

Evaluating interventions of third sector organisations in ICT Policy implementation- A case study of Secondary schools in Northern Malawi



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Report for Placement based Dissertation with Turing Trust in association with Centre for Youth and Development

Acknowledgement

I would like to express my sincere gratitude towards Dr Daniel Kenealy for his valuable guidance, support for literature, critical review of report and above all the moral support he provided to me at all stages of work. I extend my gratitude to Dr Jay Wiggan for his support during the Placement Dissertation and ensuring my compliance. I also extend my gratitude to James Turing, Director of Turing Trust for allowing me to undertake the Placement with his institute including Brian Ferguson and Samuel Gray for their co-operation.

I take this opportunity to specially thank Mr Jamesh Gondwe, Mr Yewo Msiska and Mr Chindi Can of Centre for Youth and Development in Malawi who have been an invaluable support in my field work and not only helped me in identifying specific schools and teachers in Malawi but also provided me with valuable insights on the working of the project. I express my sincere thanks to Dr Jayakrishnan, Lecturer at Indian Institute of Madras for his advice in this work.

A special thanks to my friends who have encouraged and supported me in completing this paper.

Abstract

ICT integration is a key criterion for social and economic development of a country. In this case of Malawi, one of the poorest countries in the world; ICT development is crucial for its growth. With the right intentions expressed through its policies, Malawi has immense potential to tap the opportunities of ICT for ensuring this growth. However, in this paper, the author argues that due to lack of stakeholder engagement--especially with third sector organisations and resource constraints, ICT development has been impeded and policy intentions not met on the ground. Through an analysis conducted in secondary schools in Malawi the author argues that ICT integration have not been successful due to limited interventions by the third sector in overcoming integration barriers and proposes for an increased engagement for successful ICT implementation in the country. The paper adds to the existing literature for increasing stakeholder engagement in ICT and suggests for a broader study to evaluate government-stakeholder engagement in ICT.

Keywords: *ICT, Malawi, Engagement, Integration, Barriers*

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Evaluating interventions of third sector organisations in ICT Policy implementation- A case study of Secondary schools in Northern Malawi

Chapter 1: Introduction

1.1. Introduction

There has been a larger acceptance that well-performing developing economies requires a large-scale economy-wide diffusion of the Information and Communications Technology (ICT) (Meso et al, 2006, p.141). In 1999, The World Bank World Development Report (World Bank, 1999) titled 'Knowledge for Development' saw ICT as a powerful tool to fight poverty and underdevelopment. Ever since then ICT policies have been developed to push ICT adoption and integration across sectors. It is evident that ICT is not merely the computerization of a government and or institutions system, but the ability of technology to achieve levels of improvement in various areas of a nation's socio-economic developments through effective policy formulation and implementation (Omowunmi et.al, 2009). This has been affirmed by Wagner et. al (2004) in the case of Africa where around 85% of the countries adopted ICT (ITU,2012). Due to institutional policy (Makoza and Chigona, 2013) and economic issues (Igun, 2013), the adoption and integration of ICT in Africa has been highly segmented between countries, between regions-urban & rural (Saheb,2005; Samarakoon,2017) and between people-rich & poor (Chiumbu, 2009; Igun, 2013). Hence, ICT policies might have genuine intentions but need not reflect the situations on the ground.

The case of ICT in Malawi's secondary education highlights this predicament which is the basis for this paper. In fact, it is the priorities set by the government, economic situation and infrastructural requirements that play a major role in determining ICT development. Pankomera & Greunen (2016) study on ICT in Malawi mention how the resource constraints like infrastructure, high cost of telecommunication and unqualified teachers creates barriers for engaging students in better education and ensuring learning outcomes. There is common agreement that the widespread, sustained positive impacts of ICT have not met the expectations of stakeholders (Huang et.al,2016).

Of particular reference to this is the World Bank Africa (2012, p.6) Report which mentions, “ICT is about reducing barriers to entry for potential stakeholders to traditional education institutions by reducing the importance of geographical distance, enabling potential new efficiencies in overheads and the logistical requirements of running education programmes and research agencies, and expanding cheap access to information resources.” When translated means more engagement with stakeholders especially in the non-governmental sector is required. This paper is an addition to the various literature which argues for increasing stakeholder engagement in policy implementation. Further, in the context of ICT education policies, the priorities of the government and the policies need to match with stakeholder interventions for effective ICT integration.

1.2. Malawi’s profile

Malawi is an aspiring country poised to grow as a major economy and setting its priorities for development. The government of Malawi has pushed its mandate of achieving the Millennium Development Goals (MDG) through its Malawi Growth and Development Strategy (MGDS), currently in its third phase till 2022. The strategy aims to bring in systematic reforms to address its gaps and lead the change from an import-dependent agrarian economy to an export-oriented manufacturing economy. As the UNESCO reports, this change need to be facilitated by major reforms in the educational sector as it needs to be led by its youthful population, with approximately half (46 percent) below the age of 15, and up to 73 percent below the age of 30 years.

Malawi however suffers from institutional and political systemic issues which needs to be corrected to achieve its mandate. This requires sustained and progressive institutional reforms and stronger engagement with private sector based on a predictable and transparent eco-system. The impact need to be more visible in education, especially in the secondary and higher education sector which has very low enrolment at 260,000 students (Below the National Education Sector Plan (NESP) target of 486,706 (2012/13). The World Bank (2012) has cited the low scores in the South African Consortium for Monitoring Educational Quality (SACMEQ) and National Examination pass rates as a major impediment in the primary school which has a concurrent effect on secondary school enrolment. The lack of infrastructure and unqualified teachers further creates barriers for engaging students in better education and ensuring learning outcomes.

One of the key ways of ensuring better engagement with the youth and achieving desirable learning outcomes has been the introduction of Information, Communication and Technology (ICT) in education. Studies have measured and reported how ICT Education has influenced enrolment, learning and aid in sustained development of a country. As per World Bank “ICT is reducing barriers to entry for potential competitors to traditional education institutions by reducing the importance of geographical distance, enabling potential new efficiencies in overheads and the logistical requirements of running education programmes and research agencies, and expanding cheap access to information resources.” However, critics like Wagner et al. (2014) notes the significant negative impacts of ICT outcomes including the reinforcing of dependencies, imposition without community involvement and collapse due to lack of funding or political commitment.

In the case of Malawi, it has been largely accepted that ICT policies were backed by various agencies especially the UN. This includes the National ICT Policy which was formulated in 2013 driving the need to create an information society and aimed to build ICT infrastructure for human capital development. The use of ICT in schools is therefore a major requirement for uplifting students to attain higher levels of education.

However, access to ICT in education is still a major problem and the policy intentions have not been translated into action. With computer studies as an optional subject limited to secondary schools and very few schools having computers, a lot is left to reach the desired levels. The government is incapacitated to provide adequate support for schools and majority of the schools do not have the wherewithal to develop ICT infrastructure. This is specifically applicable to the majority rural schools who do not have access to electricity and are lacking library, lab facilities.

The Non-government organisations, International aid agencies and charities have been a crucial intervention in Malawi by providing financial support, infrastructure and training. Many organisations currently provide computers and accessories to schools, training, develop curriculum and facilitate ICT infrastructure. However, they have mainly been ad-hoc and not effectively in line with the visions of the Malawi ICT policies and strategies. Hence, at the government level, there is lack of engagement, monitoring and evaluation with these organisations in ICT adoption and/or integration. This is crucial given the humungous task in developing the state of education in the country, both in terms of infrastructure and skill enhancement. A broader engagement is required from third sector organisations to enhance the

competitiveness of Malawi education sector utilising ICT which can connect schools, government and students.

It is in this context that this report has attempted to undertake an evaluation of ICT education in Malawi with an aim to assist organisations and schools in developing the right strategy for ICT adoption and integration. The report is developed based on the field studies conducted in North region of Malawi, which has higher educational coverage compared to other regions. The study has been developed utilising the services of Centre for Youth and Development (CYD) based in Mzuzu who has been implementing various projects including in ICT in North Malawi. This report is part of the Placement based dissertation offered by Turing Trust, United Kingdom (UK) to the author as part of his Master's in Comparative Public Policy from University of Edinburgh, United Kingdom.

1.3. Research objectives

- To assess and evaluate ICT policies and framework in Malawi
- To evaluate the implementation of ICT policies in secondary schools of Malawi and its adoption in the curriculum framework and infrastructure
- To assess the role of NGOs and third-party organisations in implementing ICT policies in Malawi
- Identify the beneficiaries and suggest steps towards enhancing support

1.4. Research Methodology

The evaluation study has been conducted in Northern Malawi and involved a mix of quantitative and qualitative research inputs. A series of questions were developed for identifying the ICT infrastructure, proficiency of teachers in ICT and the level of implementation as per the policies of the country. The study is limited to an assessment of Computers and other peripherals such as printer, photocopier, scanner and projector due to the paucity of time. These questions (*See Annexure 1*) were administered to the Head Teachers

and Computer Teachers of the sample schools. 20 Schools consisting of 13 public (or government) schools and 7 private schools further divided into urban (14 schools) and rural (6 schools) were identified for the purpose undertaking the field surveys (*See Annexure 2*).

