Enhancing Female Participation in Information and Communication Technologies Through Education: A Survey of Grade Nine Learners in Selected Government Schools in Zambia

Judith Lubasi Ilubala-Ziwa[1], Tisah Siisii[2], Peter Steve Ngabwe[3], Tuesday Bwalya[4]
University of Zambia[1][4]
Ministry of Infrastructure, Housing and Urban Development[2][3].
judith.ziwa@unza.zm[1]; ziwatisah@gmail.com[2]; peterngabwe@gmail.com[3];
bwalya.tuesday@unza.zm[4]

ABSTRACT

Information and Communication Technologies (ICTs) have become an integral part of the social, economic, and personal development of everyone in society including girls. This study therefore explored education as a tool for increasing women's participation in ICTs among grade nine learners in selected government schools in Zambia. The objectives of the study were to establish ways in which learning ICT grade nine female learners used education as a catalyst for the acquisition of digital skills and participation in ICT spheres; examine the challenges faced by female learners in ICT usage and participation; and establish measures taken to combat the challenges faced by grade nine female learners in ICT skills acquisition. A mixed methods approach was used adopting both qualitative and quantitative research methods. Quantitative data was collected from two hundred and thirty six (236) grade nine female learners while qualitative data was gathered from ten (10) Computer Studies teachers as key informants. Qualitative data was analysed thematically, and quantitative data was analysed using Statistical Product and Service Solutions (SPSS) software, version 20. The findings revealed that the majority (61%) of learners were introduced to ICTs at the grade eight level, but it was not known whether they would continue to acquire ICT knowledge and skills at senior secondary school. The findings have shown that doing ICT in schools has helped to remove the gender bias that technology is predominantly of the male domain and improved job prospects for girls. However, it has been established that learners lacked access to adequate ICT infrastructure such as computers and internet connectivity. The study recommended that since ICTs were a necessity in all spheres of life, the Ministry of Education should ensure that enough ICT infrastructure is provided in all schools where Computer Studies is taught.

Keywords: ICTs, Education, Women, Usage, Participation, Learners.

1. INTRODUCTION

In line with global emerging needs, the government of the Republic of Zambia through the Ministry of Education (MoE) introduced Computer Studies (CS) as a compulsory subject to be taught at the junior secondary school level in Zambia. As enshrined in the 2023 Zambian school curriculum, CS gained its status as an optional subject "to equip learners with essential skills necessary for them to have basic knowledge in Information and Communication Technology, ICT" (MoE, 2013:34). Overall, citizens, especially those who have undergone basic education, should acquire and demonstrate ICT literacy as a surviving skill in today's global competitive economic environment (MoE, 2013).

According to UNESCO (2017), ICTs are defined as a diverse set of technological tools and resources used to transmit, store, create, and exchange information. In addition, these technological tools and resources include computers, the internet (websites and emails), live broadcasting technologies (radio, television, and webcasting), and recorded broadcasting technologies (podcasting, audio and video players, and storage devices), among others.

At the centre of this article were women and the level of their participation in ICTs in secondary schools in Zambia. Women form the foundation of any society because they determine the shape of individuals and

society (Olorunda, 2004). Society's ability to develop depends on the ability of individuals, including women, to access information and knowledge. Access to information, however, is the third major concern facing women globally after poverty and violence against them (Primo, 2003). As such, the article sought to determine levels of ICT knowledge and skills among grade nine learners in selected schools in the ten provinces of Zambia. The article has unveiled ways in which grade nine female learners used education as a catalyst for the acquisition of digital skills in ICT. In the process, challenges faced by female learners in ICT participation were unearthed. Measures taken to combat these challenges were examined.

Available studies conducted in Zambia (Mulauzi & Albright, 2008; Nchimunya, 2022; Chashi, 2022; Bwalya, 2023), have concentrated on teaching ICT in schools and its associated challenges such as infrastructure, gadgets, and electricity while others have dwelled on benefits of ICT in general. This current study sought to establish the learning experiences of girls doing ICTs in schools.

2. LITERATURE REVIEW

According to Dlodlo (2009), most nations' experiences demonstrated that women played significant roles in development and that restricting them from doing so would limit opportunities for economic expansion. Dlodlo (2009) further asserted that the most significant variable enabling women to contribute to the advancement and expansion of their countries was education. ICTs have been known to be more and more essential to every country's socio-economic progress (Dlodlo, 2009). These were crucial instruments that could give women access to education, training, and a lifetime of learning. In addition to depriving women and their families of income, failing to provide women with these tools lowered national skill levels, diminished productivity, and prevented a nation from competing in the international market (Dlodlo, 2009).

