



Utrecht University



MASTER'S THESIS INTERNATIONAL DEVELOPMENT STUDIES

ICT implementation in primary and secondary schools in Sierra Leone

TAKING A LOCAL NEEDS PERSPECTIVE

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Abstract

During previous research, the researcher has conducted desk- and field research on ICT implementation in Ghana and Sierra Leone. This Thesis builds on this and other research conducted for Maxim Nyansa and ICT4D (ICT for Development) debates. The main research question is “How can ICT implementation in primary and secondary schools in Sierra Leone meet local stakeholders’ needs?”. The purpose of this research is to outline the (relevance of) local needs during ICT implementation in schools, for a more successful implementation and coordination at a later stage, with a regional focus on Sierra Leone. In this way, a fuller potential of ICT projects can be reached. The unique case of Sierra Leone provides an interesting example of a resource-poor context. The longer-term regional goal of this study is to increase research in Sierra Leone in the areas of ICT and education, which can lead to increasing participation of national and international organizations and investors.

To answer the question, nine schools have been visited by the researcher between February and May 2021, and seven educational experts have been interviewed. At the schools visited, various focus groups and interviews have been conducted with principals, teachers, parents and students. The debates of education, technology and development have been explored, including concepts of project management, needs assessment, social justice and e-readiness. This Thesis contributes to the field of Educational Technology (EdTech) by providing stepping-stones for a bottom-up approach.

To answer the main research question, this Thesis is divided in three parts: State of ICT, Educational needs and ICT meeting local needs. Firstly, the state of ICT in Sierra Leone is very poor, with most schools lacking both a proper ICT infrastructure and access to ICT. Secondly, educational needs identified include improving access and quality. Various categories that are challenging the quality of education have been identified: learning environment, teacher qualification and motivation, content-overloaded curriculum, and other challenges in the external environment. Thirdly, ICT must meet local needs. Though failing to meet all needs, it has the potential to create a better learning environment and gives private schools the opportunity to market themselves better. The many needs limit the focus on ICT. Limiting factors for ICT itself include rudimentary power networks and internet, attitude, poor ICT knowledge and skills. For the ICT lifespan, needs include ventilation, security, monitoring, repair and maintenance. From low-tech initiatives reviewed, lessons have been drawn for high-tech ICT implementation, including good content quality, starting in urban areas and low-cost.

Key words: Education, information and communication technology, Sierra Leone, project management, needs assessment, e-readiness, social justice.

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I am writing this Thesis as a MSc student of International Development Studies (IDS) at the Utrecht University, in collaboration with Maxim Nyansa IT Solutions. Since the beginning of 2019, I am a volunteer for Maxim Nyansa. As a BSc student of 'Internationale Ontwikkelingsstudies' at the Wageningen University, also in collaboration with Maxim Nyansa, I have been conducting a feasibility study the end of 2019 and written my BSc Thesis at the beginning of 2020, comparing ICT implementation in primary and secondary schools in Ghana and Sierra Leone. I have been satisfied with this collaboration, and decided to continue as a research intern for Maxim Nyansa.

During my Thesis, I have been supervised by Femke van Noorloos, Assistant Researcher in IDS, from the faculty of Geography. Besides, Diana van der Stelt, the Co-founder and Managing board of Maxim Nyansa, has been supervising me from the organization's side. Diana van der Stelt has been the supervisor for my previous research as well. I am grateful for this learning experience and want to thank both from the bottom of my heart. It has been great working with you and your feedback has been very helpful to guide me through the various research processes, from writing my proposal to Thesis writing.

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List of abbreviations

BECE	Basic Education Certificate Examination
DSTI	Directorate of Science, Technology and Innovation
EDH	Education Data Hub
EdTech	Educational Technology
EIC	Education Innovation Challenge
ESP	Education Strategic Plan
HCDI	Human Capital Development Incubator
ICT	Information and Communication Technology
IDS	International Development Studies
IT	Information Technology
JAMB	Joint Admissions and Matriculation Board (Nigeria)
JSS	Junior Secondary School
GER	Gross Enrolment Rate
MBSSE	Ministry of Basic and Senior Secondary Education
MDGs	Millennium Development Goals
MEST	Ministry of Education, Science and Technology
NECO	National Examination Council (Nigeria)
NER	Net Enrolment Rate
NGO	Non-Governmental Organization
NPSE	National Primary School Examination
RAN	Rising Academy Network
SDGs	Sustainable Development Goals
SL-MTNDP	Sierra Leone's Medium-term National Development Plan (2019-2023)
SPR	Student Pass Rate
SSA	Sub Saharan Africa
SSS	Senior Secondary School
STC	Save The Children
TSC	Teaching Service Commission
WAEC	West African Examination Council
WASSCE	West African Senior School Certificate Examination

1. Introduction

1.1 Agenda setting

Education aims to create productive workers, responsible citizens and lifelong learners. In short, education empowers people. The education system includes the whole system of developing basic and specialized knowledge, skills and abilities (Spector, 2015). Therefore, most International Development organisations see education as an important area of (financial) investment (Psacharopoulos and Woodhall, 1993; Shizha and Kariwo, 2012). It is not surprising that education is identified as one of the Millennium Development Goals (MDGs), from 2000 to 2015, and Sustainable Development Goals (SDGs) from 2015 to 2030. MDG 2, 'achieve universal primary education', and SDG 4, 'quality education', are focused on education. Generally, the assessment of MDG 2 has been positive. Overall access has increased and the number of children not being educated has fallen. For example, primary school net enrolment rates in the global South were estimated to be 91% in 2015 compared to 83% in 2000. Children out-of-school were estimated 58 million compared to 100 million in 2000. Yet, the marginalized children were often not reached yet and quality of education has been low. Whereas Eastern Asia and Northern Africa have nearly achieved universal primary education enrolment, Sub Saharan Africa (SSA) falls behind compared to other regions. Causes include extreme fragility and conflict. Disabled children and children living in disadvantaged communities particularly struggle to access quality education. Even though the overall primary school enrolment rates in SSA have increased from 52% in 1990 to 78% in 2012, progress have been challenged by the quick growth of the primary-school-age population (+85% from 1990-2015), huge poverty, armed conflict and other emergencies (GPE, 2015).

From the MDGs to SDGs, the focus shifted from access towards the quality of education. Besides, whereas MDG 2 had been centred around primary education, SDG 4 includes secondary and tertiary education. An overview of SDG 4 from the Sustainable Development Goals Report 2020 is shown in Figure 1.1. Quality of the learning environment (basic school resources) is very poor in SSA compared to the world (see the middle diagrams). All basic school resources are significantly less available in SSA compared to the world. Besides, the gap between privileged and marginalized between and within countries as identified in the MDG assessment, is similarly found. Low-income countries have a bigger gap between the poorest 20% and the richest 20% in terms of primary school completion, compared to higher-income countries (see the lower diagrams). Due to the Corona pandemic, gaps between the privileged and marginalized have increased. Most schools have been closed for a while and learners have often been dependent on remote learning opportunities. Unfortunately, this has exacerbated existing inequities (Srivastava, 2020). Remote learning has not been available for over 500 million

students and school closures kept 90% of the students out of school (see data on top of Figure 1.1).

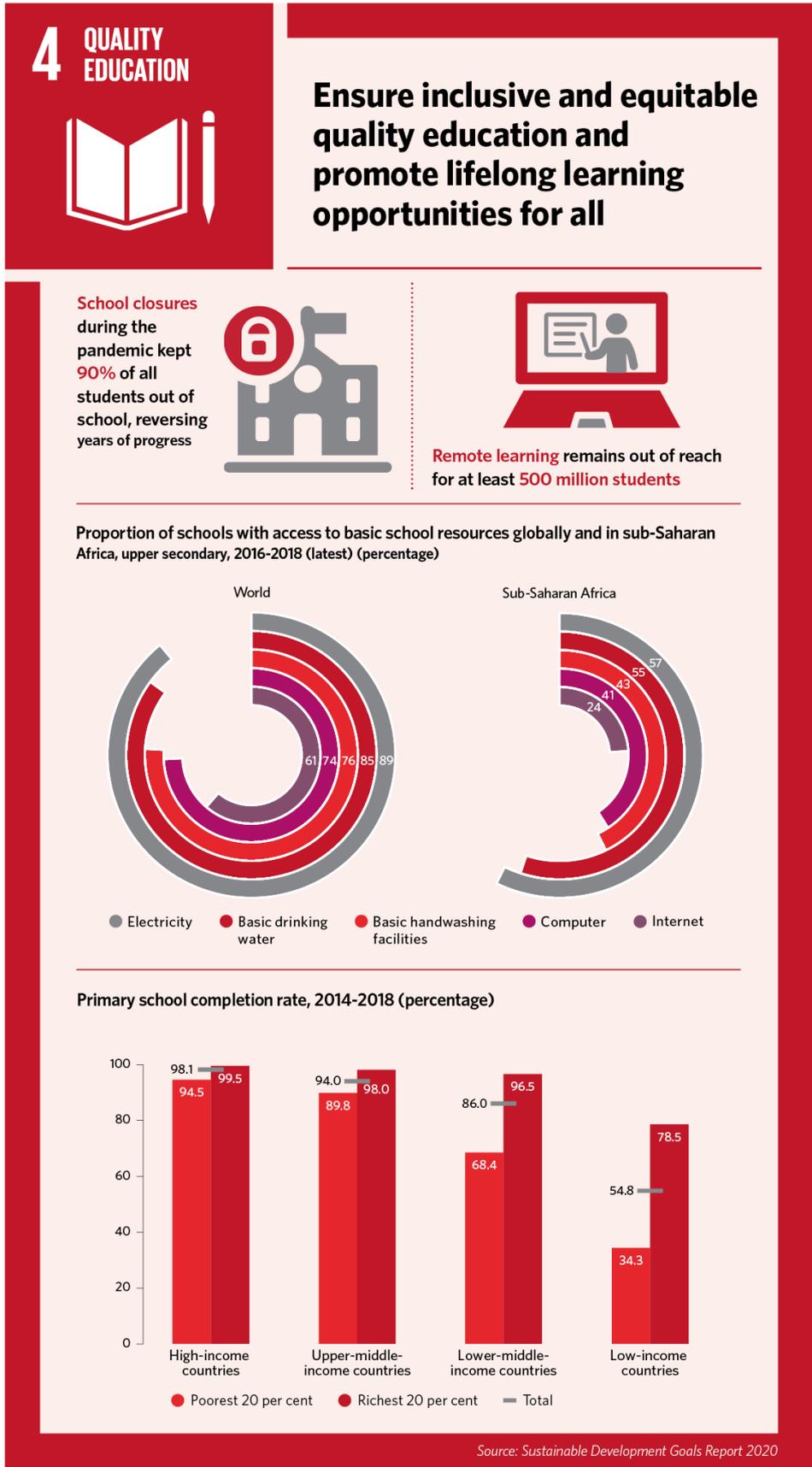


Figure 1.1 SDG 4 assessment (UNA-UK, n.d.)

When it comes to education, an important measure for quality is to see if it reaches its goal to create ‘productive workers, responsible citizens and lifelong learners’ (Spector, 2015). Reaching its goal, the educational systems in most African countries are not very efficient. One of the clear signs is the high youth unemployment in Most African countries (Kimpolo and Szyszlo, 2020). A major problem for this is the lack of job creation. While 10 to 12 million African youth enter the workforce each year, only 3.1 million formal jobs are created. Formal jobs are officially registered jobs that provide more income sustainability compared to informal jobs. Yet, this does not mean that all individuals lacking a formal job are unemployed, although official statistics might indicate such. The workforce will likely grow significantly in the coming years. Currently, 40% of the Africans is aged under 15. In 2050, it is expected that two out

of three Africans will be aged under 30. So, the population is rapidly growing, while job creation is lagging behind (Busson, 2020).

Beside the lack of job creation, Kimpolo and Szyszlo (2020) identify the mismatch between requirements of the working industry and the skills possessed by graduates, as a cause for the lack of work-readiness. This is confirmed by various authors (for example McGivney and Winthrop, 2016; SDG Compass, 2016). In 2015, an estimated 250 children did not have enough basic skills to enter the job market. When all children are fully equipped with the relevant skills, for the coming years, GDP in low-income countries is estimated to grow 28% per year and in higher-income countries 16% per year (Solberg, 2015). An underlying challenge is the outdated educational curriculum (Busson, 2020). This mismatch results in a poor transition to the labour market and is particularly caused by changing industry demands due to technological advancements and disruptions. Ampong (2020) confirms these findings for the Ghanaian education system, which fails to create 'employable graduates'. He identifies the traditional way of teaching as the cause. This traditional way does no longer meet the required 21st century skills when students apply for jobs. These skills include communication skills, teamwork, strong work ethics, professionalism, creativity, critical thinking, problem solving, and analytical and technical thinking (Partnership for 21st century Skills, 2008; NACE, 2009; AMA, 2010). These skills are also the key for students to create their own job (Ploum, Blok, Lans, and Omta, 2018), as these skills provide students the capacity to be entrepreneurial, to take responsibility and manage themselves (Vare and Scott, 2007). In the current system in most African countries, "[y]oung Africans have been taught to find a job and not to create one" (Busson, 2020, p. 7). Besides these skills, digital skills have increasingly become important when applying for jobs. Whereas we live in a networked world where people are increasingly globally connected, not everyone is 'e-ready', which means being prepared for the world we live in (Cyber Harvard, n.d.; Kimpolo & Szyszlo, 2020).

1.2 Justification of the topic

One of the approaches identified in International Development to meet a fuller potential of education, is to implement ICT in schools. Implementation of ICT in schools can increasingly equip students with 21st century skills, including digital skills. As can be seen in the middle diagrams in Figure 1.1, in schools in SSA, electricity (57%) and internet (24%) are less available compared to other regions (89% and 61%, respectively). While there are significant challenges, there is also a huge potential to increase the access to ICT in schools.

The assessment of MDG 2 and SDG 4 show that access to education is not enough for better education. Similarly, access to ICT is not enough in itself. The quality of education should be considered, as well as for ICT. ICT can have a lot of benefits, but should be implemented with care. Challenges should be considered to reach a fuller potential (Huang et al., 2019). Unfortunately, most challenges have not

been considered before ICT projects have been implemented in African schools. Top-down interventions have resulted in schools being equipped with computers, yet finally computers are not or slightly used for its purpose. Due to the top-down character of the interventions, local needs have not been considered. Technology has been implemented for the sake of technology, rather than for the sake of quality education. Technology is not a one-size-fits-all tool. Technology has often not been made locally appropriate and as a result technology has often not been integrated and used in local environments to a desired extent (Jasanoff, 2002).

1.3 Research objectives and question

This Thesis focuses on the ICT implementation in education, rather than the impact afterwards. The academic purpose of this Thesis is to reveal perspectives on needs from local educational stakeholders: the principal, teacher, the parent, the student. This Thesis adds a unique case of a resource-poor country. This perspective adds to the general debate of local needs, since local people in resource-poor countries do often not have the agency to make themselves heard. Instead, top-down organizations often control the designing and implementation phase of projects up to the evaluation phase. Giving the most marginalized people a voice paves the road for increasing social justice (Fraser, 2007; Jasanoff, 2002).

This research has a national focus on Sierra Leone. In Development Studies, it is well known that whereas the global North is what we can call 'over-researched', the global South is 'under-researched'. Moreover, most studies that have been conducted in Africa were located in the richer countries. This also applies to the education system. In West-Africa for example, a huge number of studies are available that researched the Ghanaian and Nigerian education sector. See the research of Amedeker (2020) in Ghana in Box 2.1. Yet, for Sierra Leone, only few studies have been available, and the quality of research is poor compared to that of Ghana and Nigeria (See De Bruine, 2020b). Research is often poor in resource-poor countries. Yet, it is these countries where educational issues are most relevant, because the quality is often lower compared to richer countries. Raising the quality provides many opportunities for people to get steer clear of the poverty trap (Samarakoon, Christiansen and Munro, 2017). The void in research on ICT in education in Sierra Leone has to do with a general lack of equipment as well. For example, in Ghana the government introduced ICT in education in 2007, the government of Sierra Leone started introducing ICT in education only recently in 2018. Although it is officially the introduction of ICT, this has not been implemented on a large scale yet. Various circumstances have been restraining the development of Sierra Leone, including the civil war and the Ebola outbreak. See [section 3.1](#) for more information.

The practical purpose of this research is to outline the relevance of local needs during ICT implementation in schools for a successful execution and coordination at a later stage, specifically for Sierra Leone. In this way, a fuller potential of ICT projects can be reached. This research is focused on primary and secondary schools in Sierra Leone, due to the partner organization and my positionality (see [3.3 partner organization](#) for more information). The longer-term regional goal of this study is to increase research in Sierra Leone in the areas of ICT and education, which can lead to increasing participation of national and international organizations and investors.

My research question is:

How can ICT implementation in primary and secondary schools in Sierra Leone meet local stakeholders' needs?

1.4 Reading guide

Next, the Conceptual and theoretical framework (2) is outlined, after which the [Geographical contextual framework](#) (3) and [Methodology](#) (4) follow. Afterwards, the results are presented. [Chapter 5](#) illustrates the current situation of ICT in education in Sierra Leone and how it emerged. [Chapter 6](#) outlines the current needs in the education system. Chapter 6 sets the foundation for [Chapter 7](#), which presents the results on how ICT can meet the local needs. This core part of this Thesis is closed with a [Discussion](#) (8) and [Conclusion](#) (9). Finally, the [References](#) and appendices are presented.

In [Appendix A](#), an overview of research conducted for Maxim Nyansa is given. In [Appendix B](#), an overview of the activities conducted is given, as well as photos of the schools. In [Appendix C](#), the interview and focus group guides are shown. In [Appendix D](#), the coding tree is presented. In [Appendix E](#), the Student Pass Rates for different categories can be found. [Appendix F](#), presents figures on education in Sierra Leone. [Appendix G](#) [Appendix G](#) gives an overview of recent EdTech initiatives. In [Appendix H](#), an overview of the results of the Education Innovation Challenge (EIC) is given, which is a recent EdTech initiative.

2. Conceptual and theoretical framework

As outlined in the [introduction](#), one of the major barriers to successful ICT implementation in schools, is the top-down nature of the interventions. Top-down initiatives do mostly ignore local needs on-the-ground. To better understand this, it is useful to first review concepts and debates on [education, technology and development](#).

2.1 Education

Learning theories have their own idea of what education should look like. In the global North, three learning theories have recently dominated educational debates, which are also relevant in the global South to a large extent: behaviourism, cognitivism and constructivism. Behaviourism has been dominant in the global North during the 1920s to the 1960s, cognitivism during the late 1970s and early 1980s, and constructivism from the 1970s onwards. Behaviourism has been mostly popular in America. The effect of learning is measured by the learners' responses stimulus and it supports a system of rewards and punishments. This theory is in line with the traditional method identified by Ampong (2020) as mentioned in the [section 1.2](#). Cognitivism considers learners to be individual processing information. Whereas for behaviourism, the learner has a passive role, cognitivism envisages a more active role for the learner. Constructivism is fully learner-centred and assigns the most active role to the learner. For constructivism, interactions are important as they are the means to learn, using mental constructions (Huang et al., 2019, Ch. 2). Over time, in the global North the focus shifted from teacher to learner and from a passive to active learner. Besides, a shift from acquiring knowledge towards learning skills similarly took place in the global North. Whereas this shift has appeared in the global North, it has not been the same in the global South (Huang et al., 2019, Ch. 2).

It can be discussed whether and how this shift is desired for the global South. Requiring the global South to change, can be seen as modern imperialism. Still, considerable results are the result of a change from more 'traditional' to 'interactive' education. In constructivism, more meaning is created on-the-ground, since it is learner-centred. Constructivist approaches highlight personalized learning, it is easier for learners to 'own' what they learn. For example, Bloom's taxonomy shows that the more interactive education, the higher the degree of retention (Van der Bilt, 2020). See Figure 2.1 for an illustration of Bloom's taxonomy. Besides, every learner has his or her own style of learning. For examples Kolb's learning cycle and learning style illustrate the importance of personalized learning, as learners differ in terms of preference: feeling, watching, thinking, and doing (Managing for Sustainable Development Impact, n.d.). Social learning or interactive learning has shown positive effects

Bloom's Taxonomy

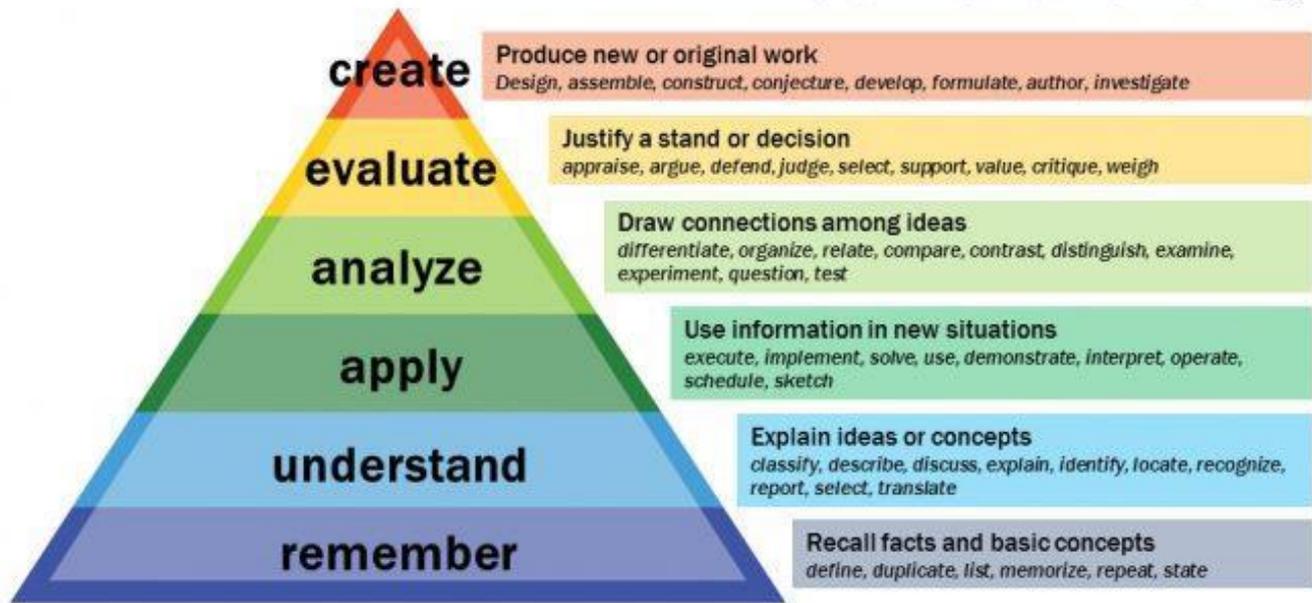


Figure 2.1 Bloom's Taxonomy (Van der Bilt University, 2020)

in four domains: social, psychological, academical and assessment. Socially, it creates a fruitful environment for collaboration and various understandings. Psychologically, it creates an environment where anxiety can be overcome and where self-esteem can be built. Academically, social learning paves the way for better results, as well as more critical and problem-solved thinking and taking responsibility of one's learning process. Lastly, assessment will improve, since there will be a variety of assessment (Laal and Ghodsi, 2012). Finally, constructivism empowers students to add more value to the current economy by producing new or original work, as can be seen in Bloom's Taxonomy in Figure 2.1. Yet, innovation is what is challenging in behaviourism, or the traditional learning method. Therefore, a broader change is required to make this work. Next, the concepts and debates around technology and development are outlined.