The schools were identified on the basis of support provided for ICT by various organisations (including Turing Trust/CYD), those which has computers with government support and those which did not have any computers. One-to-one interviews were further conducted with policy stakeholders namely, District Education Manager (DEM), Divisional Education Officer, MZUZU university representative, ICT Training institutes representatives.

The author was able to cover 16 schools of the 20 samples due to the unavailability of the respondents in two schools and travel time required to go to the remaining two schools situated in rural areas.

1.5. Socio-economic profile of Malawi

82 percent of the population in Malawi lives in rural areas where school supply and demand are weaker as per World Bank report. 50.7 percent of the population lives below the poverty line and 25 percent living in extreme poverty (IMF,2017). It has one of the worst malnutrition rates with 48 percent of children below five years stunted (FANRPAN, 2018).

The adult literacy rate is estimated to be 69 percent which is lower than the SADC average (75 percent). As per the WB Report, illiteracy of parents impedes the achievement of education for all because these parents are less likely to enrol their children in school than literate parents.

Further flooding and drought has affected Malawi's economy which is primarily agriculture based with tobacco, sugar and tea accounting for 80 percent of its exports and employing 80% of the workforce (African Economy Outlook, 2014). As per IMF figures, growth picked up from 2.3 percent in 2016 to an estimated 4.0 percent in 2017 owing to a recovery in agricultural production. Inflation has been reduced below 10 percent. The economy however requires substantial support from WB IMF, donor countries and organisations to sustain itself. For Financial Year (FY) 2017, the WB disbursed \$ 421 million through various projects while IMF recently granted Extended Credit Facility (ECF) to the tune of \$113 Million to entrench 'macroeconomic stability and to foster higher, more inclusive, and resilient growth' (IMF Press

Release,2018). While most of the funding has been on infrastructure support, country backed donors like DFID, USAID, GIZ, JICA, ChinaAID, DANIDA etc are active in education sector funding also.

1.6. Education in Malawi

The education system in Malawi follows the 8-4-4 format divided based on primary, secondary and higher education. The Ministry of Education, Science and Technology (MoEST) oversees all levels of education in Malawi. At the end of their primary education, students take the Primary School Leaving Certificate Examination (PSLE), which determines their eligibility for entry into secondary school.

Public school secondary students attend either Community Day Secondary Schools (CDSSs) or Conventional Secondary Schools (CSSs). Private schools have increased considerably in recent years. There are a lot of religious schools (mainly Catholic schools) which are supported by the government but independently run like private schools. At the end of two years of secondary education ie. in Form 2, pupils take the national Junior Certificate of Secondary Education (JCE), which is followed by the Malawi School Certificate Examination (MSCE) in Form 4. Professional education for four years is largely undertaken in the major universities like University of Malawi and University of Mzuzu (MZUNI). Further to this are the Technical, Entrepreneurial, Vocational Education and Training (TEVET) courses under the TEVETA.

The Gross Enrolment in Primary education hovers around 146 percent (UNESCO,2017) ever since it has become part of Free primary (FPE) or Education for all initiative in 2004/05.

Teacher qualification remain a major challenge across the schools, though there is an improvement in primary schools, the student to qualified teacher ratio (SqTR) is still high at 88:1 (down from 118:1 in 1999) compared to SqTR ratio of 51:1 in Secondary schools.

Secondary education enrolment has been very less at 43 percent, increasing from 39 percent in 2014 (UNESCO,2012). Classroom pupil ratios are on average 60:1 as per the EMIS data for 2012/13 as compared to NESP target of 40:1 students by 2017. According to the EMIS 2015 Report, in 2014–15, there were 1454 secondary schools, which included 1094 public schools (including government and religious schools) and 360 private schools (MoEST).

CHAPTER 2: ICT in Malawi

2.1. ICT in Malawi

The adoption of ICT has increased in Malawi, but not considerably, except for mobile phone use. The level of computer and internet penetration is still relatively less. Further, the degree of penetration has been highly biased towards urban areas. This is reflected in the fact that Malawi's rank has further dropped in UNDP's e-government development index from 159 in 2012 to 166 in 2016, out of the 190 countries. The Collaboration on International ICT Policy for East and Southern Africa (Cipesa) 2017 Report identified Malawi as among 10 eastern and southern Africa (ESA) countries with the poorest ICT penetration with low mobile penetration of 36 percent, and Internet penetration rate at 9 percent. As per International Telecommunication Union (ITU), in 2017, the proportion of households with Computer in their home is 3.5 percent, while 2.5 percent of them have Internet access at home.

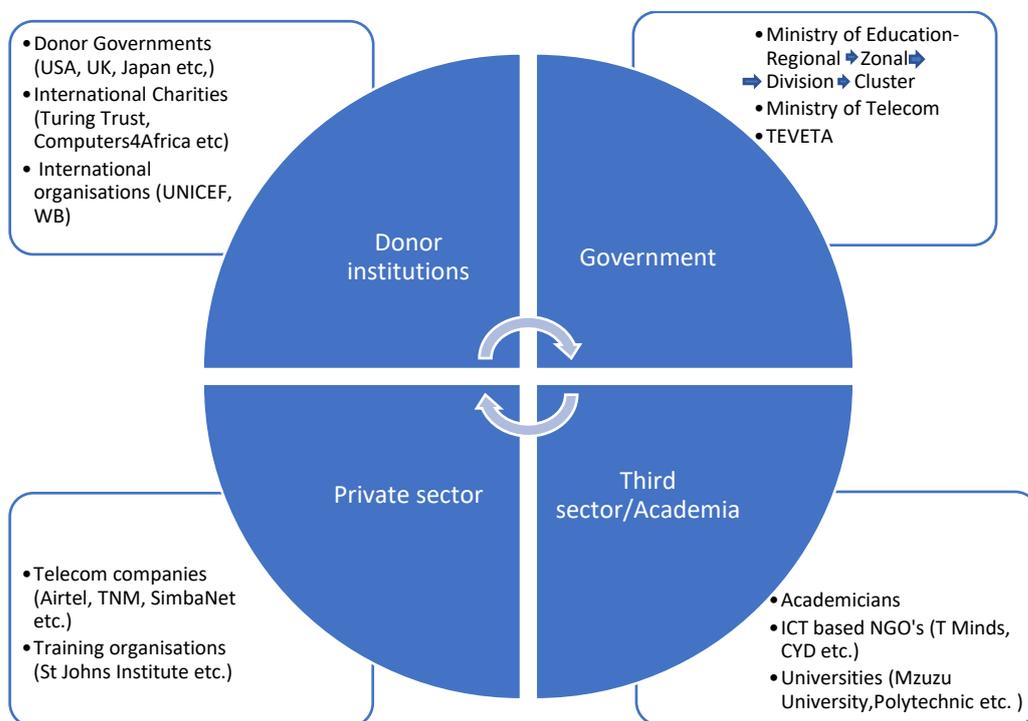
On the other hand, the 2011 Millennium Development Goals (MDG) report indicates that use of Internet by the population in Malawi improved from the low levels of 0.07 percent in 2005 to 17 percent in 2011. Further, due to larger use of mobile phones the tele-density ie. the use of mobile and fixed telephones has improved from 2.63 percent to about 27 percent. These variations in figures needs to be taken into account in identifying the major barriers for developing ICT plans in the country.

2.2. ICT Education in Malawi

Across Africa, there has been a major push towards ICT integration in education. A result of the pressure from donor countries and international organisations including UNDP, World Bank and UNICEF; majority of the African countries have developed schemes and plans towards incorporating ICT in education. However, ICT adoption is prone to various barriers in Africa which according to the 'ICT in education for Africa' report prepared under the E-Transform Africa initiative of WB and African Development Bank, has affected the progress in education.

This include the cost involved in developing ICT infrastructure across all countries. At the same time the increased rollout of competitive fibre to Africa and within African countries and the use of National Research and Education Networks (NRENs) have expanded opportunities for connectivity and broadband access in educational institutions in countries like Kenya and South Africa. However, the state of ICT adoption in this respect is minimal across Malawi. In spite of policies and government intentions in ICT, little is being done to integrate and adopt ICT thereby effecting its utilisation in education.

Figure 1: External Stakeholders in Malawi ICT



Source: Developed by researcher from field research and review of policy documents

We will now have a look at the key policies and programmes relating to ICT and education.

