Availability and Usage of Information Communication Technology Facilities in Secondary Schools in Zambia

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Abstract

This paper examines the availability and usage of ICT facilities in secondary schools in Zambia, from the perspective of teachers. Based on two key research objectives; to analyse the availability of ICT facilities (infrastructure) and usage of the available ICT facilities in the selected Secondary Schools. The data was solicited from four provinces of Zambia, namely: Lusaka, Copperbelt, Eastern and Luapula. Three districts were selected from each province and in each district three schools were sampled. The paper employed a survey design in which a sample of 360 teachers were selected. A questionnaire was used to gather data from teachers, whose findings were analysed using descriptive and inferential statistics. A Mann Whitney U test and also Kruskal Wallis test were used to validate the null hypotheses on the availability and usage of ICT facilities. The results showed a low access to ICT facilities by administrators, teachers and pupils which resulted in low usage of the available ICT facilities. The study also reveals high challenges in ICT facilities especially in government schools, which exhibits a low effort in investing in ICT by especially the Government of Zambia. Concerted effort should be made by the Government in partnership with other stakeholders to ensure a more improved input investing in ICT infrastructure in Zambia to ensure maximum outcomes in the education system.

Key Words: *Information and Communication Technology; Teachers; Challenges, Opportunities, Facilities, Zambia*

Background and Context

Information and Communication Technology (ICT) is defined in various ways by different writers in context of its nature and use. Some authors define ICT as an umbrella term that encompasses some devices such as radio, television, cellular phones, computer, among other gadgets, that enable the manipulation and communication of information (Ang'ondi, 2010; Bate, 2010; Bidarian *et al.*, 2011).

Zambia, like many other countries, has acknowledged the relevance of ICTs in national development and has demonstrated this by the approval and inclusion of ICT as a priority sector in the Fifth and Sixth National Development Plans (FNDP, 2005; SNDP, 2014). In its target to elevate Zambia to a 'Prosperous Middle-income Nation by 2030', the Government, among others, envisions an information and knowledge-based society by 2030, by: increasing connectivity to fibre optic (telecommunication infrastructure rollout) and other high capacity transition technologies (networks) from seven to seventy-two districts by 2010; increase the access to phones per 100 people (tele-density) from 0.9 to 8 by 2015 and to 50 by 2030; and increase access to ICT services such as Internet users from 35,000 in 2005 to 100,000 by 2015 and 1,000,000 by 2030 (Government Republic of Zambia, 2006).

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It is a well-known fact that education is an effective tool for poverty reduction and national development and also the effects of effectiveness and efficiency of service delivery as a result of investment in school infrastructure, equipment, maintenance, teaching and learning materials, and in the supply of qualified personnel, at this level of education (GRZ, 2010; Kangwa, 2012). Therefore, using the Ministry of General Education (MoGE), as a vehicle to ensure maximum benefits that accrue from ICT into the education sector, the Government in Zambia has upheld the use and learning of ICT into the education curriculum at both secondary and primary school levels. This empowerment by government led the Ministry of General Education and Ministry of Communications and Transport to develop a National Information and Communication Authority (NICP, 2006), with a vision to enable all schools in Zambia have access to ICT by 2030. This was in order to provide and promote lifelong education and training to all, the policy that was formulated in line with the Fifth National Development Plan (Mulima, 2013).

By virtue of being at the point of delivery, teachers become key players in the implementation of the effort made by the government to ensure efficiency and effectiveness of education. Therefore, the government through the Ministry of General Education, has the mandate to consistently build capacity in teachers, through training and continuing professional development as well as encourage skills training and technology diffusion and use (MoE, 1996; Government Republic of Zambia, 2006). It is believed that promoting teacher quality is a pointer to improving primary and secondary education (MoE, 1996; Harris and Sass, 2011). While the caliber of these teachers matters a lot to the quality of education, Kennedy (2010) elucidates how the quality of teaching is influenced by other factors outside their personal qualities, such as resources. Thus, teachers' views on the availability of the ICT facilities visa vis the use of these available facilities, which becomes cardinal to both the providers of these resources and policy makers in the education system. Moreover, scholars such as Mulenga and Mwanza (2019: 37) authenticated this view that 'because teachers are familiar with the classroom situations, their role is deemed central for discovering the gaps and bringing about change and improvement'. In this paper, therefore, the authors' main objective was to establish and analyse teachers' perceptions on the availability and usage of the available ICT facilities in secondary schools in Zambia. Thus, it was hoped that this study would add to the knowledge on the ICT facilities and usage in secondary schools in Zambia and other developing countries that have a similar ICT landscape. It was also hoped that the findings of this study would help uphold opportunities and also offer solutions to the challenges in investing in ICT architecture.