2.2 Technology and development

Technology in education (EdTech) can have a lot of benefits as well as challenges. EdTech has the potential to provide deepening and broadening learning and teaching experiences. Increasingly different tools are available, including apps, mindmaps, online textbooks and videoclips (Huang et al., 2019, Ch. 7.2.3). Benefits include visualization of unfamiliar content (Courville, 2011; Lemke, 2002) and easy monitoring of students and teachers by administrative staff (Suryani, 2010). Besides, teachers can save much in class and exam preparation (Suryani, 2010; Interview Stanley Dankyira, 12-06-2020, in De Bruine, 2020b). While available information has increased through technology, it has also brought us a downside. Technology has brought us a dark side of distraction, including mis- and disinformation,

pornography and hate speech. This increasingly leads to depression and alienation (Lemke, 2002). Therefore, digital content must be filtered carefully and quality must be controlled. Other related issues include privacy and security, and the power of big tech monopolies, which should be regulated carefully (Trucano, 2005).

When EdTech is implemented in a school, care is required, since new challenges arise in the process. While many development projects have aimed to contribute to a shift from the ‘traditional’ to ‘interactive’ (or constructivist) education, throughout the project management cycle (See Figure 2.2), the very idea of constructivism has often not been practised. This means that the top-down projects have not been taking local needs into account. As explained, this results in not, or only partially, using the computers introduced in the classroom. Jasanoff (2002) identifies two causes. Firstly, technology has been misread as simply material and inanimate. Instead, ICT gets meaning through its social construction. Secondly, history and time have been erased as relevant factors, and development projects have therefore often not been adapted to the local situation. This has resulted in not creating much meaning on-the-ground. Amedeker (2020) illustrates a clear example in Ghana, where the local situation has not been considered. See Box 1.1, where an integrated strategy and plan to include the local context have been lacking (Amedeker, 2020; summarized in De Bruine, 2020b).

The result has been a lack of local meaning. Overall, the results and the means should not be confused. ICT should not be pursued for the sake of ICT or technological advancement. Moreover, ICT is not a one-size-fits-all tool, but should be adapted to the local context to meet local needs. Instead of a linear path to progress which is often assumed in Development Studies, every locality has its own particularities and people appropriate technologies in creative ways (Huang et al., 2019, Ch. 2). Besides, ICT is not a ‘quick fix’ for problems in the education systems of African countries. For example, ICT cannot make up for teachers’ qualities and the educational curriculum. When the curriculum is not considered, ICT can lead to worsening exam results (Courville, 2011). As can be seen in Box 2.1, the local context of timetables and money for fuel, has not been considered. This illustrates that well-meant projects are ready to fail when not considering the local needs (Amedeker, 2020).

Since 2006, the government, NGOs and PTAs (Parent-Teacher Associations) have introduced ICT in schools in Ghana. There has been progress, but positive results have been occasionally. For donors, the projects have been mostly uncoordinated. Most projects aimed to ‘fill gaps’, without local stakeholder involvement, including educational authorities, teachers and students (Amedeker, 2020). Science Resource Centres (SCRs) were set up for the SHS (Senior High School). Although buses were available for transportation, fuel has not been funded. Moreover, timetables were disrupted because of a very much examination-driven curriculum and teachers lacking incentives to visit the centres. There has been no guide on how to integrate ICT in education and teachers have been stepping out.

Box 2.1 Science Resource Centres Ghana (Amedeker, 2020)

Anto, Van der Stelt, Dankyira and Bei (2019) identified tailor made programs for local needs as one of the seven success factors for introducing ICT in schools in Africa. Other success factors include the local community in the lead, a direct benefit of ICT to the stakeholders, basic facilities supporting the change, and a holistic approach. The local community in the lead, or local ownership, is confirmed by Huang et (2019, Ch. 13). Closely related are local attitudes. Local attitudes affect the project outcomes to a large extent. Educational stakeholders can be reluctant to use ICT. For example, teachers see ICT classes as a burden for their work and are insecure when teaching, supported by ICT, since they do not have sophisticated digital skills (Suryani, 2010). Jasanoff (2002) confirms that local attitudes are key for technology to work. She identifies consultation and decentralisation as two responses to top-down technology processes. Since the present is plural, because of different roots people come from, technology cannot be a one-size-fits-all tool. Therefore, involving local people and mapping attitudes will provide meaning on-the-ground and makes it more likely for an ICT project in an African school to reach its purpose. Without local readiness to use technology, the chance is very slim ICT is used efficiently for its purposes. There should also be freedom to decide not to engage in the project or to abort it at a later stage (Suryani, 2010). Constructivist ICT implementation that considers the local appropriateness and needs, including the local readiness, will lead to local ownership and is likely to have a better success rate of ICT implementation in schools, which means that the computers are more used for its purpose. The concept of local readiness carries the risk of selecting privileged schools that are ready to a high extent, and this should be considered. Yet, it is the readiness from where the ICT implementation starts. The perspective taken in this Thesis is that ICT introduction should be co-constructed and bottom-up to reach a fuller potential. Next, the ideas of [project management](#), [needs assessment](#), [social justice](#) and [e-readiness](#) will be elaborated on.

2.2.1 Project management

Project management is *“the application for skills, knowledge, tools and techniques to meet the needs and expectations of stakeholders in a project”* (Marthur (2006) in Othman, Zain and Hamdan, 2010). The identified needs and expectations and the identified stakeholders themselves, vary per project. For example, traditional project management addresses the surrounding resources, including labour, time and money. Modern approaches also include the dynamic environment. An example is the chaos theory, requiring a holistic and flexible approach to project management (Othman et al., 2010). Top-down interventions take a traditional project management approach, while bottom-up or constructivist interventions take a modern approach. The concept of project management provides a useful frame for understanding the effect of the different perspectives taken.

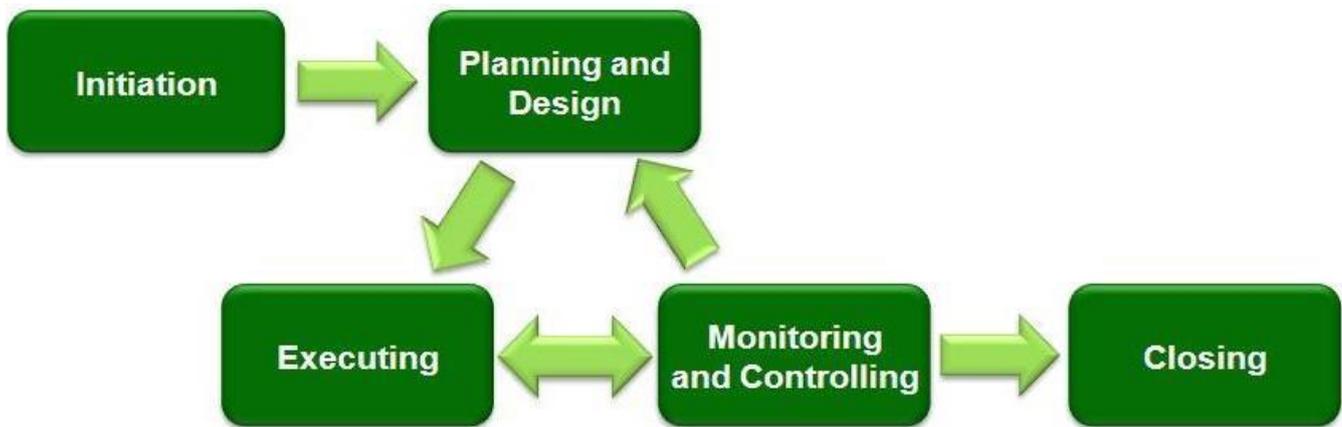


Figure 2.2 Project management phases (Bogra, 2014)

Having a certain approach throughout the project management cycle influences all stages. Bogra (2014) identifies five stages for project management: project initiation/ needs assessment, planning and design, execution, monitoring, and evaluation and closing. The phases are presented in Figure 2.2. This Thesis focuses on the first stage. The Master Thesis of Smulders (2020), which has been conducted for the same organization as this Thesis, focuses on the fourth stage: monitoring and controlling. He conducted a systematic literature research on impact assessment and identified methods and frameworks. The method chosen in phase four, highly depends on the approach taken in the first phase. Every method and framework can be adapted to be more organization- or user-centred. A critical question that should be asked from the beginning is: *“Should the planning and design, execution and monitoring be determined by outsiders or the final users of the project?”* (Bogra, 2014). The approach taken in the initiation phase determines the outcome and satisfaction by final users.

When it comes to ICT implementation in schools, it is often external organizations introducing ICT. Unfortunately, needs assessment during the initiation phase is mostly based on organizational goals and needs (Bogra, 2014). This means local needs are often not considered, and unspoken expectations of local stakeholders might not be met. Whereas project goals might be met and outcomes are good taking the organization’s perspective, it is very likely that there are hidden stakeholders that are not satisfied (Jasanoff, 2002). The needs assessment will be further discussed below.

2.2.2 Needs assessment

As introduced in the previous part, needs assessments can be done in various ways. More focused on the organisation or the final users. Bogra (2014) identifies nine categories for ICT project management, for the longer and shorter term: needs of final users, technical constraints, financial constraints, human resources, technical support, training, standardization, sustainability, and specific constraints. The

needs of final users are the focus of this Thesis, while the others are not unimportant, since the various needs are interconnected.

Before a needs assessment can be done, stakeholders must be identified. Reed et al (2019) identify four stakeholder groups: context setters, crowd, key players and subjects. This is illustrated in Figure 2.3. Context setters have high influence and low interest, and are involved in projects automatically. Besides, key players are involved, having both a high level of interest and high influence. Moreover, it is mostly important to include the marginalized stakeholders: the subjects. They have a high level of interest, but low influence. Due to the low influence, they are often not involved. They simply do not have the power to say anything. Lastly, the crowd has both a low level of interest and low influence. Therefore, they are not worth prioritizing to involve for the moment (Reed et al., 2019). When it comes to education, various stakeholders can be included. Huang et al (2019, Ch. 13) identify stakeholders for the education sector: parents, employers, administrators, and students. The DSTI identified important stakeholders for the Education Innovation Challenge in Sierra Leone: head teachers, teachers, students, field officers and deputy directors (DSTI, HCDI, 2020). In education, educational experts, deputy directors, head teachers/ principals and field officers can be seen as having high interest. Subjects are the students, parents and teachers/other employees.

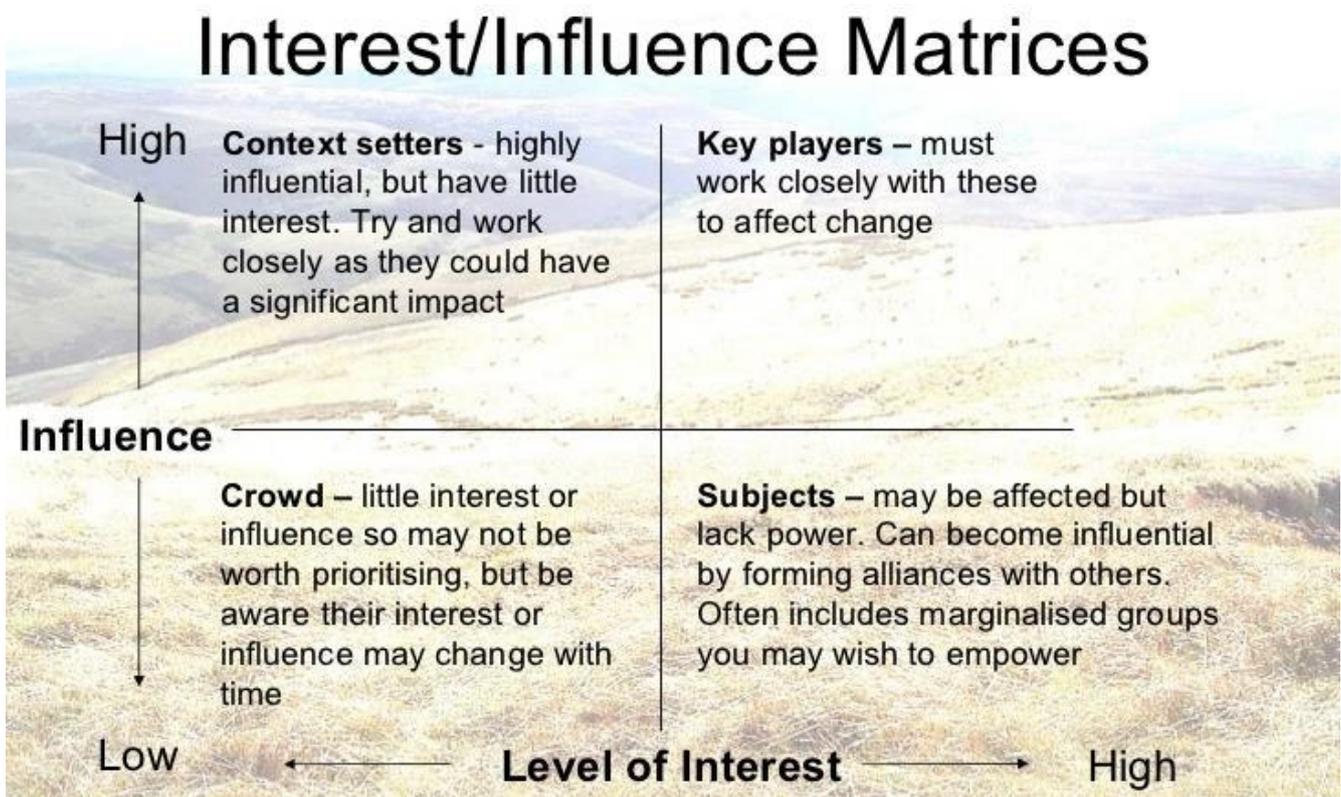


Figure 2.3 Interest/ influence matrix (<https://www.slideshare.net/AberdeenCES/how-to-do-stakeholder-analysis>)

Thereafter, local needs must be identified to be able to objectively determine how ICT can meet these needs. This requires looking beyond project needs and goals and opening for new ideas to reach the fullest potential of fair representation. Including local stakeholders in the initial phase allows for a fuller legitimacy of projects (Fraser, 2007). Taneri and Engin-Demir (2011) conducted a needs assessment study on the quality of education in schools in a rural district of Ankara, Turkey. The following categories were used:

Parents and students were asked about:

The school climate, teachers' qualifications, curriculum implementation, availability of technology, parental involvement.

Administrators were asked about:

School facilities, teachers characteristics, school opportunities and availability of technology.

The stakeholder identification has been done and key educational stakeholders selected. While the researchers focused on local stakeholders' needs, there were limitations in the research set-up. A Likert-scale was used, not leaving space for any qualitative explanation. Besides, the topics were set beforehand, not leaving space for local stakeholders' input, for example by adding categories. Projects get meaning because of their social embeddedness and because local needs often differ from top-down identified needs, including local people and identifying local needs is key towards a meaningful implementation (Jasanoff, 2014). This includes leaving space for new topics added by the stakeholders. This is closely related to the social justice debate, which will be elaborated on next.

2.2.3 Social justice

In practice, the division between bottom-up and top-down initiatives is hybrid. While top-down ICT implementation often happens without collaboration with and consultation of local stakeholders, bottom-up approaches do. Yet, the government or organization can introduce ICT in schools nationwide through a meeting with several schools for consultation. Still, it can be the government or organization that has the decision-making power during the later project management stages. Instead, the government can also involve local stakeholders from the very start of the decision-making process up to the final implementation. This example illustrates the issue of 'representation' and is part of the bigger social justice debate (Saward, 2005).

Social justice can be defined fairness in the social or societal realm (Fraser, 2007). An important author in the social justice debate, Fraser (2007), identifies three dimensions of representation: distribution, recognition and representation. Firstly, when ICT is implemented, access to ICT can be more equally distributed. The dimension of recognition means that local needs are identified by organizational

or governmental actors. Yet, the dimension of representation means that the local stakeholders get a voice, a say throughout the project management cycle. This includes the meta-level of social justice, where the power over decisions is at stake, rather than participation in the process where decisions are already made. Finally, local stakeholders will feel more recognized. This is confirmed by the citizen participation ladder of Arnstein (1969), which is shown in Figure 2.4. Although this ladder is created for citizen participation, it is relevant for ICT implementation as well. The ladder shows the range from full control of the ‘final users’ to manipulation of the ones that have the decision-making power.

Just ‘add and stir’ technology to a local context does not work and can be seen as just ‘informing’ (level 3 on the ladder of participation in Figure 2.4). Instead, ICT should meet local needs. Noddings (2005) illustrates this by asking the question: “Do educators know what children need?”. It is often assumed that educators and policy makers know children’s needs, but they often neglect expressed needs by students. This is related to the learning theories, and in policy making processes, a shift toward constructivism would also be desirable to take need into account. Fraser (2007) argues that to reach social justice, ideally, local stakeholders should be included from the very start of the decision-making process, which is the project design stage. In other words, they should be co-constructors and co-implementers. When expressed needs are ignored, according to Noddings (2005), opportunities

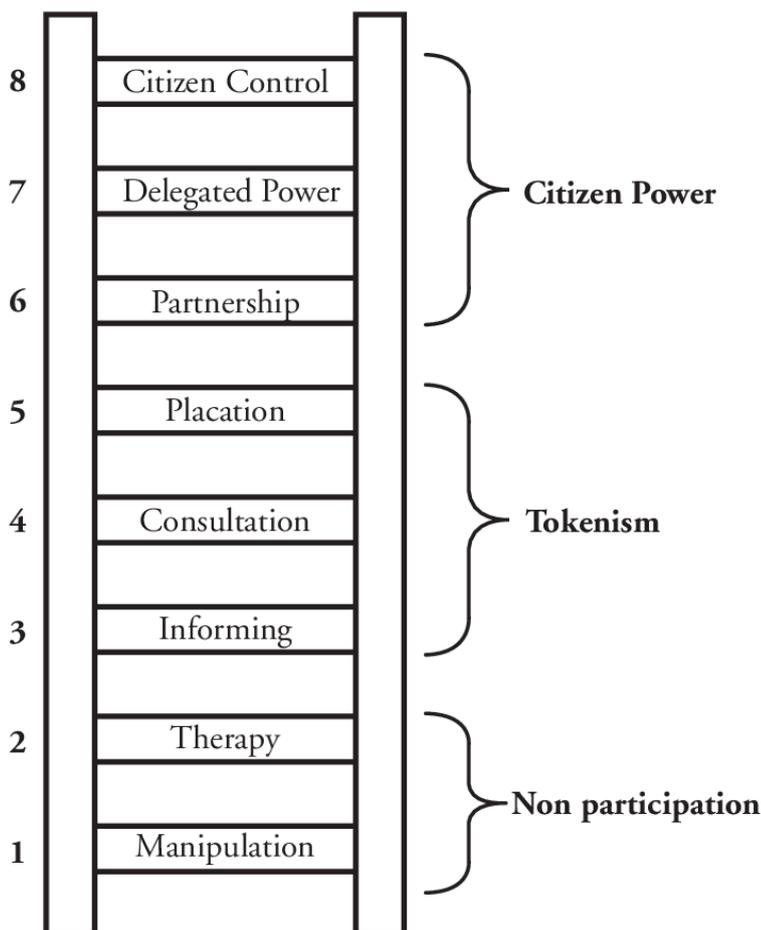


Figure 2.4 Arnsteins participation ladder (Arnstein, 1969)

to develop talents, motivation and joy of learning are sacrificed. Similarly, in project management and needs assessment, when outsiders decide for insiders, the local ownership can be very low and the project is not legitimized and not likely to succeed, neither for local stakeholders, nor often for organizational goals (Jasanoff, 2002).