Chapter 3: ICT Policies

3.1. ICT Policies in Education in Malawi

The WB identifies that many governments in Africa have focused on developing national ICT policies and National Information and Communication Infrastructure Plans to support their socio-economic development efforts and policies for ICT in education. Further, many of them are prioritizing the use of ICT in education, to achieve critical strategic developmental objectives or have principally agreed to develop policies. IMF (2007) suggests the need for intensifying ICT education as a future growth strategy.

The key sectoral policies for ICT in Malawi have been developed similarly with reference to the need for ICT adoption and achieve e-literacy. Enabling policy environment to drive the national ICT agenda has been critical for this and includes, policy on ICTs in education, bandwidth and connectivity. The conjuncture of these policies defines the policy landscape for ICT development in the country. For ICT education, there are four key policy enablers (WB, 2012), namely:

- a) Legislating ICT in education and ICT education including curriculum development.
- b) Developing telecom and broadband policies or strategies to enable connectivity
- c) Provisions to enable access to ICT for teachers, students include ICT management for administrators
- d) Developing capacity and skilling

Enabling and activating these would mean considerable work by the government and other stakeholders including the private and third sector organisations to provide the necessary direction.

One of the major challenge across developing and least developed countries has been the issue of connectivity and institutional support including the financial constraints. Correspondingly at the institution level is the availability of teachers, resources for teaching including e-learning, qualification criteria, methods and modes of teaching and the ICT use. Unless the policy prescriptions can guide these aspects, ICT adoption will not successful or will be prone to

issues. In this report, an attempt has been made to evaluate how the schools are prepared to implement ICT and the steps they have taken to enable the policies on ICT education.

Malawi has enabled provisions for ICT in education and ICT education. Following are the policies which transverse these domains and can be grouped into those which are aimed at providing access to ICT, those which enabled integration and connectivity of ICT and those aimed at skilling and resource development and finally which engage stakeholders through collaborations. A further explanation of the domain of these policies and the key aspects relevant to the study are explained in the next section.

Table 1: Summary of key policies and objectives

Policy Enablers	Policies
Access to ICT	ICT4D, 2006; National ICT Master Plan 2014-2031
Enabling ICT integration and connectivity	ICT4D, 2006; National ICT Policy, 2013; National ICT Master Plan 2014-2031
Skill and resource development	ICT4D, 2006; National ICT Policy, 2013; National Education Sector Plan 2008-2017, National ICT Master Plan 2014-2031
Collaborations with stakeholders	National Education Sector Plan 2008-2017, National ICT Master Plan 2014-2031

Source: Developed by author from reading of policy documents

3.2. National ICT for Development 2006

The ICT for Development (ICT4D) policy framed in 2006 was the first policy envisaged in Malawi with focus on integration of ICT across sectors including education sector. Its rationale was to put in place an

“appropriate framework for ICT to support and accelerate various national and sector initiatives and interventions at all levels of society” (ICT4D,1.2).

The broader aim of the policy and of special significance to this paper is the development of an ‘ICT-literate nation’ with a specific four-fold objective, namely, first, utilising ICT to improve access, quality, relevance and delivery at all levels, second, to achieve universal basic

ICT literacy and improve the level of ICT literacy in the country, third, to transform Malawi into an information and knowledge-driven ICT literate nation and fourth, to improve the management of education systems.

3.3. National ICT Policy 2013

The National ICT Policy framed in 2013 is the key policy on ICT in Malawi that transverse areas of telecommunication, infrastructure development, human capital development and e-governance. It envisages the need to integrate ICT in service delivery of education and health. This was deemed to ‘facilitate and accelerate human capital development’. Its major focus include3s increasing access to education and training through use of ICT.

HUMAN CAPITAL DEVELOPMENT

The value of human capital is increased through education, healthcare and acquisition of skills through training. Currently, there is limited access to health, education and training services by the majority of Malawians. The integration of ICT in service delivery within the education and health sectors will facilitate and accelerate interventions in human capital development.

Objective: To increase access to healthcare, education and training facilities through ICT utilization.

Policy Statement 1: The policy will ensure that Government shall integrate ICTs in the education systems at all levels in order to improve access to and quality of education; improve management of education

With reference to ICT education, Policy Statement 1 of the policy is of specific significance as it proposes “ICT to be integrated at all levels to improve access to and quality of education...”, which needs to be read along with the key initiative 2.1 aimed at ‘Building a knowledge society through ICT enriched learning’.

3.4. National Education Sector Plan (NESP) 2008-2017

The NESP has been one of the major programme initiatives under the MGDS III. While the policy does not directly mention about Computer or ICT development. However, it suggests maximising private sector to participate in secondary education (by atleast 10%) and provisioned to carry out a Secondary Curriculum and Assessment Review (SCAR) intended to improving availability of teaching and learning materials and relevance. Consequent, to this

policy, Computer Studies as a subject had a revision of syllabus incorporating more advanced learning like programming in Form 3 and Form 4 of secondary schools.

3.5. National ICT Master Plan 2014-2031

Corresponding to the National ICT policy has been the National ICT Master Plan which runs from the years of 2014 to 2031. It is currently one of the most important ICT plans aimed at ICT integration in Education. While supplementing the National ICT policy in providing access to ICT it further extends to improving management of education systems and improve ICT literacy. The Plan encompasses Malawi's telecommunication and broadband connectivity which is a crucial infrastructure policy.

It also has a few innovative initiatives in this area, committed largely to the promotion of integrated library and information services and networks.

One of the key aspects which the policy aims to improve is the establishment of the Education Management Information Systems (EMIS) and District EMIS (DEMIS) at the District level. EMIS has been a key driver for collecting information and data on education across Africa. It was established in 1986 in Malawi to generate quality information for planning, policy formation, and decision-making. Despite many efforts to improve the EMIS, it still struggles to have good and consistent information (Kimura, 2005). Due to the policy interventions and donor funding, EMIS data was effectively collected for the years of 2012-2014. However, limited support and lack of administrative interest coupled with poor record keeping in schools have led to a scenario wherein the information of schools are not recorded or not uniform. These policy approach has been clear in demarcating the need for ICT in Education and ICT education, with a stronger emphasis to the latter. While they are quite overwhelming, much is desired on policy implementation. This is clear from the fact that there are no specific programmes or initiatives providing ICT support to schools nor collaborative plans envisaged with ICT stakeholders. The only programme which is significant is the Computers for Malawian Schools (CFAS) programme.

Malawi's National ICT Policy includes different pillars for measuring the progress of the countries initiatives in ICT. The policy has emphasised the need for building a creative knowledge society and mentions:

Strategic Pillar 2: Innovation and Human Development

The Plan will entail a strategic objective of building a creative knowledge Society. This pillar is geared towards people-centered development. The pillar involves the seamless incorporation of ICTs into learning at all levels of the education and human capital development systems. In this regard it is foreseen that ICT will be made a compulsory subject at the appropriate education levels. In addition to theory, there will be an emphasis on practical, creative application of ICTs.

The policy approach has been clear in demarcating the need for ICT in Education and ICT education, with a stronger emphasis to the latter. However, Computer studies is still an optional subject and Mr Robin, Faculty at Mzuzu University says “Despite calls for making Computer Studies mandatory for secondary schools in a government

meeting on ICT education, they were not adopted because of the inability of the government to provide computers and required infrastructure for schools”.

In addition to this is:

Key initiative 2.1: Building a knowledge society through ICT enriched learning’ which includes the provision for fostering a creative e -Ready Generation. In this respect, the emphasis has been on human resource development and encouraging e-initiatives through innovation and talent development to achieve the goals of knowledge economy.

As a part of its policy objective is that, “Framework acknowledges that innovation and production are inextricably linked and that innovation and talent have become valued assets in the local and global knowledge economy.”

Concurrent to this, the policy identified the need for Human Capital Development by skilling and training of its citizens.

“The human resource capital development will be done through initiatives to change mind set, orientation of skills, work process re-engineering, improvement of institutional set up and provision of appropriate [ICTs] equipment.

Further, the uptake and absorption of ICT’s into the everyday activity of citizens and businesses depends in part on the level of development of our human capital to absorb and apply ICTs and on the other the availability and accessibility of ICTs and ICT infrastructure to all.”

Other key policy provisions

Key initiative 2.1: Building a knowledge society through ICT enriched learning

Training is a key strategy to address the growing demand for the knowledge worker. An ICT capacity building framework that caters to the different levels of ICT competencies across both the public and private sectors is necessary to build a knowledge equipped workforce. The ICT training courses must be internationally accredited, so that the ICT training and certification attained is widely recognised. Further, the interest in ICT must be cultivated from an early age and sustained through life. Accumulation of ICT literacy skills is crucial to employability in the knowledge economy.