Globally, only 5% of women are working in the ICT sector (United Nations Fund for Population Activities, 2023). Many women and girls shy away from taking ICT as a career because of the perception and sociatal beliefs that the field is a preserve of men. Women and girls who braved themselves to undertake ICT as a career lacked self efficacy and found themselves depending on males, who proved more helpful than their fellow females when faced with ICT challenges (Hachintu J. K. et al, 2024). Craig, Fisher, and Lang (2007) in their paper which described the outcomes of the Young Girls ICT project designed to encourage girls to continue with computing, observed that in recent years fewer students were enrolling in ICT courses and subsequently there was a significant decline in ICT graduates. The decline in participation by females was even greater than for males resulting in a further widening of the gender imbalance in this discipline (Craig, Fisher &Lang, 2007). The scholars further asserted that the early years influenced children's decisions regarding career choice and that for many girls, although they were initially interested in and engaged with Information Technology (IT) in their early years of schooling, this faded as they reached middle and senior secondary school. Reasons for this decline in interest included the perceptions that, among other things, IT was 'geeky', male dominated, and generally not a people focused career. Craig, Fisher, and Lang (2007) added that many initiatives to try and redress the problem were mostly localized and poorly funded and in schools, usually depended very much on one key individual.

In Zambia, studies show that women and girls struggle to access and use ICTs such as the Internet as many do not have the requisite skills. The Government of Zambia acknowledges that ICT connectivity and ICT knowledge and skills for women and girls are still of concern in Zambia. Furthermore, inequalities in distribution and access to ICT extend to geographical locations – with rural areas in Zambia disproportionately impacted (The Republic of Zambia. Ministry of Gender, 2019). For example, 4.3% of women compared with 55.7 % of men are engaged in e-commerce, while 10.4 % of people living in urban areas compared with 3.4 % in rural areas are engaged in the same(The Republic of Zambia. Ministry of Gender, 2019) When Covid-19 hit Zambia and schools were closed, many girls could not attend online

classes because of a lack of ICT tools (Chongo, 2020). This trend should be arrested to increase the participation of women in the ICT field.

There is an urgent call to ensure gender inclusivity in ICT related fields, and this will facilitate the attainment of the Sustainable Development Goal (SDG 5) which talks about ending gender inequality globally (Huawei, 2020). Scaling up the uptake and participation of women and girls in the ICT field is a priority of many Governments and non-state actors. In Zambia, the Government is promoting access to ICTs among women by implementing deliberate programmes and policies aimed at developing ICT skills in school-going children; and increasing women and girls' participation in science, technology, environment, and mathematics (STEM). It is also expanding ICT infrastructure development to rural areas (The Republic of Zambia. Ministry of Gender, 2019). Further, the government has developed the National Gender Policy that provides guidelines for media coverage concerning positive portrayal of women and girls, while mandating the government to ensure gender mainstreaming in media institutions. The paper considered what the best options might be for encouraging more girls to continue to study ICTs in schools to acquire digital skills to bridge the gap between men and women in terms of ICTs usage in the country.

3. THEORETICAL FRAMEWORK

This study relied on social constructivist theories from feminist technology studies (FTS) emphasising the constructed element in women's relationship with technology (Corneliussen, 2011; Lagesen, 2011). For Silverstone et al. (1997, 1992), the encounter between humans and technology does not take place in a vacuum, but in a cultural space loaded with meaning related to how people viewed technology. This included an encounter between gender and technology, and researchers have documented how gender and technology co-construct each other (Cockburn, 1992). Gender is here seen as a socially constructed difference between men and women, developed through societal discourses and negotiated in many different arenas (Connell 2005). Technology is a construction involving a wide spectrum of artifacts, knowledge, competence, cultural perceptions, and stereotypes.

The study opted to use constructivist theories from FTS because they have documented that many women find it challenging to enter ICT fields due to the field, work, metaphors, and images of ICT which are closely associated with men and images of masculinity (Adam et al., 2005; Corneliussen, 2011). According to Kanter (1993, 1977), women risk becoming a "token" representing women and simultaneously being invisible as experts (Faulkner, 2009) or even having their professional competence in ICT questioned (Corneliussen and Seddighi, 2020). This can make women's entry feel like a "bumpy road" (Branch, 2016), and the task of negotiating their belongings is more challenging than for most men (Corneliussen, 2020). For these reasons, being a woman in a male-dominated field may yield different experiences as opposed to being a man in the same field. However, Trauth and Quesenberry (2007) warned researchers against trying to understand women only as a "tightly knit group with common interests, backgrounds, values, behaviours, and mannerisms but should be aware that other factors also matter, as emphasised by the "individual difference theory.