ICT development has exerted demand on capacity building in infrastructure in both developed and developing countries (Masaiti, Njobvu and Kakupa, 2018). Consistently, it is perceived with relevance in the promotion of sustainable development in education and other aspects in the 21st Century and having its main feature in the knowledge-based economy (Ramaswami and Sivarajan, 2002;

Kaminow and Li, 2002; Butcher, 2011; Zhao and Jiang, 2013). The developments in Zambia's ICT facilities are in tandem with arguments in different literature about the importance of the availability of ICT infrastructure. For example, Butcher (2011) opined that education and development are interrelated drivers for socio-economic development and ICT is an enabler for both innovation and education, without which, a knowledge society cannot be realised, supported, or further developed. Nisar *et al.* (2011) annotate that ICT helps the students to augment their knowledge skills as well as to improve their learning skills, leading to their better performance. In their study on the Usage and impact of ICT in Education Sector: A Study of Pakistan, Niser et al (2011) engaged 429 respondents from five (5) colleges and universities. The findings indicated that the availability and usage of ICT was improving the educational efficiency as well as obliging for making policies regarding education. Moreover, the Building Bulletin (2014) ratifies the need to have ICT rich environments, which are branded with the escalating application of laptops and tablet computers, whose implication was to alleviate the diminished need for untimetabled ICT- rooms as a bookable resource. This instituted the need for a few ICT- rich classrooms, endowed with fixed desktop computers for each workstation, to teach computing as a discrete subject or to billet a language laboratory and also a room for electronics and control systems.

In his study, Al-Maliki (2013) revealed that ICT infrastructure needed adequate skilled personnel to meet the anticipated growth in ICT. Furthermore, educational establishment needed to incorporate ICT in their programs and to establish markets for further investments in the field, while raising public awareness. The study also revealed the effort played by the Saudi government in the promotion and development of IT environment, by creating strong ICT infrastructure in order to facilitate and improve the efficiency and effectiveness of the operations of all organisations, both the public and private sectors. Therefore, several guidelines were formulated by the government with regards to ICT development, with focus on constructing strong ICT infrastructure, among others.

The scenario obtaining internationally and within Africa is similar to what is obtaining in Zambia. For example, Mulima (2013) in his Case study of Selected Secondary Schools in Kabwe District, found that computers, DSTV Kits, DVD Players, TVs, Printers and Phones were the available ICTs in the schools and also established available programmes such as Bible Pro, what the Bible Says, Bible Commentaries and the Bible in soft copy. However, he records a variation in the levels of ICT usage from one teacher to another, as well as learners, subjects and also schools. Science based subjects employed more usage of ICTs compared to other subjects including Religious Education (RE) and this was attributed to readily available materials for science. Both teachers and learners expressed the value that ICT possesses in its role in R.E. as a tool for enhancing the teaching and learning of the subject. With ICT, teaching was improved as well as learning.

The perception was that ICT provoked participation and ambiance transformation in class, creativity, motivation, easier understanding and higher retention levels among learners in R.E.

A study by Chifwepa (2006) on Development of a Model Plan for Application of ICT in Distance Education at the University of Zambia, revealed that the most accessible ICTs were radio sets; radio cassette recorders; television; video cassette recorders (VCRs), computers and Internet. He also observed that 60 per cent of the students did not have access to Internet due to distances to possible access points and the cost of using Internet. Nevertheless, his study records positive attitude towards the ICT and ICT based formats of materials. However, their attitudes towards the radio as a means of disseminating course contents were negative. Lecturers' perceptions were that ICT would improve learning and, therefore, should be employed in the delivery of distance education. He established also that some students did not have access to electricity and telephones in their homes, service provider coverage, inadequate infrastructure and skill to use the ICTs. The Researcher developed a Conceptual Model that was found to be appropriate and capable of being applied at the University of Zambia. He recommended an integrated model that employs computers, audio recorders, audio-visual equipment, video cameras and recorders, CD-ROM burners and Internet, as well as the formats of the course materials such as print, audio, audio-visual, multimedia CD-ROMs and web.

Having included Computer Studies as a subject in the 2013 Zambian revised curriculum the aspect of whether teachers had the right pedagogy to teach the subject is vital since this can greatly affect their attitudes towards the subject. It is for this reason that Masumba and Mulenga (2019: 90) did a study in North-western province in Zambia to find out the teacher's pedagogical content knowledge in the teaching of computer studies in one of Zambia's most rural provinces, given that most studies on the subject were done in urban areas. In that study the two scholars employed a concurrent embedded research design of the mixed method approach which enabled the collection of both qualitative and quantitative data simultaneously. 'It was established that the majority of teachers of Computer Studies had no qualifications to teach the subject. Secondly, teachers employed inappropriate pedagogies and thus learners were failing to acquire the necessary knowledge and skills in Computer Studies'.