When local stakeholders are included, a new challenge arises: the loudest voices often win. When stakeholders are physically represented, they cannot feel represented, since they do not feel like equally participating when being in the room. The extent to which a stakeholder feels represented, is partly determined by the extent to which the stakeholder can participate. A challenge can be the language used. For example, when participating in the decision-making process for ICT implementation in schools, local stakeholders might not have the 'vocabulary' and therefore be uncertain to speak or when speaking be delegitimized by other participants. Therefore, training of participants can be useful for a fair representation (Saward, 2005; Fraser, 2007). Overall, the issue of representation and power in decision-making should be carefully thought of.

2.2.4 E-readiness

When it comes to local stakeholders' needs and ICT implementation in schools, e-readiness is a key concept, although often used in the global North. E-readiness describes the extent of preparedness of a school or institution to use ICT to enhance the quality of education, including teaching and learning (adapted from Kashorda and Waema, 2014). Yet, e-readiness itself can be approached bottom-up or top-down.

Various authors have identified factors for e-readiness. Suryani (2010) identifies that ICT introduction should be in line with the educational curriculum, learning environment, schools' culture, ICT infrastructure, financial status and skill. Trucano (2005) adds that ICT implementation in schools should be in line with national and local policies, and guidelines and directions for ICT. Suryani (2010) and Trucano (2005) focus on what they call 'developing countries'. Cyber Harvard (n.d.) provides a general e-readiness guide for communities, which can be customized to be suitable for a school environment. 19 categories of indicators have been created within five groups: Network Access, Networked Learning, Networked Society, Networked Economy and Network Policy. Although this guide is mostly suitable for the global North, Kashorda and Waema (2014) adapted the e-readiness guide of Cyber Harvard (n.d.) for universities in Kenya, using 17 indicators. An overview of the findings is shown in Table 2.1. Overall, seven topics have been identified by the various authors: school climate (cultures, attitudes and innovation), learning environment (materials, learning and teaching ways, and learners' and teachers' communities), teachers characteristics and qualifications, curriculum implementation,

Table 2.1 Overview literature e-readiness

Indicators for e-readiness in schools and explanations		
Cyber Harvard (n.d.) – e-readiness guide	Kashorda and Waema (2014) – operationalized for universities in Kenya	Additional findings and explanations
<i>Network Access</i> Availability, cost and quality of ICT networks, services and equipment.	<i>Network Access</i> 1. Information infrastructure 2. Internet availability 3. Internet affordability 4. Network speed and quality	Electricity is relevant in the Sierra Leonean context (Field notes, 14-11-2020; De Bruine, 2020a).
<i>Networked Learning</i> Integration of ICT into processes of improved learning. Technical ICT training programs.	<i>Networked Learning</i> 5. Enhancing education with ICTs 6. Developing the ICT workforce 7. ICT research and innovation 8. ICTs in library	The learning environment include resources and tools, learners and teachers’ communities, and learning and teaching ways. Resources include curriculum, school facilities and educational materials (Huang et al., 2019, Ch. 9.4.3). In Sierra Leone, communities are mostly lacking (De Bruine, 2020b).
<i>Networked Society</i> ICT use at work and in personal lives. Significant opportunities when having ICT skills.	<i>Networked Society</i> 9. People and organizations online 10. Locally relevant content 11. ICTs in everyday life 12. ICTs in the workplace	Schools’ culture (Suryani, 2010). Local attitudes towards ICT influence the success of ICT interventions (Trucano, 2005).
<i>Networked Economy</i> Government and business use of ICT to interact with public and each other.	<i>Networked Campus</i> 13. Network environment 14. E-campus	
<i>Networked Policy</i> Promoting of hindering ICT adoption and use by the policy environment.	<i>Institutional ICT strategy</i> 15. ICT strategy 16. ICT financing 17. ICT human capacity	Financial status (Suryani, 2010) National and local policies, schools’ guidelines and regulations (Trucano, 2005).

availability of and access to technology, parental involvement and school opportunities. The challenge for this research is to translate the concept of e-readiness to the educational practice in West-Africa and specifically primary and secondary education Sierra Leone. The relevant indicators for e-readiness have been identified and 13 operationalized indicators for this Thesis are presented in Box 4.1, in the [Methodology](#). These indicators are designed based on the seven topics combined with the e-readiness guide of Cyber Harvard (n.d.) and earlier findings for Sierra Leone (See Table 2.1).

Research on e-readiness in West-Africa is scarce and as mentioned, more available for richer West-African countries, including Ghana and Nigeria, than for poorer countries, including Sierra Leone. It is generally known that e-readiness is poor. Jeladze et al (2017) show this for Ghana. They identify three dimensions of a digital ecosystem: mediating, transformative and flow components. Firstly, mediating component include resources, tools, and a computer classroom. Secondly, transformative components include change management, ICT rules, ICT incentives, a support system and ICT training.

Lastly, flow components include digital learning, networking, information management and analytics. Three clusters of smartness have also been identified based on three indicators: intensity of flow components, connectivity of the mediating and transformative components to each other and the agent, and lastly the responsiveness to the socio-technical landscape. To analyse the digital ecosystem, three clusters have been created. The first cluster uses ICT at grass roots level and ICT is mainly used for administration and management. The second cluster has medium availability and is top-down. The third cluster is most desired as it has the smartest digital ecosystem, it is bottom-up and based on self-realization. Schools were sampled in the Western Area of Ghana and often categorized as the first and second cluster, and only occasionally as the third cluster. Challenges found in the research include low teacher involvement, which left most teachers and staff unaware of new rules, visions and agendas (Jeladze et al., 2017). In the West-African context, the concept of e-readiness is useful, but has to be adapted from the original Cyber Harvard format. Based on the findings of Jeladze et al (2017), the Networked Campus and indicator 7 of Networked Learning are less developed for Ghana and potentially West-Africa.

3. Geographical contextual framework

This study is focused on primary and secondary schools in Sierra Leone. A presentation of the [national context](#) is given in this chapter, as well as relevant processes related to [education and ICT](#). Afterwards, the [partner organization](#) will be presented.

3.1 National context

Sierra Leone is an Anglophone country located in West-Africa. Sierra Leone has a fast growing and young population. With a growth rate of 2.1% per year, its population of 7.65 million in 2018 is quickly increasing. In 2020, up to half (44%) of its population has been under 15 (UNESCO, 2020). The country has four regional provinces with 13 district councils and 149 chiefdoms. A map of Sierra Leone is shown in Figure 3.1. The young people increasingly come from the provinces and move to the Western Area. Generally, there is the trend of young people moving from rural to urban areas, resulting in 41% living in urban areas (MEST, 2018). Whereas English is the official language, Krio is the most spoken language.



Figure 3.1 Map of Sierra Leone (Ezilon Maps, n.d.)

Besides, there are two languages of significant minorities: Temne (37%) and Mende (31%) (Mullan and Taddese, 2020). Sierra Leone acquired the first university in West-Africa in 1827: Fourah Bay College. From that time onwards, Fourah Bay College was a popular university for Africans to study (Elikplim, 2021). In 1961, Sierra Leone gained its independence as a former British colony. Between the 1960s and 1980s, the country and the education system in Sierra Leone were doing well, compared to other West-African countries. The British left the country with a British educational system, and gradually ceded control to the local population. From the 1980s onwards, Sierra Leone has started being highly dependent on donors. The civil war of 1991-2002, the Ebola outbreak and poor leadership have contributed to significant dependency (Bangura, 2019; SL-MTNDP, 2019). The civil war, which ended in 2002, left over 50.000 dead (Mullan and Taddese, 2020). The Ebola outbreak from 2014 to 2016 worsened the situation and increased dependency on donors. It caused all schools to be closed during the 2014/15 academic year and the economy decreased over 20% (Mullan and Taddese, 2020). From 2019 to today, the Corona pandemic is worsening the donor-dependence once again. All schools were closed on March 31, 2020. After a week, an emergency education programme, 'Rising on air' was created, using the experience gained during the Ebola outbreak (Mullan and Taddese, 2020). Since the civil war, the IMF provided financial support under strict conditions. Long-term debts have been a consequence of the structural adjustment program (SAP). Whereas money was given under requirements, such as good governance, to alleviate poverty, the result was the opposite. Poor governance and corruption contributed to an era of political instability and more poverty. The country was left with a huge debt (IMF, 2005). In 2018, Sierra Leone ranked 182 out of 189 countries in the Human Development Index (HDI) (UNESCO, 2020). 64% of the population is multidimensional poor. The Western Area, where the capital Freetown is located, has the lowest multidimensional poverty (28.5%). The provinces are poorer. The dimensions included in multidimensional poverty measurements are health, education, living standards, housing and energy (SL-MTNDP, 2019). The average life expectancy is 58 years and 52% of the population lives below the poverty line (UNESCO, 2020; Mullan and Taddese, 2020). The majority that lives in rural areas, has less access to technological infrastructure, fewer schools and lower school enrolment than urban areas (UNESCO, 2020; Mullan and Taddese, 2020).

3.2 Education system and ICT

The overall mission of the Ministry of Education, Science and Technology (MEST, 2018) is *"to provide opportunities for children and adults to acquire knowledge and skills, as well as nurture attitudes and values that help the nation grow and prosper"* (p. 3). This Ministry has provided an Education Sector Plan 2018-2020 (MEST, 2018) and an Annual School Census in 2019. Broader government documents include the Sierra Leone's Medium-term National Development Plan 2019-2023 (SL-MTNDP, 2019). Less

recent documents for the education sector include the 2004 Education Act and the 2010 National Education Policy, which is currently under review. These documents have been written by the ministries of education and are the organizing documents for the education sector. The previous minister of Education, Youth and Sports, gives an overview of the education policy documents in the foreword of the 2010 National Educational Policy. See Box 3.1. Whereas the early 2000s documents have integrated the MDGs, the more recent documents have integrated the SDGs (MEST, 2018; SL-MTNDP, 2019). While in theory a lot changed, in practice not much has happened. Changes that did have impact include the change from a one-shift system to a two-shift system after the war due to the increasing number of pupils per school, which will be elaborated on in [5.2.2 history](#) and the Free Quality Education Programme, which will be elaborated on next.

The education system in Sierra Leone includes various levels based on the British education system: pre-primary/ kindergarten (two to three year), primary (six years), Junior Secondary School (JSS, 3 years), and Senior Secondary School (SSS, three years). Yet, 85 of the 149 chiefdoms were lacking pre-primary schools in 2016 (MEST, 2018). The current government has launched its 'Free Quality Education Programme', to increase access to all levels. This is a country-wide program launched in 2018 which applies to primary and secondary education (SL-MTNDP, 2019; Maada Bio, 2018). After primary school, pupils sit their NPSE (National Primary School Examination). After JSS, students have their BECE (Basic Education Certificate Examination). Whereas JSS has general subjects that are mostly the same for all students, at SSS you chose your preferable stream. There are three streams: science, commercial and arts. After SSS, students sit their WASSCE (West African Senior School Certificate Examination) and with a good result, they can go to university. As an alternative route, they can choose to engage in vocational training, which is mostly seen as an opportunity for students that did not (fully) complete secondary school or that did not have an excellent score on WASSCE (MEST, 2018). The West-African Examination Council (WAEC) is the overarching body that organizes the NPSSE, BECE and WASSCE for all anglophone West-African countries, including Ghana, the Gambia, Nigeria, Liberia and Sierra Leone (MEST, 2018).

Beside the 'Free Quality Education Programme', the current government provided 50 school busses and school feeding programmes (Bangura, 2019; SL-MTNDP, 2019). The government also

Policy development on education in Sierra Leone predated the Education Act of 1964 and continued up to 1970, when the first White Paper on Educational Policy was published. Twenty five years later in 1995, the New Education Policy was published to provide a framework for the new education system that was introduced in 1995. The introduction of this system was influenced by the World Conference on Education for All in Jomtien, Thailand in 1990. Since then, there have been many significant events in education at the national and international stage such as the World Education Forum in Dakar in 2000, the Millennium Summit which adopted the Millennium Development Goals (MDGs), and the passing of a number of Acts in 2001 culminating in the passing of the new Education Act in 2004.

Box 3.1 Policy development of education (MEYS, 2010)

launched the Teaching Services Commission (TSC), which is responsible for improving teacher management and performance. The TSC is coordinated by the Ministry of Basic and Senior Secondary Education (MBSSE). The other 'sub' Ministry of the broader Ministry of Education is the Ministry of Technical and Higher Education. This Ministry is responsible for the tertiary education level. Besides, the Ministry of Social Welfare, Gender and Children's Affairs works closely with the two education ministries to focus on access for marginalized groups, including women, disabled people and elderly (Mullan and Taddese, 2020).

The current government has promised to spend 21% of its budget on education. The funding has increased from 2.59% of the GDP and 12.8% of the total government expenditure in 2017 to 7.14% of the GDP and 32.47% of the total government expenditure in 2018 (UNESCO, 2020). Since 2017, government expenditure on education has increased significantly from 12.8% of its total budget in 2017 to close to 35% in 2020 (Trading Economics, 2021). So, over time, the government expenditure has increased significantly relatively. In 2020, African governments spent 5% of the GDP on education averagely. In absolute terms the government expenditures in Sierra Leone increased as well. In 2017, the government spent a total of about 96.866.000 US dollars on education, which increased to 292.026.000 US dollar in 2018 (Trading Economics, 2021). In 2019, 54.1% of school revenues were coming from the government, 9.3% from performance-based finance, 22.5% from parents and 3.8% from religious groups (MBSSE, 2019).

When it comes to ICT in education, the state is very poor. Currently, there is no ICT in education policy. Yet, there are plans to create one. The most recent ICT policy is the National Innovation and Digital Strategy, 2019-2029 (DSTI, 2019, November 1). This is created by the DSTI. The government itself mainly works manually and is not digitized yet. This causes malpractices and a lack of accountability and transparency. Therefore, the DSTI was launched in 2018. For example, they have created the Teacher Application, Approval, and Allocation Portal (TAAAP) (DSTI, 2019, December 23). Besides, they have launched the Education Data Hub (EDH) giving more reliable data than before (DSTI – EDH, 2020). Due to the DSTI, the Annual School Census 2019 has been much more reliable compared to previous years with a much higher transparency. For all the data, the original source is identified, unlike before (MBSSE, 2019). *“While most people had an idea that our education system had challenges, they believed that their districts, schools, and children were doing well because they did not look at the entire data. But when you see the numbers, it becomes clear that something major is wrong and that education over the years has been a disaster in Sierra Leone”* said Dr. Sengeh [Chief Innovation Officer of DSTI] (DSTI, 2019, September 16). The needs in the Sierra Leonean education system are outlined in the [Chapter 6](#).

3.3 Partner organization

Maxim Nyansa IT Solutions, or simply Maxim Nyansa, is an NGO based in Ghana with the mission “to create a career perspective for young Africans with the use of information technology” (Maxim Nyansa, n.d.). Maxim Nyansa is founded in 2016 by the Ghanaian Stanley Kwakye Dankyira, and a Dutch national, Diana van der Stelt. To reach the above goal, they offer four programs:

1. A learning transformation program for primary and secondary schools;
2. A trainee bootcamp for university graduates in IT;
3. Digital library – developed during the COVID pandemic;
4. A vocational training focused on secondary school leavers.

This study is conducted in collaboration with Maxim Nyansa and focuses on the first program. Therefore, the research participants chosen are local stakeholders in primary and secondary schools. Since the start in 2016, Maxim Nyansa has been built to expand – in fact, in the past year to Burkina Faso, the Gambia, Nigeria and Sierra Leone. Besides, other countries including Kenya and South-Africa are in the pipeline. This study focuses on Sierra Leone, since the researcher is currently employed in Freetown, Sierra Leone. During this Thesis, the researcher has functioned as Communications Officer for Maxim Nyansa Sierra Leone and together with the Country Director and Logistics Manager, she has assisted in setting up the office of Maxim Nyansa Sierra Leone, started the registration process and visited potential partners to kick-start learning transformation projects. In July 2021, the first ICT-lab has been equipped. Last year, the researcher has done a Feasibility Study and written a Country Investigation Report for Sierra Leone for Maxim Nyansa, including 12 stakeholder interviews in the private, public, and educational sector. This previous study was focused on higher education, since the researcher has been in a college with easy access to university stakeholders. The primary and secondary education has been touched slightly. This Thesis has been written within a chain of other research of Maxim Nyansa. This is elaborately explained in [Appendix A](#), including Table A1.

4. Methodology

4.1 Research design and questions

As mentioned in [section 1.3](#), the main research question of this Thesis is: *“How can ICT implementation in primary and secondary schools in Sierra Leone meet local stakeholders’ needs?”*. Based on the collected data, the sub questions have been finalized:

Sub question 1: How did the present situation of ICT in primary and secondary education in Sierra Leone emerge?

Sub question 2: What needs in primary and secondary education in Sierra Leone are identified by local stakeholders and how do they differ in the various schools?

Sub question 3: How can ICT meet needs identified by local stakeholders?

An overview of the operationalized research questions is shown in Box 4.1. While operationalizing, the researcher has used the Hutter-Hennink Qualitative research cycle as guide (See Figure 4.1). By induction and deduction, questions and subcategories have been formulated and redefined. It is important to start with the current state of ICT in primary and secondary schools in Sierra Leone, before outlining the educational needs and how ICT can meet those needs. Sub question 1 is divided in two parts: (1) the present state, which is subdivided in access and usage, and (2) its emergence, which is subdivided in usage, history, governance and funding. The second sub question is divided in two parts as well: needs according to stakeholders (children and parents, teachers and administration, compound and school culture, and the broader educational system), and varying between categories (urban/rural, primary/secondary and public/private). The last sub question is divided in two parts: opportunities and barriers/challenges. These two are each subdivided in access to ICT, quality usage, ICT lifespan, and finally how ICT can meet the local needs identified in sub question 2.

4.2 Selection of schools

In Table 4.1, an overview of the visited schools is shown. Based on the categories identified, schools have been selected. The categories urban/rural, primary/secondary and public/private) have been found relevant, since these are often the categories used by development agencies, literature and have also been found relevant on-the-ground (for example Mullan and Taddese, 2020). Yet, these categories should be considered ‘hybrid’, which will be further explained in [paragraph 5.1.1](#).

Overall, a representative selection of schools has been made, representing the various

Sub question 1: How did the present situation of ICT in primary and secondary education in Sierra Leone emerge?

1.1 What is the present state of ICT in education in Sierra Leone?

- A. How is the *ICT access* in primary and secondary education in Sierra Leone?
- B. How is the *ICT usage* in primary and secondary education in Sierra Leone?

1.2 How did the present situation of ICT in primary and secondary education in Sierra Leone emerge?

- A. How does the *history* of primary and secondary education influence the state of ICT in primary and secondary education?
- B. How does the *governance* in primary and secondary education influence the state of ICT in primary and secondary education?
- C. How does the *funding* in primary and secondary education influence the state of ICT in primary and secondary education?

Sub question 2: What needs in primary and secondary education in Sierra Leone are identified by local stakeholders and how do they differ in the various schools?

2.1 What are needs of the education system identified by local stakeholders?

- A. What are needs identified for the *children and parents*?
- B. What are needs identified for the *teachers and administration*?
- C. What are needs identified for the *school compound and school culture*?
- D. What are needs identified in the *broader educational system*?

2.2 How do the identified needs differ for urban/rural, primary/secondary and public/private?

- A. How do the identified needs differ for urban/rural?
- B. How do the identified needs differ for primary/secondary?
- C. How do the identified needs differ for public/private?

Sub question 3: How can ICT meet needs identified by local stakeholders?

3.1 What barriers for ICT are identified by local stakeholders?

- A. What barriers for ICT access are identified by local stakeholders?
- B. What barriers for quality ICT usage are identified by local stakeholders?
- C. What barriers for a long ICT lifespan are identified by local stakeholders?
- D. How do these barriers relate to the identified needs by local stakeholders in the primary and secondary education? (see sub question 2)

3.2 What opportunities for ICT are identified by local stakeholders?

- A. What opportunities for ICT access are identified by local stakeholders?
- B. What opportunities for quality ICT usage are identified by local stakeholders?
- C. What opportunities for a long ICT lifespan are identified by local stakeholders?
- D. How do these opportunities relate to the identified needs by local stakeholders in primary and secondary education?