Key Initiative: 2.2: Creating and Promoting Local Digital Content

Key Initiative: 2.3: Develop a Culture of Research and Development

3.6. Computers for African Schools Malawi (CFAS)

Computers for Malawian School scheme is jointly administered by the British Council and SchoolNet Malawi, an NGO. It is administered by the Ministry of Education and British Council through a committee comprising of business and government officials. As per the Scheme, 10 to 15 computers are provided to eligible schools and teachers trained in ICT (Issacs, 2007). Interested schools which have continuous supply of electricity are required to procure the computers from the capital city of Blantyre.

3.7. Summary

The policies related to ICT has shaped the strategies for ICT in Malawi. The policies aim at ensuring ‘universal ICT literacy’ and achieving the development of a ‘learning society’. The policy intentions have been clear in this regard. However, except for the CFAS, there has not been any specific initiatives targeting ICT implementation in schools. Over the next chapter we see how ICT specific policy initiatives are crucial for development of a country and sustaining growth. A list o Indicators are chosen towards assessing ICT adoption and integration as detailed below.

Table 2: Indicators for measurement

Indicators for measuring ICT adoption and integration

- a) Number of computers available for students, teachers and administrative purpose
- b) Number of students-computer ratio
- c) Number of ICT infrastructure namely, laboratory, printers, photocopier, projector
- d) Availability and proficiency of qualified teachers
- e) Availability of computer studies as a subject
- f) Frequency of use of computers by teachers and students
- g) Access to internet by students and teachers
- h) Availability of ICT Plan
- i) Access to resources, namely, textbooks, e-learning resources

Chapter 4: Analysis

4.1. Challenges to ICT Integration and overcoming Barriers

The UN Information Economy Report (2006) mentions how developing countries have made the deployment of ICT infrastructure and universal ICT access a top priority in their ICT master plan and as a prerequisite for participating in the information economy. A reading of the policies in Chapter 2 shows that Malawi government has spelt out its intentions through the various policies. However, what is critical is the extent in which ICT is integrated and implemented with reference to secondary schools in this context.

An effective ICT integration is possible only by overcoming the three barriers envisaged by Ertmer (2009) and Tsai & Chai (2012). Though conceptualised with respect to evaluating technology integration with reference to teachers, they serve as an extended purpose for assessing policy level prescriptions too. The First- order (external) and Second-order (internal) barrier propounded by Ertmer (1999b) seeks to identify whether the teacher has enough resources in terms of computer, time, training and support to implement ICT. The underlying assumption was that once adequate resources were obtained, integration would follow (Ertmer, p.51).

The second-order barrier relates to the ‘attitudes and beliefs’ of the teachers in learning and teaching. These barriers are considered more difficult ((Dede, 1998; Fisher et al., 1996), given the preconceived notions and deeply ingrained bias (Ertmer), which are likely to impede effective ICT integration.

The Third-order barrier as added by Tsai & Chai (2012) is the design thinking required for ICT capacity building. This means the ability of the teacher to re-organise or create learning materials and activities, adapting to the instructional needs for different contexts or varying groups of learners. This is further supplemented by the school level-ICT plan framework and comprehensive ICT policy to be devised by the key people including the educator, administrator and manager. A comprehensive ICT policy is defined as a policy plan grounded in a vision on education and ICT integration with implications for how the school organization should provide supportive conditions for teachers' classroom practices and pupils' learning activities (Dexter et.al, 2012). Given this significance, the third-order barrier is crucial for an effective ICT integration.

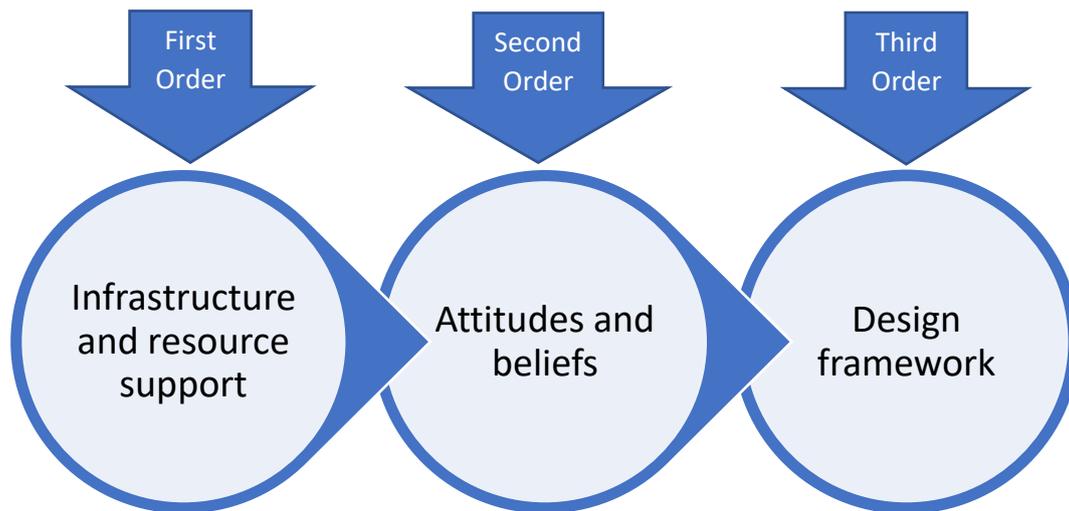


Figure 2: Three Order Barrier Test for ICT integration

So, to summarise and understand the importance of removing these barriers: elimination of the first-order barrier may facilitate the usage of technology by teachers. Through removal of second-order barrier the teachers may be committed to implement technology integration in classrooms and finally by overcoming the third-order barrier, they can undertake technology integration actively and fluently (Tsai & Chai (2012)). The key aspect for overcoming these barriers exist in streamlining ICT implementation through effective ICT integration at the school and classroom level. In this approach one should note the importance and the central role of teachers in effectively facilitating ICT integration.

On the other hand, the lack of training, policy and institutional support and the limited capacity to understand and/or design framework has been the major third order barrier impacting ICT integration in school. It is in this level that stakeholder interventions are crucial and would provide a cushioning effect. Thus, it is important to analyse how stakeholders get involved and are linked towards overcoming these barriers and most importantly intervene to achieve policy outcomes.

One could gather that the core purpose for ICT development are social development, economic efficiency, development of ICT market and e-governance. *Table 3* below illustrates and summarises how various policies goals are achieved through specific instruments and strategies. An understanding of these strategies is essential to assess how various countries achieve its policy goals.

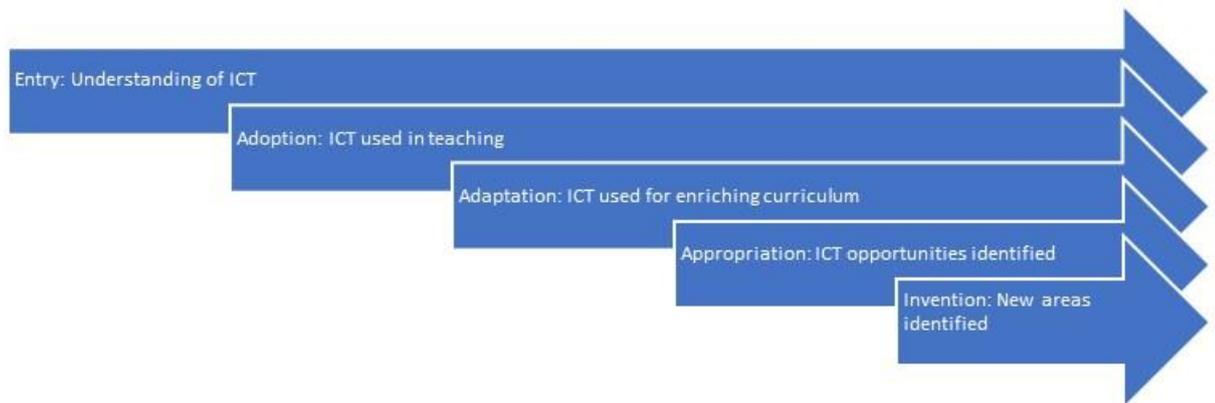
Table 3: Policy process in ICT

Policy goal based on substance	Instrument through which they are achieved	Policy Strategies deployed	Country Examples
Social Development	Policies aimed to improve the quality of life through access to jobs, education, information	Compulsory Computer literacy, ICT technical training	Egypt IT Club policy to provide access and education on computers to young adults and children (Checchi et.al, 2012)
Economic Efficiency	Policies aimed to improve the overall output of the nation through access to efficient methods and technology	Lower taxes for ICT products and services, privatisation and regulation of ICT	The UAE's no-tax regime to attract IT investments. Atkinson & Miller, 2014)
Development of an ICT Industry and market	Policies aimed to improve the economic output including measures aimed to encourage industries or enterprises	Subsidisation, tax breaks, Intellectual Property protection, Start-up policies, Hardware Manufacturing policies, ICT training	India's IT start-up policy provided for three years tax holiday (BL,2018)
e-government	Policies aimed to improve efficiency, transparency and accountability of government	Information sharing, file processing/tracking systems	Morocco's e-consultation to improve e-governance (Almeida & Zouain)

Source: Adapted and reconstructed by the author from International Handbook of Information Technology in Primary and Secondary edited by Joke Voogt, Gerald Knezek, p.1093

Also in this context, one needs to understand how ICT integration is undertaken. ICT integrations proceeds through a five-step process according to CEO (1999) as cited in Sabaliauskas & Pukelis (2004) (See Figure 3). Thus, ICT Integration is a culmination of different strategies and steps initiated by schools backed by a policy plan. A reading of the paper should therefore be constructed from this ICT process. Though an extensive discussion is not possible within the scope of the study, it is important to understand that ICT integration is a critical step for ICT policy implementation.