This study was guided by two theories namely. The Theory of Capital Investment Appraisal Technique and the Public Value Theory. The Theory of Capital Investment Appraisal Techinique, also known as Capital Budgeting, helps an organisation or country apply caution in resource selection, implementation and management for public investment. This has been necessitated by the shift in fiscal policy for public capital investment, in order to support growth as well as the need for countries to move away from inefficient investments, which tend to be acute especially in low-income and low capacity states (Miller and Mustapha,

2016; IMF, 2015, Olawale *et al.*, 2010, Hunjra *et al.*, 2012). While Public Value is a proceed of the analysis of the influence of basic exigencies of individuals, groups and the society by relationships involving the public (Meynhardt, 2009). For any investment to have impact in any state, the Public Value Theory advocates for a focal point the state or organisation should establish based on three composite matters of initial consideration and these include the importance of 'public value' the organisation sought to produce; 'sources of legitimacy and support' that would be depended upon to permit the organization to take action and deliver resources required to support the strive to create the value; and 'operational capabilities' which an organization would reckon with to produce the appropriate outcomes (Moore and Khagram, 2004).

Kangwa (2012) in evaluating the extent to which ICT had been integrated in the teaching process in selected colleges of education in Zambia, established factors that influenced ICT use as being: lack of good policy, framework, poor ICT skills among lecturers and inadequate funding and resources. He concludes that there was a low extent to which ICT was integrated in the teaching process and this had been ineffective as it met neither national nor international standards as outlined in the Zambia Ministry of Education ICT Policy and the UNESCO framework. The question that needs to be asked in this regard is, in spite of the efforts made by the Zambian government to invest in infrastructure in secondary schools, what are the available ICT facilities in schools and the usage of these available facilities? More specifically this paper assess the following: the ICT infrastructure such as computers, computer laboratories, internet, among others, and the use of the available infrastructure by administrators, teachers and pupils in secondary schools.

Methodology and Design

This study was hugely quantitative and employed a survey design, with a sample of 360 teachers, who were randomly selected from thirty-six different secondary schools in four provinces in Zambia, namely Lusaka, Copperbelt, Eastern and Luapula provinces in which three districts were selected from each of the provinces using simple random sampling. Ten (10) teachers were selected from each one of the selected schools, from the three school entities (Government, Grant-Aided and Private Schools), which were either co-education or single sex schools.

The selected teachers participated by responding to a questionnaire that was in soft copy in a tablet or gadget. The questionnaire was designed and uploaded online on a tablet, using a software application called Open Data Kit (ODK), to be filled in by the researcher as each individual participant gave responses to the questions and later downloaded onto the computer online. Related literature was reviewed to establish other views relating to the study. Data collected was analysed using the Statistical Package for Social Sciences (SPSS) Version 23 and the findings were

expressed in percentages, graphs and tables. A Mann Whitney U test was used to validate null hypotheses that the use of the available ICT facilities was NOT dependent upon: Gender; School Location; Type of School; Training on the Use of ICTs; and Education Level of Teachers. And also a Kruskal Wallis test was used to tell the null hypothesis that the availability of ICT facilities was not dependent upon the work experience of the teachers.

Demographics of the respondents

The use of direct entry of data into the soft copy questionnaire by the researcher, using a one-on-one approach, guaranteed a 100 per cent response to the questionnaire, in that all the 360 questionnaires administered to teachers were successfully completed and entered by the researcher. The respondents were selected from a total of thirty-six schools, from the three different school types that is Government schools (120 teachers), Private schools (119 teachers),and Grant Aided Schools (121 teachers). Out of the 360 teachers who participated in the study, 214 (59.4%) were males while 146 (40.6) were females.

Results

Availability of ICT Facilities

In order to have effective impact of ICT on education, availability of the facilities to be utilised becomes very cardinal in the education sector. To establish the Teachers' perceptions on the availability of ICT facilities, a five-point Likert question was used on various statements, as:

1 represented the response 'Not Available',

2 – 'Available but Not Working',

3 – 'Available but Not Accessible by Teachers and Pupils',

4 – 'Available but only Accessible by Teachers and Administrators' and

5 – 'Available and Accessible by Administrators, Teachers and Pupils' for a range of ICT equipment listed.

The results are presented in Figure 1 where majority of the respondents (36.7 %) reported that their schools had ICT facilities but they were not accessible to teachers and pupils, and the lowest response (8.3%) was that ICT facilities in the schools were available and accessible to administrators, teachers and pupils. And according to Table 2, the most common ICT facilities largely available to administrators, teachers and pupils were desktop computers (77.2%) and computer laboratories (63.9%). The rest of the facilities were on the low side. And facilities that were critically not available included: ICT facilities for learners with special needs (71.4%), intercommunication devices (56.9%), fixed phone lines/fax machines

(52.8%) and personal digital assistant (50.6%), among others.