Regarding the current study, we applied the FTS perspective to explore how grade nine learners used education to negotiate a space for their participation in ICT, which is increasingly associated with tools and support for shaping and controlling society (Corneliussen & Prøitz, 2016).

4. METHODOLOGY

4.1 Research Approach

A mixed methods approach was adopted to help collect not only quantitative data but also qualitative data through semi-structured interviews. Shema and Jenny (2013) asserted that the mixed methods approach could address some research questions more comprehensively. The two methods complement each other by overcoming each other's weaknesses while building upon their strengths. In terms of research design,

the study used a survey of selected grade nine female learners in different government schools in the ten provinces in Zambia. A survey design was preferred because though the girls came from different schools, they shared the same experiences of taking CS at the grade nine level. Additionally, all the schools were in provincial districts, making it possible for the schools to have at least the same facilities for computer use. The study was conducted in selected government schools in Eastern, Western, North-Western, Southern, Lusaka, Luapula, Central, Muchinga, Northern, and Copperbelt Provinces of Zambia in the provincial centres.

4.2 Study Population and Sample Size

The study population for this research included teachers and grade nine female learners in selected government secondary schools offering computer studies in the ten provinces of Zambia. The total sample of teachers and learners in the selected schools was two hundred and seventy-six (276). Out of this, 266 were pupils and 10 were teachers as key informants. Three participants (two computer studies (CS) female learners and one teacher) in each of the selected secondary schools formed the sample. A non-probability purposive sampling technique was used to select both the learners and teachers. Determination of this sample size was based on Slovin's statistical formula as follows:

Formula :
$n=N/(1+Ne^2)$
Variables :
- n = Sample Size
- N = Population Size
- e = Margin of error

The average number of students in a computer class was reported to be 40 and schools had an average of two computer classes. As such, the study population was estimated at 800, and a confidence level of 95% giving a marginal error of 0.05. Using Slovin's formula, the study sample size was calculated to be: N = $800/ (1+800 \times 0.05^2) = 266$.

4.5 *Data Collection Procedures*

Quantitative data was collected through a questionnaire, designed in Google Forms and shared with the pupils through their teachers. Qualitative data was also gathered from teachers using semi-structured interviews. The teachers opted to be interviewed on the phone due to time constraints. The researchers prepared a topic guide with a list of key questions with some useful prompts to encourage the interviewees to talk about specific issues (Patton and Cochran, 2002). Secondary data was collected through a review of literature from scholarly journals and the internet.

4.5 Data Analysis

Data was analysed quantitatively using the Statistical Package for Service Solutions (SPSS version 20) and Microsoft Excel 2013. Questionnaire responses were coded and then entered the software which analysed the data using descriptive statistics, from which graphs and charts were then derived. Thematic Analysis was used to qualitatively analyse the data that was collected from interviews. Using thematic analysis, the researchers examined all the data to identify the common issues that summarised all the views collected. The first step notably involved a preliminary observation of the data followed by identifying the themes. Theme identification involves making sense of the data and grasping the meaning of the responses (Patton and Cochran, 2002).

4.6 Ethical Issues

The researchers did not deal with the learners directly but used their teachers to gather information on their behalf. The teachers verbally consented to take part in the study as they felt that it would help them improve their teaching and how they related to the learners' challenges in the acquisition of ICT knowledge and skills. The teachers were particularly interested in this study because the results were presented at a

conference for women. Supporting women's issues and promoting education for girls in Zambia, was something they were interested in and would always be involved in.

5. FINDINGS

As indicated above, 266 questionnaires were distributed but only 236 participants gave feedback, giving an 89% response rate. Further 10 online interviews were carried out with teachers from the ten provincial districts. The following are the findings presented in line with the research questions. The first question was: How do learners use education as a catalyst for the acquisition of ICT knowledge and skills? Tables 4.1 to 4.5 give the responses of the learners from the questionnaire.