Figure 3: Five stages of technology integration



Source: As reconstructed by the author from CEO, 1999 as cited by Sabaliauskas & Pukelis (2004)

For ICT to be integrated in schools, there are two different aspects to be understood as per Tondeur et.al (2009). These are- structural (infrastructure, planning and support) and cultural (leadership, goal-orientedness). The structural aspects of the settings that need to be considered comprise elements such as the distribution of classroom space and resource availabilities and distribution, support and maintenance of ICT integration. Further, the cultural aspects could include a school's vision and mission for ICT integration or adequate guidance and support for all stakeholders involved in the process.

To summarise, ICT policies and its implementation in schools is defined through its integration process. Each of these do not act in silos but are influenced by a combination of factors (attitudes and beliefs), actors (schools, students, government, third sector) and context (structural and cultural). All stakeholders to this process need to assess and fit into the framework for successful interventions. And in Malawi, interventions are possible by overcoming the numerous barriers. The next chapter provides a narration based on the analysis conducted in secondary schools of North Malawi. The analysis has been conducted to enable us to determine how the policy prescriptions have been effective in Malawi. It also measures how Third sector interventions have been effective in various stages of ICT implementation.

1. Access to Computers:

As availability is the major criteria for assessing access, the surveys tried to capture the number of working computers made available for the teachers, administrators and students. Adequate,

effective and continuous technical support and infrastructure is a necessary condition for sustainable integration of ICTs in schools. As access is a question beyond computers; the availability of printer, photocopier, scanner and projector was also mapped. 81.25% of the schools had computers and photocopiers available while less than 70% of the schools were equipped with scanners and projectors. This cannot be generalised given the selection of the samples which are largely urban and where ICT interventions was made possible through third sector and donor agencies who supplied computers and other accessories. However, it provides a sense of ICT adoption in schools across the country which has aimed at achieving ‘universal computer literacy’.

Only around 56% of the school teachers had direct access to ICT. Only one private school of all the sample schools had computers in the staffroom, showing the shortcomings in learning and development amongst teachers. Given the economic condition and limited opportunities to access ICT, teacher development has been critical. One of the teachers observed “I had a personal laptop which I was using to learn and prepare lessons for my computer studies teacher. However, it was stolen, and now I am dependant on the computer provided for the students to learn myself.”

What was however the mitigating factor has been the support provided by third sector organisations in providing computers to students and personal laptops to teachers. 87.5% of the sample schools confirmed that they had got support from third sector organisations. On the other hand, only one school of the total sample had received computers through government support. The government’s Computers for Malawi (CFAS) programme has not been effective in reaching out to all schools in the region nor have they provided financial support for ICT procurement. As per government data in Northern region, less than 60 of the 207 schools had utilised the scheme. This gap is currently filled by third sector organisations in the schools in the region. Such support is essential for overcoming the first order barrier.

2. ICT Adoption and being e-ready:

The extent to which a school is ‘electronically ready (e-readiness)’ ie. whether the institution has taken all the necessary steps to integrate ICT in administration and management in its day

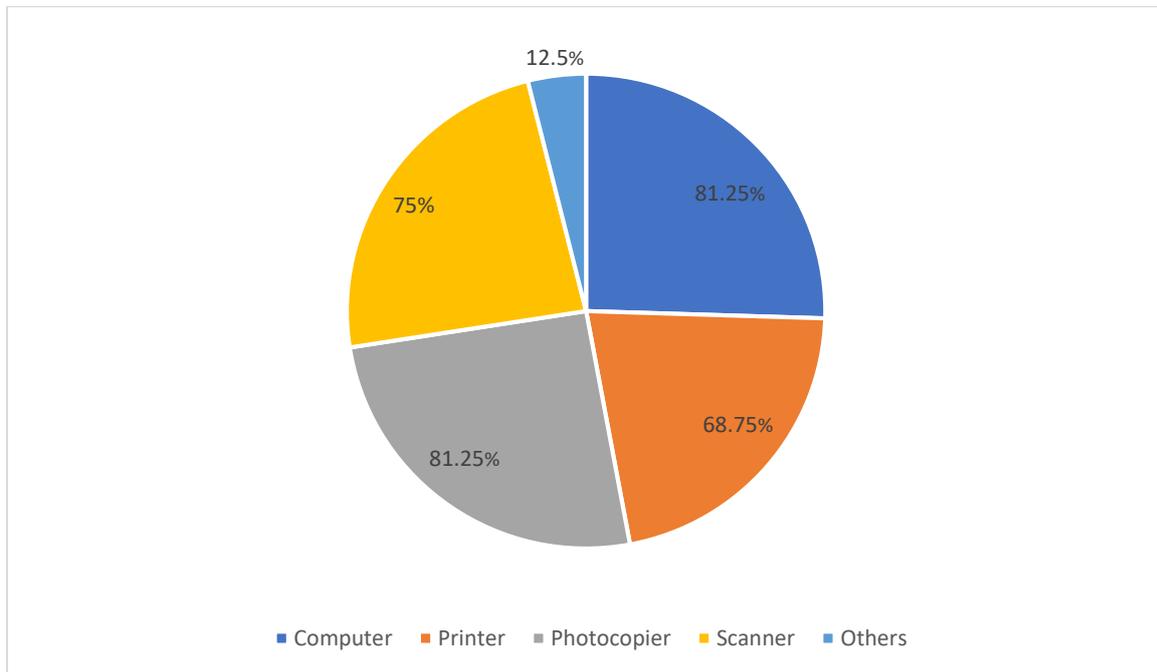
to day activities is an important measure for evaluation. One of the categories, as Bhalla (2013) had classified, relates to use of ICT for non-instructional purpose like record keeping and as a communication between instructors and administrators. This was apart from the pre-instructional purpose for developing teaching materials, researching, teaching, etc. Being e-ready is not limited to having the required hardware and software, but the overall use of ICT through an environment designed to maximise the benefits of computers (Jo, 1995) in the functioning of the school from record keeping, communication, performance or progress reports etc.

a) Lack of digitisation: In the case of Malawi, only half of the schools had digitised school records which includes enrolment and attendance sheets, student progress cards etc. Supporting this finding are the observations of Nyirongo, M, District Education Manager (DEM) of Mzuzu District who says, “Schools without access to ICT recorded them manually and sent the records by post to us, where our ICT Team digitise it for the purpose of record keeping and data collection”. As poor utilisation of ICT is found to hinder school administrative effectiveness, technology adoption is critical for school development. The Headteacher of ‘One Time Private School’ mentioned how school enrolment increased after computers were introduced in the school and enhanced administrative efficiency.

From the policy side as under the National ICT Policy, 2013, with the introduction of EMIS database management system, all schools are mandated to computerise and electronically send data of schools related to enrolment, number of teachers and their qualifications to the central database. Majority of the schools in the city regions of North Malawi have been provided computers and other accessories for administrative purpose by the Malawi government as part of this initiative to modernise the school education system. Though the researcher were not able to track the data related to this, the responses from the samples corroborate the fact that ICT adoption has been minimal.

b) Lack of ICT support systems: As an indicator for measuring ICT readiness, the presence of customised platform, website and communication tools are an important aspect for ensuring an ICT based environment (Jo, 1995). Only 25% schools had a website or a customised of their own, while less than 37.5% of the schools had official emails for effectuating communications between teachers and administration.