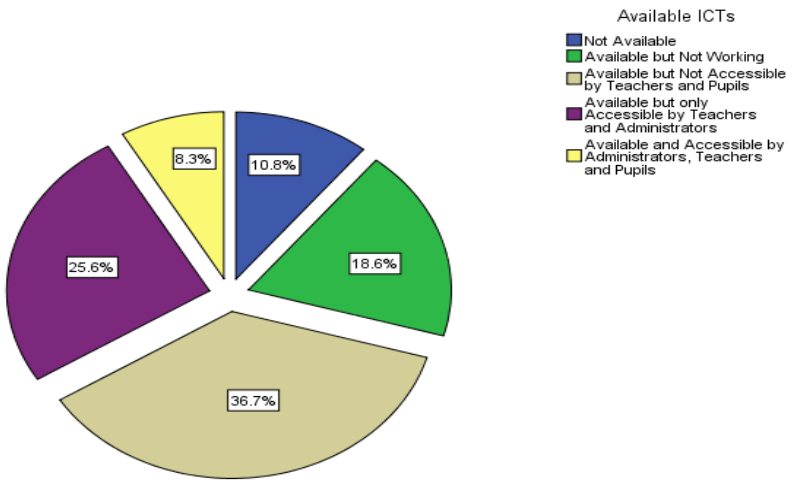

Figure 1: Available ICT Facilities

Table 2: Availability of selected ICT facilities in the schools

	Not available	Available but not working	Available but not accessible by teachers and pupils	Available but only Accessible by teachers and administrators	Available and accessible by administrators, teachers and pupils	Total
Desktop computers	7.8%	2.8%	2.5%	9.7%	77.2%	100.0%
Computer Laboratory/ Classroom	11.4%	1.9%	5.3%	17.5%	63.9%	100.0%
Photocopying Machine	14.7%	3.1%	8.9%	37.5%	35.8%	100.0%
Printers	8.6%	3.1%	8.6%	45.8%	33.9%	100.0%
Television	16.1%	6.4%	14.7%	31.7%	31.1%	100.0%
Internet Connection	35.8%	3.3%	12.2%	21.4%	27.2%	100.0%
Projector and Slide	31.1%	4.7%	6.1%	32.5%	25.6%	100.0%
Scanner	27.5%	8.1%	9.2%	33.3%	21.9%	100.0%
Satellite Decoder	34.2%	5.3%	9.4%	30.3%	20.8%	100.0%
Computer Aided Learning Software	46.4%	10.6%	7.8%	15.0%	20.3%	100.0%
Laptops	46.1%	5.0%	8.3%	21.1%	19.4%	100.0%
Intranet (a Local Network)	40.3%	8.3%	11.4%	22.5%	17.5%	100.0%
Radio	48.9%	7.5%	8.1%	18.9%	16.7%	100.0%
Personal Digital Assistant	50.6%	9.2%	12.8%	13.3%	14.2%	100.0%
Fixed Phone Lines Fax Machines	52.8%	9.4%	8.9%	16.1%	12.8%	100.0%
Intercoms (Intercommunication Devices)	56.9%	13.1%	6.7%	12.2%	11.1%	100.0%
ICT facilities for learners with special needs	71.4%	10.8%	1.9%	6.7%	9.2%	100.0%
Other	2.5%	97.5%	0.0%	0.0%	0.0%	100.0%

Further investigations were carried out to establish the teachers' responses on the various statements on the five point scale, by type of school, and according to Figure 2, the highest response (49%) reporting non-availability of ICT facilities was from private schools, while the lowest was from government schools. While the highest response (53%) on the facilities being available and accessible by administrators, teachers and pupils was from Grant-aided schools, while the lowest (17%) was from Government schools.

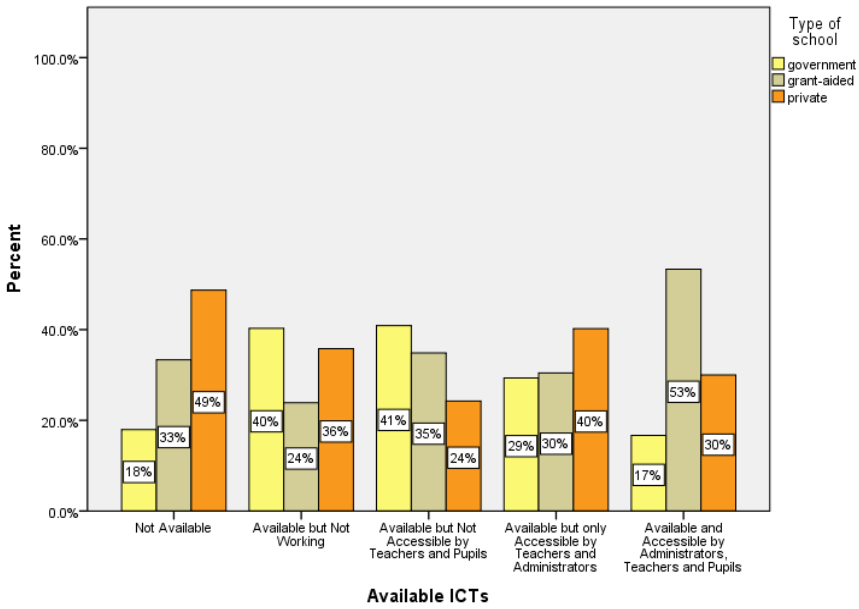

Figure 2: Available ICT Facilities by Type of School

Using the same five point scale, further analysis was carried to establish the perception of teachers on the available ICT facilities by school location (that is rural or urban), (Figure 3) shows the highest response (78%) from teachers in urban schools, who rated their schools not having ICT facilities and 50% of the teachers in both urban and rural schools reported that the available ICT facilities in their schools were accessible by administrators, teachers and pupils.

