

“Gender Inequality in Computer Education: Challenges and Restrictions to Meaningful Computer Access and Use for Female Secondary School Students in Northern Malawi”

MSc International Development Dissertation

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Abstract

This dissertation aims to explore the restrictions and limitations girls face in access to and use of computers in secondary schools in Northern Malawi, as well as discussing the implications this has for girls and their role in Malawian society, the ICT sector and computer education. Using a framework of literature on ICT access, feminist empowerment and computer access and use in education, the study uses qualitative analysis of both quantitative and qualitative findings. Using varying methods; observation, questionnaire, semi-structured interviews, and focus groups, the study triangulated to achieve valid results.

The research found four recurring themes to explain lack of girls in computer education; male dominance, time constraints, role models, motivation, and future prospects, and gender neutrality. Through the analysis, the findings suggest that there are wider consequences of girls' lack of engagement, for the girls' own personal development, the development of a Malawian ICT sector, and effects on the progress towards gender equality. In conclusion, the male dominance in society is the main culprit and is connected to all other findings. By not acknowledging the structural gender inequality, there is little prospects of progress or positive outcomes of programs aimed at girls' meaningful access to computer education.

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Executive Summary

This executive summary will summarise the main points of the dissertation “Gender Inequality in Computer Education: Challenges and Restrictions to Meaningful Computer Access and Use for Female Secondary School Students in Northern Malawi”.

Since the world as a whole has moved to a technological stage, many countries are lagging behind. Countries like Malawi are missing an adequate work force within the ICT sector, which prevents the country from being able to take part in the global ICT economy and system. In order to achieve this, the people need to become computer literate and have opportunities and motivation to enter into the ICT sector. In order for this to happen, physical access needs to be ensured, which is highly recognised in Malawian and African national ICT policies (Republic of Malawi, 2013). What is more or less disregarded is the need for meaningful access (Selwyn, 2004), the focus on achieving sufficient computer literacy as an outcome of the physical access. In Malawi, the gender digital divide is divergent and contributing to significant differences between men and women in meaningful access and use of computers. Although the access is generally limited, the girls and women are at substantial disadvantage. This has severe consequences and implications for the development of the Malawian ICT sector, yet women’s access and use of ICTs can also lead to empowerment and social change (Madanda et al., 2007). This dissertation is part of a work-based placement with Turing Trust, and explores the restrictions and limitations girls face in access to and use of computers in secondary schools in Northern Malawi, as well as discussing the implications this has for girls and their role in Malawian society, the ICT sector and computer education. This adds a gendered view to the existing computer access literature, a commonly disregarded theme. Using a framework of literature on ICT access, feminist empowerment and computer access and use in education, the study uses qualitative analysis of both quantitative and qualitative findings.

The methodology used was a combination of different qualitative methods so that the results would be valid. The sample was chosen from five secondary schools that represented the five main types of schools. The main group of informants were female

students through focus groups, as they were the primary research focus. In addition, the study included semi-structured interviews with computer teachers and head teachers as experts on the gendered education system and computer education in Malawi. A questionnaire was also conducted with students, both male and female, that collected quantitative and qualitative data for analysis.

The research found four recurring themes to explain lack of girls in computer education; male dominance, time constraints, role models, motivation, and future prospects, and gender neutrality. Firstly, the Malawian society's male dominance that was reflected in all aspects of the study, especially as a reproduction of gender roles in the education setting. It imitates the view that women are not supposed to work with computers. Secondly, the traditional gender roles means the girls have many responsibilities that take up most of their time. This leaves little time to use other computer access points apart from computer class, in the home or outside. It also affects their engagement in classes as they are often held outside of normal school hours. Thirdly, the lack of role models and future prospects leaves little motivation to enter into the ICT sector, or even to become computer literate. The lack of women in the sector only creates an "evil circle" that reproduces the view of women being unfit for computers. Lastly, gender neutrality and blindness in policy and practice is a hindrance to girls' access and use, as their structural gendered disadvantage is not accounted for.

Through the analysis, the findings suggest that there are wider consequences of girls' lack of engagement, for the girls' own personal development, the development of a Malawian ICT sector, and effects on the progress towards gender equality. Finally, these restrictions and limitations the girls face in secondary education create wider consequences. It hinders their personal development, which has disadvantageous effects on empowerment, job opportunities and access to knowledge. It also affects the ICT sector, and leaves a substantial part of the work force without computer literacy or the ability to contribute in building human capital for ICT improvements. Lastly, the progress towards gender equality is prevented because it reproduces the gender disparities found in the Malawian society. Lack of computer literacy also affects the ability to access information, which also creates a larger gap in the information divide.

In conclusion, the male dominance in society is the main culprit and is connected to all other findings. By not acknowledging the structural gender inequality, there is little prospects of progress or positive outcomes of programs aimed at girls' meaningful access to computer education. The focus needs to be on achieving meaningful access and use of computers and computer education for girls in secondary schools. As argued, this has such wider implications that emphasises the importance of investing in better ICT infrastructure in schools, sufficiently trained teachers and a gender sensitive policy and practice. This research has highlighted how the patriarchal society of Malawi is the main cause of low female engagement with computer education. This suggests a change of how society views women, a difficult and contested process. The importance is therefore in facilitating for the structural inequalities, including gender in policy and practice, and making sure that the schools accommodate for the girls' needs. In conclusion, based on the findings and arguments presented in this dissertation, there is a need to acknowledge the gender disparities rather than ignore them.

1. Introduction

“The world is technological” was a recurring reason for why girls believed learning how to use a computer is important to them. Since the world as a whole has moved to a technological stage, many countries are lagging behind. Countries like Malawi are missing an adequate work force within the ICT sector, which prevents the country from being able to take part in the global ICT economy and system. In order to achieve this, the people need to become computer literate and have opportunities and motivation to enter into the ICT sector. In order for this to happen, physical access needs to be ensured, which is highly recognised in Malawian and African national ICT policies (Republic of Malawi, 2013). What is more or less disregarded is the need for meaningful access (Selwyn, 2004), the focus on achieving sufficient computer literacy as an outcome of the physical access. In Malawi, the gender digital divide is divergent and contributing to significant differences between men and women in meaningful access and use of computers. Although the access is generally limited, the girls and women are at substantial disadvantage. This has severe consequences and implications for the development of the Malawian ICT sector, yet women’s access and use of ICTs can also lead to empowerment and social change (Madanda et al., 2007). This dissertation is part of a work-based placement with Turing Trust, and explores the restrictions and limitations girls face in access to and use of computers in secondary schools in Northern Malawi, as well as discussing the implications this has for girls and their role in Malawian society, the ICT sector and computer education. This adds a gendered view to the existing computer access literature, a commonly disregarded theme. Using a framework of literature on ICT access, empowerment and computer access and use in education, the study uses qualitative analysis of both quantitative and qualitative findings.

The following chapter is a review of the previous literature on the digital divide, highlighting three essential themes; access and use, gender and the digital divide, and access and use in education. The next chapter outlines the context of Malawian school system, ICT policy, gender specificities and the organisations involved in providing computer access in the area. The subsequent chapter provides the methodological framework and ethical considerations. Chapter five explores the main findings and offers an analysis of the themes. It also addresses the consequences of the findings

and analyses the implications on wider themes such as personal development, the ICT sector, and gender equality. The final chapter summarises the main points and offer concluding comments on the findings of the study.

2. Literature review

The digital divide was previously considered to be the technological division between North and South (James, 2003; Wilson and Wong, 2003), but is now considered to be the digital inequality between different groups (Fuchs and Horak, 2008; van Dijk, 2006). In the early 2000s, the digital divide was often discussed as the gap between the “haves” and “have-nots”, the difference being having physical access to technology and information or not. This chapter will review the literature on the digital divide and highlight questions around three key themes; access and use, gender and the digital divide, and access and use in education.