Table 4.1: Stage of ICT Inclusion of the School Curriculum

Levels of Education	Frequency	Percentage (%)
Pre- School	6	2.78
Primary School	78	33.33
Grade 8	146	61.11
From grade 8 to 12	6	2.78
Total	**236**	**100**

Results in the study revealed that 2.78% of the learners were introduced to ICT at pre-school, 33.33% were introduced to ICT at primary school (between grades 1 and 7), 61.11% were introduced to ICT in grade eight while another 2.78 were introduced to ICT in grade eight with the school offering it up to grade twelve. Therefore, only one school indicated offering ICT from grade eight up to grade twelve.

Table 4.2: The Teaching of ICT in Schools Per Week

Frequency of Learning ICTs	Frequency	Percentage (%)
Twice	136	58.47
Three Times	46	19.47
Four Times	26	11.02
Unanswered	7	2.97
Twice per Term	7	2.97
According to the school timetable	7	2.97
Junior Twice, Senior Three Times	7	2.97
Total	**236**	**100**

Table 4.2 indicates that most government schools (58.47 %) teach ICT twice a week with some schools teaching ICT as low as only twice per term. In cases where ICT was offered both at junior and senior secondary, senior secondary school learners were exposed to ICT more than junior secondary school learners.

Table 4.3: Whether parents and guardians were in support of the girl child's Interest in ICT

Responses	Frequency	Percentage (%)
Yes	210	88.98
No	26	11.02
Total	**236**	**100**

Table 4.3 shows that not all parents or guardians supported their girl children's interest in ICT.

Table 4.4: The Role of Education in Promoting Girls' Involvement in ICT

Statements on the Role of Education in ICT Promotion	Frequency	Percentage (%)
Improves girls' mobility and access to in-person ICT training	92	38.98
Helps remove the gender bias that technology is predominantly in the male domain	177	75
Helps reduce gender discrimination in the employment sector	150	63.89
Improves engagement and knowledge retention	170	72.2
Creates a supportive environment where girls can make mistakes without fear or judgment	118	50
It helps girls view ICT jobs as attractive	73	30.55
Total	**780**	**100**

Results in Table 4.4 indicate that the two hundred and twenty six learners who took part in this research had more than one input. 38.98% of the participants felt that education allowed girls to be mobile and thus have access to in-person ICT training like attending class with a teacher present to offer training. Most of the participants, (75%) were of the view that education helped to remove the gender bias that technology was predominantly of male domain with 72.2% of these citing that education helped girls improve their retention of knowledge.

Table 4.5: Perception of Society Supporting Girls Pursuing ICTs

Responses	Frequency	Percentage (%)
Yes	203	86.02
No	33	13.98
Total	**236**	**100**

As indicated in Table 4.5 above, society was more in support of girls' involvement in ICT (86.02%) than not (13.98%).

The findings from the interviews held with teachers indicated that girls showed no or less interest in ICT except for non-educational things. A Computer Studies (CS) teacher from Eastern Province said:
> *"Female learners view ICT to be a challenging subject, close to Mathematics".*

The general view among the teachers was that some learners misused ICT; they used it to share explicit content on media platforms.

Another teacher from Southern Province indicated:
> *"With limited knowledge, learners often spent excessive hours on computers involved in non-educational and potentially harmful pursuits".*

In response to the question of whether society was in support of girls' involvement in ICT, a teacher from Lusaka and another from Solwezi indicated in different interviews that generally, society supported girls' participation in ICT and that parents had a say in their children's use of ICT as they were the ones who bought the supplies (such as computer accessories)".

The study also sought to determine if learners faced challenges in pursuing ICT. The findings revealed that 92% of the learners indicated having challenges. As captured in Table 4.6, among the challenges cited include inadequate equipment for ICT.

Table 4.6: Challenges Faced by Female Learners as They Pursue ICT

Challenges	Frequency	Percentage (%)
Lack of adequate equipment for ICT learners & teachers including internet and generators	171	72.5
Special attention is not given to slow ICT learners	14	5.9
No deliberate ICT educational programmes	27	11.44
Few ICT teachers	6	2.54
Lack of exposure to successful ICT Organisations & Individuals	6	2.54
Lack of inclusive curricula	6	2.54
Discouragement from ICT teachers	6	2.54
Total	**236**	**100**

Table 4.7 shows that 72.5% of the participants highlighted the lack of equipment such as computers, internet connectivity, and generators as a major challenge for girls' involvement in ICT in schools. Lack of special attention being given to slow learners was cited as a challenge by 5.9 percent of the participants while 11.44% felt a lack of ICT educational programmes was a major challenge. Having few ICT teachers, lack of exposure to successful ICT organisations and individuals, lack of an inclusive curriculum, and discouragement from ICT teachers were highlighted by 2.54% of the teachers and learners as challenges.