Box 4.1 Research questions

categories. Besides, the Utrecht University has advised the researcher not to travel excessively due to the Corona pandemic. Opportunities for traveling to rural places have been used, which were already arranged: Makonkarie and Makombeh. Moreover, schools close to the researcher's residence were

Table 4.1 Overview visited schools

Schools visited	Type of school		Location	
	Primary/ secondary	Private/ public/ government-assisted	Province/ Area	Rural/ urban
<i>Richard Allen Kissy</i>	Secondary	Public	Western Urban (East-Freetown)	Urban
<i>Eva Houston Thunder Hill</i>	Primary and JSS	Private	Western Urban (East-Freetown)	Urban
<i>Muslim Congress Kissy</i>	Secondary	Public	Western Urban (East-Freetown)	Urban
<i>Makombeh</i>	Primary	Private/ gov.assisted	Northern – Tonkolili District	Rural
<i>Makonkarie</i>	Primary	Public	Northern – Tonkolili District	Rural
<i>We Yone George Brook</i>	Primary	Private/ gov.assisted	Western Urban (West-Freetown)	Rural (in urban)
<i>EducAid Lumley</i>	Secondary	Private	Western Urban (West-Freetown)	Urban
<i>Rising Academy Calaba Town</i>	Primary and secondary	Private	Western Urban (East-Freetown)	Urban
<i>Rising Academy Waterloo</i>	Primary and secondary	Private	Western Rural	Urban (in rural)

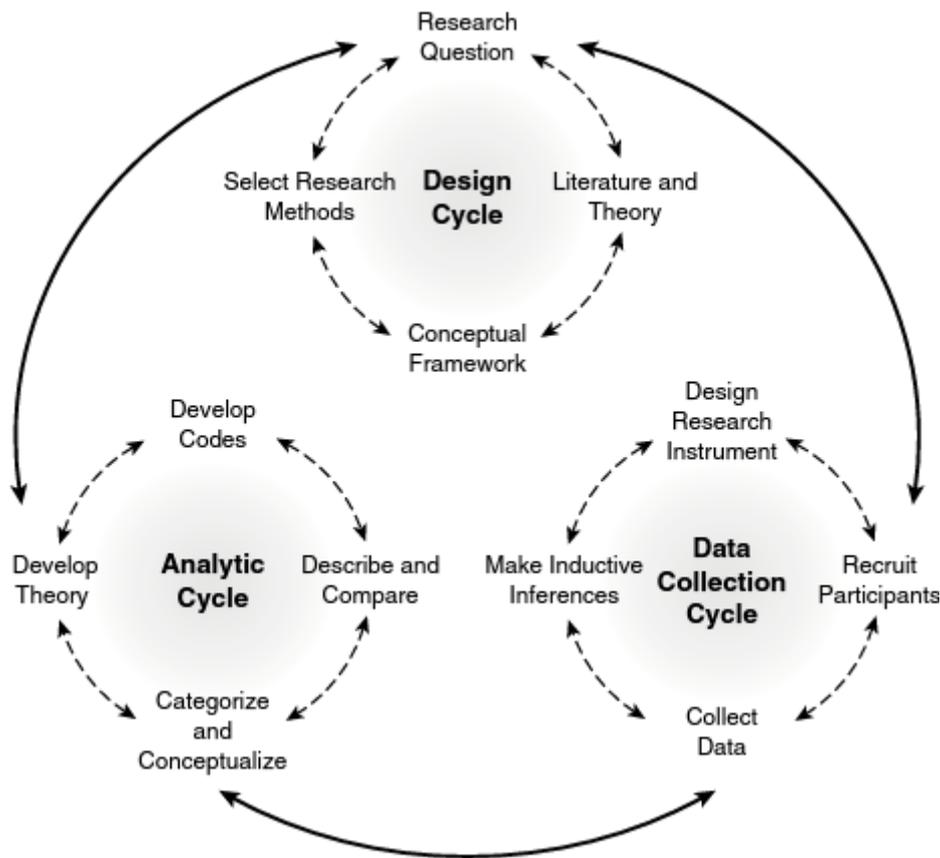


Figure 4.1 Hutter-Hennink Qualitative research cycle (Hutter, Hennink and Bailey, 2020)

selected: Richard Allen, Eva Houston and Muslim Congress. We Yone and Makonkarie have been selected due to the link with the partner organization Maxim Nyansa. The researcher has decided to use the opportunity to visit these schools, since the rural schools have been helpful to collect more findings for remote schools. Lastly, RAN and EducAid have been contacted directly and selected based on their participation in the Education Innovation Challenge (EIC), and adding to the representative sample. The five key education providers identified by the government have been contacted and these organisations were able to provide an opportunity to research in their school.

The selection of schools is representative for the different categories to a high extent. From the nine schools, three are primary schools, three are secondary schools (JSS and SSS), one school provides primary education and JSS and two schools provide combined primary and secondary education (JSS and SSS). This illustrates the challenge of clearly distinguishing between primary and secondary schools. The distinction between private and public schools cannot be made easily as well. Three schools are public, four schools are private and two schools are both private and government-assisted. The public schools are often, yet not always, funded by the government. This depends on whether they are approved by the government. Private schools are either funded by parents who pay school fees, or organizations, including foundations, religious organizations or a private owner. Schools can also be government-assisted, which means partial funding is provided by the government and in part by other sources. This will be further explained in [paragraph 5.2.5](#).

Lastly, from the sample, two schools are located in the Northern province, one in the Western Rural Area and five in the Western Urban Area. From the six schools in Western Urban, there are four schools in the East of Freetown and two in the West of Freetown. The West of Freetown is more developed in various ways compared to the East of Freetown. At the same time, the East of Freetown is overpopulated and has more schools compared to the West. In the sample, six schools are located in rural areas and three in urban areas. Yet, this division must be considered 'hybrid'. There is one school that is urban in a rural area and one school that is rural in an urban area. On the one hand, We Yone is located in the Western Urban Area, yet remote. On the other hand, Rising Academy Waterloo is located in the Western Rural Area, but accessible, and therefore not remote.

4.3 Data collection and analysis methods

In the selected schools, the researcher has conducted various research methods: observations, focus groups and interviews. A qualitative mixed method approach has been used, since that is useful for obtaining new insights into local needs and the mixed methods approach provides useful method triangulation (Hutter, Hennink and Bailey, 2020). Sierra Leone is under researched and therefore

qualitative research is a useful first step to explore the local needs. This method has provided qualitative data which confirms and are complementary to each other, and sometimes question each other. An overview of the research activities conducted in each school can be found in Table B1, in [Appendix B](#). First, operationalized indicators for e-readiness are outlined, as they function as the framework behind the data collection, specifically the interview and focus group guides.

4.3.1 Operationalized e-readiness indicators

Based on the research questions, and as a backbone for the interview and focus group guides, 13 operationalized e-readiness indicators have been created (see Box 4.1). Based on the adapted e-readiness guide by Kashorda and Waema (2014) for universities in Kenya, originally from Cyber Harvard (n.d.), the operationalized indicators have been determined. First, the group 'Networked Campus' (Kashorda and Waema, 2014) or 'Networked Economy (Cyber Harvard, n.d.) has been removed, since in Sierra Leone, ICT is often not used within the broader school environment. Therefore, this group, although not unimportant, does not have the priority while collecting data. The other four groups are important and for lower education are operationalized as: ICT access, ICT perception and usage, ICT and the learning environment, and institutional environment. Apart from the operationalized e-readiness indicators, the research methods have been conducted from a local needs' perspective, leaving space for input of other indicators during the research. During the research, the indicators turned out to be relevant for local stakeholders, while some (ICT access, perception and usage) more than others (learning and institutional environment).

ICT access – How is the schools' access to ICTs? – 4 indicators

1. Information infrastructure
2. ICT availability, affordability and quality
3. Internet availability, cost and affordability
4. Electricity availability, cost and quality

ICT perception and usage – How do local stakeholders perceive and use ICT? 3 indicators

5. Schools' culture and attitudes towards ICT
6. ICT usage in everyday life
7. ICT usage in the workplace

ICT and the learning environment – How can ICT be integrated in the learning environment? – 3 indicators

8. Educational curriculum
9. Teaching and learning ways
10. Library/ lab

Institutional environment - To what extent does the institutional setting promote or hinder ICT introduction and usage? – 3 indicators

11. Schools' strategy and plan, e.g. for maintenance
12. Financing and funding
13. Human capital

Box 4.2 E-readiness indicators (adapted by the researcher)

4.3.2 Methods: Observations

In all the nine schools visited, the researcher has conducted an observation. Field notes have been made either during the visit or afterwards. Permission has always been requested, also when the visiting purpose has been a purpose other than that of the research. This has been the case for the visit of Makombeh, We Yone and Rising Academy Waterloo. Beside general observations in the school, the researcher has observed in the ICT-lab of Eva Houston. The researcher has also taught two times in a syndicate programme, an extra educational program to prepare students for their tests and exams. This has helped the researcher to understand the educational setting better, yet has not been used for the Thesis findings, since this teaching was only occasionally provided.

4.3.3 Methods: Focus groups

In five of the schools visited, focus groups have been held with teachers, students and parents. These schools are Richard Allen, Eva Houston, Muslim Congress, Makonkarie and Rising Academy Calaba Town. Unfortunately, the parents were not available in one school. The parents that were available in the other three schools, were the parents that are also teachers or sell food at the school compound. In four schools, separate focus groups have been conducted and in one school, a mixed focus group with teachers, students and parents has been conducted to observe the interaction between the various stakeholders. In this school, it has also been harder to find a research time slot and therefore a mixed focus group was a suitable option for the Thesis and the school.

The focus groups have always been conducted on the school compound, either outside or in a classroom or office place. See Figure 4.2 for two examples of the focus group setting in the schools. The



Figure 4.2 Focus group setting (Muslim Congress left and Richard Allen right)

researcher has asked the principal or head teacher to invite the participants. The number of participants has mostly been between six and eight at the start, although at the end some participants left, and the focus group was continued with a smaller number of participants. Most focus groups have had six participants, with a mix of gender and other backgrounds. The researcher recorded most of the focus groups, except for two focus groups where the participants did not prefer the focus group to be recorded. In that case, extensive notes have been made and archived. The researcher has functioned as moderator while making notes, which was possible due to the recordings. After the first focus group, the researcher found out it was not easy to hear what was said from the recordings. Therefore, from the second focus group onwards, the researcher asked the focus group participants to take the phone as microphone and as a result it has been easy to register what was said. During the focus groups a specific sequence of topics was applied. The discussion started with an introduction round, where the research was introduced and participants introduced themselves. The core part involved questions about challenges and opportunities related to education generally and ICT specifically. Finally, the focus group was closed with a discussion question related to the vision for the coming two years. After the focus group, the participants could always ask questions or add information. See [Appendix C](#) for a focus group guide. At first, a detailed focus group guide was made, based on the e-readiness indicators, which later had been roughly used. The specific questions in the guide have been adapted halfway the research and during the focus groups depending on the topics raised by the participants. This means the focus group was semi-structured.



Figure 4.3 Interview setting (Eva Houston)

4.3.4 Methods: Interviews

In five of the schools visited, interviews have been held with the vice-principal, principal and/or head teacher: Richard Allen, Eva Houston, Muslim Congress, Makonkarie and Rising Academy Calaba Town. This depended on whether the (vice)principal or head teacher has been available for the research at the time of visiting the school. During these interviews, background information has been requested related to school history, culture, decision making, but also about challenges and opportunities related to education and ICT. The challenges and opportunities have been requested to triangulate research methods and doublecheck information within the schools. See Figure 4.3 for an example of an interview setting.

Apart from the interviews in the schools, expert interviews have been held with overseers, diaspora which are connected to the schools and Country Directors of the education providers. These experts have been selected due to their ability to provide a general overview of the education system and therefore to position the needs in a broader perspective. An overview can be found in Table B1 in [Appendix B](#). Besides, photos of the school are presented in Appendix B. A total of eight expert interviews has been conducted by the researcher: Makombeh, EducAid, Makonkarie, Schooling for Life, Rising Academy and Save The Children. These expert interviews helped to zoom out and make sense of the findings on-the-ground from a system perspective. Besides, some were conducted with experts from the visited schools. Therefore, this information has been used to triangulate research methods as well. These interviews have all been conducted online, as advised by the Utrecht University. The experts have been mostly selected using the snowball method, which means the researcher has asked experts to refer her to other educational experts.

During the interviews with experts, some referred me to useful literature or articles written by them or other authors. Background readings have been conducted by the researcher to confirm the collected data or show different perspectives. Therefore, a short literature review of the relevant organizations and their approach has been included, in addition to the expert interviews.

4.4 Sampling

The sampling has been mostly done via gatekeepers and snowballing (Hutter, Hennink and Bailey, 2020). The Country Director of Maxim Nyansa has functioned as one of the gatekeepers and helped the researcher to go to schools. Within the school environment, principals often functioned as gatekeepers, gathering teachers, students and parents. This gives a potential selection bias. For example, they might have selected the best teachers and students, and the teachers and students that were the best in

English. To overcome the bias as much as possible, the researcher has always asked for a mix of participants, for example related to gender and educational stream. The parents selected have been parents that were around the school. Therefore, this is biased. Yet, otherwise there was no way to have parents represented in the sample. Besides, participants might have felt coerced to participate. The teachers, students and parents might have felt coerced by their principal. The positionality of the researcher might also have contributed to this, since the participants could have felt the need to participate to get ICT in their school. While this has not been mentioned, this could have been an expectation from the educational stakeholders.

Besides, snowballing has occurred in relation to contacting educational experts. This has the potential challenge of lack of diversity. Therefore, local educational experts have been selected as well. Besides, it has been harder for the researcher to disclose private information. The researcher has been careful to tell the participants enough information to know how I came to meet them when asked, while disclosing private information of the other educational experts where necessary. Overall, snowballing has given qualitative data, yet has been time consuming.

A mixed method recruitment has been used occasionally. Principals who were interviewed before sometimes participated in the focus groups afterwards. Another example is educational experts who were present during observations in their school. This has the potential bias of prior involvement which may have primed participants on study issues. Besides, it increased participant burden. Yet, the participants often participated a second time voluntarily, and therefore it is less likely they would have felt coerced. Since they have been the gatekeepers and often did not say very much, the researcher allowed them to participate.

4.5 Reflection

Below, a reflection is provided on the [positionality](#) of the researcher and [relations](#) from the researcher's side.

4.5.1 Positionality

Being a foreigner, white, and a young lady, makes me an outsider in the Sierra Leonean education system. There is the danger of interpreting findings in accordance with 'my way', rather than adopting the local needs perspective taken in the Thesis. A communication skill applied during the focus groups and interviews has been summarizing what the participants have said, and I sometimes found myself corrected by the research participants. Some participants also asked about the Dutch education system, because of my positionality. Listening to the recordings, helped me to create a smooth way of returning

the focus to the Sierra Leonean system. To overcome the positionality as outsider to a certain extent, I have been introduced by the Country Director of Maxim Nyansa Sierra Leone as gatekeeper. Afterwards, the principals have often been the gatekeeper towards teachers, students and parents. This made the data collection easier.

While being an outsider, I am an insider to a large extent as well. Firstly, I have acquired experience in the ICT and education field in Sierra Leone due to previous research. See Table A1 in [Appendix A](#). Besides, I have accumulated over eight years of experience as a tutor in the Netherlands, including secondary school pupils from all years and levels. Also, being a student myself, made it easier for me to connect to my research participants. Thirdly, I have been living in Freetown for about seven months before the Thesis research started. This made me to understand the widely spoken local language, Krio, to a large extent. While transcribing, I have also asked the Country Director to explain what was said. This allowed me to easily grasp the concepts and expand my vocabulary used by participants and interviewees, which I used when conducting research thereafter. This made the questions better and led to less misunderstandings. My positionality has caused potential biases. Being a full outsider or insider would likely give other data. For example, an insider could have gathered more in-depth findings, whereas an outsider would not understand the education system as I do.

I am also acting as volunteer for an NGO, Maxim Nyansa. As explained in [section 3.3](#), Maxim Nyansa is an NGO that aims to create career perspectives for young Africans through ICT. Towards the participants, I have told them that I am not the one deciding, but I can recommend the school to Maxim Nyansa. I only talked about this at the end of the focus groups and interviews. This strategy worked well, since the expectations were well managed. Not reporting to the organization about the research during the data collection and keeping the visits for the NGO mostly separate from the research, have allowed me to stay as neutral as possible. Overall, a conflict of interest has been avoided as much as possible. I have taken the answers of the research participants as dread for the Thesis instead of organizational purposes. For example, the coding tree has been predominantly based on the participants' input. The coding tree which has been used to analyse the data, can be found in [Appendix D](#). Besides, criteria for selection of quotes have been made based on representation of the local needs of various stakeholders who participated.

4.5.2 Relations

A careful way of approaching people has been required throughout the research. Most people were eager to meet me and due to my positionality, might see the potential for development of their school. As mentioned in [section 4.2](#), I used the snowballing to sample during expert interviews. These experts

have often been researchers themselves and most of them have experience outside Sierra Leone, understanding both the researcher's and the local stakeholder's side. This causes a bias among educational experts, who are more 'white' or 'diaspora'. At the same time, it is often this category of individuals that act as heads of educational organizations or providers. Due to the living experience inside and outside the Netherlands, it has been easy for the researcher to connect to the educational experts. Besides, the snowballing applied when asking educational experts, has caused a biased sample of schools connected to organizations with funding outside Sierra Leone, more than on average. To overcome this bias, local schools in the area has been visited, which do not have external funds. Moreover, as mentioned, local Sierra Leonean experts have been interviewed, although in lower positions, yet high and experienced enough to provide a useful overview of the education system.

The link with the partner organization Maxim Nyansa has been good. Most contacts were found by me based on my own networks and by contacting educational organizations. As mentioned in [section 4.2](#), two of the schools have been referred to me via Maxim Nyansa.

During the research, confidentiality and anonymity have been promised to the research participants. The topic researched is not that sensitive, and therefore, a verbal agreement has been given. The data is only used by the researcher and personal identifiers have been removed from the data (Hennink, Hutter and Bailey, 2020).

5. Present state of ICT and its emergence

5.1 Present state of ICT in education

The present state of ICT in Sierra Leone is very poor. On the household level, this can be seen in access to phones, computers and internet. Whereas 71% of the households in Sierra Leone owns a mobile phone, the ‘feature’ phones dominate the smartphones. There is a big gap between urban and rural areas. 93.5% of the urban population owns a phone, compared to 53.4% among the rural population. When it comes to computers, only 5.7% owns at least one. For rural areas, this number is below 1%. Internet access overall is 14% (GSMA, 2018; Mullan and Taddese, 2020; UNICEF, 2017). See Table 5.1 for an overview of the ICT access in Sierra Leone.

Like in the household scene, the state of ICT in education is poor. An experienced teacher of Eva Houston illustrates the present state of ICT in Sierra Leone: “Let’s say over 100% of schools in this country, only 5% is computer literate. For the rest, 95% they don’t have that idea in computing. [...] Keep on visiting schools and you’ll realize.” (Focus group teachers, 16-02-2021). UNESCO (2018) shows that indeed, the overall ICT infrastructure in schools is very poor. Yet it differs per location and level. Overall, senior secondary schools (SSS) are better equipped with technology than primary schools. Electricity is

Table 5.1 ICT access in Sierra Leone on household level (adapted from Mullan and Taddese, 2020; originally from UNICEF (2017))¹

ICT	Overall (%)	Urban (%)	Rural (%)
Radio	54.7	66.9	44.8
Television	18.2	-	-
Telephone - fixed line	0.7	93.5	53.4
Telephone - mobile	71.4		
Computer	5.7	11.6	0.8
Access to internet at home	13.8	26.3	3.7

Table 5.2 EdTech infrastructure in Sierra Leone (% of total) (adapted from Mullan and Taddese, 2020; originally from UNESCO (2018))²

EdTech infrastructure in schools	Primary schools (%)	JSS (%)	SSS (%)
Electricity	5.6	17.5	33.7
Internet for teaching and learning	0.6	3.0	7.8
Computers for teaching and learning	2.6	12.9	21.9

¹ Available at https://www.statistics.sl/images/StatisticsSL/Documents/sierra_leone_mics6_2017_report.pdf

² Available at <http://data.uis.unesco.org/index.aspx?queryid=3483>

available in 5.6% of primary schools, and 33.7% of SSS (Mullan and Taddese, 2020). The quality of the power network is generally poor, due to insufficient electricity generation caused by overloaded transformers and obsolete cables (Interview NRA, 24-01-2020 in de Bruine, 2020a). Internet access in primary schools is 0.6% compared to 7.8% in SSS. The majority of the population in Sierra Leone lives in areas that have access to high performance 2G networks. 3G and 4G are only available for a minority. Like the household access, the ICT infrastructure is more developed in urban than rural areas (Mullan and Taddese, 2020). See Table 5.2 for an overview of EdTech infrastructure in primary schools, JSS and SSS. EdTech stands for Educational Technology, which means that IT tools are introduced in the classroom (Mullan and Taddese, 2020). A female teacher gives a summary of the state of ICT in education:

“And now being a global world and digital world, most of these pupils do not have access to computers. I would not say most, all! [louder]. Only the privileged, let me say 0.5% can have access to.”

(Female teacher Richard Allen High School during Focus group, 05-02-2021)

Access is not only poor for pupils, but also for other educational stakeholders. First, the various categories will be discussed. Next, the access for pupils, teachers and staff is described and major underlying factors are outlined. ‘

5.1.1 State of ICT per category

Table 5.3 shows ICT usage in schools, per type of school and location, for the sample. Below, the ICT usage of schools in the sample is described.

As illustrated in the [Methodology](#), the various categories, such as private or public, are hard to distinguish. Instead of being approached binary, the categories must be considered ‘hybrid’. Interestingly, in the sample, most private schools visited are primary schools. In the rural areas, the schools visited are exclusively primary schools. The public schools visited are mostly secondary schools. Yet for Sierra Leone, it cannot be said a school is primary or secondary, urban or rural, or private or public. In [section 6.1](#), the example of rural in urban and urban in rural has been given. Another example is the combined primary and secondary school. For example, Eva Houston provides both nursery, primary education and JSS. For this sample, the nursery has been left out, since the focus is on primary and secondary schools. Lastly, private and public must be considered ‘hybrid’ as well. Instead of the binary private versus public, government-assisted must be included as a third category. The standard idea of private schools where parents pay school fees has to be considered ‘hybrid’ as well. Private school are not necessarily schools where the parents pay school fees. Two of the schools visited, EducAid and We Yone, are exceptions in this case. In these schools, the school fees are paid by an international

Table 5.3 Basic information on visited schools and ICT availability

Schools visited (in order of visit)	Type of school		Location		ICT-lab/ administration/ teachers (yes/ no/ before)			Funding
	Primary/ secondary	Private/ public/ gov. assisted	Province/ Area	Rural/ urban	ICT-lab	Learning manage- ment	Teachers	Type of funding
<i>Richard Allen Kissy</i>	Secondary	Public	Western Urban (East- Freetown)	Urban	Before	Yes	No	Government / community
<i>Eva Houston Thunder Hill</i>	Primary and JSS	Private	Western Urban (East- Freetown)	Urban	Yes	No	No	School/ fees paid by parents
<i>Muslim Congress Kissy</i>	Secondary	Public	Western Urban (East- Freetown)	Urban	Before	Yes	No	Government / community
<i>Makombeh</i>	Primary	Private/ gov.assisted	Northern – Tonkolili District	Rural	No	Yes	No	Foundation/ government
<i>Makonkarie</i>	Primary	Public	Northern – Tonkolili District	Rural	No	No	No	Government / diaspora
<i>We Yone George Brook</i>	Primary	Private	Western Urban (West- Freetown)	Rural (in urban)	Yes (starting)	Yes	No	Foundation
<i>EducAid Lumley</i>	Secondary	Private	Western Urban (West- Freetown)	Urban	Before	Yes	Yes	NGO
<i>Rising Academy Calaba Town</i>	Primary and secondary	Private	Western Urban (East- Freetown)	Urban	No	Before (coming soon)	Yes	Fees paid by parents
<i>Rising Academy Waterloo</i>	Primary and secondary	Private	Western Rural	Urban (in rural)	Yes (starting)	Before (coming soon)	Yes	Fees paid by parents

Legenda: Green = in use Orange = in use before Red = not in use

foundation. Introducing this hybrid approach is important to assess local needs, which are relevant on-the-ground. ICT usage will be analyzed taking this hybrid approach.