Access and use

Spectar (2000) defines the digital divide to be inequitable access to the various technology or information within ICT, which includes computers, Internet and telephone technology among others. The biased access, he argued, was between either individuals or within groups in or between countries (Mutula, 2005: 122). This view became outdated as several academics (Selwyn, 2004) put more emphasis on the importance of socio-economic variations such as age, gender, income, level of education, and geography (Selwyn, 2004: 344). As Chikati et al. (2013: 268) discusses, physical access has always been the original cause of the digital divide, however many studies have emphasised the importance of looking beyond this and discuss access within a framework including “socio-cultural issues, literacy levels, gender, place or region, psychology among others” which are important contributors to the use and opportunities created by ICT access (Min, 2010; Potosky and Bobko, 2001; Arendt, 2008; Seyed, 2008). Broos and Roe (2006) also argued that there was a limitation to only explore socio-demographics of the digital divide, and argued to consider psychological variables using social cognitive theory and self-efficacy.

The relationship between physical access and the usage access of computers is widely discussed (Selwyn, 2004; Mutula, 2005; Gyamfi, 2005), however, there is a consensus that physical access is not enough. Despite this there have often been

developed simple solutions, such as creating free computer centres for people who cannot afford a computer (Selwyn, 2004: 345), which would be considered sufficient to close the digital divide. This reflected itself in ICT policies that aimed to create physical access for “unconnected” citizens, as the UK’s aim to achieve “universal access” to the Internet in the early 2000s (DTI, 2005). This policy included implementing community ICT centres that would create access for people who lacked access to ICT facilities in their homes or while at work. The motivation behind the policy was that if the “unconnected” had access to ICTs; this would close the socio-economic digital divide in the country.

As argued by Selwyn (2004), this reasoning is simplistic. He claims there are several limitations to the dichotomous view of access in terms of people who “have” and “have-not”, and argues for a more hierarchical view where the context of use is considered. He claims that providing ICT facilities is in practice useless unless the physical access includes knowledge by users on how to appropriately take advantage of the opportunity and create meaningful access and use (Selwyn, 2004: 347). In meaningful use he means that it creates positive outcomes, such as computer literacy. These criticisms to the emphasis on physical access as the solution to bridging the digital divide has led to a change in perception, yet these types of programs continue to be used in development projects.

Selwyn (2004) contributed an important foundation for digital divide and ICT access studies, yet his work was focused in developed countries where the digital divide is rapidly closing. In a low-income country context, such as in many African countries, including Malawi, the question of access is a lot more pressing. There is still a focus on providing physical access where there is none, such as implementing computer labs in secondary schools. The drawback to a large focus on initial physical access is that the programs or policies that provide computers, or other similar programs, lack recognition that quality of access is highly important. As Mutula (2005) has argued, sub-Saharan Africa has another set of specific peculiarities that needs to be addressed when discussing ICT access in this region. These special conditions affect the way access and use should be approached, which means there needs to be more specific studies on African countries. Although there is a somewhat consensus that context of use is important for meaningful access, several NGOs and international organisations,

as well as governments, facilitate programs that only account for physical access or that fail in their usage approach (Gyamfi, 2005: 24).

Gender and the digital divide

As established, the digital divide is becoming more and more about usage access rather than simply physical access. As technology and ICTs are becoming entrenched in any society the only way to participate in a global society is to be a part of the process. Gender has proven to be a factor that creates significant division in the technological society (Alozie and Akpan-Obong, 2017; Fuchs and Horak, 2007; United Nations, 2005; Friedman, 2001), and the digital gender divide is now also becoming part of the discussion. Many authors have argued that the importance of ICTs mean they cannot be considered as a supplementary factor (see Alozie et al., 2011; Fuchs and Horak, 2008; United Nations, 2000; Carr and Huyer, 2002; Norris, 2001). Alozie and Akpan-Obong (2017) claim that “any discussion of the digital gender gap in Africa must necessarily begin with recognition of ICTs as a ‘strategic gender need’” (Alozie and Akpan-Obong, 2017: 139). They argue that ICTs are of strategic importance to change a woman’s status in society, rather than simply for accommodating practical needs (Boyd, 2002; Denton, 2002). Because women in Africa are part of patriarchal societies (Alozie and Akpan-Obong, 2017: 141) it means that although the country is improving their people’s ICT access and use this does not necessarily lead to more usage by women (Hafkin and Huyer, 2008: 35).

As ICT policies have developed in African countries, including the low-income countries such as Malawi, it has been advocated for the need to incorporate women’s issues and a gendered context (Olatokun, 2008; Chauraya, 2012). Olatokun (2008) concludes that unless this is part of the ICT policy framework, the digital gender divide is only going to widen. The dire consequences will therefore be that most women without access will be excluded from the possible positive outcomes of ICT (Olatokun, 2008). In the early years of ICTs for development, there was barely any mention of women or any gender aspect. In a study by Hafkin (1995), she found that in ten country studies by United Nations Economic Commission for Africa on informatics policy instruments, none of them mentioned gender (Hafkin, 1995). Although there has been significant progress within ICT policies both globally and in Africa, we still find that ICT policies on a highly limited scale mention gender in an

adequate and sufficient manner (Olatokun, 2008). Another issue of ICT policies is that if they do attempt to consider gender issues there is usually an assumption that policies need to be gender neutral (Chauraya, 2012). Technology and the way they are used vary greatly across different groups. Factors such as age, gender, socio-economic status among others determine in what context the technology is used (Huyer and Sikoska, 2003: 12). This means that ICT needs to work in different contexts, and the differences need to be accounted for rather than disregarded. An example is Nigeria's National ICT policy that was analysed by Marcelle (2000). She found that the policy was using highly gender-neutral terms, and argues that using these words was based on an assumption that it would include everyone (Olatokun, 2008: 64). As previously mentioned, this aim to be gender neutral is ignoring the social, economic and cultural differences between genders that affect the context around access and use of ICTs.

The relationship between gender and ICT access and use is greatly documented through research on the gender gap in developed countries such as the UK, Netherlands and Belgium (Beentjes et al., 1999; Losh, 2004; Van der Voort et al., 1998). Broos and Roe (2006) as previously mentioned looked beyond socio-demographics and into psychological factors on use of ICT in adolescents. They found gender specific results that further implied a variation between boys and girls. Their results argue that there are significant differences between boys and girls "suggesting that gender remains an important differentiating factor in the digital divide, even among young people" (Broos and Roe, 2006: 314). In the developing world the focus is mostly on adult female empowerment and ICT access and how this access to ICT can aid them in economic empowerment (Buskens and Webb, 2014; Oreglia and Srinivasan, 2016; Masika and Bailur, 2015). Studies investigating factors keeping women and girls from using ICTs have found several socio-economic and cultural aspects such as discouragement from the community or family, and the opinion that ICT is only for boys, and the domesticated role of girls and women (Broadband Commission, 2013; Deen-Swarray et al., 2012; Spender, 1995). There is still a lack of classroom studies that incorporate gender and ICT, which would be beneficial for further study on genders and ICT.

Access and use in education

Studies from sub-Saharan Africa on access and use of computers tend to focus on universities. A study by Brown and Czerniewicz (2007) in South African universities found that there were relationships between physical access and use, however these were not exclusive or determinant. The study accounted for several factors that affected the variations in use, and levels of use, however exploring the students' previous experiences with computers could also affect the findings. The ability for ICT to be empowering for anyone is contingent on whether or not people are able to take advantage of ICT resources (Olatokun, 2008: 66). It is possible to argue that the earlier in life students have access to computers, the earlier they will become familiar with them and the chance of more meaningful use will rise. It is therefore important to put more focus on access and use of computers in primary and secondary school, not just at tertiary level. Some studies have addressed computer access and use on secondary level (Chikati et al., 2013). A study conducted in Botswana found that although there was physical access to the computers, factors such as lack of qualified teachers created significant divergence between the students' use and engagement (Chikati et al., 2013).

As outlined in this chapter the literature has developed from the digital divide between the "haves" and the "have-nots", to several variations of the digital divide that includes context and usage of technology and ICTs. Academic studies and articles today support the importance of considering physical access as a prerequisite. The focus should be on meaningful access, usage access and engagement by the users (Selwyn, 2004). The gender digital divide has received much attention in the later years, following an increased focus on inclusion of women through several conferences and agreements since the 1990s (UN-NGLS, 2010; Alozie and Akpan-Obong, 2017). With a much more porous foundation in the literature, classroom studies from sub-Saharan Africa that explores computer education and the use of ICTs in learning are somewhat lacking. Most studies on ICT and education look at tertiary education, and few incorporate significant gender aspects to the study. This is where this dissertation contributes to the discussion, by investigating the gender variations in access and use of ICT equipment in secondary schools in a low-income country. Because of the importance of early learning, and the empowering effect of

ICT knowledge, it is important to examine the discrepancy between boys' and girls' varying levels of engagement with computers at a young age.