Diagram 1: Percentage of schools using various ICT equipment's



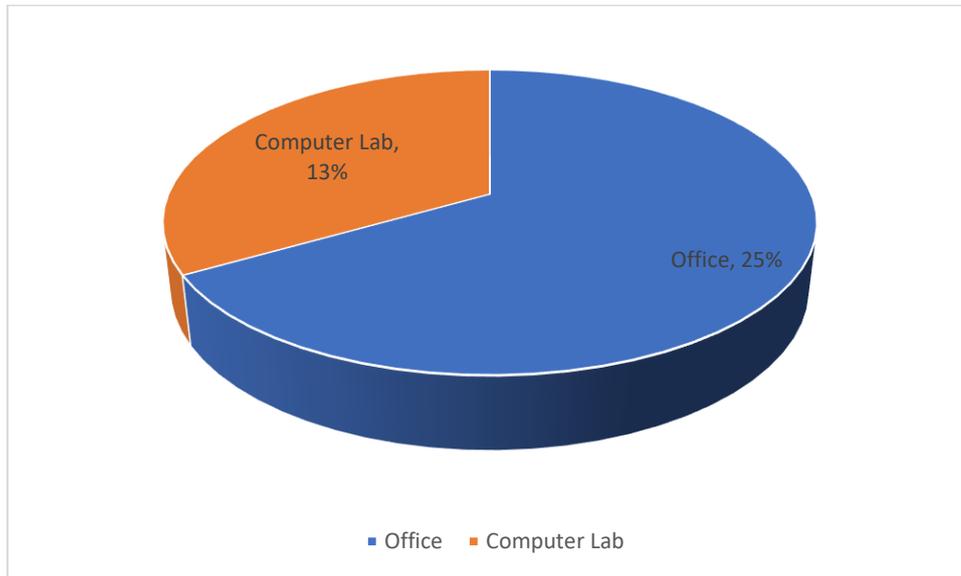
Apart from the interventions through supply of computers and teacher training, third sector organisations are not involved in enabling e-readiness of schools in Malawi. The digitisation process requires lot of financial resources and is under the domain of school management and administration. However, it has been observed that third sector organisations like CYD has been provided computer maintenance and guidelines for e-learning facilities to fill the gaps.

c) Access to Internet: Given the prominence of e-learning; availability and access to internet with good broadband speed is essential. In a comparative study conducted by Erdogdu & Erdogdu (2015) using Programme for International Student Assessment (PISA) data in Turkey it was found that availability of internet connection has a positive impact on academic success. One could extend this impact to teachers also in the case of Malawi, as learning and development is also enhanced by access to internet resources. Teacher-based strategies categorised under Teacher Professional Development (TPD) are therefore important to assist teachers in this process as Guru & Percy (2005) affirms.

One of the major barriers for low 'access to Internet' as shown in Diagram 1, has been the cost involved in connecting the schools to internet. As the Headteacher of Nywenga CDSS remarked "Ever since we received computers, we have been trying to obtain broadband internet

access. We received quotations from service providers but found that it was unaffordable for us to procure it due to limited funding available from the government”. This argument is also supported by Pankomera & Greunen (2006) in their study in Malawi.

Diagram 2: Availability of internet in the school in Computer Lab and Office



Availability of internet and extended ICT components like website and email fall in the bracket of first order barriers for a successful ICT integration. Third Sector organisations like TMinds, an NGO based in Mzuzu have planned to develop offline customised platform for assisting schools in streamlining their administrative operations. Another case in point is the ‘Solar Berry’ project of Turing Trust which installed a solar powered computer lab in Choma CDSS thereby enabling access to ICT without government support.

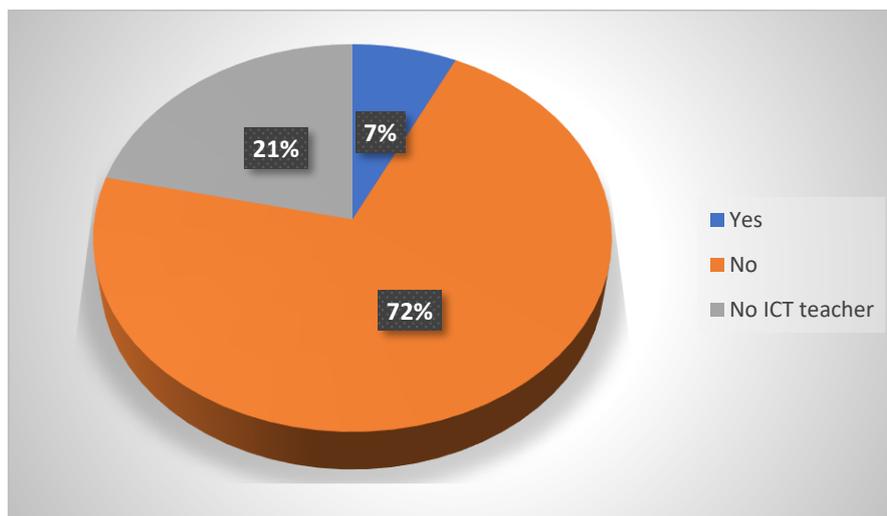
3. Availability of qualified teachers:

One of the essential components for ICT integration in schools is the availability of ‘qualified’ teachers for teaching computers. Sabaliauskas et al (2004) in their study mentions how qualification was the foremost barrier with lack of teacher competencies affecting teacher confidence also.

Qualification criteria for teachers differ across countries but essentially would mean a person with under-graduate degree in ICT. In the context of Malawi, the minimum eligible criteria for

being an ICT teacher includes those who have graduated from a recognised institute with a major or minor in Computer Science. However, a significantly less proportion of teachers are qualified to teach the subject in the country (See *Diagram 2*). This is further attenuated by the policy level delays in recruiting the qualified teachers (Sedere,2005) citing economic reasons (Malawi Nation, 2017).

Diagram 3: Percentage of schools having qualified ICT teachers



a) Lack of ICT proficiency: The 72% of the schools having unqualified computer teachers comprise of teachers who are majoring other subjects like mathematics, physics or chemistry but who teaches computer science as an added subject out of ‘interest’ or ‘duty’. Given the lack of teachers, it is not uncommon for teachers to handle multiple subjects in Malawi. As these are very subjective, the researcher had tried to capture the ICT proficiency of teachers using the curriculum framework. The revised curriculum contains teaching modules on MS Windows, MS Excel, MS Access and Visual Basic. While all of them knew MS Office excluding MS Paint, less than half of them displayed knowledge on graphics/animation with very few having learnt any programming languages. Under CFAS scheme, training was provided to teachers who taught computer studies. However, the only respondent teacher who had undertook the training mentioned that it was inadequate for them and sought additional training & support.

In this context it is important to understand that ICT proficiency are not entirely dependent on technological environment improvement but through professional development activities as mentioned by Hsu (2017) in a comparative study of ICT integration proficiency using

longitudinal framework in Taiwan. Reading along this argument, we should assess the various programmes and initiatives provided by the school or government to improve ICT proficiency of teachers. None of the schools had specific programmes aimed at enhancing ICT learning among general teachers nor for Computer teachers. 90% of the ICT teachers sought specific training for enabling them to teach the ICT curriculum in schools.

Some of the key stakeholders such as NGOs, training institutes have been supplementing teacher development through their trainings. Currently, Malawi government do not run ICT training programmes nor have envisaged initiatives to induct computer teachers into the secondary system. This gap has to a large extent been filled by third sector organisations as the case of FAIR Denmark-TMinds who have trained more than 35 ICT teachers from various secondary schools in North Malawi. The teachers of the three schools who were provided training approved of the benefits of the training and responded in the affirmative that ‘if’ the NGO did not provide training, ‘then’ they would find it difficult to teach computers. The researcher also observed that a positive relationship existed between availability of computers and possibility of Computer studies as a subject in the school, which could be further augmented by teachers who are trained.