ICT usage differs largely per type of school. In the sample, one school has a functional ICT-lab (Eva Houston), and two schools are starting it up (We Yone and Rising Academy Waterloo). These schools are all private, either paid by parents (EH) or a foundation (WY and RA Waterloo). Besides, they

are all somewhat urban. One school is fully urban, one school rural in urban and one school urban in rural. One school is a primary school (WY) and two schools are primary and secondary (EH and RA Waterloo). Where an ICT-lab is functional, it is mostly used for educational purposes, rather than administration. Yet, We Yone and Rising Academy have staff members who use their smartphone or computer to manage education. Both have international organizations supporting them. For Rising Academy, they are changing software and are temporarily not using ICT for administration.

There are also schools that did have a lab or never had a lab. Three schools have a non-functional ICT-lab, but used the lab before (EducAid, Richard Allen and Muslim Congress). One of the schools is private (EducAid) and two are public (RA and MC). All are urban secondary schools. While Muslim Congress does not have a functional ICT-lab, they use a computer for their administration and learning management. At Richard Allen, the principal uses a tablet to administer attendance and grades and to forward such data to the Minister of education. There are also three schools that never operated an ICT-lab. Two of the schools are remote in rural areas and primary schools (Makombeh and Makonkarie). One school is a private urban secondary school (Rising Academy Calaba Town). This school has started in 2016 and has a short-term vision of equipping an ICT-lab. Lastly, the head teacher of Makombeh uses a laptop to report to the foundation.

Overall, the schools that receive international support use ICT more often for administration. Similar as for the labs, ICT for administration is more available for private and urban schools in the sample. Besides, these schools also have more teachers that use digital devices to prepare classes. At other schools, teachers often lack the skills to use digital devices if they would have been available. The skills part will be discussed in detail in [paragraph 7.1.4](#). Other major contributing factors to the poor access to ICT of the various educational stakeholders are the hardware costs, lack of buildings and a poor digital infrastructure. These and other factors will be discussed in detail in [Chapter 7](#). Below, ICT usage is elaborated on, from the angle of access by pupils, teachers and staff. In Table 5.4 an overview of the ICT availability in the visited schools is shown.

5.1.2 Access to ICT: pupils, teachers and staff

5.1.2.1 Pupils

Pupils: access at home

As illustrated in the quote of the female teacher of Eva Houston in the introduction of this Chapter, pupil access to ICT is generally poor. As can be seen in Table 5.4, pupil access is better in private schools than public schools. This is confirmed by various educational stakeholders and experts. According to the female teacher in the focus group, parents cannot afford to

Table 5.4 Access to digital devices in visited schools

Schools visited (in order of type of funding)	Digital devices in school							Type	Funding
	Smart- phone	Desktop	Laptop	Tablet	Project- or	Print -er	Smart- board	Level/ type/ location	Type of funding
<i>We Yone George Brook</i>	Staff only	Amount: 14	Amount: 15-20					Primary Private Rural in urban	Foundation
<i>EducAid Lumley</i>			Mostly staff and teachers					Secondary Private Urban	NGO
<i>Eva Houston Thunder Hill</i>		Amount: 15-20 Mostly pupils						Combined Private Urban	Fees paid by parents
<i>Rising Academy Calaba Town</i>			Mostly staff and teachers					Combined Private Urban	Fees paid by parents/ organization
<i>Rising Academy Waterloo</i>			Mostly staff and teachers					Combined Private Urban in rural	Fees paid by parents/ organization
<i>Makombeh</i>	Amount: 1 HT only		Amount: 1 HT only					Primary Private/ Gov-ass. Rural	Foundation/ government-assisted
<i>Richard Allen Kissy</i>		Amount: 25-30 Mostly pupils		Amount: 1 Principal only				Secondary Public Urban	Government/ (community)
<i>Muslim Congress Kissy</i>		Amount: <5 Staff only						Secondary Public Urban	Government/ (community)
<i>Makonkarie</i>								Primary Public Rural	Government/ diaspora

Legenda: Green = excessive access Orange = Occasional access Red: Rarely or no access

buy their children computers. This is confirmed by the parents and other educational stakeholders in most public schools. For example, a male student at the public Muslim Congress High School mentioned during a focus group that the students that do not have smartphones outnumber the ones that do not have a smartphone. Moreover, of the students highlighted, only a very small percentage has access to computers at home (Focus group, 16-02-2021). The situation is slightly better for private schools, yet pupil access to ICT is still poor. From the 24 pupils of class five of the private Eva Houston Primary School, only six raised their hands when asked whether they had access to a computer at home (Interactive session Eva Houston, 16-02-2021). The difference in ICT access between private and public schools is significant. This is illustrated by the personal story of a female student who transferred from a private to a public school:

“I used to bring my laptop, my computer with me. The other time the principal met me. [...]. He was trying to work with others and said ‘no computers allowed in class. I was like: really? [...] You should have them, because students need them. Because you can’t even just put a computer here and ask a student or someone to say: ‘Where can you find a mouse on this computer?’ They won’t say anything.”

(Focus group students Richard Allen, 09-02-2021)

She is one of the few students in public schools that has access to a computer at home. She gained experience during her educational years at a private school. After her JSS, she switched to Richard Allen. Yet, usage of personal computers at school is often not supported. This shows, that in most cases a digital culture has not been established yet. This will be illustrated further in [Chapter 7](#). Next, the access at school is outlined.

Pupils: access at school

Since most pupils cannot access ICT at home, children are mostly dependent on developing their digital skills in school. A student of Muslim Congress states:

“[T]he reason why not all of us do have the means of having the smartphone. What if we have our computer building now, we have computers there. [...] Because not all of us having the means of having smartphones. Some of us are poor, some of us are rich, some of us are average. So, which means the school as an institution, we need a computer system in the school.”

(Focus group students Congress, 16-02-2021)

Yet, schools often do not have ICT-labs. In most schools, ICT-labs are not available or poorly functioning. For the private schools, access to ICT at school is slightly better. Yet, it remains a small share. The EDH shows that of 162 schools sampled, 52 (32%) did have computers and a significant effect can be seen on exam performance (See Figure F4 in [Appendix F](#) +65% from the average compared to -70.1% from the average). Below the different types of schools are outlined.

1. Functional ICT-labs

From the visited schools, only one school does have an ICT-lab that is functional at the moment of researching. Eva Houston Primary School and JSS, a private school uses the ICT-lab to teach the children from class three of primary school to the last class of JSS in basic software. An ICT teacher is paid who teaches the children in shifts. Each class has about 1 or 2 sessions per week. They have computing as separate subject with theory and practice. They start with theory, after which pupils engage in practical training. The theory is for pupils that start learning about ICT, including in class three of primary school and for new pupils entering the school having no ICT knowledge. Yet there are also significant constraints, including electricity, which makes access challenging, especially for desktops that are mostly used. In the ICT-lab, Eva Houston also has a printer and photocopier (Focus group ICT-lab, 12 and 16-02-2021). Most of the urban schools have generators, yet fuel is expensive and the capacity is limited (for

example Interview Vice Richard Allen, 09-02-2021; Focus group ICT-lab Eva Houston, 12-02-2021). This challenge is elaborated on in [section 7.1.2](#) and in the vignette in Box 7.1.

2. Non-functional ICT-labs

Three schools of the sample used to have ICT, but it is not functional any longer. Whereas Richard Allen High School has an ICT-lab, children only rarely use it, since it has not been functioning for ICT classes for the past 2 years (Focus group teachers, 05-02-2021). A male student tells me *“What is the problem is that they don’t give us access to the computer. As for the teachers, we have some with computers. [...] But we don’t have access to the computer.”* A female student adds: *“I don’t know nothing about computer, I’m sure. I don’t know what to do in college.”* (Focus group, 09-02-2021). A male teacher of Richard Allen mentions during the Focus group (05-02-2021) that *“we have a computer lab in school, but it’s not working adequately. [...] Where you have a class about 50 to 60 and you only have 5 to 6 computers, you cannot work there. You see, sometimes we have a lot of problems.”* For Richard Allen, the major problem is the large number of students and limited number of computers. Similarly, Muslim Congress High School did have a functional ICT-lab, but no longer do so. EducAid also used to have a lab, yet it is not functioning any longer for the children, except for teachers and management. Constraints include affordability of new devices, lack of monitoring, maintenance and repair. These will be elaborated on at [paragraph 7.2.2](#).

3. Starting ICT-labs

Whereas some ICT-labs are not functioning, increases in ICT use over time are observed as well. The ICT teacher of Eva Houston tells me:

“[P]eople are eager to do it. Yet, it’s not every school that has computers. Only some of the private schools. And it is expensive even to have one. [...]. However, it is improving. When we started, it was not like that. [...] now there are lots of schools around town that have computers.”

(Focus group, 12-02-2021)

She also tells me that in the West of Freetown, there are more ICT-labs. In the East of Freetown, there are less ICT-labs. Two schools in the sample are starting their ICT-lab. We Yone Primary School has just started its ICT-lab (Field notes, 15-02-2021), as well as Rising Academy Waterloo (Field notes, 12-05-2021). These schools in the sample are limited to the urban context. In the rural context, schools rarely have ICT-labs, let alone students having access at home. The usual challenges are even larger here, including electricity and the lack of a safe building with a roof (Interview head teacher Makombeh, 17-02-2021). Apart from having ICT to teach the children in computer skills, some schools use ICT to manage the school. This will be discussed next.

5.1.2.2 Teachers and staff

The access of teachers to computers differs significantly per school. Whereas some schools only have digital devices available for the children, others only have for the teachers. Besides, access to ICT for personal usage among teachers varies significantly as well.

Teachers and staff: Access at home

Various teachers at public schools mention during the focus groups that they do not have access to ICT at home. A male teacher of Richard Allen illustrates this: *“As we’re all sitting here now, nobody is having a computer among us, because we don’t have the money to buy a computer.”* A female teacher of Richard Allen adds that *“Now, if you see a teacher with this kind of phone [pointing to the researcher’s smartphone, a Fairphone], it’s not from our salary, if it must be from the salary, it has to take 6 months for that person to pay for it.”* (Focus group 05-02-2021). Here the factor of relative expensiveness of ICT combined with the salary is challenging. The salary and payment of teachers will be outlined in [paragraph 6.2.2](#). This is the common story for teachers of public and rural schools. For private schools, teachers have more personal access to digital devices. Varying from few to most of them having access to a smartphone. It is mostly the schools that have international support which require teachers to have basic knowledge and skills in ICT. For EducAid, the alumni of the school are often asked to teach. Therefore, they often have the skills, since they have used an ICT-lab before (Interview Country Director, 21-02-2021; Interview educational expert, 01-03-2021, 15-04-2021, and 05-05-2021). The teachers on these schools often have a smartphone and/or laptop for personal use and are IT literate.

Teachers and staff: Access at school

Where a computer lab is available, it is mostly the pupils and ICT teacher that have the ICT access and knowledge. Since access is limited, the few computers are often reserved for an ICT teacher to train children in computing skills. As illustrated before, the number of computers in the lab is often not sufficient for the children, let alone the teachers. This applies for example to Eva Houston Primary School (Focus group ICT-lab, 12 and 16-02-2021). The ICT teacher stated during a focus group that the computers in the ICT-lab used to be available for adults, yet the place was tight and if adult will attend, there is no place for the children. In this school, teachers are not involved much. This also applies to Sierra Leone Muslim Congress, where the ICT manager uses ICT to manage attendance and grades. Teachers hand in manual transcripts which the ICT manager digitizes. He also states:

“And I would like to share this knowledge with my colleagues, those that want to know about it. As I said, it is only this group that is offering this, you can see within the township here. It is only this school.”

(Interview ICT manager Congress, 12-02-2021)

Whereas some of the teachers have computer knowledge and skills, others have not. Having no access, does not allow teachers to use computers to prepare classes or to use a computer while teaching. One of the female teachers highlights:

“Another thing again. Teachers, we should be teaching now with PowerPoints. Students, projectors. Visuals. All of these are not available. We don’t have this. We are still using choke. Our eyes are getting pain, our hands are peeling off because of the chemicals from the chalk. It is affecting us. All of us here use glasses, because of chalk for all of us here use glasses. Either white board or PowerPoint teaching. We are far, far behind. We would save 10%.”

(Richard Allen, Focus group teachers, 05-02-2021)

While teachers in urban settings often know about various software and hardware, teachers in rural settings in the sample mostly are unfamiliar with ICT, computers or smartphones (for example Interview Makombeh Head teacher, 17-02-2021; Focus group Makonkarie teachers 28-02-2021). For example, they are very happy having access to blackboards, where before they did have to teach without a board. It is mostly the teachers that used to be or are teaching in urban areas that are familiar with ICT (Interview educational expert, 15-04-2021).

Compared to the teachers, the staff has slightly more access to digital devices. For example, the head teacher in Makombeh Primary School received a laptop from the foundation that supports the school. He uses it to report to the foundation (Interview 17-02-2021). Similarly, the principal of Richard Allen High School received a tablet of the UK government as one of the 50 pilot principals across Freetown. He uses the tablet to record attendance of pupils and teachers to the Ministry of Education (Interview Principal, 9-02-2021). Both have the access and are learning how to use it while having the device. They are both supported by an observer or friend that can teach them additional skills. At the same time, the vice principal of Richard Allen High School mentioned that she has a computer at home, yet does not know how to use it. Therefore, she tells me she does not have access (Interview, 09-02-2021). The challenge is that she does not have the skills to use the computer, but if she would use the computer, she will develop her skills. In her case, she has a son who is studying ICT and can teach her. Whereas these teachers are learning ICT skills, the staff members of schools that are connected to a foundation or international organization, such as EducAid (Field notes, 02-03-2021) and the We Yone Child Foundation (Interview Officer, 15-02-2021) are mostly if not all fully ICT literate. For example, they use their laptop to attend online meetings on a daily basis.

5.2 Roots of current state of ICT

The present state of ICT in primary and secondary schools in Sierra Leone has an important roots in the [history](#), [donor dependency](#), [school approval system](#) and [funding system](#). The different roots are outlined

below, after which the link to [ICT introduction](#) is explained. First, a short overview of the [current state of education](#) is given.

5.2.1 Current state of education

The current state of education is introduced in the [Geographical contextual framework](#) and will be elaborately outlined in [Chapter 6](#). Yet, it will be shortly touched upon here. Generally, the present state of education is hard to measure, since decisions made have previously not been much data-driven or evidence-based. Data has been unavailable and conclusions drawn have been unreliable and not transparent. One of the causes is that an Education Management Information System has been absent until 2018 (MEST, 2019).

Recent data and documents, show that the state of education is poor in two ways: access and quality. Firstly, the access to education is improving, yet poor. For example, between 2011/2012 and 2015/2016, the number of schools has increased from 7.972 to 8.784, respectively (MEST, 2018). From 2018 to 2019, the number of school increased from 10.747 to 11.180, an increase of 4.7%, of which most in pre-primary (7.8%) and SSS (7.4%). At the same time, enrolment has also increased significantly, resulting in overcrowded classes. Enrolment in pre-primary increased from 2018 to 2019 with 44.1%, in primary with 29.4%, in JSS with 43.2% and in SSS with 49.9% (MEST, 2018). The focus on increased access to education has resulted in an improved literacy rate. An indirect effect is that most of the parents that are now having their children in school are illiterate. The illiteracy rate in Sierra Leone is around 60% and widespread among for the older generation (SL-MTNDP, 2019). It is also more prevalent in rural areas (Interview Makombeh, 17-02-2021).

This contributes to the poor second dimension: quality of education. Overall, the students per school and per class have increased (MBSSE, 2019). For example, the goal for 2020 has been to have a maximum of 25% of primary classes with over 50 students, 20% with over 40 students in JSS and 15% of SSS with over 40 students (MEST, 2018). The pupil-to-qualified teacher ratio is shown in Table 5.5. The pupil-to-qualified teacher ratio is higher than the pupil-to-teacher ratio. A related challenge is the lack

Table 5.5 Pupil-to-qualified teacher ratio (SL-MTNDP, 2019, p.43)

<i>Region</i>	<i>Preschool</i>	<i>Primary</i>	<i>JSS</i>	<i>SSS</i>	<i>All</i>
East	62	71	64	75	70
North	38	65	38	73	58
South	41	73	47	35	63
West	29	39	29	50	37
<i>National</i>	<i>37</i>	<i>61</i>	<i>40</i>	<i>55</i>	<i>55</i>

of resources and tools. In some chiefdoms and districts, there are no secondary school facilities. *“Many students lack basic learning materials, such as core textbooks, exercise books, pens, pencils and rulers to use in school, especially at the primary school level.”* (MEST, 2018, p. 59). The challenges related to access and quality are further discussed in [Chapter 6](#). Next, the history of the education system is outlined.

5.2.2 History

In 1961, the civil service in Sierra Leone was among the best in West-Africa. Government salaries and records were well managed. In the 1980s and 1990s, the civil service disintegrated and this process was accelerated by the war. The war destroyed most records. The education system broke down as a result, while bribery and corruption flourished. At the end of the war, teacher record archiving had collapsed. Afterwards, there have been attempts to verify basic information on teachers, which mostly have failed. Every time, the stumbling block has been the poor quality of existing records. Besides, the secretary of the Ministry of Education was charged with payroll fraud. In the post-war period, the key data for financial control have not been available, which resulted in a weak administrative database. From 2002 to 2008, the teachers payroll doubled. When a check was conducted, the payroll turned out to have been “inflated” from 15.000 to 61.000 (IRMT, 2008). Since the 1980s, record management and payroll verification have been huge challenges. Apart from the destruction of records, there has been a lack of capacity and checks to manage and update the payroll. Moreover, incentives for supervisors have been insufficient and records incomplete. One of the reasons has been that the staff responsible for control, has not been instructed and trained sufficiently. This has consequences for the payroll. Firstly, some teachers are not registered, while there are ‘ghost’ teachers that are paid but not occupied. Besides, incorrect payments are made as well as late or no payments (Turrent, 2012).

Moreover, during the civil war from 1991 to 2002, many schools have been destroyed. The Revolutionary United Front (RUF), a rebel army which was responsible for the civil war, targeted schools and destroyed the majority of primary and secondary schools (IRIN, 2007; World Bank, 2007). As a result, many children, especially girls, have not attended in school (ActionAid, 2007). At the end of the war, the NER was 41%, which grew to 63% in 2004 (UNICEF, 2005). Subsequently, education has been prioritized and a lot of schools have been built (Interviews Vice and Principal Richard Allen, 09-02-2021; Interview Vice Muslim Congress, 12-02-2021). As can be seen in Figure 5.2 and Figure 5.3 in [paragraph 5.2.4](#), a large number of schools are found in the Western Area, where Freetown is located. At the same time, these figures show that primary schools outnumber secondary schools. Since that time, schools have been more populated or overcrowded, since children were increasingly encouraged to attend school.

Schools all over the country were relocated. Schools were often relocated in Freetown. An educational expert outlines the situation after the war:

“[Y]ou know, during the war 1000s and 1000s of kids have lost access to their education. There was no free education at that point. 2004, there started to be sort of free primary education, but it wasn't really invested in. It was just a law. So, all it meant was even more overcrowded classrooms. And it's really poor. But as well at the end of the war when the government really wanted to motivate people to go back to the provinces. They needed schools to reopen, so that families could go back and have their kids go to school. How are you going to staff that? How you're going to staff all of those classrooms? So, almost anybody that could say the alphabet was a teacher. You know, if you were two steps ahead of anybody else that was it. And I understand the strategy at the time, but the problem was, it was never followed up by maths teacher training which is what's it needed to have.”

(Interview educational expert, 21-02-2021)

Around 2002/2003, most schools were having a single shift (Interview Vice Congress, 12-02-2021). A policy of the Ministry of Education stated that they should split the school.

“Because during the war, you know most of the country sites were devastated. So, all the people from the country they came to Freetown. [That's] why we decided to divide the school that we have two separate administrations. Both morning and afternoon, so that we can accommodate many pupils, that's a reason why we decided to work on two shifts.”

(Interview Vice Congress, 12-02-2021)

So, because of the overcrowded classes at that time, the two-shift system was introduced for secondary schools, which is still in place in most public schools. For most schools, this means a morning and afternoon shift (for example Congress, Richard Allen).

