching staff being professional and experienced, as revealed in Table 3. However, when it came to the internal efficiency of public primary schools, schools, having both soft and hardcopies was ranked poor (M = 1.67), as well as schools using computers to grade pupils' performance (M = 1.60). This is because, some schools do not have computers, and in addition to this, some teachers are computer illiterate. This challenge, of a lack of qualified teachers in the use of technology in relation to teaching and learning were also cited in other studies conducted in other countries including South Africa (Jantjies & Joy, 2016). Regarding the external efficiency being ranked as fair by the respondents (M = 2.19), only one item concerning the pupils who complete the primary school cycle was ranked as being highly satisfactory (M = 3.37). This could be due to the implementation of education for all, where all children are given the chance to attend school. Item such as pupils being motivated to learn was ranked as satisfactory (M = 3.14). This could be because parents, teachers and local government authorities motivate pupils to learn, such that dropout was minimised by virtue of the efforts made by different primary education stakeholders in Rwanda. The fair interpretation was ranked by respondents on items such as pupils getting good grades in the primary leaving examinations (M = 2.48), as well as the performance of pupils who join secondary schools from their primary schools (M = 2.39), the practical skills the pupils have (M = 2.07). This could be because only exceptional pupils are able to follow all lessons taught. It could also be caused by the inadequate access to ICT tools, where teachers and learners might be lacking access to the necessary updated content, without recourse to ICT in teaching and learning. Regarding the external efficiency of public primary school in Nyagatare District, Rwanda; the use of electronic libraries for research was ranked as poor (M = 1.48), pupils finishing P6 who use internet for research (M = 1.44), and those teachers who have skills of emailing and the basic skills in ICT (M = 1.18) were both ranked as poor. This could because of inadequate or insufficient ICT equipment and lacking the technological knowledge for teachers in primary schools of Nyagatare District, Rwanda.

The null hypothesis of no significance relationship between Information Communication Technology and primary school efficiency was rejected, as shown in Table 6. This was because the calculated sig-value shows less than a 0.05 level of significance (Sirkin, 2005; Sproull, 2002).

Findings

Demographic Characteristics of Respondents

The study found that the majority of teachers, about 69%, were male. About 47% of the respondents were aged 20–30 years of age, and 27% of the respondents were in the range between 31–39 years old. Those aged between 40–50 years were 22%, and only 4% were 51 years or older. Concerning the teaching experience, a majority of the respondents (42%) had eight years teaching experience and above. Only 6% of them had spent less than one year working as a teacher.

Table 4 Level of Information Communication Technology (Item Analysis), $N = 144$

Indicator	*M*	*SD*	Interpretation	Rank
Your school has email for sending and receiving messages.	2.74	0.43	Satisfactory	1
Your school is aware that the impact of ICT in service delivery has brought faster flow information.	2.74	0.20	Satisfactory	2
Your school is aware that the main components of information system are computer hardware and software, databases, telecommunication systems, human resources, and procedures.	2.08	0.47	Fair	3
Your school has a PC printer.	1.97	0.45	Fair	4
Your school works with good spreadsheets, for instance Ms Excel, Lotus, etc.	1.77	0.48	Fair	5
Your school makes good use of computers.	1.69	0.54	Poor	6
Your school has a good database management such as Ms Access, SPSS, Ms Excel, Ms PowerPoint, etc.	1.68	0.52	Poor	7
Your school has a good Desktop Publishing Software (DPT) like Ms Word, Ms Excel, etc.	1.67	0.44	Poor	8
Your school has a good scanner.	1.66	0.56	Poor	9
Your school has good electronic bulletin board services, mailing lists, etc.	1.62	0.54	Poor	10
Your school has a good Electronic Database	1.60	0.64	Poor	11
Your school uses a good PC CD-ROM and other multimedia components	1.26	0.68	Poor	12
Your school has good access to the World Wide Web (www)	1.24	0.51	Poor	13
Your school has good utility software, such as Antivirus, Disc Defragmenter, etc.	1.11	0.51	Poor	14
Your school has a good computer conferencing system	1.00	0.44	Poor	15
Average Mean	1.72	0.49	Poor	

Note. Source: Primary data 2015.

Level of ICT in Public Primary Schools in Nyagatare District

The findings of the study showed that the extent of use of ICT in primary schools in Nyagatare District, Rwanda was poor and limited ($M = 1.72$).

The Level of Primary Schools' Efficiency in Nyagatare District

The findings of the study showed that the level of primary school efficiency was satisfactory ($M = 2.53$). The internal efficiency ranked satisfactory with a mean of 2.88, followed by external efficiency, which was ranked as fair by the respondents, with a mean of 2.19.