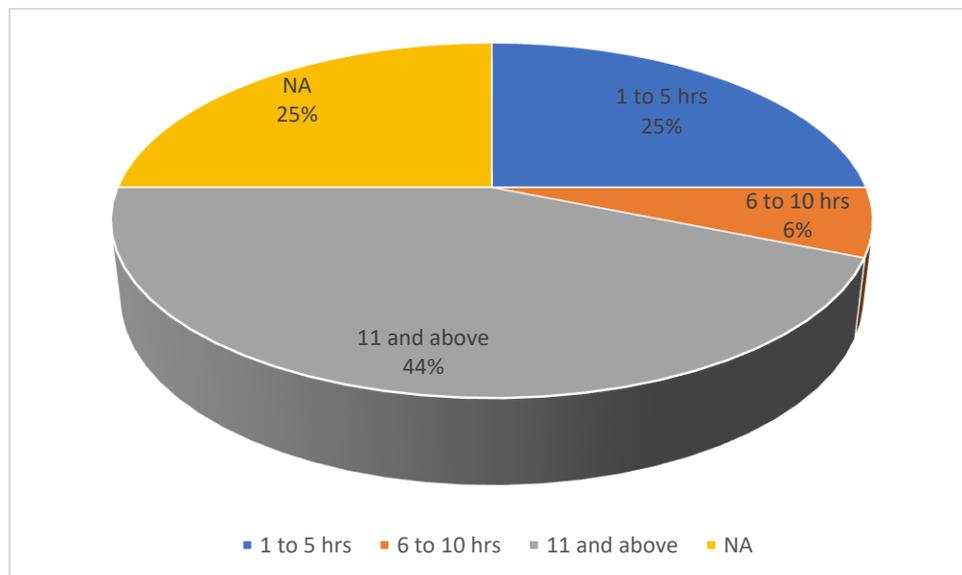
4. ICT Teacher engagement and attitudes:

It has been identified that ICT have the potential to enhance teaching and learning through enriching the curriculum, improving delivery, extending methods of presenting information, offering new opportunities through technological techniques, and allowing teachers to manage and reduce their administrative workloads (Becta ICT Research, 2004). However, an efficient ICT integration requires dedicated teacher engagement to overcome the second order barrier of attitudes and beliefs. This is further manifested by the time they dedicate for ICT learning and development, which assumes relevance especially in the context of Malawian teachers whose primary subject is not Computer studies. As per Vallance (2008) the teachers need to exhibit effective managerial and leadership skills to facilitate changes. In fact, as Gil-Flores et al., (2017) mentions teacher characteristics are better predictors of ICT use in the classroom. Further with reference to teacher’s attitudes towards technology integration, Scherer et al (2018) shows how general attitudes towards ICT, attitudes towards ICT in education, and ease of use are correlated. Many research studies have highlighted numerous factors to explain why

teachers are unprepared to use technology in their schools, comprising lack of ICT skills (Teo et.al, 2009), inadequate computer access (Dawson, 2008) and inadequate time (Chen, 2010). This have been validated by the teachers in Malawi schools. Increasing access to technology, adequate time and technology skills are therefore essential for successful integration of ICT by teachers.

a) Learning hours and embracing ICT: It was found that around 44% of the teachers spent more than 11 hours per week for updating their knowledge and learning to educate the students. 25% of the teachers spent less than 5 hours per week which is significantly short and likely to impede the learning process among teachers impacting students. Alt (2018) mentions how time spent for learning as a measure of ICT efficacy among teachers increased the use of ICT in classrooms. Majority of the computer teachers in the sample schools displayed keen interest in updating their skills. This contradicts the findings of Pankomera & Greunen (2006, p.167) who cited the eLearning Africa Report (Burgess,2015) suggesting that teachers in Malawi schools did not embrace ICT.

Diagram 4: Average number of hours spent by teachers for ICT self-learning

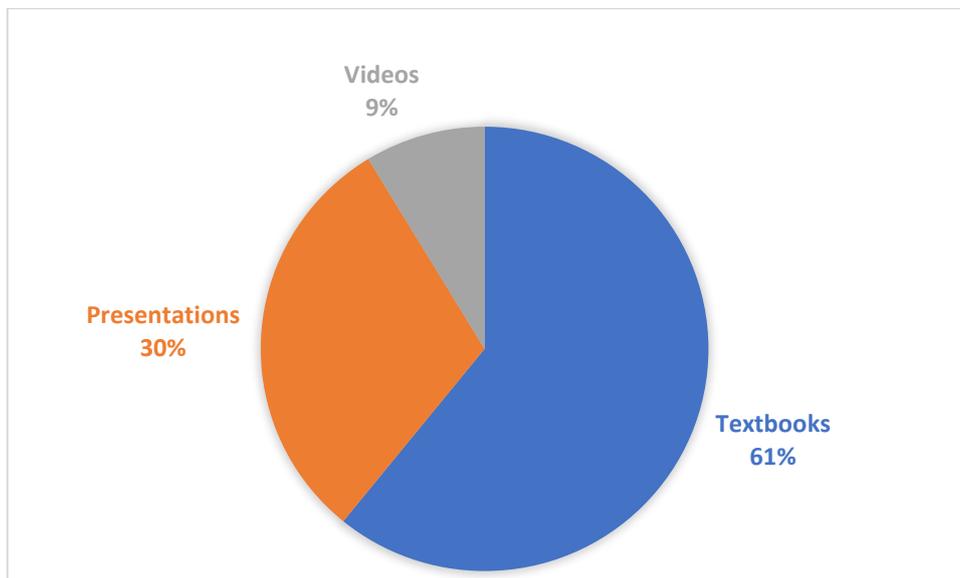


b) Resource constraints: Further, the methods used by teachers are important to motivate students and enhance the learning experience of the students in ICT. Jimoyiannis & Komis (2007) mention how in their study few practicing teachers knew exactly how to proceed to integrate ICT into the curriculum with some of them lacking an understanding of the meaning

of ICT integration. It was evident from the field interviews that resource constraints affected imparting of ICT teaching across schools which caused the lack of understanding.

The level of understanding and use of multimedia methods of teaching was very limited. The use of projectors by all subject teachers including computer teachers were minimal. Further, majority of the teachers had to resort to use of textbooks which were short in supply. This gap need to be supplemented by Principals or Head teachers who are the main actors in the institutional promotion of innovative use of ICTs in their schools. As suggested by Ho (2006), they should encourage teachers to use ICT in their instructional practices and provide teacher development programmers to increase their capabilities. However, the analysis shows that except one, none of the schools had prioritised teacher development or initiated steps towards engaging ICT learning among teachers.

Diagram 4: Percentage of teachers using various Teaching methods used



To summarise, the priorities set by the school in scheduling ICT learning, infrastructural limitations (electricity, space in computer lab etc), interest among students in ICT learning (including their parents) and teacher’s attitudes towards ICT teaching are determinant criteria’s which influence ICT learning and integration.

c) Curriculum based learning:

Curriculum is a true reflection of the policy intentions of the government and hence are framed at the national level. The Curriculum policy followed determines the effectiveness of ICT integration at the school level. It needs to define the ICT attainment targets, defined as minimum objectives regarding the ICT knowledge, skills and attitudes viewed by the government as necessary for and attainable by all students in compulsory education (Vanderlinde et. al, 2012, p. 1340). Reading along the Malawi National ICT policy goal for ‘universal computer literacy’, one can identify that the intended purpose and goal are not aligned impeding the implementation of ICT policies. Computer studies is not a compulsory subject in Malawi and though 75% of the sample schools had computers, the overall computer availability is very less across the country. A parallel can be drawn here from the study of Flemish Schools conducted by Vanderlinde & Braak (2010). The study traced the development of ICT in schools after mandating compulsory ICT education through a decentralised framework in primary schools. It was found that schools were able to implement a broad spectrum of ICT-enriched activities corresponding to the different educational goals envisaged by the government ICT policy.

At the same time, stakeholder involvement in curriculum formulation is absent in the case of Malawi. Rueben.M, Director of TMinds mentions how in spite of writing policy briefs and drafting ICT curriculum to the government, the Ministry of Education had not consulted them when the revision of the curriculum was proposed. Going by the plans for collaborations envisaged by the National ICT Master Plan, it would have been more appropriate if the third sector working in ICT development are consulted and their inputs taken.

5. ICT plans and policy:

Developing an ICT policy plan at school level is a crucial step toward the practical implementation of the integrated use of ICT as affirmed by Bryderup & Kowalski (2002). As the Flemish school study conducted by Vanderlinde & Braak (2010) has shown, ICT policy planning and the establishment of a school-based ICT policy plan is critical for an effective integration of ICT. However, the analysis notes that none of the schools had an ICT plan nor

incorporated ICT as part of the student development plans. The planning has largely been haphazard, and resources procured only on an ad-hoc basis. Countries like Ireland encourage the setup of Planning committees to decide the allocation of budget for ICT development and improvement (ICT in School Report, 2008). This enables them to develop a 'shared vision' for ICT implementation.

Citing Fishman and Pinkard, 2001 & Lim et al. (2011), Vanderlinde et al. (2012) argues the importance of constructing an ICT policy plan based on a shared vision of teaching and learning on the one hand and ICT integration on the other hand. Further, these school level plans should ideally match the intentions of the national policies on ICT. Generally, the understanding of an ICT design framework is limited among the teachers including the head teacher who oversees the school development plan. To overcome these barriers, schools require more engagement from the government and third sector organisations. Though there has been opposing studies against a centralised approach as Visscher and Coe (2003) which shows that central level ICT based reforms do not automatically lead to educational change in schools. It is determined by 'shared vision' by the school stakeholders (teachers and management) with the government. Ideally, the teachers and management need to act as street-level bureaucrats to quote Lipsky, 1980 as cited in Taylor, (2007) to engage and control the school-level outcomes (Taylor, 2007, p.557). This is more applicable in the case of schools in countries like Malawi which are incapacitated to develop their plans at the local level. A decentralised planning system would encourage local community and locally based third sector organisations to involve in a better manner. Such support systems and collaborations will ensure better implementation and assist in achieving successful ICT integration.