5.2.3 Donor dependency

Beside the increased population in the schools available, the civil war caused the country to be highly donor-dependent. Donor dependency carries many risks. Whereas NGOs operate closer to people in the school compared to the government agencies, there is the risk that communities and schools cannot make autonomous decisions. Moreover, NGOs tend to cluster activities and funding parties prefer large-scale educational projects over smaller projects to save transaction costs (Brannelly, Ndaruhutse and Rigaud, 2009). NGOs also developed a risk-avoidance strategy, since they must compete for funds and demonstrate success (Koch et al., 2008). This is confirmed by Samarakoon et al (2017), who highlight that conflict-affected and poorer countries like Sierra Leone, are researched and funded less compared to wealthier countries, and therefore have to make do with little resources.

The Ebola and Corona outbreak increased the donor dependency of the country (Mullan and Taddese, 2020). The government does not have enough funds to serve the whole system of public schools. One of the reasons is, as explained, the poor record management and payroll verification, which promotes corruption and uncontrolled spending of funds. This is very relevant for external donors as well, since 18% of ODA before 2012 has been channeled directly via the government's budget (Turrent,

2012). Over time, the lack of government focus on the education system has resulted in many private schools arising in Sierra Leone, particularly low-fee schools. The government does not have much control over these schools. The rise of low-fee schools as an 'agency of the poor' is indicative of state failure. As a result of the government failure to provide their citizens with sufficient education, citizens take their agency and build schools. While private schools are often more expensive, increasingly parents will opt for private schools, because the price-quality ratio is more advantageous. Parents often want to invest in their children for a better future, which will be elaborated on in [paragraph 6.3.2](#) (Tooley, 2009; Interview RAN, 16-04-2021). At the same time Tooley (2009) argues that quality of private schools is still poor, but seems better, because the quality of public schools is even worse.

5.2.4 School approval system

An important underlying factor for the poor state of education as well as ICT, is the school approval and governance system in Sierra Leone. The education system in Sierra Leone consists of roughly two types of schools: private and public. Yet, this distinction does not suffice. Over half of the schools in Sierra Leone are outside direct government control. In the sample schools outside direct government control are EducAid, Eva Houston, Rising Academy Calaba Town and Rising Academy Waterloo. As explained, this is largely caused by the rise of private schools after the civil war. Providers are often non-governmental or private organizations, including religious organizations, local communities and private companies (MBSSE, 2019). An overview of the funding for the visited schools can be seen in Table 5.4. In 2019, 56% of the schools were mission schools, 16.2% private, 14.1% from the community and 13.8% from the government (MBSSE, 2019). These schools can be 'approved schools', which means approved by the government and the government has partial control (Mullan and Taddese, 2020) While government approval requires basic facilities to be in place, non-approved schools are not necessarily of bad quality. The school approval process is often slow and contacts with government officials might be of help. When these schools are approved, they are given government support, including payment of the teachers' salaries and learning materials (Interview STC, 30-04-2021; Interview educational expert 18-02-2021). These approved schools differ from public schools, which are built by the government. Government-approved schools are schools which are for example set up by organizations and now seek support from the government. In recent years, the government has focused on approving unapproved schools, when they meet minimal standards. In 2016, the government identified 4.777 of the total 8.907 schools as 'not-approved'. In the Western region, 50% has been approved, compared to 35% in the Eastern and Northern region (MEST, 2018). The Annual School Census of 2019 found that 79% of the primary schools, 77% of JSS and 80% of SSS were approved (Mullan and Taddese, 2020). At the same

Number of schools by approval status in 2019

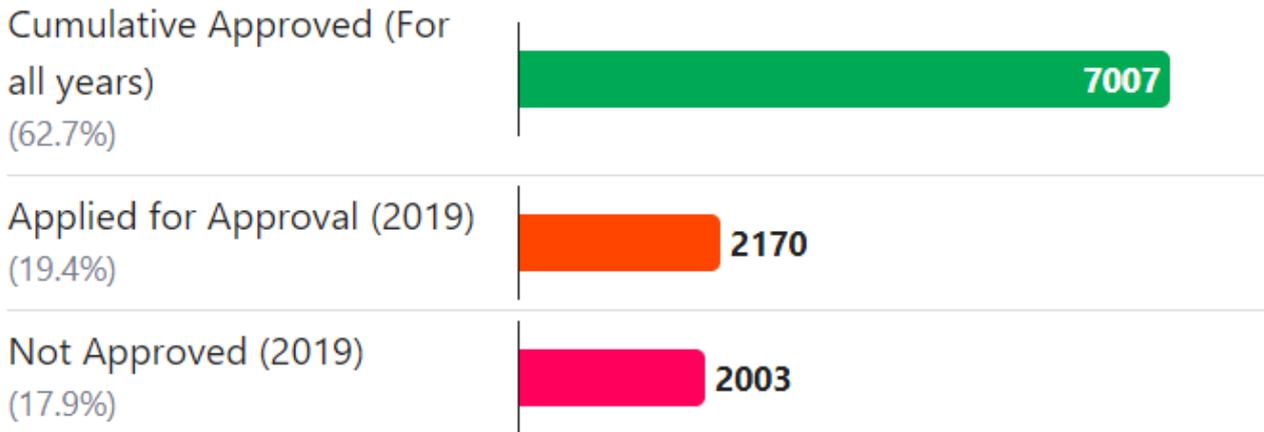


Figure 5.1 Approval status 2019 (DSTI – EDH, 2020)

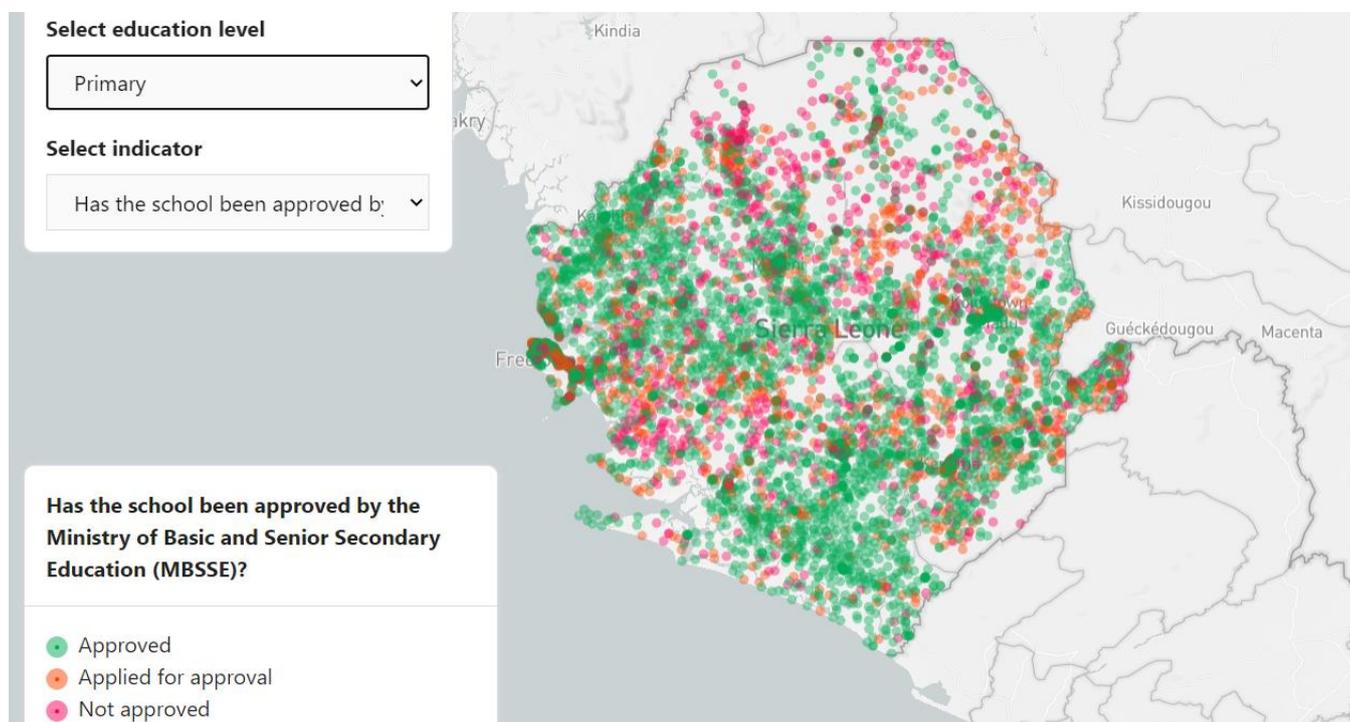


Figure 5.2 Approved primary schools (DSTI-EDH, 2020)

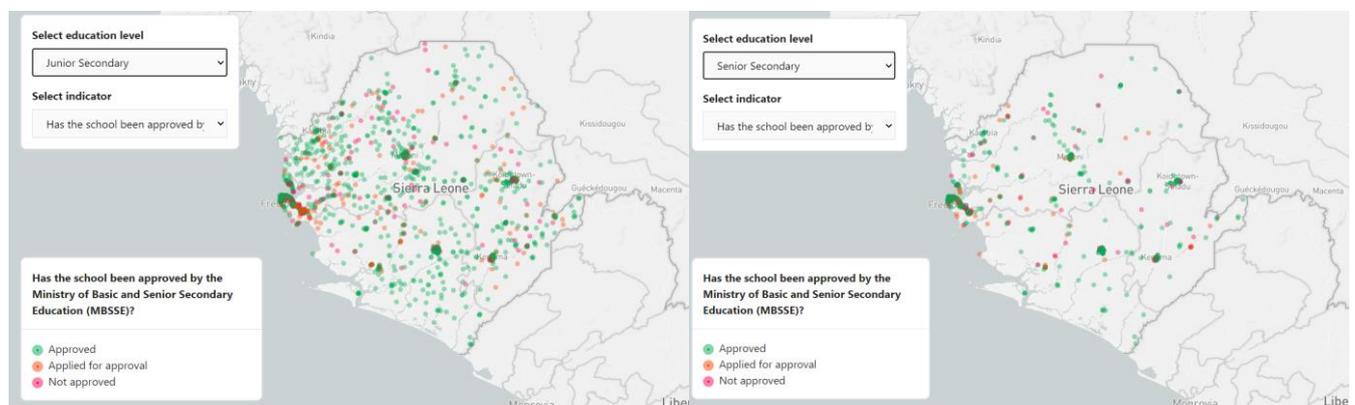


Figure 5.3 Approved secondary schools (JSS left, SSS right; DSTI – EDH, 2020)

time, the MBSSE identified only 3% of the primary schools in 2019 ‘not-approved’ (MBSSE, 2019). The Annual School Census is more likely to be reliable, due to the efforts of the DSTI as explained. In their report, the MBSSE identifies unapproved schools as serving a mostly low-income school environment, and they assume that these schools are generally less accountable and lack a learning-conducive learning environment. Students attending unapproved schools have more risk of dropping out, as the school does not receive support from the government when failing to meet the government standards (MBSSE, 2019; MEST, 2018). Yet, the EDH shows different results. See the overall approval status in Figure 5.1. As can be seen in Figure 5.2 and Figure 5.3, the approval of schools is well-spread among the provinces and districts. Since August 2018, the current government has launched its ‘Free Quality School Education’ campaign, which made the school population increase (Maada Bio, 2018). Yet, free education only applies to public and government approved schools. The unapproved schools often do not have the funds to finance educational projects.

Whereas the school can be approved, the teachers do not necessarily have to be approved as well (Interview Officer We Yone, 15-02-2021). In 2007, up to 60% of the non-private schools were not on the payroll. The same year, an estimated 10% of all schools was approved by the government (STC, 2007). From the schools on the payroll, none teachers or some teachers can be approved. In the sample, none of the public schools was staffed by approved teachers (Richard Allen, Muslim Congress and Makonkarie) and a single government-assisted school was not staffed by non-approved teachers (We Yone). The approval of teachers can be time-consuming, especially when a teacher must follow (expensive) educational courses first. It is officially a requirement to have a completed teacher training before you can be approved as a teacher by the government. Normally teacher training is provided by means of distance learning, although this does not mean the teacher training is ‘on a distance’. It means the teachers training is done in vacant time and weekends. Yet, the costs are high. An expert stated:

“[Teachers income] can be 300.000 [Leones; equal to \$30], taking costs to eat, let’s not even think about the certificate. [...]. It costs around 980.000 [Leones; \$98] some years back. When I entered in 2017, it had increased to 1.920.000 [Leones: \$1.920]. This year the form is 3.000.000 [Leones; equal to \$3.000]. Many villagers do not have education. Therefore, corruption in villages is too high. The government does not bring enough money, so they have to make money themselves.”

(Interview educational expert, 01-03-2021)

When teachers are approved, a new challenge arises. While there is record management and an overarching institution that arranges the bank payment, legacies of the armed conflict are the core problem behind poor payment, combined with the limited means and ability to levy sufficient resources. This is caused by weak internal control, poor public finance management and insufficient resources to pay teachers (Turrent, 2012). A simple audit to retrieve teacher salaries paid in a specific month in EMIS is impossible (Hamming, 2008). In the teacher salary system and broader educational system, the

Ministry of Education fails to fulfil its monitoring role as highlighted before, so there has been a lack of accurate, reliable and rapidly accessible data for a long time. The poor monitoring is worsened by corrupt practices. These corrupt practices result for example in 'ghost' teachers, teachers who receive salaries from several schools and registration of non-existing schools. This is caused by low transparency within the ministries (Amman and O'Donnell, 2011; Turrent, 2012).

When it comes to the governance system, a general problem is the failure to execute project. Whereas a lot of project proposals and documents are written, implementation is often going slow or not being done (De Bruine, 2020a). When plans are executed, poor monitoring often makes projects fail (Anto et al., 2019; Amedeker, 2020; Interview STC, 30-04-2021; Interview educational expert, 15-04-2021; Interview educational expert, 05-05-2021). Incentives for monitoring are often lacking, including financial incentives. Besides, supervisors are often not controlled themselves. Monitoring is particularly challenging in rural areas. Ministers avoid these areas, especially in the rainy season, when road movement by car or motorbike is hampered or impossible. Even if they get paid to visit, supervisors will not always do so (Interview STC, 30-04-2021; Interview educational expert, 15-04-2021).

5.2.5 Funding

The funding of government schools is mostly based on government spending. Public schools often receive government funds and are dependent on them (Interview Principal Richard Allen, 09-02-2021). While most public schools are funded by the government, the funding is if available often not enough and paid late (Interview Vice SSS Muslim Congress, 12-02-2021; Interview Principal JSS Richard Allen, 09-02-2021). How much the government pays depends partly on the type of school and the number of pupils. Therefore, schools tend to increase their numbers of pupils. For example, for the EIC, schools receive 25 dollars from the government per child per year (Interview RAN, 16-04-2021). Moreover, the schools that have contacts in parliament have less difficulty in obtaining the resources (Field notes, 18-11-2020). The public schools in the sample that seek funding elsewhere are the ones innovating more and implementing various projects (for example Richard Allen and Muslim Congress). Additional funding and support can be community-based, or supplied by staff. For example, the student prefect in a secondary school can present proposals during the CTA (Community Teachers Association) meeting, which the community can decide to support. The student prefect usually consists of students from SSS 3, who are selected based on voting and selection by the administration (Focus group students Muslim Congress, 16-02-2021). In this way, the school does not have to wait before the government will act.

In private schools, funding is easier. It is often the parents that pay the school fees and other costs. Whenever costs are incurred, parents must pay, either directly or indirectly via the school fees.

Yet, paying by parents can also be a challenge. For example, some students must change from a private to a public school if their parents can not afford the school fee (Focus group students Richard Allen, 09-02-2021; Interview educational expert, 01-03-2021). There are also private schools where the fees and other costs are paid by a foundation. Examples are EducAid and Makombeh. Yet, for Makombeh, it is also government-approved and therefore receives teacher salaries for two of their teachers. This shows that private schools can be government-assisted as well. As explained, instead of a clear separation, the distinction between private and public must be considered 'hybrid'.

5.2.6 ICT introduction

After the war, ICT has been introduced into the education system (Interview Vice Muslim Congress, 12-02-2021). At the same time, until recently, ICT has not been prioritized by the government. It has only been the current government that has developed explicit plans to digitize the education system (Mullan and Taddese, 2020; Interview DSTI, 22-01-2021 in de Bruine, 2020a). As explained in the [Geographical and contextual framework](#), the current government has created the general National Innovation and Digital Strategy 2019-2029, and there are plans to create an 'ICT in Education' policy, which does not yet exist (Mullan and Taddese, 2020; DSTI, 2019, November 1). The lack of policies and implementing agencies are an important cause for the present state of ICT. While there is a Ministry of Information and Communication Technology, it is not closely connected to the education ministries (Mullan and Taddese, 2020). The governance and funding structure in relation with ICT will be outlined next.

The poor governance structure combined with a lack of funding in the government makes access to ICT in education highly dependent on external parties, including private education providers. These education providers often run small-scale projects (Mullan and Taddese, 2020). When it comes to funding, both for government and external parties, a general problem in the education system arises; there are many needs. According to an educational expert, priorities are not made, which means that the funding is spread over many educational areas (Interview educational expert, 21-02-2021). Needs include feeding, toilet and water facility, library, dusty playground, furniture, and educational materials. The needs related to the school or learning environment will be elaborated on in [paragraph 6.2.1](#). These various needs require specific attention, and may compete with ICT for prioritization. Stakeholders do often not see ICT as a cost-saving measure. In other words, funding parties have not identified ICT as an important need, in a context with limited available funds. Currently, the Corona pandemic is also challenging the funds. Particularly for NGOs that depend on funds coming from Europe or America, last year's budgets have been much reduced and some schools had to be closed or scale down their activities (Interview educational expert, 21-02-2021; Interview Schooling for Life, 01-04-2021). Beside NGOs, diaspora can also bring funding to schools individually or via organizations led by diaspora (Interview

Makonkarie, 16-03-2021; Focus group Muslim Congress parents, 24-02-2021). Yet, the Corona pandemic has also affected them significantly in financial terms.

5.3 Sub conclusion

The present state of ICT in education in Sierra Leone in primary and secondary schools is poor. Access at home is very poor and therefore the various educational stakeholders are mostly dependent on their access at school to develop their digital skills or IT literacy. ICT access in private, internationally-supported and urban schools is much better than in public and rural schools. In the sample, there is not a huge difference between primary and secondary schools. Yet, all the rural schools visited are primary schools. The secondary schools are mostly concentrated in the urban areas. This variation in ICT access also applies to pupils, teachers and staff. Among those stakeholders, the pupils and staff are usually better off. In most schools sampled, the ICT access is limited to students. Yet, for the internationally-supported schools in the sample, it is rather opposite. Whereas staff and teachers have access to ICT, pupils do not have that access now. This can explain the variation in ICT usage: for learning (pupils), teaching (teachers) and administration (staff). This will be elaborated on in [section 7.1](#).

There are various explanations for the current state of ICT in primary and secondary schools in Sierra Leone. Firstly, the poor state of ICT in education in Sierra Leone has its roots in the education itself. Access is increasing, yet poor. The quality of the education is also very poor. Secondly, the state of ICT is rooted in the history. After the civil war, many schools have been built, yet not all schools are approved. The poor approval system has its roots in the collapse of state provision of government services and salaries during the war. Because of the war and recently the Ebola and Corona outbreak, the country is characterized by its donor-dependency, poor governance and lack of government funding. Additional challenges include corruption and the lack of monitoring. The civil war from 1991 to 2002 has also caused overpopulation of schools. Public schools often expect money for projects, including ICT projects, from the government. Yet, they do not have the financial resources available to provide all schools with ICT. The external parties are only running ICT projects on a small scale and have other priorities as well. Currently, other needs are prioritized rather than ICT. The government has only prioritized ICT since 2018 and therefore is in a starting phase.

6. Needs identified by stakeholders

In the last part of the previous section, some challenges in the education system were mentioned. For example, the approval of schools and teachers are key challenges in the country, and closely related to the lack of funding for schools. It was also outlined that the needs in the education system include feeding, toilet and water facility, library, dusty playground, furniture, and educational materials. This will be elaborated on in this part. The needs will be outlined as well as the locational differences (urban/rural) and differences related to types of school (primary/secondary and public/private). This section is organized the following way: first [access to schools](#), then [quality of education](#), and lastly the [external environment](#).

6.1 Access to schools

An overall problem is the lack of schools. It is estimated by MEST that 10% of all the children is out of school. Whereas in the cities, there are many schools, in rural areas, schools are not always located at a reasonable distance from pupil homes (MEST, 2018). In Figure 5.2 and Figure 5.3, it is shown that there are less schools in the provinces compared to the more urban and crowded Western Area. As mentioned, after the war a huge number of schools has been built. Yet, there are many pupils without access to schools. Therefore, the current government has launched its 'Free Quality Education Programme' to increase access to all educational levels (SL-MTNDP, 2019; Maada Bio, 2018). As mentioned, in 2016, of the 149 chiefdoms, 85 were lacking pre-primary or nursery schools in that year. In previous years, half of the new schools built had been primary schools (MEST, 2018). In rural areas, there are often primary schools in villages or neighbouring villages, but secondary schools are more scarce (Field notes, 18-11-2020; Focus group Makonkarie teachers, 28-02-2021; DSTI- EDH, 2020, See Figure 5.2 and Figure 5.3). Having no functioning school in the village is an important reason for parents not to send their children to school (MEST, 2018).