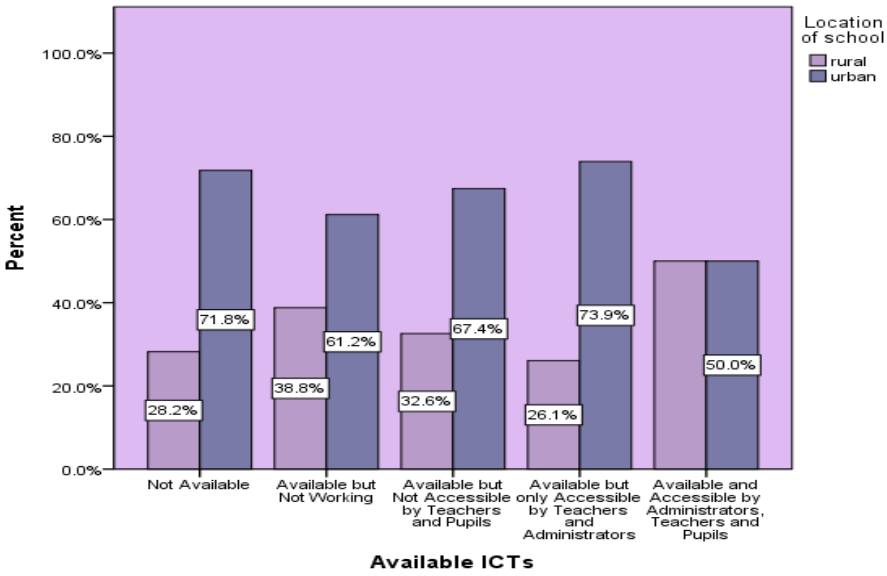

Figure 3: Available ICT Facilities by School Location

Use of the Available ICT Infrastructure

The Second objective of this study was to establish the usage of the available ICT facilities in the schools and to address this objective teachers were asked to respond to different statements on specific use of the facilities using the five point scale with

1 = Never,

2 = Rarely,

3 = Sometimes,

4 = Often, and

5 = Always.

Figure 4 shows a general low use of the available facilities, with the highest (33.1%) of teachers who used the facilities 'Sometimes' and the lowest (8.1%) teachers 'Never' used the available ICT facilities in their schools. And as shown in Table 3, most of teachers (54.7%) used the available ICT facilities for timetable planning and 51.1% of them used the facilities for issuing admission letters. The lowest use of the facilities (11.9%) was for staff training.

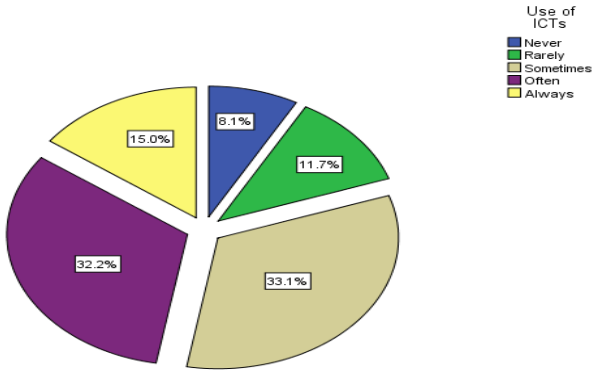

Figure 4: Use of Available ICT Facilities

Table 3: Use of Available ICT Facilities

	Never	Rarely	Sometimes	Often	Always	Total
Timetable Planning	8.6%	5.3%	9.4%	21.9%	54.7%	100.0%
Issuance of Admission Letters	11.7%	2.2%	16.1%	18.9%	51.1%	100.0%
Result Compilation and Processing	15.3%	4.2%	8.3%	23.6%	48.6%	100.0%
Data/Record Storage	10.3%	7.2%	11.4%	23.6%	47.5%	100.0%
Report Writing	15.0%	6.4%	19.2%	20.3%	39.2%	100.0%
Payroll Processing	37.2%	5.3%	7.5%	11.7%	38.3%	100.0%
Teaching and Learning	14.2%	6.7%	19.7%	25.8%	33.6%	100.0%
Internet Browsing/ Surfing and Chatting	42.8%	8.1%	12.5%	16.9%	19.7%	100.0%
E-Mailing	43.3%	11.9%	14.2%	15.3%	15.3%	100.0%
Staff Training	27.8%	10.3%	32.5%	17.5%	11.9%	100.0%
Other	1.1%	98.9%	0.0%	0.0%	0.0%	100.0%