3. Context

This chapter will discuss the specific context of Malawi, including the school system, particularly the secondary school system. Following this, it will cover the country's general ICT policy and more specifically within the school system. Further, the gender specific characteristics of Malawi are especially significant in the study and will be outlined. Lastly this section will shortly explain the role of the Turing Trust (TT) and Centre for Youth and Development (CYD) in distributing computers to secondary schools in Northern Malawi.

Malawian School System

The Malawian school system is divided between public and private schools, and has an 8-4-4 structure. Primary school runs from Standard 1 through to standard 8, secondary school is divided in two two-year cycles from Form 1 to Form 4. Primary school education is free, yet fees are introduced in secondary school (World Bank, 2010). The secondary school system has five school types: government-run secondary boarding schools, government-run secondary day schools, community day secondary schools (CDSS), private secondary schools founded by an individual, and lastly private secondary schools founded by a church. For the government schools (including CDSS), there is a selection system after final exams in primary school that allocates students to secondary school. The students with the best results will be allocated to boarding schools, the following to day schools and the remaining to CDSS (UNESCO, 2008). Malawian schools are characterised by high drop-out rates, especially by girls, low quality education and high student-teacher ratio which also means a lack of teachers. The enrolment rate in primary Standard 1 is promising, however there is a long progress left before universal primary education is reached. The drop-out rate is very high with only 64 percent of the students reaching grade five in 2013, however with an increase to 88 percent in 2014. Despite the increase, the continuing high drop-out rates create negative effects for further schooling (Ministry of Finance, Economic Planning and Development, 2014; Ministry of Finance, Economic Planning and Development, 2015). Drop-out rates are lower in secondary

education, however the negative transition from primary to secondary level leaves many children without proper schooling (World Bank, 2010).

ICT policy

As a low-income country, Malawi has little resources to invest in ICT policy implementation and infrastructure. It has been argued that in countries where basic needs are not fulfilled, these need to be addressed before allocating funds to ICT (Fink and Kenny, 2003). Nonetheless, ICT can be a part of the overall development and poverty reduction. Malawi has recognised how ICT can have positive effects on poverty reduction, as it is part of the Poverty Reduction Strategy Papers (IMF, 2012). The 2013 National ICT Policy maps out the limitations of ICT in Malawi currently. The report acknowledges that many of the socio-economic challenges the country is facing is partly due to “inadequate communication infrastructure, very low utilization of ICTs and lack of information” (Republic of Malawi, 2013: 2). There have been significant improvements in Malawi (Sturges, 1998), yet there are still severe limitations to the Malawian ICT infrastructure, including the people’s general physical access to ICT services. Numbers on computer density is unavailable, yet it is reported that it is lower than the average in the region and mostly concentrated in urban areas (Republic of Malawi, 2013). As evident from reports concerning access to ICT in Malawi, the focus is limited to physical access, and does not extend to usage access or engagement. The National ICT policy has a section on “Universal access to ICT and ICT related services” (Republic of Malawi, 2013), which suggests commitment to implementation of ICT infrastructure, however it frequently disregards the importance of usage access within the policies.

Educational ICT policy

In terms of ICT in education in Malawi, there are few policies aimed directly towards incorporating ICT in learning, and even less on including computer education in schools. In the 2013 National ICT Policy there is one mention of education within increasing human capital, focusing on ICTs to improve general quality of education rather than access to ICT services through education. There is an ICT curriculum in place (Isaacs, 2007: 8), which is currently being revised. Despite this, there is no universal program in place to provide secondary schools with computers or other ICT resources that will make them able to use this curriculum. The schools usually rely on donor aid of refurbished computers, or funding to purchase computers for the schools.

Because of this it is difficult to envision a prospect of universal physical access to computers in the Malawian school system. In terms of usage and engagement, the prospects are even worse, as the schools often do not prioritise computer education, and only a selected few are able to take it as a course. With significant variations between the different types of schools, students have even more differing usage and engagement access depending on the school they are enrolled in. Lack of teachers, or un-qualified teachers in computer education is another factor that creates ripple effects. Many teachers are self-taught in how to use a computer and in rural areas there might not be any teachers that are computer literate.

Gender inequality

Girls' and women's position in the Malawian society can be viewed as disadvantaged due to the continuing discrimination based on gender, the entrenched traditional gender roles, including lack of political and economic opportunities as compared to males. As outlined in the literature review, women's empowerment is a recurring theme to study, also in terms of ICT. In primary school enrolment for standard 1 the girl-boy ratio was 1.001 in 2014, a slight decrease since 1.04 in 2009 (Ministry of Finance, Economic Planning and Development, 2015). Despite the fact that more girls than boys enrol in primary school, at secondary level the gender ratio was at 0.88 in 2015. This has been a great increase from the previous years, yet it shows that there is a large discrepancy between primary and secondary school enrolment. There are several factors that explain why girls are not continuing education through to secondary education, including socio-economic, socio-cultural and school related factors (Maluwa-Banda, 2003: 12). This includes for instance poverty and consequently the costs of schooling, household responsibilities, lack of female role models and so on (Maluwa-Banda, 2003: 12). This means fewer girls go to secondary school, and even those who do have constraints on their access to quality education. The gender inequality leads to a significantly more restricted computer access for girls than for adolescent boys.

Turing Trust and Centre for Youth and Development

This dissertation was conducted through a work-based placement (WBP) with TT, a Scottish organisation founded in 2009. Their main aim is to provide quality technology and IT training to schools in sub-Saharan Africa (Turing Trust, 2017). The organisation distributes refurbished computers and other equipment from the UK to

secondary schools in Northern Malawi, and further plans include installing an offline software of learning resources and teacher training. CYD is TT's local partner in Mzuzu in Northern Malawi, and work with several development projects, mainly aimed at youth. Their role in the process is the physical distribution of computers to the schools, as well as monitoring and maintenance.

In conclusion, the Malawian context is highly affected by their underdevelopment within ICT infrastructure, the school system and significant gender discrimination. These conditions are all substantial factors when studying access, use and engagement with ICT, and especially computers, by girls in secondary schools in Northern Malawi.

4. Methodology and Ethical Considerations

This chapter will establish the methodological framework and the reasoning behind the methods used to answer the research questions posed in the introduction. It will also discuss the ethical considerations in the research and certain limitations to the study.

Data collection

Initially in a preliminary literature review on Malawi, the education system and ICT scheme it was possible to draw out certain themes. Upon arrival for fieldwork the next step was engaging with the local community, both within the host organisation and in the schools, by doing informal interviews and observations of the culture. With this, a foundation for the study was established and following was the selection of a study sample. Out of CYDs at the time 19 schools that had computers installed, five were selected. This was to represent each of the five types of schools in the Malawian secondary school system, and to have a broad sample of varying schools. The respondents and informants were selected based on non-probability sampling as the study focuses on cultural data, which requires experts (Bernard, 2006: 146). It was decided that the students were the main group of information, using purposive sampling (Bernard, 2006: 190), in addition to key informants including the computer teachers and head teachers. The key informants were selected because they are considered experts on the culture of gender in Malawi and specifically within computer education (Bernard, 2006: 196). Following this initial selection, the data

collection continued with further observations in the schools to establish a relationship with the institutions and informants.

Observation

As previously mentioned, the initial stage of the study involved general observations and informal interviews, which continued throughout the data collection period, although more explicitly concentrated on the aims of the study. In order to settle in and establish good relations with the schools and informants we set up meetings with head teachers and computer teachers to present the research project and use informal interviews to understand the school structures and culture (Bernard, 2006: 211). In a general sense participant observation was used as I was living with a local family, participating in their every day life, working with local colleagues and through informal interviews with them understood the workings of every day life. The limitation to this, however, was that within the school setting this was partial as time constraints and other logistics made it difficult to spend a lot of time in all the five schools. Although it has been argued that participant observation reduces the problem of reactivity (Bernard, 2006: 354), because of the limitations this was not the case. It was difficult not to be a curiosity when conducting the research and most people, both students and teachers, were noticeably aware that they were being studied.