These challenges were also mentioned by some teachers. For example, a teacher in Chinsali indicated that the lack of computers was a major challenge in the district as many girls wanted to take up computers from primary to senior secondary but could not do so because there were not enough computers in schools. Another teacher from ManguDistrict indicated that computers might be available, but connectivity was a major challenge.

Table 4.7: Mitigation of Challenges Faced by ICT Learners

Mitigation Measures	Frequency	Percentage (%) (%)
Distribution of ICT devices and internet connectivity in	111	47
Formation of ICT clubs and ICT awareness programs	20	8
Introducing ICT in the school curriculum at pre-school	33	13
Address gender stereotypes and bias	26	11
Improve teaching methods	26	11
Improve teaching methods, curricula, and ICT resources	20	8
Total	**236**	**100**

Table 4.7 shows that the distribution of ICT devices and internet connectivity in schools was the highest measure to be instilled to combat the challenges faced by grade nine learners in ICT acquisition of knowledge and skills through education.

6. DISCUSSION

The primary objective of this article was to elucidate how grade nine female learners taking Computer Studies (CS) were fairing in acquiring digital skills. Additionally, the study aimed to identify the challenges faced by female learners in the Information and Communication Technology (ICT) sector, with a specific focus on establishing measures taken to mitigate these challenges. The preliminary findings gleaned from the study of female learners in the ICT sector in Zambia have yielded insights into several critical aspects discussed below as per the objectives of the study:

6.1 Education as a Catalyst for the Acquisition of Digital Skills and Participation in ICT Spheres

The first question sought to establish how the learners used education as a catalyst for the acquisition of ICT knowledge and skills. The results from the questionnaire showed that the learners were introduced to ICT skills at different levels: pre-school, primary school (between grades 1 and 7), grade eight, and grade eight to grade twelve. Only one school indicated offering ICT from grade eight up to grade twelve. The results further showed that in cases where ICT was offered both at junior and senior secondary, senior secondary school learners were exposed to ICT more than junior secondary school learners. These results acknowledged Craig, Fisher, and Lang (2007) observation that in recent years fewer students were enrolling in ICT courses and subsequently there was a significant decline in ICT graduates. The decline in participation by females was even greater than for males resulting in a further widening of the gender imbalance in this discipline (Craig, Fisher &Lang, 2007). To close the imbalance, there is a need for schools in Zambia to offer CS at both junior and senior secondary. This could reduce the barriers (such as women's entry to ICT feeling like a bumpy road and being invisible as women) related to women having their professional competencies in ICT (Faulkner, 2009; Corneliussen and Seddighi, 2020).

The study opted to use constructivist theories from FTS because they have documented that many women find it challenging to enter ICT fields due to the fields being associated with men and images of masculinity (Adam et al., 2005; Corneliussen, 2011). In the current study, the results showed that education allowed girls to be mobile and, thus, have access to in-person ICT training provided in schools by the teachers. Since education also helped to remove the gender bias that technology was predominantly of the male domain, it helped girls improve their retention of knowledge in ICT. This was exacerbated by the support female learners received from their parents and society in general.

6.2 The Challenges Faced by Female Learners in ICT Participation

Regarding the challenges female learners faced in ICT, the results from the interviews held with the learners showed that lack of equipment such as computers, internet connectivity, and generators was a major challenge for girls' involvement in ICT in schools. Other challenges included a lack of special attention being given to slow learners, a lack of ICT educational programmes, having few ICT teachers, a lack of exposure to successful ICT organisations and individuals, a lack of an inclusive curriculum, and discouragement from ICT teachers. These challenges negatively impacted the learners as they could not continue studying CS as a subject because there were not enough computers in the schools. The situation was worse in rural areas where computers might be available, but connectivity was a major challenge. These findings resonate with the findings that inequalities in distribution and access to ICT extended to geographical locations – with rural areas in Zambia disproportionately impacted (The Republic of Zambia. Ministry of Gender, 2019). Generally, women's participation in the ICT field is low (Chongo, 2020). As such, there is a need to increase the participation of women in the ICT field by combating the challenges inhibiting their participation.