4.2. Conclusion and summary

With the proliferation of technology, government and institutions have been taking adequate measures to reduce the issue of access to technology (Ertmer et al., 2012). With reference to the analysis undertaken in North Malawi schools one could assume that there has been issues at various stages which are debilitating the policy intentions and goals set. The lack of supply of computers, accessories and other ICT equipment's have been the major first order barrier

limiting ICT integration in the country. One could gather that some of the internal barriers require external support.

Further assessment based on the interviews conducted with ICT teachers show that their positive attitudes and beliefs were the overwhelming reason for ensuring ICT in schools. Because of the constraints in accessing resources (first-order) and other financial constrains; it has multiplier effects in overcoming second-order barriers. However, if we go by assessment made by Ertmer et al. (1999) that the relative strength of second-order barriers may reduce or magnify the effects of first-order barriers, there is lot to expect in the future, ie. if teachers and management are provided with adequate support, ICT integration is possible and policy goals can be achieved.

However, as the stakeholder theory of Freeman & Reed (1998) propounds, there has been a mismatch of stakeholder interventions and policy goals which has minimised the impact of such interventions. One could further assess this by taking the examples cited by Pankomera & Greunen (2006, p.166) and see how these interventions have failed or not met its objectives in Malawi. This needs to be read along with the policy impact of various interventions mentioned in Chapter 3 Table 1.

Table 4: Status of ICT Project interventions in education in Malawi

S.No	Third Sector Interventions	Objective	Beneficiaries	Status of the intervention
1	Malawi Research and Education Network MAREN, 2016	Internet connectivity for the tertiary education and research sectors in Malawi	Mzuzu University and Chancellor college, College of Medicine	Not extended to schools
2	FAIR Denmark-TMinds	Bridging the digital divide between developed and developing countries by providing refurbished ICT equipment	Secondary Schools in the northern and central regions which received over 1000 desktop and laptops. Installed with Linux based Open Source software	National Curriculum follows Microsoft based computer learning. The schools which had installed these computers either refused or unable to use it
3	ITSchools Africa	Computers for Malawian Schools Creating e-learning centres for students and training of teachers	Secondary Schools in Blantyre, Chichiri, Chipasula, Zingwangwa	Secondary schools in North Malawi not covered

Source: As reproduced and adapted from Pankomera & Greunen (2006, p.166)

In addition to the above barriers, the researcher has documented from the field interviews various instances where ICT interventions by the third sector encountered barriers from the government and policies. Some of these include failure to clear consignment of ICT equipment's donated from donor organisations, levying additional tax on donated computer imports, transferring teachers trained in ICT to schools which neither had computers nor had electricity and not demarcating budget for ICT. These barriers, though not uncommon to least-developed countries, have negative impacts on ICT development. These instances further highlight how interventions failed to meet their objectives due to lack of policy level support or planning. However, a detailed assessment is beyond the scope of this paper. What can be gathered here is that in spite of the limitations, the third sector has been able to fill the gaps in ICT integration wherever the government has not been able to involve or failed in its role.

To summarise the problems that Secondary schools face in ICT in Malawi are the following:

- 1) Lack of Electricity and Infrastructure Support
- 2) Lack of qualified ICT teachers and availability
- 3) Scarcity of learning resources
- 4) Lack of policy planning and ICT priority at school level: Poor understanding of ICT among school administrators and management
- 5) Lack of financial support
- 6) Curriculum limitations

Chapter 5: Recommendations

5.1. Increasing stakeholder engagement for successful policy implementation

- a) **Defining ICT interventions:** It is critical for Turing Trust and CYD to determine and define its ICT interventions. While, support through supply of laptops and maintenance is the current key interventions. It will need to broaden the scope of its interventions to facilitate better ICT engagement with the beneficiaries. Training is one important component which need to be structured for the computer teachers based on a framework. This framework needs to necessarily incorporate the National Curriculum for Computer studies.
- b) **Enabling better ICT access:** Access to ICT through infrastructure support is already in place, but, need to extend to the classroom space. One of the key infrastructure challenge (apart from supply of electricity) is broadband access. While, few schools have already taken initiatives towards enabling broadband connections, cost has been a major impediment. According to interactions with government, all government offices have internet access through fibre optical lines which could be extended to schools (atleast nearby). Petitioning the government and pushing schools towards enabling connectivity could be done with a joint effort from all third sector organisations working in this space.

Community engagement is a key to enabling access to information. Priority should be given to schools which are run by communities, private schools, public schools in that order. It is important to engage and make the community familiarise with ICT. PTA meetings or school events are good opportunities for reaching out to communities. As mobiles are more prevalent, SMS messages linked to the platform could be useful, keeping in mind the costs involved.

- c) **Supporting existing ICT Initiatives:** Malawi's ICT sector is not devoid of interventions through donors or third sector support. The key thing is to facilitate its continuity within the educational system. TMinds have prioritised their interventions through development of customised learning platform for schools. Opportunities for partnership can be explored with them in this regard given the platform developed by Turing Trust for its Solar Berry project. It is also worth to focus on existing schools which are ICT-

ready so that there are proper outcomes for the interventions. It would be good to group the schools in terms of the scope of interventions planned. Below is a scenario:

Group 1 schools would be those which have already computers

Group 2 schools are those without computers

Group 3 schools are those with computers and with competent computer teachers

Group 4 schools are those with computers but with no competent computer teachers

**Competent teachers mean those who have good knowledge of ICT and curriculum modules.*

d) Enhancing and increasing skill and training: As there are not adequate skilling opportunities, Turing Trust/CYD need to prioritise their interventions to address the skill gap. It is a good opportunity to conduct a needs assessment for skill improvement among teachers (including computer teachers). A rough sketch of skill proficiency has been mapped.

e) Infrastructure and budget support: It would be good to think beyond computers and laptops for the next phase. The provision for laptops for teachers should be definitely explored with strict terms and conditions. CYD can monitor their ICT proficiency with monthly assessments which justify supply of laptops.

One of the key findings has been in relation to the willingness of the schools to levy a small fee for computers. While this maybe highly undesirable in certain schools where students cannot afford. An ideal strategy is to have discussions with schools in this regard towards. It is important for schools to demarcate a budget for ICT which could be mandated as part of this arrangement.

f) Engagement in policy formulation: It is also important to have a constant and deeper engagement with the government and the policy makers. This can be done through a structured engagement with policy makers in form of meetings, discussions and networking. Sending policy briefs, newsletters and pamphlets of the interventions or programmes initiated by Turing Trust/CYD will go a long way in better engagement.

In spite of the limited role by government, it would be an ideal way to streamline the activities in line with the government plans and policies.

Few things which could be done on a priority basis is developing of an ICT plan for schools which will help them to identify the existing resources and plan for the future. This could be done in conjunction with school headmasters and/or the District and Divisional managers. The Divisional office is in a better position to instruct schools in this regard, but which require monitoring and follow-ups by CYD.

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Annexure 1: Field research interview questions

1. Details of School: Name, number of teachers
2. Is Computer studies taught in the school? If yes, Till when
If No, proceed to question 8
3. Number of ICT teachers. What are their qualifications and level of proficiency?
4. Number of computers
5. How is ICT used in the classrooms? How much time is allocated for students to use and learn ICT?
6. How much is ICT used for administrative purposes
7. What are the issues affecting ICT integration in school
 - a) Lack of teachers- Delay in appointment?
 - b) Students not interested
 - c) Lack of IT infrastructure support
 - d) Lack of electricity
 - e) Any other
8. Is the school intending to provide ICT training for teachers?
9. Are any NGOs or Government bodies helping you in ICT integration through ICT training or infrastructure support or any other manner?
10. If yes, what is your comment about their work. What is the scope of intervention. If they did not support, what will be the scenario?
11. What is the level of funding obtained in the school for ICT (Answer if possible)
How much is the fees for computer studies? Is that enough to support the activities
12. Do the school have an official website or official email or customised platform?

Annexure 2: List of Secondary schools

1. Choma CDSS
2. Nyungwe CDSS
3. Multicareer Pvt SS
4. Mzuzu Govt SS
5. Katoto Conventional SS
6. St Peter's Catholic
7. Lupaso CDSS
8. Chibavi CDSS
9. Luwenge CDSS
10. Maymount Catholic Girls Pvt SS
11. Njerenjere Pvt SS
12. Blessings (Malzale) Pvt SS*
13. Zolozolo CDSS
14. Royal Pvt SS
15. Msongwe CDSS
16. Moyale CDSS
17. Our Time Pvt SS
18. Masasa CDSS*

Note: Those marked in *, interviews were not recorded due to unavailability of the respondents.