Questionnaire

Questionnaires are a regularly used research tool in anthropological studies (Bernard, 2006: 252). This study distributed a supervised paper based questionnaire within the classroom setting to a total of 76 students. Using a questionnaire gave the opportunity to collect both qualitative and quantitative data (Harwell, 2011: 151), and reach a large number of students as opposed to more time-consuming structured interviews. To achieve more control over the respondents' interpretations and being able to answer their questions, a supervised rather than self-administered questionnaire approach was used (Bernard, 2006: 260). The questionnaire had 27 questions, developed to gather general and gender specific information. A pretest was conducted with students from the CYD youth hub that fit the questionnaire respondent demographics, and allowed them to ask questions and comment on the questionnaire. As Bernard (2006: 286) stated, this led to some realisations and changes of aspects and interpretations that were taken for granted. This was also made clear later in the study, as it was pretested for level of English within the respondent demographics and

it was established that a translation was not needed. However, the last group of respondents' answers needed to be dismissed due to several miscommunications.

Semi-structured interviews

For the key informants an interview guide for semi-structured interviews was produced (see appendix 9.4 and 9.5) in order to ensure reliable and comparable data. As there was only one chance to have a formal interview with most of the staff, the semi-structured interview was the best method (Bernard, 2006: 212). These interviews were conducted with five head teachers, one from each school, and four computer teachers. The original strategy was to interview one computer teacher from each school for comparable data, however due to the absence of a newly hired teacher in the last school this was deemed impossible.

Focus groups

As the questionnaire presented a wide scope of answers, both quantitative and qualitative, the focus groups were complementing the answers by providing lived experiences, background information and further explanations to the responses in the questionnaire. Focus groups are “widely used to find out *why* people feel as they do about something or the steps that people go through in making decisions.” (Bernard, 2006: 237) This is how the focus groups in this study are able to go in-depth to see the processes and experiences the girls have in computer class and in the wider society that restricts their meaningful access to computer education.

Triangulation

This study incorporated several methods and respondents/informants in order to triangulate the results. According to Creswell and Miller, triangulation is a procedure to achieve validity, and it means looking for convergence between several varying sources of information that together form themes in the study (Creswell and Miller, 2000). The decision to use different methods and sources of information was to obtain broad data and validity by finding recurring and common themes within the different groups. As Basch (1987) argued, focus groups are inappropriate when aiming to make statements on larger populations, however with triangulation it is possible to validate the focus group information with other methods in the study (Hennessy and Heary, 2005: 239).

Ethical considerations

The main ethical consideration in this study is working with children and young people as they are often considered a vulnerable group (Kirk, 2006). Even if the study content is not deemed highly sensitive, any ethnography including young people and children adds a difficulty to adhere to ethical research practice (Russell and Barley, 2016: 1). As children and women are considered a vulnerable group in Malawi, anonymity was important to uphold. The data collection included gathering name, age, and gender, however this is not used in the dissertation. All information was stored on the password-protected University OneDrive, and I was the only person with access. With adult informants, the ethical considerations were limited, as they were strongly made aware of their role and participation and were able to understand their position. The University of Edinburgh ethics regulations were used to ensure appropriate research ethics.

Working with studies in educational settings is difficult in terms of ethical concerns (Russell and Barley, 2016) and continuous reflections on ethical situations are part of the process. Written consent forms were used, and in addition verbal information about the rights of participation were repeated throughout to avoid facing issues of language barriers and miscommunication. As an example, the focus groups were made aware that they could refrain from answering questions at any time. The choice to use focus groups rather than interviews were also an ethical consideration. Mauthner (1997) argues focus groups provide a safer environment for the students, because it replicates a familiar setting of their classroom work. It also provides peer support that equalises the power imbalance that exists between an adult researcher and a child (Hennessy and Heary, 2005: 237). It also aimed to create agency for the participants, as argued by Levine and Zimmerman (1996) focus groups acknowledges participants as experts rather than interviewees (Hennessy and Heary, 2005: 238).

As one of the main arguments discusses the girls' time constraints due to household chores, it was important that the study would not put further pressure on them. The study was therefore conducted within school hours. To ensure informed consent, there was always an initial conversation with the participants to make sure they understood they were participating voluntarily and could leave at any point.

Positionality was also a concern as I was coming into the schools as a white, female researcher. The problem of reactivity, as previously discussed, was consistent and there was always a sense that the participants' actions reacted to my presence. My connection to CYD who provided computers meant that the participants noticeably felt a sense of accountability towards me. In interviews and focus groups I attempted to account for this by informing that the research hopes to improve access to computers, and encourage honest opinions. This was also to prevent issues of silent refusals (Kamuya et al., 2015), where informants felt they needed to give the "correct" response in order to keep a good relationship with the donor.

5. Findings and Analysis

This study looked at what limitations and restrictions girls are facing in terms of meaningful access and use of computers in secondary education in Northern Malawi. It is clear that the general interest and ability to learn to use a computer is not one of these restricting factors. As one computer teacher said: "It's about gender issues. When there is a demarcation to say computer is for males, not for females, then computer studies is mostly for boys. If we leave out the gender issues, anyone can do it. Anyone can become a computer analyst, a computer programmer, whatever. But, with these gender issues, we look at it as male areas." The teacher is talking about the structural gender inequalities that restrict promotion of girls in ICT. The quote is insinuating that it is not about ability, it is about the views within the system that creates the barriers for girls.

The main problem for girls' access is that there is a male dominance, and a view that girls should not work with computers (Geldof, 2011). This does not necessarily mean they are incapable, rather that there is little space for them to achieve meaningful access and use. The patriarchal system of Malawi involves traditional gender roles such as women as care takers with household responsibilities (Geldof, 2011: 72). It also covers the lack of role models in the ICT sector and education, which means there is no inspiration or motivation for the young girls (Maluwa-Banda, 2003: 12). The lack of women is reproducing the pattern that claims computers as a male space, and creates disincentives for possible future prospects for girls. Policy and practice is also an issue, because there is an assumption within Malawi that gender equality

means gender neutrality (Chauraya, 2012: 256), which disregards the societal, cultural and structural inequalities between genders. This chapter discusses the findings within these themes and explores the impact that lack of girls' meaningful access to computer education entails.

In order to view the gendered variations in access and use of computer education, it is important to note that it is also generally limited for all students in Malawi due to restricted ICT infrastructure in education institutions (Isaacs, 2007: 12). Although there are some government programs, complemented by NGO initiatives, that provide computer resources in schools, this is still in the trial phase (Chikumba, 2011). Other infrastructural issues include lack of electricity, both in terms of power outages as well as computer rooms that are unsuitable for the amount of computers in them (Isaacs, 2007). Throughout the study, plans often had to be rearranged because there was no electricity, which is a common issue in Malawi (Taulo et al., 2015). Due to inadequate power sources in the computer rooms, the computers also broke regularly, which was a concern voiced by all interviewed computer teachers and head teachers.

Another issue is that where there are physical resources and access, the teachers lack adequate education and training to teach computer studies (Hollow and Masperi, 2009: 27). Only one computer teacher had received any form of specific computer education training, and it was only a two-week course with no follow-up. Throughout this chapter, these general restrictions to computer education access are acknowledged. It is, however, possible to argue that many of the factors affect girls in a more significant way than boys, as the following arguments will outline. For instance, due to time constraints, girls' access to computers is limited to school only, while the boys find other sources of access. This following section will present the main findings and analysis through four main points; the male dominance in society and in education, time constraints for girls, role models, motivation and future prospects, and gender neutrality.

Male dominance

The male dominance in Malawian schools is well documented (Mbilizi, 2008; Kamwendo, 2010), and many have argued that schools can function as instruments of social and structural reproduction (Mbilizi, 2008). In the five schools in this study

there was little willingness to admit any difference between boys and girls, although there were visible differences both generally and in computer classes. When looking at numbers alone Malawian secondary schools have fewer girls enrolled to begin with, and they are underrepresented in science classes (Ministry of Finance, Economic Planning and Development, 2015). Within this, according to the teachers, computer classes stand out with girl-boy ratios showing 2 girls in a class of 20 at the secondary day school, 36 girls out of 80 in CDSS, around 40 out of 150 in the government boarding school, 53 girls out of 180 in the religious private school, and unknown numbers in the last private school as their classes were not fully incorporated yet.