Correlation between ICT and Public Primary Schools' Efficiency

The study showed that there was a significant relationship between Information Communication Technology and primary school efficiency in Nyagatare District, Rwanda. This is shown by the fact that the significance value (0 .029) was less than the maximum significance level considered in social sciences to be indicated by a value of 0.05.

Conclusion

Based on the findings of this study, the following conclusions were drawn: the level of ICT ($M = 1.72$) and the level of primary schools' efficiency ($M = 2.53$) in Rwanda were significant correlated, and that explains the importance of ICT integration in public primary schools. This means that the positive increment in ICT application will increase the level of public primary schools' efficiency. Specifically, the following conclusions were made according to the findings:

1) The null hypothesis of no significance relationship between the level of Information Communication Technology and the level of primary school efficiency was rejected with the *r*-value of 0.56 and sig-value of 0.029. This led to the researcher to conclude that there is a significant relationship between ICT and primary schools' efficiency in Rwanda.
2) Behaviour conditioning theory and constructivist theory were upheld by the findings of the study. This is because the study showed that the use of ICT is crucial to both teachers and pupils who can improve their abilities through the new knowledge brought by ICT. ICT was shown to be helpful to strengthen the constructivist view of learning because learners are considered to be active participants and the use of ICT tools in teaching and learning processes. These ICT tools are helpful in structuring their own learning experiences.
3) The study contributed towards knowledge generation by revealing that there is a significant relationship between ICT and public primary schools' efficiency.
4) No study had correlated the ICT and public primary school efficiency in Rwanda. This study addresses this gap, where it measured the level of ICT against the level of public primary schools' efficiency, and assessed the general relationship between the level of ICT and the level of public primary schools' efficiency in Rwanda.

Table 5 Level of Primary School Efficiency (Item Analysis), $N = 144$

Indicator	*M*	*SD*	Interpretation	Rank
Internal efficiency				
Assess learners very quickly and give them feedback.	3.81	0.23	Very satisfactory	1
Consider learner sentiment and social situations.	3.49	0.13	Very satisfactory	2
Keep track of pupils' progress.	3.31	0.14	Very satisfactory	3
As teachers, we train pupil in relevant skills.	3.19	0.11	Satisfactory	4
Usually confidently give local and international examples when teaching.	3.15	0.12	Satisfactory	5
Interact freely with pupils.	3.04	0.25	Satisfactory	6
Use local resources as teaching/learning aids when teaching.	3.03	0.45	Satisfactory	7
Use guided discovery methods in teaching.	2.92	0.10	Satisfactory	8
Retrieve pupils' records fast when needed.	2.68	0.87	Satisfactory	9
Promote a competitive spirit among the learners.	2.67	0.76	Satisfactory	10
Have both soft and hard copies of pupils' records.	1.67	0.23	Poor	11
Use computers to grade pupils' performance.	1.60	0.13	Poor	12
Average mean	2.88	0.45	Satisfactory	
External efficiency				
Many of our pupils complete the primary school cycle.	3.37	0.60	Very Satisfactory	1
Our pupils are motivated to learn.	3.14	0.22	Satisfactory	2
Our pupils get good grades in the primary leaving examinations.	2.48	0.92	Fair	3
These from our school who join secondary school perform well.	2.39	0.26	Fair	4
Our pupils have practical skills	2.07	0.12	Fair	5
Teachers use electronic library for research.	1.48	0.73	Poor	6
By the time our pupils finish P6, they are to use internet for research.	1.44	0.92	Poor	7
Teachers have skills of e-mailing and the basic skills in ICT.	1.18	0.99	Poor	8
Average mean	2.19	0.59	Fair	
Grand mean	2.53		Satisfactory	

Note. Source: Primary data 2015.

Table 6 Correlation between level of Information Communication Technology and level of public schools' efficiency

Variables correlated	*r*-value	Sig	Interpretation	Decision on H_o
Level of Information Communication Technology and level of primary schools' efficiency	0.56	0.029	Significant correlation	Rejected

Note. Source: Correlation of two variables of the study (data collected in 2015).

Recommendations

1) There is a need for effective use of ICT tools in teaching and learning processes in primary schools.
2) There is a need for promoting the One Laptop Per Child Programme in all primary schools to help pupils become familiar with ICT use.
3) Teachers need to advance their technological knowledge of computers and other technological tools related to teaching and learning processes.
4) The government of Rwanda ought to allocate ICT equipment equally in all schools and generate funds specifically for promoting the ICT use at the primary schools' level.

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