Additionally, the study found that girls were more likely to express an intention to pursue ICT at the college or university level after becoming accustomed to and proficient with Information Technology. However, the negative opinions and beliefs they held about ICT seemed to be rooted in societal preconceptions rather than experiences with ICT. It is worth stating that Phiri and Ziwa (2023) noted, in their article, that social

and cultural beliefs concerning menstrual blood caused the girls to adhere to menstrual traditional norms when at school believing that the dissonant belief was true. This insight underscores the urgency of interventions that provide access to technology, and challenge and dispel inaccurate perceptions surrounding ICT among female learners. It is imperative to cultivate an environment that not only equips female learners with technical skills but also cultivates a positive attitude and perception towards ICT careers.

6.3 Mitigation Measures to the Challenges Faced by Female Learners in ICT Participation
The findings have shown the need to incorporate digital literacy skills into the school curriculum. A pivotal finding highlighted the imperative need to advocate for the incorporation of digital literacy into the national curriculum. This encompasses introducing and promoting essential facets such as basic computer skills, internet usage, and digital safety. This is in line with social constructivist theories from feminist technology studies (FTS) adopted in the current study. Incorporating digital literacy into the Zambian school curriculum might enhance women's relationship with technology (Corneliussen, 2011; Lagesen, 2011). As Silverstone et al. (1997, 1992) put it, the encounter between humans and technology does not take place in a vacuum, but in a cultural space loaded with meaning related to how people viewed technology. In our study the cultural space the learners found themselves in motivated female learners to have an encounter with digital technologies, thereby, making gender and technology co-construct each other (Cockburn, 1992).

The findings also showed the pressing need to enhance access to technology, particularly for female learners residing in rural areas. This necessitates the promotion of initiatives that provide affordable or subsidised devices. Bwalya (2023) acknowledges that bridging the technological divide is paramount to ensuring that female learners, regardless of their geographical location, have equitable opportunities to engage with and benefit from ICT education. Initiatives aimed at enhancing access should be comprehensive, addressing both hardware and connectivity challenges (Bwalya, 2023). These findings are in line with Chongo (2020) and The Republic of Zambia. Ministry of Gender (2019) observed the existence of a digital divide in terms of access to ICT among men and women, in line with the theory used in the study in which the term gender is seen as a socially constructed difference between men and women, developed through societal discourses and negotiated in many different arenas, ICT inclusive (Connell 2005).

Another salient finding highlighted the importance of connecting female students with successful women in the ICT field, who could serve as role models and mentors. Exposure to accomplished women in the industry is perceived to bolster confidence and provide valuable guidance on potential career paths in the ICT sector (Miliszewska I. & Moore A., 2010). Establishing mentorship programmes might contribute significantly to creating a more supportive and empowering environment for female learners, fostering a sense of belonging and encouragement to pursue ICT-related careers.

Furthermore, the study highlighted the significance of fostering a supportive and inclusive learning environment. Essential to this is the need to address gender stereotypes and biases, creating an atmosphere where grade nine female learners could feel not only encouraged but also empowered to explore and excel in ICT. The emphasis on equal opportunities contributes to laying the foundation for confidence and active participation in the ICT spheres, paving the way for a more diverse and inclusive industry. Dlodlo (2009) highlighted the fact that there were fewer resources available to teach technical sciences and since the equipment needed was expensive, enrollment in technical courses was also expensive. The lack of supplies also prevented schools from offering hands-on instruction. The lack of computers in schools, let alone access to the internet, hindered the teachers' ability to teach ICTs. If the relationship between women and ICT participation is to become meaningful (Corneliussen, 2011; Lagesen, 2011), the challenges discussed in this section need to be mitigated in no time.

7.0 CONCLUSION AND RECOMMENDATIONS

The findings have shown that there is general interest from female learners in schools to pursue ICT as a career. Most of the girls surveyed have indicated that they began learning ICT in Grade 8 and they were learning ICT as a subject twice a week. Other findings show that learning ICT has improved the girls' morale and desire to pursue Science based careers. However, the study shows that girls who pursue ICT face several challenges which include inadequate ICT equipment. In line with the above findings, the following have been recommended to the Ministry of Education for implementation:

i) The Ministry of Education should ensure that enough ICT infrastructure is provided in all schools where CS is taught.

ii) A one-to-one computer-to-student ratio for students for grade nine to grade twelve learners must be introduced.

iii) Curriculum planners should make deliberate ICT programmes to enhance the participation of female learners in ICT such as ICT clubs.

iv) The Ministry of Education should ensure that ICT learning aids are provided in schools for easy assimilation of ICT material by the learners.

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