A Manny Whitney U test was conducted to test the null hypothesis that use of available ICT facilities was not dependent upon gender. Median scores in females and males were 194.54 and 170.92, respectively. The distributions in the two groups differed significantly (Mann–Whitney U = 13572.5000, df = 1, p=0.034 two-tailed). These results seem to suggest that female respondents used the

available ICT facilities in the schools more than males.A Manny Whitney U test was conducted to test the null hypothesis that use of available ICT facilities was not dependent upon location of the school. Median scores of respondents from rural schools and respondents from urban schools were 159.53 and 190.85, respectively. The distributions in the two groups differed significantly (Mann–Whitney U = 11844.000, p=0.005). These results seem to suggest that respondents in urban schools tended to use the available ICT facilities more than respondents in rural schools.

A Kruskal Wallis test was conducted to test the null hypothesis that use of available ICT facilities was not dependent upon work experience of the respondents. The results were not significant, χ^2 (3) = 4.617, p = 0.202. Therefore, the null hypothesis was accepted.

A Manny Whitney U test was conducted to test the null hypothesis that use of available ICT facilities was not dependent upon educational level of the respondents. Median scores of respondents with diploma/certificate and respondents with degree/masters were 175.29 and 187.09, respectively. There was no significant difference in the use of available ICT facilities between the two groups (Mann–Whitney U = 14932.000, p=0.267). Therefore, the null hypothesis was accepted.

A Manny Whitney U test was conducted to test the null hypothesis that use of available ICT facilities was not dependent upon training on the use of ICTs. Median scores of respondents who had received training and respondents who had not undergone formal training were 195.57 and 172.28, respectively. The distributions in the two groups differed significantly (Mann–Whitney U = 12881.000, p=0.035). These results seem to suggest that respondents who had undergone formal training in ICTs used the available ICT facilities more often than respondents who had not undergone formal training in ICTs.

Opportunities and Challenges in ICT Facilities

To establish challenges in ICT facilities in secondary schools, teachers were asked to express their responses to different statements using the five point scale of:

1= ‘Strongly disagree’
2 = ‘Disagree’
3 = ‘Moderate’
4 = ‘Agree’ and
5 = ‘Strongly Agree’.

Figure (5) shows that majority (58%) of the teachers were moderate about their schools being well equipped with ICT infrastructure. This finding is similar to the findings by school location (Figure 6), where majority of the responses were at ‘Moderate’ for both rural and urban teachers rated at 37 per cent and 21per cent

respectively. Although both rural and urban schools had challenges, there appears to be more challenges in urban schools compared to rural ones.