As discussed earlier, the Malawian school system is characterised by an almost equal gender distribution, with more girls than boys in Standard 1 in primary schools, yet this decreases throughout the following school years. In secondary schools, girls are underrepresented. The classes will already have a gender discrepancy, and the male dominance is visible in the numbers. Even in the amount of spaces available in each school, it is possible to see the gender inequality. In the boarding school there are more housing for boys than for girls, which means that already at school selection level it is partial to male students. With more resources from the government; these types of schools are considered better. According to interviews with administrative staff, many factors can effectively lead girls going to lower ranked private schools, including low results in primary education, repeating classes, stigma around age, pregnancy and re-enrolment. Consequently this affects participation in computer classes as well, because in terms of statistics the number of girls will be lower.

Further, in the schools there were several ways of offering computer class to students, yet only one of them (CDSS) were able to offer it to all students. Where the school selects certain classes in each form to have computer studies, the numbers will depend on how many girls are in the class originally. One school does the computer selection based on results in other subjects. Where the students are able to choose to take the subject, we see very low numbers of girls, such as in form 3 and 4 in the boarding school where there are respectively 10 and no girls in computer classes with a total of around 40 students. In terms of access for all students, everyone involved in the study

have made it clear that unless all students are able to use the computers, there is no “universal access”.

Several aspects explain the lack of girls in computer classes, and enrolment rates are only a small part of the picture. What is even more interesting about the male dominance in Malawi is the cultural and social factors. Historically, a patriarchal culture characterises Malawi and gender equality was not brought into policy until the late 1980s (Tiessen, 2008: 202). In terms of gender equality indicators such as political participation, Malawi’s performance is lower than many other countries in the region (Tiessen, 2008: 201), and the inequalities are reflected in society’s perception of women. As outlined previously in the Malawian context, women are in a disadvantaged position. Throughout history women have had the traditional household role, there to serve the husband and take care of the family, they are less educated than men and illiteracy is much higher with women (Mwakasungula et al., 2001: 36; Global AIDS Interfaith Alliance, 2006; Kvam and Braathen, 2008). This traditional and cultural view of gender roles is also a profound part of the school system and contributes in discouraging girls from choosing computer studies.

In one school, the girls discussed how the boys do not want them to learn how to use a computer. One girl tells the story of when the boys put passwords on the school computers so the girls would not be able to access them. “Maybe they are afraid of us being less inferior to them. Maybe they think we are just wasting their time asking them what is what. Most boys don’t like to help girls ‘cause when we ask them they don’t want us to know much better than them”, were some explanations to the boys’ actions. The girls expressed opinions that the boys did not want them to become computer literate, or better than the boys. This could indicate a male pride and entitlement, which emphasises the assumption that computers are commonly viewed to be only for boys. The way the boys are freezing girls out of the computer class setting can also be a discouraging factor.

The computer teachers also recognised the “power” the boys have over the girls. One teacher mentions that due to lack of computers there is a battle in every class to be able to sit in front of a computer. “When they are coming into the computer lab, they have to run and everyone would like to be the first one to enter. Usually the boys have

power over the girls and they enter first so they will have occupied all the seats before the girls arrive”, was another teacher’s comment. An observation in several of the schools was that when boys and girls shared a computer screen, the girl would either watch the boy do the work, or she would control the computer with instructions from the boy. The focus groups revealed that the girls often found the boys knew better, or pretended to know better so they would let them be the frontrunners of the class.

In all the groups the study interacted with, head teachers, computer teachers and students, there was acknowledgement that the Malawian culture comprised of traditional gender roles, and that these were reflected in the classroom. “The girls or ladies in our community should always come behind the males so whenever there is a group of males and females, the males take the lead. It’s the same trend in classrooms, girls always think that boys should participate more than them because it’s how they have been trained in their homes”, says a computer teacher. It is possible to argue that because computer is viewed as a predominantly male dominated subject, as well as industry, girls are discouraged from participating, or even simply entering into it, because they believe that they will never be at the boys’ level. Parents show a preferential treatment of boys when it comes to education, and will often choose to send the boy child to school rather than the girl because the girls are not expected to end up in professions that can financially support the parents in the future, or they will be married off (Mzuza, 2014: 58). These facts, and that girls feel they are inferior in computer subjects, suggests that the theory of schools as a socially and structurally reproductive environment is valid. It is therefore possible to claim that because the school reproduces the idea that computers are mostly for boys, this is a limiting factor on girls’ motivation to access and use the computers in a way that creates engagement and results.

An effect of the male dominance in the classroom, and the preferential treatment boys receive, is that the girls become insecure in their own capabilities to learn or work on the computer. It has been argued that teachers and other students have a significant effect in how girls act in a school setting (Chisamya et al., 2011: 5). At several stages in the study, informants claimed that boys were not necessarily always better than girls at computer studies, but they had more confidence and in many ways pretended that they knew everything. One teacher says that; “boys normally pretend as if they

know things, but in the real sense, they don't, [...] we find that boys will behave as if they're already more advanced than girls". This goes with Broos and Roe's (2006) study that claims boys psychologically show more self-efficacy and internal locus of control when it comes to computers, which in short means that boys respectively have more belief in their own abilities to perform tasks and that they believe they are in control of possible outcomes¹.

In accordance with these findings, although not wholly distinct, this study finds that boys show more confidence in their own abilities. The student questionnaire showed that there was a difference in how the boys and girls perceived their computer competencies. More than 1/3 of the boys said they found using a computer "not difficult", while only about 1/5 of the girls said the same. No boys said they found it "very difficult", while around 1/5 of the girls did. In terms of confidence in using the computer, almost all the boys, 92,5 percent, said they were "very confident". For the girls, over half at 55,6 percent, said they were "very confident", a significantly lower number than the boys. Although the differences were not distinct, it could also be explained with the fact that many of the students had not had computer studies for a long time. As we see differences despite this, indicates that girls were more careful to claim their competency and have less belief in their abilities.

As a girl in a focus group expressed: "Most of the girls are not aware that they can do the same things the boys do [...], they are not aware that they have it in them, the capability to do what boys do". Her focus was that girls can do what boys can do, Within this is the assumption that boys are all capable, because they are boys, which was a recurring sentiment. This also supports the male dominance argument, that girls have to do what boys do, in order to be able to learn computers. Other findings from the focus groups were that they agreed most girls in class lack confidence, and a few claimed that: "some might have the knowledge, they have the answer, but then they just feel that there are more boys, let them just do it, so some [girls] just give up".

The girls' lack of confidence is arguably due to the male dominance in the classroom and in society as a whole, and connected to this is the language used in the

¹ For more explanation, see Broos and Roe (2006), page 308-309.

classrooms. Teachers, and students themselves use phrases such as “even girls can do computer” when discussing whether or not computer studies is for males only. This assumes girls as inferior, that they are *even* able to use computers. In addition, while observing several computer classes, the teachers would use examples to explain concepts with traditional gender disparities. One teacher used the example of cars to answer a student question on who could work on a workstation computer. The answer was that anyone can use one, but at different levels. Since automatic cars are simple, they are for women, but a man can still drive the car. Use of gendered stereotypes contributes to encourage the male dominant society and with the strong view that girls are unsuitable for computers, this heavily limits their meaningful access and use of computers.

Time constraints

One of the frequently repeated aspects by participants in the study was that girls have more time constraints due to household responsibilities than boys, and that this in effect gave the boys more time to learn to use a computer. This is linked to the previously discussed cultural and traditional aspects of Malawian. Because women’s role includes taking care of the family, this means every female member of the family need to contribute. The focus group discussions often circled around the issue of time, and kept coming back to it. The girls told of boys that were able to come home from school and go to a community centre, or more often a friend’s house to use the computer and practice. The girls themselves described coming home and having to clean and cook, while “all the guys do is just wake up, sweep around the house and then they’re done”. This significantly restricts the girls’ available time to practice on a computer.