Yet, whenever access is available, barriers to access are present as well. An important factor is affordability. While the government pays for the school fees and sometimes learning materials in government-approved schools, the parents must pay for the uniforms and other expenses, including lunch (Maada Bio, 2018; Mullan and Taddese, 2020) and extra activities in the school, books, transportation and report cards (MEST, 2018). Especially in rural areas, this is keeping parents from sending their children to school (Interview educational expert, 15-04-2021). This is one of the reasons the government has identified school feeding programmes as key policy action (Bangura, 2019; SL-MTNDP, 2019). Mostly in the villages, it is the parents expecting their children to contribute to their

livelihood, so they can eat a meal. For example, they want their children to help carrying items to the 'luma', a weekly market. Even when the children are going to school, they expect their children to help them early in the morning. Therefore, sometimes they will be late and tired when they attend school that day of the week. Another factor contributing to being late is the transportation. Especially in villages, children often have to walk village to village before they reach the school. By that time, they are often tired (Focus group Makonkarie teachers, 28-02-2021). In the city, transportation can be expensive and time-consuming due to traffic jams (for example focus group teachers Eva Houston, 16-02-2021). Parents in villages can also feel that the education providers are substandard, which is causing absenteeism, poor results and/or dropping-out from school. For example, they can have the idea that education providers are keeping their children from entering 'secret societies', including FGM (Interview educational expert, 15-04-2021).

6.2 Quality of education

The quality of education is generally poor as explained in [paragraph 5.2.1](#). This is particularly shown in the high drop-out levels and repetition rates, and the low results when taking external exams.

Firstly, enrolment rates are high, but the drop-out levels and repetition rates are high as well. In 2016, the Gross Enrolment Rate (GER) has been 125.5% for primary, compared to 61% for JSS. For pre-primary and SSS, this has been terribly low with 11% and 28% respectively. The Education Sector Plan does not provide Net Enrolment Rates (NER) (MEST, 2018). Compared to 2016, in 2019, the GER has been better for pre-primary (13.5%) and SSS (30%), but worse for primary (108%) and JSS (55%). The increase in GER has been higher for girls (+34%) compared to boys (+30%) (MBSSE, 2019). The high GER indicates a high over-age enrolment and therefore year repetition or leaving school and returning at an older age. Yet, the reliability of the data can be doubted, especially before 2016. Births have often not been registered by parents and are therefore guessed by schools. As mentioned before, since 2018 the government has started digitizing the management system and therefore reliability and transparency increased. Reasons for drop-out include marriages and pregnancies for the girl child. 28.6% of the girls has been excluded of education because of teenage pregnancy (MEST, 2018). Whereas in primary school and JSS, the GPI (gender parity index) is relatively high for girls, after the first years of JSS, there is a huge drop-out of girls (UNICEF, 2012). Therefore, the government has recently provided pads for girls. Yet, the challenges of child marriage and pregnancy remain (Interview Officer, 15-02-2021; Interview educational expert, 15-04-2021).

Beside high drop-out levels, there are low transition and completion rates. The low transition rate is related to the high repetition rates. In 2015, the transition rate from primary to JSS was 83% and

the completion rate for JSS was 64%. In 2016, the transition rate increased to 88%. Due to Ebola, completion and transition rates have been lower in 2017. For example, the JSS Gross Completion Rate fell from 61% to 49% and the primary to JSS has decreased from 88% to 78% (SL-MTNDP, 2019). Over the whole education system, internal efficiency is low, which can be seen in the poor results for BECE and WASSCE, especially in science and mathematics. At secondary level, usually below 20% that sits WASSCE passes (MEST, 2019). In 2019, only 3% that sat WASSCE passed their English. And if you do not pass your English, you will not pass your WASSCE (Interview educational expert, 21-02-2021). In 2019, exam scores have been very poor. This can be seen in Figure 5.4. Almost one out of three schools have 50% or less students who sit the national exam fail. Besides, the rate of 50% of students passing the exam is relatively low. Moreover, in Figure E1 in [Appendix E](#), the Student Pass Rate (SPR) is presented. Compared to previous years, the SPR in 2019 has been worse. This trend can be seen for JSS and SSS, yet is not significant for primary schools. Generally, primary SPRs are better compared to JSS SPRs, which are better than SSS SPRs. In Figure E2 in [Appendix E](#), it is shown that generally, private schools score the best and community schools the least. Government schools and mission/religious group schools have a quite similar SPR. Other schools are in between. Other schools are defined as ‘public schools that are established by individuals, NGOs and other organizations that are neither government nor faith-based and the community cannot claim ownership’ (DSTI – EDH, 2020). The EDH shows similar trends for all levels, with again SSS having very low student SPRs. While at the various levels, private schools are scoring higher on SPRs, in primary schools, the difference with the other types of schools is bigger than for the other levels for all the years (DSTI – EDH, 2020). In Figure E3 in [Appendix E](#), it is shown that the SPR is better for the Western Area Rural and Western Area Urban compared to the ‘provinces’.

So, the SPRs differ per location and age group. The average student in Sierra Leone has 4,5 of teaching adjusted school years of education (World Bank, 2019). Younger people in the Western Area are more likely to be higher educated than to older people in the provinces. See Figure F1, Figure F2 and Figure F3 in [Appendix F](#) for the illustrations, adapted from the database DHS (2016). Various factors are highlighted. Firstly, age influences the level of education. There is a large amount of people that have

Number of schools by exam success status in 2019



‘Successful schools’ are defined as schools where more than 50% of the students who attempt the national exam pass, and ‘Unsuccessful schools’ are defined as schools where more than 50% of students who attempt the national exam fail.

Figure 6.1 Exam success status for schools (DSTI – EDH, 2020)

received 'incomplete primary/ secondary' education (see Figure F1). With this data, the high drop-out rate is confirmed. Secondly, the location of the school determines the quality and amount of education (See Figure F2). A minority among the urban residents has received no education, while the majority has completed secondary or (partially) completed higher education. The level of education in the Western Area is higher than in other areas (See Figure F3), which is in line with the number of schools and SPRs as seen in Figure 5.2 and Figure 5.3 and Figure E3, respectively. The educational attainment for other areas does not differ much from each other. Lastly, private schools have different characteristics than public schools. Generally, private schools have more resources and are better equipped. This mostly results in better educational attainment (SL-MTNDP, 2019; MEST, 2018; De Bruine, 2020b).

A critical note must be placed. One of the goals set by MEST (2018) is *"Improved systems integrity by cases of malpractices reported by the MEST Examinations Monitoring Teams going down by 80% between 2018 and 2020 and the number of results withheld by WAEC decreasing by 50% over the same period"*, showing the challenges within the system to provide reliable exam results. When the SPRs are compared to students from other countries that are part of the WAEC, Sierra Leone scores very poorly on examination. For example Nigeria and Ghana score much higher (Interview educational expert, 21-02-2021; Interview Makombeh, 18-02-2021). At the same time, WAEC is the only examination body in Sierra Leone. The other countries all have other national councils that provide an alternative to the regional WAEC exams. Examples are NECO (n.d.) and JAMB (n.d.) in Nigeria. These are also considered when calculating the examination results and when passing the exam allows students to go to university. Since WAEC is the only provider in Sierra Leone, they do not have much competition. Therefore, it is interesting for WAEC in Sierra Leone to give pupils a fail score or withhold results, so they must pay again for a resit exam (MEST, 2018).

Barriers to the low learning outcomes include the method of teaching, a low availability of textbooks and learning materials, low level qualifications and motivation among teachers and unapproved schools, which are outside the supervision of the Ministry. The curriculum, management and government capacity also play their part (World Bank, 2019). These will be outlined next.

6.2.1 Learning environment

Barriers to efficient education in the learning environment and school compound include the method of teaching, low availability of learning materials, overcrowded buildings, lack of adequate water and toilet facilities (Mullan and Taddese, 2020).

The method of teaching is traditional and often not efficient. Educational experts and other stakeholders mention a change in the method of teaching as a need for the education system, which

must be improved. The traditional teaching is described as ‘chalk and talk’, ‘copy on the board and give notes’ (Interview Vice Muslim Congress, 12-02-2021) and ‘memorization’ (Interview Makombeh, 18-02-2021). Most teaching is supported by a chalkboard (various observations; De Bruine, 2020a). Linking back to the [Conceptual and theoretical framework](#), this traditional teaching is grounded in the behaviourist learning theory (Huang et al., 2019, Ch. 2). Teachers themselves complained about the chalk that is damaging to their eyes (for example focus group Richard Allen, 05-02-2021). In contrast to interactive teaching, it is hard for students to really understand what is taught. It is also called ‘the hard way’ (Interview educational, 01-04-2021). Another educational expert calls the schools ‘isomorphic schools’, where teachers imitate other teachers, without reflecting on whether it is working. Yet this system is changing and the traditional method is more prevalent in public schools (Interview educational expert, 21-02-2021). There is an environment created in which talking is not easy and reflection does rarely happen (Interview Schooling for Life, 01-04-2021).

During the research, students, teachers, parents and staff members highlight the lack or poor quality of health (Interviews and focus groups Congress; Makonkarie), toilet and water (Interviews and focus groups Richard Allen; Makonkarie; Congress), and food facilities (Congress; Makonkarie). This is confirmed in by MBSSE (2019). In 2019, four out of ten primary schools lacked water, three out of ten for JSS and two out of ten for SSS. Besides, the number of students per toilet ranges from 33 in pre-primary to 157 in SSS (MBSSE, 2019). Other needs mentioned are the lack of classrooms and furniture (Richard Allen, Congress), resulting in overcrowded classes, and roofless and/or dusty grounds serving as classrooms or auditorium. This is both a problem in rural and urban areas, yet less prevalent in private schools. This is closely related to the available funding. A teacher outlines:

“[We have m]ore than 100 students per class. You know when they introduced this free education, most parents send their kids to school. It’s three years now. No new building has been built yet. We are still using the old buildings. And now the number has doubled. [...] I cannot control a class. Normally on the educational system we have to have access to move and observe all the students, which is not possible here now. Classrooms are choked. Even you the teacher for you to have free movement in class is not possible. [...] To assess them also is a very big problem.”

(Teacher Congress during focus group, 09-02-2021)

Other challenges in the learning environment include the lack of functioning libraries and properly equipped science labs (for example Field notes, 18-11-2020; Interview Vice Richard Allen, 09-02-2021; Focus group Eva Houston, 12-02-2021; Focus group teachers Congress, 16-02-2021). The MBSSE (2019) reports that in 2019, 2% of the schools had a functioning science lab. In addition, 6% had a functioning library, of which the majority is in SSS. Students often do not have personal books, and are therefore dependent on libraries to gather more information. Libraries are less equipped in rural and public schools compared to urban and private schools (Interview educational expert, 21-02-2021).

6.2.2 Teacher qualification and motivation

The method of teaching is also related to the qualifications and motivation of teachers. During teacher education, teachers are often trained in traditional methodology (Interview educational expert, 21-02-2021). Generally, qualifications of teachers are poor. In 2016, according to government data, 41% of the male teachers in JSS taught without qualification or with substandard qualifications, compared to 28% of the female teachers in JSS. In SSS, this share has been 44% for male and 53% for female teachers (MEST, 2018). In 2016, 34% of all teachers did not receive training as educator (SL-MTNDP, 2019). In 2019 there were 48.761 teachers, of which 72% was male. 58.7% of the male teachers did have the minimum qualification to teach (MBSSE, 2019). Samarakoon et al (2017) conducted their research in Koinadugu in the Northern province of Sierra Leone in 2014. They found that 11% of the teachers sampled had a university degree, and 60% had a teaching certificate. 29% of the teachers did not have teaching qualifications. Over the whole country, the lack of qualified teachers was higher in primary school (42%) than JSS (27%) and SSS (12%). From 2010 to 2016, the share of unqualified teachers has declined significantly from 45% to 34%, respectively. This percentage is lower in the provinces compared to the Western Area (SL-MTNDP, 2019). Due to corruption, certificates can be fake (Interview Schooling for Life, 01-04-2021). The challenge of 'deploying' qualified teachers in rural areas is more significant. Therefore, poor qualifications are more prevalent in rural areas. Underlying reasons are the standard of living for teachers in rural areas, which is lower than in urban areas. Besides, in rural areas, there are less opportunities to earn income from other jobs (Interview educational expert, 01-04-2021). Another educational expert points to the fact that teachers often did not receive proper education themselves. The educational expert gives the example of teachers college, where the cut score is 40%, which means you are good to go, even when you have mastered less than half of the materials (Interview educational expert, 21-02-2021). This education is important in relation approval of the teachers and helpful to salary accrual. The education of teachers is low and they are often not taught how to be a teacher, or trained in pedagogy. So, they do not have much control over themselves or the students. Some educational expert state that teachers use violence, resulting in an unsafe environment. Besides, teachers do not learn about child-development, how to communicate with children, how to transfer knowledge. This results in the current method of teaching (Interview educational expert, 21-02-2021; Interview Schooling for Life, 01-04-2021). Yet, this argument is mostly referred to by the educational experts with a background in the global North. They have either been raised in the global North or they are Sierra Leoneans that have had experience with a more interactive education system. This argument has not been mentioned in the conducted interviews and focus groups within schools. At the same time, positive results are shown from psychosocial help to children.

Teachers themselves point to the lack of motivation to teach. Two major barriers are the low salary and lack of recognition. Teachers are often not paid during their first two years as teacher (Interview Schooling for Life, 01-04-2021). Samarakoon et al (2017) found that for the sampled teachers in Koinadugu in the North of Sierra Leone, 45% received salaries, while the rest worked on a voluntary basis. Until 2012, teachers have routinely been paid late in the whole country. Many teachers leaving after 4 years due to chronic delay or absence of payment, combined with the poor working conditions. The salary system has been explained in [paragraph 5.2.4](#) (Turrent, 2012). A teacher highlights:

Well, [the salary] does not depict the status of teachers, the salary. There are people with degrees. There are people in second degrees that are earning less than 2 million, if I may be right. Whereas the others that are hanging out there who can get up to 50 million. Who have the same level of education [mentioned by male teacher at the same time].

(Female teacher during focus group Richard Allen, 05-02-2021)

A male teacher in the same focus group adds:

Since we're not getting adequate salary, most people see the classroom as a waiting place. So, they are here just to wait. They cannot give their all in all. At any time, they'll be leaving here, when they shall have a better job than this one. So, most times, they will not give there all in all, they're making fun with colleagues and go. And spend more time out there finding other jobs. [...]. Let's say these kids. You ask them normally: 'Who wants to be a doctor?'. You see the hands up. 'Who wants to be a lawyer?' [Positive noise]. 'Who wants to be a teacher?' Hmm. [Confirming sounds by other teachers]. I can remember one time we did have an assembly here. She was the one who asked the girls: 'Who wants to be a teacher here'? The girls had to say 'hmm'. [Background female teacher: Nobody.]

The teachers during this focus group highlight that beside a low salary not equivalent to similar jobs, teaching is not recognized by society as they deem fit. In public and some private schools, non-approved teachers receive a small stipend, which is often only sufficient to cover basic costs. Therefore, teachers often look for other jobs and do not fully focus while teaching. This can cause teachers to not attend their classes. This is illustrated in a quote of the male teacher and confirmed by Harding and Mansaray (2006). They mention that rural teachers often seek working opportunities in farming and urban teachers in providing (extra) tutorials. Teachers also mention the lack of professional development and promotion opportunities to explain their poor motivation. A teacher of Richard Allen tells other teachers he is an SSS teacher, but he is paid as a JSS teacher, since he is not a formalized SSS teacher. Another teacher mentions:

"What about promotion of teachers. Some of us have taught for over 10 years. The same scale. Same status. So, personal development? You want to grow as a teacher? You move? Oh yes, junior teacher, senior teacher, vice-principal, principal. But long time. Over 15 years now, they are still teachers. Yes. In 2007. Those should be encouraging us."

(Male teacher during focus group teachers Richard Allen, 05-02-2021)

This is confirmed by Harding and Mansaray (2006) who mention that when promoted, it takes time before it is reflected in the salary. At the same time, some teachers complain that they must make lesson

notes, which is very time-consuming. An underlying problem is the lack of supporting and educational materials (Focus group teachers Richard Allen, 05-02-2021; Interview educational expert, 05-05-2021). In the educational system, learners' and teachers' communities are poorly functioning if available. This means, there is not much reflection on the learning and teaching process and intervision across schools in various areas (MEST, 2018).

An underlying challenge is the lack of teachers organizations that give teachers a voice nationally. This partly has to do with the teacher approval system as explained in [paragraph 5.2.4](#). While there is a formal teacher union to which teachers must pay a fixed monthly fee, teachers do not seem to have a voice (SEM, 2013). This is in line with the lack of and poor functioning of teachers' communities. Besides, there are no overall standards, lesson plans, and structured supervision, inspection, and monitoring. Moreover, registration and licensing of teachers is lacking, and guidelines and tools are yet to be implemented (MEST, 2018). Until recently, recruiting and allocating teachers have been done entirely paper-based. These processes take a long time, due to the various agencies that are part of the decision-making process, which handles all information. As mentioned in [section 3.2](#), the DSTI launched the Teacher Application, Approval and Allocation Portal (TAAAP), which is tested by the Teaching Service Commission. The effects are yet to be shown (DSTI, 2019, December 23). Overall challenges include poor management of the teacher workforce (MEST, 2018), and a general lack of accountability and transparency (DSTI, 2019, December 23).

6.2.3 Curriculum

Apart from poor learning outcomes, the education does not prepare students properly for formal careers. As mentioned in the [introduction](#), this is often caused by various factors. In Sierra Leone, one of them is the mismatch between the curriculum and national development needs. Large barriers include the low human capital development and low productivity. The undiversified economy is focused on farming and trading. The workforce consists for more than 60% of farmers, yet farming only contributes 55.1% to the GDP. Of the farmers, 72% is poor, compared to 42% of the traders. The higher the quality and level of education, the higher the chance of diversifying and contributing to national development (MEST, 2018). While more people are being educated, people often remain farmers and trades. In other words, they remain employed in the informal job market, which is much undiversified. This is mainly due to the mismatch of the curriculum and the skills required on the job market. The curriculum is massive and very much content-loaded (Interview STC, 30-04-2021; MEST, 2018). The curriculum is simply too old and does not match job market needs. Besides, there is a lack of career guidance and the required soft skills to obtain a formal job (Interview Schooling for Life, 01-04-2021). As explained in the [Conceptual and theoretical framework](#), with the shift in the global North from

behaviourism to constructivism, the focus on hard skills has adapted step by step towards soft skills. However, since the educational system in Sierra Leone is still using the traditional method, hard skills are prioritized. At the same time, most formal jobs require soft skills more than hard skills (Interview Schooling for Life, 01-04-2021). An educational expert teaching in vocational training mentions:

“My students, they come from secondary level. They have no idea. They think they get a job and they do what they want. There’s no preparation. There’s not much general development, creative thinking. You cannot ask too many questions. You cannot stimulate the idea that the teacher does not explain it well. Or the teacher gives a wrong answer not to give the idea that he or she doesn’t know.”

(Interview Schooling for Life, 01-04-2021)

Underlying the content-overloaded curriculum is the tendency of policy makers to include more subjects and subtopics into the curriculum, without removing others. The education is highly focused on equipping students with knowledge and skills which are required for formal assessments (MEST, 2018; De Bruine, 2020a). An educational expert illustrates the tendency of policy makers:

“So, when I'm going to take anything out of this curriculum. If we want, we'll add things in, but we're not taking anything out. [...] Now, don't get me wrong, Shakespeare is great, but how many fantastic African authors are there, that we're not touching. You know, and this sort of thing.”

(Interview educational expert, 21-02-2021)

The content-loaded curriculum has recently become more challenging. Schools reopened after the recent closure and almost one term was lost and two terms were left to cover the curriculum. A male student mentions:

“Because of this COVID-19, we waste our time. And the teaching is very slow. And WAEC does not want to know if we have our syllabus covered. They will just draw their question mark. So, I'll like the government to add some time for us. So that we can be able to cover our syllabus. The teaching is very slow, even though we are trying, the teachers try to cover everything before the exam.”

(Focus group Richard Allen, 09-02-2021)

Other students in the focus group mention that this is especially challenging for the slow learners, whereas fast learners are more able to keep up with the pace. Another related issue mentioned by students in the focus group is that teachers fail to show up in the classroom, especially in public and rural schools, where face-to-face monitoring is less practiced, compared to private schools (Focus group Richard Allen students, 09-02-2021). An underlying pattern is that teachers often teach in many schools at the same time (Interview educational expert, 15-04-2021).

6.3 External environment

Apart from access to and quality of education, additional needs are identified in the external environment by various stakeholders. This paragraph focuses on [treatment of children](#) and [priorities of parents](#).

6.3.1 Treatment of children

Teachers mention the external environment as one of the challenges. Not only inside the class, but also on the streets outside school hours. Inside the classroom, the teachers report that the children do not show them respect. A female teacher of Richard Allen says *“You have to do a lot to keep them in class. You have to keep them from outside.”* Another female teacher adds:

We want to talk at least to the parents. Some of the pupils are very violent, they come with sophisticated materials, like weapons. When we invite the parents... Most of them have two different characters. What they do at school is different from what they do at home. You see. They tend to behave better at home, but when they come to school it's different. It's difficult you see. They are brought to the station.

(Focus group Richard Allen, 09-02-2021)

This is related to the poor control of parents over their children. The parents often have jobs and often do not check for example the homework or results of their children (Focus group Teachers Richard Allen 05-02-2021; Muslim Congress 16-02-2021). The behaviour of the children is not mentioned by teachers in rural schools in this research. Yet, the poor control of parents is mentioned, since parents in rural areas are often uneducated and in some cases do not acknowledge the priority of education (Field notes, 18-11-2020; Interview educational expert, 01-04-2021).