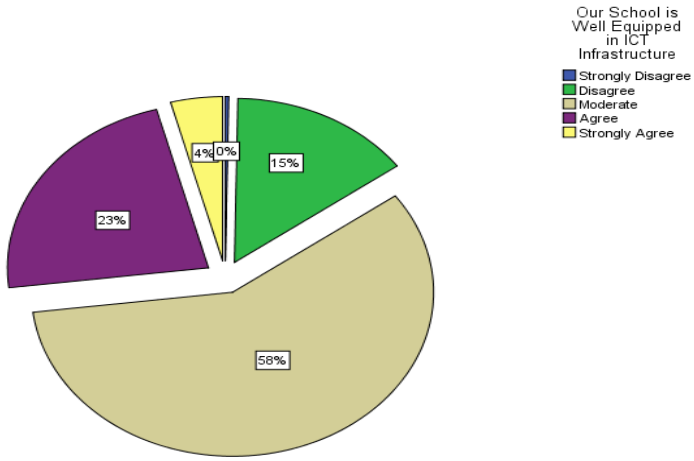

Figure 5: Challenges in ICT Facilities

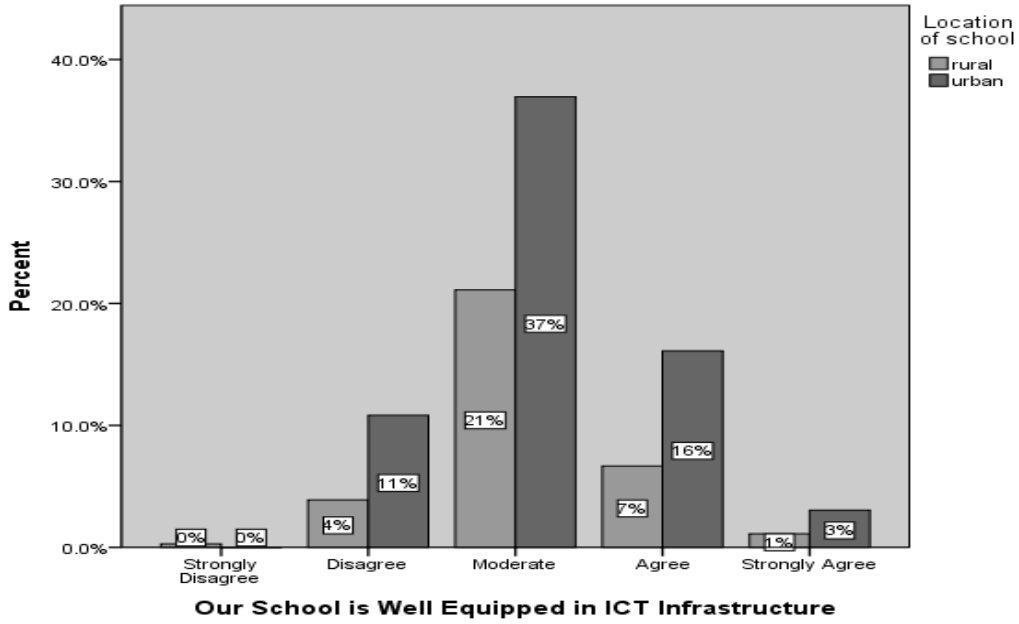

Figure 6: Challenges in ICT Facilities by Location

The study sought to establish whether teachers' perceptions on ICT challenges were as a result of the type of school they were teaching at. Figure 7 shows that a 'Moderate' response in all the three types of schools, that is Government, grant-Aided and Private with minimal variations especially between Government and

Grant-Aided and the highest being Government rated at 23 per cent, followed by 21 per cent (Grant-Aided) and 15 per cent (Private).

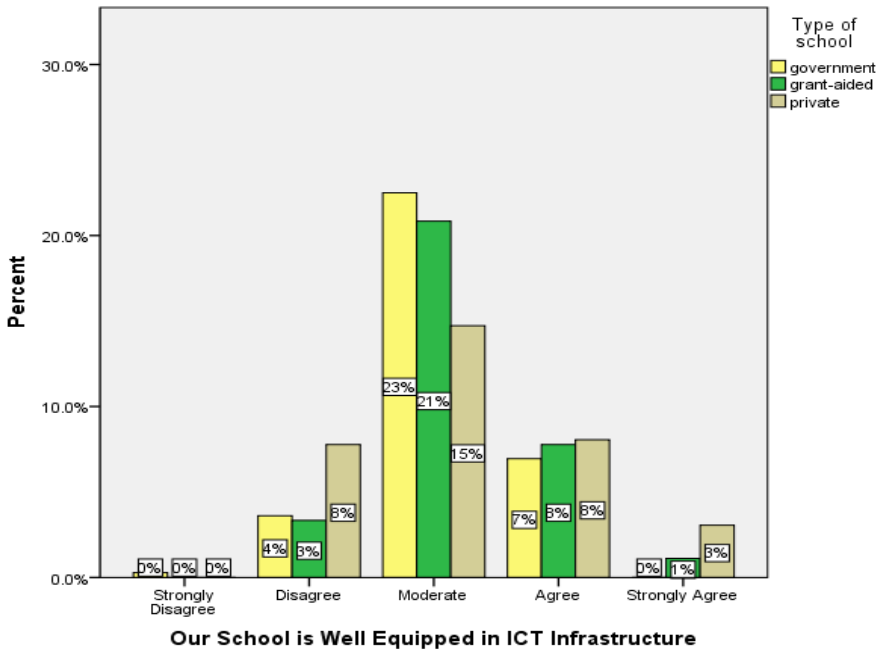

Figure 7: Challenges in ICT Facilities by Type of School

Discussion and Conclusion

In this analysis, we expose to view availability and usage of the available ICT facilities, as well as opportunities and challenges in ICT facilities at secondary school level in Zambia, based on teachers' perceptions. Investment in ICT infrastructure was reckoned in terms of available ICT facilities, use of the available ICT facilities and challenges with regard to the ICT facilities. Based on the understanding of the effects of ICT on education delivery and acquisition (Hudson, 1997; Kozma, 2005; Chitikul, 2006; Rellis *et al.*, 2009), the availability of ICT facilities in school cannot be overlooked.

With regard to *availability of ICT infrastructure*, while a good number of schools acknowledged having facilities, most of the facilities were not easily accessible by teachers and pupils, only a small sector of schools, especially from the Grant-Aided schools had pupils, teachers and administrators access the facilities, compared to Government and Private schools. The common facilities in most of the schools were computers and computer laboratories, which in some cases were converted classrooms. This is in tandem with a report by Bhattacharya et al (2012), about the deficit in infrastructure in many developing and developed countries. They report a lack of access to electricity by 1.4 billion people, which is a key resource for ICT operations, and the most hit being medium and low-income countries. A comparison by location of a school revealed, in this study, that schools in the urban

locations had more challenges than rural ones, where some of them had no available facilities, while others had the facilities, but they were not in a working condition, and also others had the facilities, which were accessible only by teachers and administrators. Consistent with this finding, Bhattacharya et al (ibid) commented on the underinvestment by developing and emerging markets in the maintenance of current infrastructure over the last decades, and the foregoing scenario renders a genuine concern as to how education in Zambia can be enhanced with regards to the initial intensions of the augmentation of technology worldwide in upgrading the teaching and learning environment, encompassing educational institutions, schools and universities (Al-Qahtani and Higgins, 2013). In fact, Mulenga and Kabombwe (2019a:126) expressed concern that 'the National budgetary allocation to the education and skills sector in Zambia has been reducing since 2015' and thus wondered how the competency-based curriculum in Zambia will be effectively implemented given that funding to the education ministries in Zambia had been going down for several years.