The focus group participants also recognised the difference between the households with or without a computer, if there were a computer available in the home it would be easier to find time to use it. Nonetheless, they also discussed that parents favour the boys in access to the computer. “Many parents say that girls cannot afford to use computers because they can damage them. When boys use the computers and damage them they can repair it themselves.” This also shows how many parents doubt girls’ ability to use computers, which is increasingly discouraging for the girls. In effect, this lowers their incentive to participate in computer class and its outcomes

(Chisamya et al., 2011: 5). From the findings it could also be argued that the time in class is more useful for boys than for girls, as the focus groups revealed the girls were often tired in computer class due to their responsibilities at home. Because classes were often scheduled outside of normal class hours, in the end of the day, they described being tired and hungry and unable to focus. Arguably, this lowers the positive outcomes even for the girls that attend class.

Following the argument of time constraints, the student questionnaire showed that a significant higher number of boys use computers outside of the computer class in school. While 81,25 percent of the boys say they use a computer outside of school, only 36,1 percent of the girls say the same. Out of the girls that say they use a computer outside of school, in the additional question of where and what they use it for, most say they have a computer at home but with limited use. Of the responses, the most frequent use is once a week for school purposes. On the question on whether they have a computer at home or not, the results between the boys and girls were quite similar. 27 percent of the girls and 31,25 percent of the boys said they do. When combining these answers it is possible to claim that there is not much of a difference between the boys and girls when it comes to having a computer in the household. The difference lies in whether or not they are using other sources of access, such as community centres and visiting friends. The divergence between the numbers of boys and girls that use computers outside of school indicates that the girls have less free time to use these other access points.

An interesting finding was that for the girls who attend boarding school, the results were very similar to the girls that live at home. While the girls in boarding school do not have the same household responsibilities that restrict their time, they also used computers less than boys. The students here were unable to use the computer classroom outside of class hours, however according to the girls in the focus group, they would sometimes have class in the weekends to make up for time lost during the week. Although this was for both girls and boys, they described that the boys received preferential treatment. “The girls go to sleep at 8, but the boys can go and return the keys [to the classroom], so that gives them more time when they are there”. The girls expressed that they believed this was very unfair treatment, and expressed the

importance of accessibility being equal to both girls and boys, including use in the weekends.

The discrepancies between boys and girls at secondary level in terms of out-of-school access and use of computers increases the gender digital divide. This means girls are less able to take adequate advantage of the physical access. This implies physical access does not necessarily lead to meaningful use or even computer literacy.

Role models, motivation, and future prospects

The ICT sector in Malawi is predominantly male dominated, which reflects the view that computers are for men. It is possible to argue that the current lack of women in the industry will be reproduced, because it means a lack of role models, motivation and prospects for young girls. They hardly have any role models in the ICT sector to create motivation to pursue a career. The traditional gender roles are effectively preventing girls and women to enter into computer related professions. Because they are discouraged from entering into the “male sphere” of computers, there is consequently a lack of possible role models for young girls. In the same way as enrolment to secondary school was discussed earlier, the low numbers of girls entering university (Isaacs, 2007: 4) in Malawi leads to a small selection of possible role models to begin with which means less visibility to the younger generation and a recurring pattern. In one of the focus groups, the girls were asked why they do not believe there are a lot of women working with computers, and their answer was they had never seen any. This lack of visibility and exposure to women in the sector lowers motivational factors.

One important factor that influences girls’ lack of motivation is that many do not know how important it is to be familiar with computers, and the many different functions it has. Although all the students, of both genders, answered in the questionnaire that knowing how to use a computer is important to them, that they believe it is important for employment, and that they see themselves using computer in their job, there are some indicators that point to the fact that they do not fully know the importance of computers. The activities they see themselves using the computer for are limited to very technical aspects, such as storing data safely, or for typing. Very few mention the possibilities that follow usage of the Internet to find

information, something that has been argued to be empowering (Buskens and Webb, 2009; Hafkin and Huyer, 2006). Many, however, are aware that jobs today often require knowledge of a computer, although these statements are also mostly limited to Microsoft Office packages or general tasks. Some questions that arose from students during visits implied that they were not aware of the breadth of possibilities computers can offer. This is reflected through questions only on whether doctors or scientists use computers rather than use of Internet resources for instance.

The questionnaire demonstrated that the students believed that both a male or female teacher could do the same job, and it did not matter to them whether it was one or the other. Yet, some of the answers revealed that having a female teacher could motivate girls, as they work as a role model. A girl said, “when a teacher is a female I become very happy because I know that I can do the same”. Studies have concluded that the presence of female teachers can have a positive impact on girls’ attitudes to computer studies. When a female teacher confidently works with a computer, she could be a female role model (Janssen Reinen and Plomp, 1997). Lee (1997) found that if there are a higher number of male teachers than female teachers that work with computers, this confirms the gendered stereotypes among the students (Bové et al., 2007). This is in accordance with the findings in this study, where the focus group discussions established that female role models would give them courage or encouragement to work with computers. In the five schools, two of the five teachers were female. In one of the schools with a male teacher, a girl said, “in everything you do I think there must be a role model for you, so if there was a female teacher it would be more encouraging to us”. In another school with a female teacher, the student said, “when you have a female teacher it means that girls can do it, they will get boosted. With male [teachers], girls are like, it’s always a male”. However, as previously mentioned, generally the level of computer training is low among teachers, and the female teacher who had received training did not find it sufficient. Her lack of confidence in her teaching could also limit the impact of her function as a role model on young girls’ motivation.

The lack of role models both in the ICT sector and as teachers is also heavily linked to the girls’ lack of motivation to pursue computer studies. They see no real incentives to pursue a career in a male dominated sector, and are therefore discouraged from

entering. In terms of job aspirations, the student questionnaire reflects that the girls did not see themselves working in the ICT sector. One out of 36 girls mentioned computer in the question of what job they want when they finish school, while a third of the boys wanted to work with computers. Other jobs mentioned by the girls were accountant, doctor, journalist, bank manager, lawyer, nurse, judge and engineer. Other science based, or suspected male dominated jobs such as doctor, lawyer or engineer are job aspirations for both the girls and the boys. This implies that computer jobs might be considered less available for girls than other “male jobs”. It could also correlate with the underdeveloped ICT sector in Malawi (Pankomera and Van Greunen, 2016: 166-167). Because most of the available ICT sector jobs are technical and mechanical, including repair and maintenance, it is seen as hands-on jobs that are as previously argued, not for women. In conclusion, there is an “evil circle” where less women to begin with means a reproduction of gender roles and no future incentives for the younger generation.

Gender neutrality

As was evident in Malawian policy, both for education and ICT, there is some focus on gender, however it is assumed that to incorporate gender means treating boys and girls exactly the same. This approach leads to disregarding the fact that there are substantial social, cultural and structural differences to boys’ and girls’ lives and how they interact with the educational system, as well as the society as a whole. When these aspects are ignored, by claiming everyone is equal, the approach fails to accommodate for the differences (Chauraya, 2012: 256). The policies and implemented programs that follow this approach aim to create equality, however they will fail if the different opportunities and difficulties faced by girls are not accounted for. The focus should not be to pretend gender differences do not exist, rather the opposite (Ferguson and Harman, 2015).

The problem at hand is that boys and girls have unequal opportunities and capabilities, and this is what has to be addressed if the aim is gender equality. Both education policies and ICT policies in African countries, including Malawi, have shortcomings in their frameworks that relate to gender mainstreaming (Isaacs, 2002: 10). The theoretical assumption is that when focusing on humans rather than different gender groups, the policies will benefit everyone equally (Alozie and Akpan-Obong,

2017: 156), which in practice has adverse effects. A report on several African countries' gender situation, including Malawi, conveyed that ICT policies acknowledge gender gaps, however they show gender neutrality or gender blindness. The former meaning the belief that gender does not matter, while the latter means that there is an inability to comprehend that because of structural gender inequality, policies will affect the two groups differently (March et al., 1999). In the Malawian ICT policy from 2013, the word gender is not mentioned at all, which underlines the approach of gender blindness (Republic of Malawi, 2013). UNESCO's Education For All (EFA) document calls for more gender sensitivity through advocacy strategies, and especially revision of national policies that will promote gender mainstreaming (Isaacs, 2002: 9).

This gender neutrality and blindness in policy is reflected in the schools involved in the study. While they are all aware of the gender inequality in Malawi, when they answer questions about differences between boys and girls, most relay the common message that everyone are humans and they are equal. One student answered in the questionnaire that, "we are all the same and we learn the same thing, there is equal treatment making it impossible to differentiate between boys and girls". Another said, "there is no difference because the school was not built for male or female only". Throughout the study we found that the way students learn in the Malawian school system affected the results, especially in the questionnaire. As they often resort to a rote-learning system (Rhodes, 2015: 114, Nampota and Thompson, 2008), opinions and attitudes are regularly repeated. It is visible among the students, teachers and head teachers that they are repeatedly taught that everyone are equal and that there is gender equality. The concept gender equality is in the schools interpreted as everyone is the same, rather than that everyone should have equal opportunities despite the structural differences. When this is the common perception, it leads to the assumption that everyone should be treated the same rather than that differences should be accounted for.

Out of the four teachers interviewed two said they treated boys and girls differently in the classroom, while the other two said they did not. One of the teachers who said he did not treat them differently stated: "why should I teach separately when that is my class and I know I have to take them equally". This assumes gender neutrality rather

than an approach that accommodates for instance for girls' time restrictions, and fewer hours of their time to practice outside of school. An example used previously is the statement from girls in focus groups who claimed because they have a lot of responsibilities they are very tired in computer class. Consequently, this reflects that the school does not acknowledge that using after school hours for computer class constrains the girls' already restricted time. Some girls in a focus group discussed that the teacher would ask whether they understood, only to hear from the boys that they did, and would move on. The computer teacher in this school claimed that girls are not interested in learning to use a computer, and that in the class the girls are silent and he has to "wake them up every time". He says girls start out being interested, but it fades quickly, which could suggest that they get discouraged when they do not understand what they are taught in class. The gender policies in African context have been criticised for only treating symptoms of gender equality, such as low participation of women in ICT, rather than the causes of gender inequality (Chauraya, 2012: 257). This is also demonstrated in Malawian policy, as well as through the findings of this study and suggests the Malawian approach is gender blind.

Consequences

The outlined findings of the study indicate that girls have a disadvantaged position compared to boys when it comes to maximising meaningful use and access to computer education. This section will discuss the consequences this can have on girls' personal development, further progress in Malawi's ICT sector and advancements toward gender equality in the country.

Personal development

Although the girls in the secondary schools have physical access to computers, unless this is transferred into meaningful use, they will possibly never become computer literate. As argued above, without facilitative measures that will ensure they have equitable opportunities to learn and use computers the physical access is meaningless. This has severe consequences for the girls' further personal development, such as possibility for further education, job prospects, and consequently poverty reduction. In 2005, almost 90 percent of Malawian women in employment worked in the agricultural sector, which is characterised by low wages (van Klaveren et al., 2009). Computer literacy can equip the girls with skills that qualify them for higher paying jobs. It can also be argued that this can indirectly lead to emancipation and further

empowerment for the women (Madanda et al., 2007; United Nations, 2005: 16). Possibly even more important are the effects it can have on access to information. Although Internet connection in Malawian schools is limited, all the schools' head teachers mentioned plans to bring network into their schools. Mobile connectivity is also improving in Malawi, including in rural areas (Ewing et al., 2012: 6). In order to take advantage of this, even basic computer literacy is a prerequisite.

Considering the gender inequalities in ICT access, and the above argued society opinion that girls should not use computers, as well as the time restrictions, it is possible to argue that apart from a school setting, girls do not have other options to acquire computer literacy. As a consequence, the community Internet and computer cafés are male dominated and women and girls are discouraged from using them. It is thus possible to argue that investment in school computer classes is the eminent precondition for the girls to achieve computer literacy. It could also have an effect on physical computer access options for girls, as someone who is computer literate more likely will feel comfortable to seek out community centres or Internet cafés. With this, if the girls have even basic computer literacy they will be more able to access information through the internet, which is argued to close the gender digital divide and lead to empowerment (Huyer and Sikoska, 2003). It has been argued that girls and women who have computer literacy achieve a sense of “self-esteem” and get more professional opportunities (Huyer and Sikoska, 2003: 8). In conclusion, ensuring meaningful use of the computers in computer education for girls in secondary schools can have significant direct and indirect effects such as computer literacy, which again leads to empowerment, with improvements in job opportunities, access to knowledge and more inclusion in the global ICT world.

Development of ICT sector

The introduction and use of ICTs have proven advantageous on economic growth, both in developed and developing countries. In sub-Saharan Africa the ICT sector has in the last decade been crucial as an economic and social driver for development (Ewing et al., 2012). However, one of the main challenges African countries face is the ICT skills gap (Ewing et al., 2012: 9). A large proportion of the population in Malawi are unable to contribute to the technological advancement. Without human capital in the ICT sector the Malawian economy is unable to participate in the

growing and valuable African ICT economy. To change this, a focus on developing skills rather than simply providing meaningless physical access is essential to build a computer literate work force. While the findings indicated that a significant percentage of the male respondents in the questionnaire were aiming to join the ICT sector, discouraging numbers were found for girls. As around half of the Malawian population are women (Trading Economics, 2015), they serve as a substantial proportion of the work force. With little investment in female inclusion in computer studies, Malawi is missing out on human capital that would be crucial in their ICT sector development.

Progress towards gender equality

Equally as important as advancing the ICT sector, and arguably heavily connected, are developments toward gender equality within the Malawian society. As previously argued, the education setting within computer education reproduces the already entrenched gender inequalities and assumptions that girls do not belong in the ICT sector. Policies and practice on the ground need to incorporate gender, not as equality simply in terms of being the same, but as equity and equal opportunities. When the gender digital divide continues to diverge, it means girls and women will stay on the disadvantageous end of the information divide as well. This means lack of access to valuable civic education that could mean a societal and political participation. Many girls in the focus groups, as well as staff at the schools underlined the importance of civic education to promote the importance of learning computer for girls. Due to the aforementioned gender neutrality or blindness in policy and practice, the potential civic education will have little value when it is only trying to treat the symptom and encourage girls to be more interested. The civic education should address structural inequalities in the society, which includes making everyone aware of it and understand that this has to be acknowledged in order for access to change. Without these underlying actions, computer access in schools will only work to reproduce gender inequalities.

6. Conclusion

Girls in secondary schools in Northern Malawi do in theory have a physical access to computers and computer education. Yet, it is nowhere near a “universal access” when looking at the number of girls in computer classes. Even more discouraging is the

meaningful access and use among secondary school girls in comparison to the boys. This dissertation has outlined several factors that were found to limit the girls' engagement with computers and meaningful use of computer classes. This was demonstrated through four main points, although interrelated. Firstly, the Malawian society's male dominance that was reflected in all aspects of the study, especially as a reproduction of gender roles in the education setting. It imitates the view that women are not supposed to work with computers. Secondly, the traditional gender roles means the girls have many responsibilities that take up most of their time. This leaves little time to use other computer access points apart from computer class, in the home or outside. It also affects their engagement in classes as they are often held outside of normal school hours. Thirdly, the lack of role models and future prospects leaves little motivation to enter into the ICT sector, or even to become computer literate. The lack of women in the sector only creates an "evil circle" that reproduces the view of women being unfit for computers. Lastly, gender neutrality and blindness in policy and practice is a hindrance to girls' access and use, as their structural gendered disadvantage is not accounted for. Finally, these restrictions and limitations the girls face in secondary education create wider consequences. It hinders their personal development, which has disadvantageous effects on empowerment, job opportunities and access to knowledge. It also affects the ICT sector, and leaves a substantial part of the work force without computer literacy or the ability to contribute in building human capital for ICT improvements. Lastly, the progress towards gender equality is prevented because it reproduces the gender disparities found in the Malawian society. Lack of computer literacy also affects the ability to access information, which also creates a larger gap in the information divide.

In conclusion, the focus needs to be on achieving meaningful access and use of computers and computer education for girls in secondary schools. As argued, this has such wider implications that emphasises the importance of investing in better ICT infrastructure in schools, sufficiently trained teachers and a gender sensitive policy and practice. This research has highlighted how the patriarchal society of Malawi is the main cause of low female engagement with computer education. This suggests a change of how society views women, a difficult and contested process. The importance is therefore in facilitating for the structural inequalities, including gender in policy and practice, and making sure that the schools accommodate for the girls'

needs. In conclusion, based on the findings and arguments presented in this dissertation, there is a need to acknowledge the gender disparities rather than ignore them.