The study also reveals generally a low *usage of the available ICT facilities* in secondary schools, the common use being in timetabling and issuance of acceptance letters, others include Internet browsing or surfing and chatting or emailing and all these aspects do not address the issues of teaching and learning (pedagogy) but administration, does not offer assurance for the benefit to the learners, who are the target for the benefits of ICT in education. The finding relates to sentiments by authors such as Petko et al (2017), Howie (2010) and Dahal and Dahal (2015), on the reluctance in the utilisation of ICT facilities by teachers in their teaching. For example, Howie (ibid) established a precursory stage in the use of ICT tools by teachers in Cameroon in spite of the great efforts made by the Government to invest in education policy, leading to meagre payoff. It was further established using the Mann Whitney test that female teachers utilised ICT facilities more than males and also schools in urban areas used ICT facilities more than often than those in rural areas. The low usage of ICT by teachers, may probably be given a scenario that may not underscore the issue of negative attitude of the teachers towards ICT usage only but also the incompetent ineffective integration of ICT as pedagogical tool and low exposure to ICT to enhance familiarisation to it as a pedagogical tool (Ndibalema, 2014). And this may confirm the finding that the teachers who often used the ICT facilities are those who had some form of training in ICT. Similar, Dahal and Dahal (ibid), who attributed the low usage of ICT by Teachers to lack of training, lack of motivation and need among teachers to adopt ICT as teaching tools. They however, raise hopes of a shift in the recent future towards a positive attitude as a consequence of the strong forces being exhibited on the adoption of ICTs in education and this comes as an opportunity to develop ICT at a large scale.

Generally, all schools expressed serious *challenges* with regard to investment in ICT infrastructure especially those in urban locations. Although all the types

of schools had challenges, the most hit were schools from Government, though the scenario was not very different from the Grant-Aided schools. This finding matches with what Masumba and Mulenga (2019) found out in their study in rural Zambia that teachers' pedagogical skills in teaching Computer Skills was not only hided by their lack of education in the subject but also by the lack of facilities and equipment. A serious consideration of these challenges offers a platform for the Government to consider investment by other stakeholders or donors, to help enhance a favourable environment. The existence of policy in favour of ICT investment and utilisation in schools, leading to curriculum transformations, offers an opportunity for a positive attitude in pupils, teachers and administrators to support this vital worldwide move of ICT and the more learners are exposed to ICT the higher the level of knowledge acquisition, innovation and inquiry among the learners, leading to a knowledge, curious and innovative society. This is in line with sentiments of Gil-Flores *et al.* (2017) about opportunities to students to have useful tools to aid in their learning such as software programs designed for editing texts, creating graphs, organising data and completing calculations, and easy access of information and resources, designed for educational purpose resulting from such facilities as Internet connection, and other opportunities as transpire that support the physical presence of a teacher with essential teaching, the software utilised simplifies demonstration of content as well as execution of diverse undertakings, among others.

In conclusion, this study has revealed that investment in ICT infrastructure in Zambia has been on a very low side. If Zambia has to be competitive and productive as a state, a more concerted effort still needs to be employed in ensuring the investment in ICT facilities becomes effective and meaningful and this can only be obtained by prioritising investment in what guarantees a conducive and provocative environment in the incorporation or adoption of ICT in learning institutions, major to which is the availability and usage of ICT infrastructure as well as meaningful practical training offered to serving teachers, who must appreciate the benefits of ICTs in their service delivery and not view ICT as a tool that replaces a teacher (Trucano, 2015). This clearly suggests that both in-service and preservice teachers' exposure to ICT is required for teachers at all levels of training. Having adopted the competency-based curriculum in 2013 the Zambian educations system will just need to ensure that teachers have these computer skills competencies in the first place if what Mulenga and Kabombwe (2019b:128) will have to come true that 'for any education system to get the benefits of it, it requires teachers to be knowledgeable of the key principles of the curriculum and equipped with skills and desirable attitudes to teach using competency based approaches'. There is also need for the Ministry of General Education to employ mechanisms that ensure adequacy in the supply of ICT facilities to enable access by all players in the learning environment, and this suggests for concerted efforts by Government as well other stakeholders in the provision of ICT facilities under the Public-

Private Partnership arrangement (Rady, 2012). Further research is recommended to establish causes of variances in availability of ICT facilities in favour of schools in rural locations.

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