7. References

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8. Appendices

8.1 Student questionnaire

About the student:

Full name: _____

Age: _____

Gender: Female Male

Form: _____

1. Have you used a computer before? Tick the box as appropriate.

Yes No

2. When did you use a computer for the first time?

3. Where did you use a computer for the first time?

4. How long have you had ICT classes in school? Tick the box as appropriate.

- Less than 3 months Less than 6 months
 Less than 1 year Less than 2 years
 More than 2 years

5. How often do you use a computer? Tick the box as appropriate.

- Every day
 Twice a week
 Once a week
 Once a month

6. How often would you like to use a computer? Tick the box as appropriate.

- Every day
 Twice a week
 Once a week
 Once a month

7. Do you like using computers? Explain why or why not.

8. How would you rate your level of computer literacy? Tick the box as appropriate.

- High level of computer literacy
- Medium level of computer literacy
- Low level of computer literacy

9. List the functions and/or programs you know how to use on a computer. (Ex. Microsoft Office Word, internet, email etc.)

10. Do you think there is enough time to work with computers in school? Explain why or why not, and how much time would be enough in a week.

11. Do you find using the computer difficult? Tick the box as appropriate.

- Very difficult
- A little difficult
- Not difficult

12. Are you confident using the computer? Tick the box as appropriate.

- Very confident
- Quite confident
- Not confident

13. Do you use computers outside of school? Explain where and for what purpose (Ex. Learning computer studies, accessing information, entertainment, research etc.)

14. Do you have a computer at home? Tick the box as appropriate.

Yes No

15. If yes, how often do you use the computer and for what purpose?

16. What do you learn in the computer in class?

17. What do you want to learn on the computer?

18. What job do you want when you finish school? Please give an explanation.

19. Do you think what you learn in computer class is valuable? Explain.

20. Is knowing how to use a computer important to you? Explain why or why not.

21. Do you think knowing how to use a computer is useful for employment? Explain.

22. Do you see yourself using computers in a job? Explain. (Not only work in the ICT sector, but also computers on administrative level etc.)

23. Do you think working with computers is a male job? Explain why or why not.

24. Does it matter to you whether the teacher is male or female? Explain why or why not.

25. Do you feel confident to participate (answer or ask questions etc.) in computer class? Explain why or why not.

26. Do you think there is a difference between girls and boys in the classroom? Explain.

27. What can make computer education more appealing to you?

8.2 Information Form

Research project title: Female inclusion into IT education

Research investigator: xx

Contact details of research investigator: xx@sms.ed.ac.uk

About the Project

This project is part of a Work Based Placement with the University of Edinburgh as part of an MSc International Development dissertation. The work is undertaken by the researcher, xx, in collaboration with The Turing Trust and Centre for Youth and Development.

The Turing Trust aims to promote education and training through the use of information technology in sub-Saharan Africa. By reusing equipment we aim to provide training opportunities and skills development both in Africa and the UK whilst reducing waste and supporting a more sustainable and environmentally friendly society. We began working in Ghana in 2009 with a view to making students in rural Africa more employable. We want to give students the best chance to break out of the rural poverty cycle through teaching IT and vocational skills. By outfitting schools with refurbished resources from the UK and providing teacher training, we can optimise the learning environment and help an individual learn a trade or become computer literate, making them more employable and financially independent. We expanded our programmes to Malawi in 2013 and thanks to support from the Scottish Government we will put over 4,000 PCs in over 200 classrooms by 2019. This project looks at how our current programme in Malawi is bringing computers into schools, yet girls are known to be somewhat left behind due to several challenging barriers such as the cultural stereotypes that IT is a male industry. We want to know how we can overcome these challenges in a cost-efficient manner and ensure that girls achieve parity in accessing the benefits of an IT education through our interventions. We hope to have several suggestions of simple, cost-efficient programmes that we can implement following the researches findings. We will use the research to enhance our programmes and improve female access to IT in Malawian schools.

Who is responsible for the data collected in this study?

- Primary researcher: xx
- Other stakeholders involved: The Turing Trust, Centre for Youth and Development
- The data will be stored electronically on password protected laptops, USB sticks etc. The data will be stored in password protected technology and will not be shared with any other organization apart from The Turing Trust and Centre for Youth and Development
- The research proposal was approved by the University of Edinburgh

What is involved in the study?

The study consists of classroom observations, a questionnaire for students, in-depth interviews with ICT teachers and Head Teachers at the schools, and focus groups with students.

What are the risks involved in this study?

We don't anticipate that there are any risks associated with your participation, but you have the right to withdraw from the research at any time. As far as possible your contribution will be kept confidential and anonymity will be upheld.

What are the benefits for taking part in this study?

The study will be used to identify the context and issues with why girls are not participating in computer and IT education in schools. It will detect these issues and provide solutions to help The Turing Trust and the Centre for Youth and Development in their work towards female inclusion.

What are your rights as a participant?

Taking part in the study is voluntary. You may choose not to take part or subsequently cease participation at any time.

Will I receive any payment or monetary benefits?

You will receive no payment for your participation. The data will not be used by any member of the project team for commercial purposes. Therefore you should not expect any royalties or payments from the research project in the future.

For more information

This research has been reviewed and approved by the Edinburgh University Research Ethics Board. If you have any further questions or concerns about this study, please contact:

Name of researcher: xx

E-mail: xx@sms.ed.ac.uk

Or contact Centre for Youth and Development:

P.O Box 943, Mzuzu, Malawi

Phone number: +265 111402722

8.3 Consent Form

Project: Female inclusion into ICT education

Researcher: xx

Thank you for agreeing to take part in the above research project. Ethical procedures for academic research undertaken from UK institutions require that interviewees explicitly agree to being interviewed and how the information contained in their interview will be used. This consent form is necessary for us to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. Would you therefore read the accompanying **information sheet** and then sign this form to certify that you approve the following:

- I agree that I have read and understood the information form and agree to the statements in the form
- I agree that my answers can be used in the study on female inclusion into ICT education
- I understand that I am voluntarily taking part in this project and can withdraw at any time

Name	
Position at school	
Date	
Signature	
Researcher	
Researcher's signature	

8.4 ICT teacher interview guide

1. How many computers do you have?
2. Do you have network in the school?
3. Are the computers used outside of computer class? Community etc.?
4. How many classes a week?
5. How many students take computer?
6. How many girls?
7. Chosen subject or mandatory?
8. How many computers usually work?
9. How often are there interruptions to computer class? (such as electricity problems etc.)
10. How many teachers teach computer?
11. Are there enough computers?
12. If there is not enough computers for everyone, who generally gets to use them first?
13. When given the option to work on the computer or go home – is there a difference between who does what in terms of gender?
14. Why are there fewer girls in the computer class? Fewer in general or do they have other priorities?
15. Why do fewer girls use computer outside of school?
16. Who participates more in class?
17. Is there a difference in how much girls and boys pay attention?
18. Is your teaching approach different to boys and girls?
19. Do the boys and girls behave differently in the classroom?
20. Do you think computer studies is directed towards boys? In terms of teaching content, learning materials etc.
21. Who performs better in computer studies? How and why?
22. In which subjects do girls generally perform better? Why?
23. Are there subjects that are considered mostly for boys vs. mostly for girls? Does this play a role?
24. Do you see a difference in girls' and boys' interest in computer?
25. Is there a difference in what they want to learn?
26. If girls are underrepresented/participating less/etc., what can be done to improve this?
27. Why do you think there is a lack of girls/women in ICT in general? Societal views, cultural gender norms etc.
28. What is the value of computer education on improving girls' status/employment opportunities etc.?
29. What can change to make girls more inclined to take computer studies?

8.5 Head teacher interview guide

1. How many computers do you have?
2. Do you have network in the school?
3. Are the computers used outside of computer class? Community etc.?
4. Are there enough computers?
5. What plans forward do you have for the computers?
6. What feedback do you get from students, teachers, parents etc. of the computers?
7. Why do you think there are fewer girls in computer class?
8. Why do we see fewer girls use computers outside of school?
9. Do you think computer studies is directed towards boys?
10. Do you think there are subjects that are considered boy subjects/girl subjects?
11. Why do you think there is a lack of girls/women in ICT in general?
12. Female teacher vs. male teacher? Does it make a difference?
13. What is the value of computer education for girls?
14. What can make more girls learn computer?
15. What needs to change to have more girls in computer class?