When it comes to the external environment and children, there are certain vulnerable groups of children that are less supported throughout the education system, both outside and inside the classroom. Considering gender, girls are treated less well than boys. Education Development Trust has provided gender-focused programmes in Sierra Leone. During the Ebola epidemic, they provided 1-hour daily classes to 4.700 adolescent girls, in which they taught life skills, sexual and reproductive health and vocational training. After the epidemic, enrolment rates only fell by 8%, compared to 16% in schools without the intervention (Hallgarten, 2020). Similarly, disabled children are often mistreated (Interview STC, 30-04-2021). An educational expert illustrates this with the example of a deaf boy being considered

EducAid is a network of schools serving the marginalized children. The vision of EducAid is to get *“A dignified, democratic and globally engaged Sierra Leone, where poverty is eradicated by educated citizens.”* (EducAid, 2017) Contrary to most schools, children do not wear uniforms. EducAid is dependent on funding and parents and children are not expected to pay, except with ‘excellent performance’. EducAid has a different learning system, based on a syllabus. You have to pass a subject with 70% to continue to the next one. Besides, the system is based on peer learning, in which the teacher supports the children in their learning. Students have to take full responsibility for their learning process. The EducAid system include: zero-tolerance towards corporal punishment, sexual abuse and harassment, vertical tutor groups and families that provide feedback to school leadership, community service, every voice counts, restorative justice approach and peer mediation, gender equality programme and leadership learning. EducAid is performing excellent in WASSCE and unusually successful in getting scholarships for students to continue their educational path.

Box 6.1 Approach of EducAid (Interview educational expert, 21-02-2021; Mason et al (2020)) 1

'dumb' in the village. Since he received special support, he obtained the best grades in his class. He promoted to secondary school and is still the best of his class. Similarly, a child with epilepsy was regarded as being possessed by the devil. With special support, the child receives a few hours of education per day (Interview educational expert, 18-02-2021). Particularly the civil war has created a very diverse range of ages and experiences in the classroom. One of the major causes is that during the civil war, 1000s have skipped school. Some of those returned later to continue education. Therefore, personalized learning is important (Interview educational expert, 21-02-2021). This is a need identified by the educational experts and found in literature. It is not mentioned by the stakeholders in the focus groups. EducAid is an education provider that approaches the education from a psychosocial needs perspective. More information about EducAid can be found in Box 6.1. During quarantine periods, vulnerable children are less likely to return (Hallgarten, 2020).

6.3.2 Priorities of parents

For parents, their priorities in school choice are a useful measurement for needs, as well as their expectations and support for their children.

For parents, the choice of school is often very important, since they want the best for their children. The choice of school for parents depends mostly on (1) what the school looks like, including paint and playground, and (2) extra-curricular activities. Besides, the fee is also important, yet parents are often willing to pay for quality education if the money is available. In that regard, exam results from previous years are also much relevant to deciding which school their child will attend. A mother from Muslim Congress mentions:

"The reason to send my child here, is the way of learning. Even the big ones, some of them are in college, some of them have made it in life [turned into something]. So, it makes me more happy to send my children to this school, all of my children."

(Mother during focus group, 24-02-2021)

The religious background can also play a role. A father mentions during the same focus group:

"The reason why I decide to send my own child to this school is because of the proper organizing way of the school. Educationally, the way they teach. We see the different types of school, how they organize their school. But Sierra Leone Muslim Congress they do very much well in raising/growing children in a better society, the code of dressing, the educational centre. Everything is normally fine. So, as I see, a fit as a Muslim, Sierra Leone Muslim Congress, they use the girl child to use the hijab, in the Islamic form, so let me send my child to Sierra Leone Muslim Congress, so they develop more Islamic life."

Whereas it is common for Muslim children to attend Christian schools, the 'other way round' is not often observed. Travel distance to the school can also be a reason. In the cities, this distance is less of a reason to choose for a particular type of school, since there are various schools available (Interview RAN, 16-04-2021; Focus group parents Muslim Congress, 24-02-2021). Parents want their child to excel and

eventually have a proper career. Many parents expect their child to become a lawyer or doctor (Focus group parents Muslim Congress, 24-02-2021). Yet, most children prefer another career. The high expectations of their parents force them into a straitjacket. In the student focus group, various participants have told me they want to go for another job than their parents wish for (for example focus group Richard Allen students, 09-02-2021; Focus group Muslim Congress, 16-02-2021). A student of Richard Allen illustrates this by saying she wanted to become an actor, but her parents want her to read books and study to become a lawyer (Focus group Richard Allen students, 09-02-2021). In the parent focus group, various participants mention the need for their children to be 'someone' and to earn a decent income (for example Focus group parents Muslim Congress, 24-02-2021).

6.4 Sub conclusion

This Chapter showed the results of educational needs identified by educational stakeholders. Firstly, access to education is poor, yet improving. Generally, the education system has high GERs compared to NERs, which implies high repetition. Besides, the education system faces high drop-out rates and poor results. The first identified need of the education system has been recently encouraged: improving access to schools. This is especially demanding in rural areas. Apart from access, quality of education is an important need. Barriers to quality include a poor learning environment with overcrowded classes, few learning materials and general facilities lacking, such as water, toilets, health and food. A major challenge is the low-interaction, traditional system, in which students often fail to understand what they learn. Another barrier is the low qualification and motivation of teachers. A major underlying factor is the low salary, which causes teachers to have other jobs and see teaching as a temporary job. Besides, professional development and promotion opportunities are lagging behind. Another need identified is an update and down-sizing of the curriculum, which is content-overloaded. Specific needs identified related to child behaviour are the are the undisciplined behaviour of kids, poor control of their parents and mistreatment of girls and disabled children. When it comes to the priorities of parents, extra-curricular activities and good exam results are important reasons for parents to choose a school for their children. Often their expectation is for their children to become a lawyer or doctor. The level of support for their children differs per educational level of the parents. Lower educated parents and parents living in rural areas often fail to see the need of education as much as higher educated parents in urban areas.

7. How ICT can meet local needs

In [Chapter 5](#), the state of ICT has been illustrated, which is generally poor. Besides, the roots have been outlined. In [Chapter 6](#), the educational needs have been identified. In this Chapter, the matching of ICT with local stakeholders' needs is outlined. Starting from the current state (Chapter 5) and taking needs (Chapter 6) into account, has laid the foundation for this section. Firstly, the [ICT usage](#) is outlined. Afterwards, the [ICT lifespan](#) is elaborated on. Lastly, the question is answered [how ICT can meet needs](#) as identified in Chapter 6, and deal with the related barriers and opportunities.

7.1 ICT usage

As mentioned in [paragraph 5.1.2](#), access to ICT is constrained by the availability of devices, affordability, electricity, and buildings. Therefore, I will not elaborate on that here. ICT usage is also already mentioned, yet will be elaborated below. As mentioned in the [Conceptual and theoretical framework](#), technology should be customized to the local setting, since it acquires its meaning on-the-ground. Below, the relevant factors related to ICT usage for Sierra Leone are outlined: [access](#), [electricity](#), [internet](#), [knowledge and skills](#), and [attitude](#).

7.1.1 Access

Usage is constrained by access, which is not the only factor constraining usage. When having access, usage also depends on prioritizing. Firstly, usage depends on what you have access to, where and when. Usage depends on whether the access is at school, at home or at a friend's place (Interview educational expert, 05-05-2021). For students to use ICT well and develop their skills, having access at home is a big advantage (Focus group ICT-lab, 12-02-2021). Besides, you need to have time to access a computer. For example, teachers are often overburdened by the curriculum. Therefore, ICT should be made a priority in the school environment (for example, Interview Vice Richard Allen, 09-02-2021). Besides, the ICT usage is also constrained by the poor quality of electricity, internet, knowledge and skills, and attitude. This will be discussed next.

7.1.2 Electricity

As explained in [paragraph 5.1.1](#), electricity supply is very poor. First, to get electricity, you need to access the national electricity grid or you should have alternatives, such as solar energy or a generator (Interview Head Teacher Makombeh, 17-02-2021; Focus group Teachers Makonkarie, 26-02-2021; Interview educational expert, 15-04-2021). Yet, even for schools in the cities, which are mostly connected to the grid, grid reliability is very poor (Interview Vice Richard Allen, 09-02-2021; Interview

Vice Congress, 12-02-2021; Interview Officer We Yone, 15-02-2021). Therefore, a back-up generator is required for optimal ICT usage. Generally, in the rain season, the light quality is better than in the dry season. Generation of electricity is dependent on water, since it is hydroelectric power that is used in Sierra Leone (Focus group ICT-teacher Eva Houston, 12-02-2021; Focus group students Congress, 16-02-2021). For example, the Bumbuna hydropower plant produces less than 20 MW during the dry season. It has been completed in 2009 and generates 62% of the country's power. Besides, two thermal power plants at Kingtom (10MW) and Blackhall Road (16.5 MW) serve the Freetown Western region area, and the 6 MW Goma run-off river hydropower station serves the Bo-Kenema system in the provinces. Oil-fired facilities provide the remainder (Ministry of Energy, 2016). Whereas hydropower generates less in the rainy season, solar is less efficient in the rainy season, since it is dependent on sun (Interview educational expert, 01-03-2021). Moreover, grid reliability in the evening is slightly higher than in the day time. That is why some schools will teach ICT during the night (Interview educational expert, 01-03-2021). The ICT teacher of Eva Houston illustrates how hard it is for a school having an ICT-lab to have no electricity in the time slot children are expected to be taught:

“Even the last time, when the old generator spoiled, we were so suffering here. Because when the time reached, children to come and take the practical. In fact, they will come and we will not do practical. It was so hitting on them. Because when they come to the exam, how can you expect them to do that. Some of them don't have the opportunity at home.”

(Focus group ICT-teacher Eva Houston, 12-02-2021)

It is in the morning, 16th of February 2021. It is the second time I'm visiting Eva Houston. Eva Houston is a private primary school, combined with JSS. The school is in Thunder Hill, Freetown. Eva Houston is a medium-sized school, for about 500 pupils, employing 35 teachers, 5 cleaners and 5 staff workers. After a focus group with the teachers and an interactive session with the pupils, I observe informally for a short time in the ICT-lab, where no class is ongoing.

The ICT teacher offers me a seat in the middle of the ICT-lab. The class is not very spacious, yet big enough to have 10 computers with 2 chairs each. Today, I only find two girls of primary school age sitting next to me, in addition to the ICT teacher. One of the girls is taking her lunch from her lunchbox. I am curious to know why there is no class today and soon hear from the ICT teacher that the children are all having their tests in these weeks. I ask her when I can observe in the ICT-lab at a moment pupils are practicing their digital skills in class. She answers the week after next week will suit, because after the tests they have a holiday of a few days.

When I am talking with the ICT teacher, the generator shuts down. The previous interviews and focus groups, the ICT teacher and other teachers told me the electricity is one of the challenges they are facing. Eva Houston uses the national grid. Unfortunately, this grid is not very reliable, as I experienced this morning. Being in the school for 2 to 3 hours, the generator has been on. The sound of the generator is easy to recognize, as the generator creates a loud noise. When the generator shuts down, it mostly means one of those two things: light is back or no fuel is left. Without asking, the ICT teacher tells me that the grid has not been functioning the whole morning. Based on my experience, I know it is very likely that no generator fuel is left.

Box 7.1 Vignette electricity Eva Houston (Field notes, 12 & 16-02-2021)

While observing in the ICT-lab, the electricity went down. See Box 7.1 for the vignette which illustrates the situation in Eva Houston. (Focus group ICT-teacher Eva Houston, 12-02-2021). The challenge of not having electricity is confirmed by an educational expert, speaking from his personal experience of suffering grid shutdowns, while studying (Interview educational expert, 15-04-2021). As mentioned in [paragraph 5.1.1](#), generally, grid reliability is poorer in rural, public and primary schools, compared to urban, private and secondary schools. In schools that have external funding, for example from foundation, there are more funds available for the generator and fuel (Interview educational expert, 15-04-2021; Field notes, 05-05-2021). Yet, as mentioned before, during Corona, these funds have been decreased. Electricity, and especially alternative energy, is quite expensive (Interview educational expert, 21-02-2021). Electricity rates are among the highest in Africa, US 28 cents/kWh. Before the war, 120 MW of generation capacity has been created, 86% of which has been allocated to Freetown. The war has destroyed a lot of the capacity. Besides, the electricity infrastructure is not maintained well and therefore has become less efficient. For example, the Bumbuna and Goma hydropower plants operate only at half capacity due to a lack of maintenance and turbines requiring a major revision. Currently, Sierra Leone has a total capacity of 90MW, while the population has been growing. Challenges related to the poor grid supply include the poor maintenance and residents cutting electricity cables. One of the reasons for the high rates is that electricity is provided by the private industry. Alternatives are occasionally available. There are initiatives for alternative energy, for instance, provided by Barefoot College in solar and Dodo hydro. Yet, these are not yet available on a larger scale. Ideally, solar energy would make up 10% of the total energy generation. A big challenge is again the lack of funding and poor infrastructure (Ministry of Energy, 2016). When electricity is available at a school, it does not mean that everyone can access electricity. It is mostly accessible in the staff room (Observation Richard Allen, 05-02-2021; Focus group students Congress, 16-02-2021). A father mentions during the focus group that an alternative for charging your devices is to go to a telecentre. Yet, that carries significant risks:

“And when you take this one to this a telecentre for them to charge. One thing that they need to do it, either they change your battery, or you remove your memory card.

(Focus group Congress, 26-02-2021).

7.1.3 Internet

Apart from electricity, the quality of internet also constitutes a challenge in relation to the optimum use of ICT. Like electricity, internet is also less available for rural, public and primary schools (Interview STC, 30-03-2021). Internet coverage is very poor in rural areas, if available (Field notes 18-11-2020; Focus group teachers Makonkarie, 26-02-2021; Interview educational expert, 15-04-2021). As mentioned in [paragraph 5.1.1](#), high-speed internet is only available for a minority. According to an educational expert,

it is only available for the well-to-do (Interview Makombeh, 18-02-2021). Another educational experts mentions:

“You know, if they were actually into that [internet], have some control over the big telecoms and get it to serve it. You know, want to have it reaching out everywhere. To, to have proper, you know, good packages, and students data packages. And why is it that our telecom is at five or six times more expensive than in the UK?”

(Interview educational expert, 21-02-2021)

Whenever internet is available, affordability is a big challenge. Most of the schools that have internet work with MiFi, which requires a monthly subscription (Focus group ICT-lab Eva Houston, 12-02-2021). Therefore, it depends mostly on funding. An educational expert mentions:

“I went to university in 2017. There was established Wi-Fi the first semester, and it worked effectively. The second semester the password changed and only few students did have access, who did have the password. The third semester they told us they cannot afford to subscribe. That was the end.”

(Interview educational expert, 15-04-2021)

Although this is about the university environment, a similar event could occur at primary and secondary schools. Yet, usually there is usually no such internet available in primary or secondary schools. EducAid is an exception, where you can go to the sight-coordinator and sign in for the Wi-Fi (Interview educational expert, 15-04-2021). One of the schools used to have a contract with a GSM provider to provide cheap bundles to their students (Interview Vice Congress, 12-02-2021). The Vice Principal of Congress mentions the seriousness of the problem:

“Really the IT is a serious problem. Because one time, the ministry was here, they say they are coming to install internet so that they can they can install so they can assist. But on to now, they have not come.”

(Interview Vice Congress, 12-02-2021)

A teacher of Congress (Focus group, 16-02-2021) mentions that each day you must spend money on megabytes to stay connected, as alternative to having MiFi, which is only available for the rich. An alternative is going to an internet café, where you spend a lot of money to access ICT and internet (Focus group teachers Congress, 16-02-2021). A student of Congress tells:

“You know, you need to buy credit to be able to transfer it to airtime, so you’ll be using it during your research. So, since we are coming from a poor home so you might not be having the money to buy airtime every day. So, you just have to wait. When we’re given our lunch, we just keeping it, saving it until a particular amount and then buy it at a time.”

(Focus group students Congress, 16-02-2021)

Before you can buy megabytes, you need to buy airtime. You can transfer that to data. To be able to buy it, the students say that they save money from their transport or lunch. Whenever internet is available, the quality is not always good, depending on the location and timing (Focus group students Congress, 16-02-2021; Field notes, 02-03-2021; Interview educational expert, 15-04-2021). The high costs and low quality discourage people from using the internet (Interview Officer We Yone, 15-02-2021).

7.1.4 Knowledge and skills

The quality of ICT usage also depends on the personal knowledge and skills. See Table 5.6 for an overview of digital skills that the various stakeholders possess. Table 7.1 shows that in general; staff have more digital skills than teachers, who have more digital skills than pupils, who have more digital skills than parents. For all the stakeholders, digital skills are lower when they live in rural areas compared to urban areas. For example, in rural areas, teachers do not often know what a computer is (Focus group Makonkarie, 26-02-2021) or how to save a document (Interview Makombeh, 18-02-2021). See Box 7.2 for an illustration of the digital environment in the village Makonkarie. In the urban schools, most teachers are illiterate (Focus group teachers Richard Allen, 05-02-2021). It is hopeful that where no ICT

Table 7.1 Digital skills in visited schools among various stakeholders

Schools visited (in order of type of funding)	Digital skills school among stakeholders in schools (for pupils/ students = equipped at current school)					Type of school	Funding
	Staff	ICT-teacher	Teachers	Pupils/ students	Parents	Level/ type/ location	Type of funding
<i>We Yone George Brook</i>	All	Available, not teaching (starting)	None	Starting	None	Primary Private Rural in urban	Foundation
<i>EducAid Lumley</i>	All	Available, not teaching	Most	None	Occasional	Secondary Private Urban	NGO
<i>Eva Houston Thunder Hill</i>	Occasional	Available, teaching	Occasional	Equipped	Occasional	Combined Private Urban	Fees paid by parents
<i>Rising Academy Calaba Town</i>	All	No appointed ICT teacher	Most	Starting	Occasional	Combined Private Urban	Fees paid by parents/ organization
<i>Rising Academy Waterloo</i>	All	Available, teaching (starting)	Most	None	Occasional	Combined Private Urban in rural	Fees paid by parents/ organization
<i>Makombeh</i>	Occasional	No appointed ICT teacher	None	None	None	Primary Private/ Gov-ass. Rural	Foundation/ government-assisted
<i>Richard Allen Kissy</i>	Occasional	Available, not teaching	Occasional	None	Occasional	Secondary Public Urban	Government/ (community)
<i>Muslim Congress Kissy</i>	Occasional	Available, not teaching	Occasional	None	Occasional	Secondary Public Urban	Government/ (community)
<i>Makonkarie</i>	None	No appointed ICT teacher	None	None	None	Primary Public Rural	Government/ diaspora

Legenda: Green = extensive digital skills Orange = occasionally Red = no or rarely digital skills

teachers are available, even in villages, there are people, although few, that have ICT skills. These people can train others. Besides, the digital skills of the various stakeholders are poorer in public schools compared to private schools. The requirements of private schools and externally funded schools are often for staff to be already ICT literate (Interview EducAid, 21-02-2021). When it comes to university students, most do not know how to use a computer (Interview Schooling for Life, 01-04-2021). Yet, the students that have digital skills often help other students (Interview educational expert, 15-04-2021).

While knowledge and skills will help you to prioritize, by prioritizing you will get the knowledge

It is in the afternoon hours, Sunday, 28th of February 2021. Today a 'poda poda' (minibus) has been hired by a social enterprise, which I had joined for my internship, to go to the village Makonkarie. After a ride of 3 to 4 hours, we arrive. From the main road, it took us about half an hour to reach the village. I have visited Makonkarie once before during this internship for private reasons and observed shortly in the school. Makonkarie is in Tonkolili District, Northern province of Sierra Leone. The school in Makonkarie is set up by the grandfather of the director of the social enterprise, who is a diaspora living in the Netherlands. Some now and then, the diaspora supports that school personally. For example, by sending uniforms. The school is a public primary school. They have 6 teachers, of which 3 are approved and on the government payroll. They are a small to medium-sized school, having 300 pupils, mainly in class 1 (81), with 30 to 54 pupils in other classes. The boy-girl ratio is almost evenly balanced in all classes. Girls slightly outnumber the boys (by 3 more), except for class 6 (where the ratio is 22 : 9).

When it comes to ICT, Makonkarie is unwitting. The Sunday afternoon, I conduct a focus group with 3 of the teachers. It is interesting to notice that this is a Muslim school, and therefore it is opened on Sunday's, and closed on Friday's. First, I ask their permission for recording the session. They're not aware of what it means to be recorded, so I explain them and they grant permission. Their IT illiteracy becomes apparent in two ways: talking in their own language or being silent. I see in the eyes of the teachers that some simply do not know what I am talking about and therefore remain silent. Other teachers talk in their own language to the senior teacher that communicates in English with me.

When discussing challenges and opportunities in the school, they easily know how to answer (See Appendix C for the Focus group Guide). Although there are some misunderstandings between me and the teachers, I observe that the teachers try to talk English directly to me and I mostly understand them. Besides, replaying the recording helps me to grasp what they mean. When it comes to the second topic in the focus group, ICT and its challenges and opportunities, they hardly provide any information. Though in the first part of the focus group, I observe that the teachers are quite talkative, in this part they are less talkative. The answers are more to the point and less elaborate. Taking my smartphone, which is recording in front of them, as an example of ICT, makes it a bit easier. Therefore, I ask them specific questions, on grid access and reliability, internet, security, and knowledge. They confirm that these aspects are lacking and they need it for sure.

Moving back to Freetown that day, feels like I returned to another universe. Villagers often have to travel considerable distances on foot to access the network. Back in Freetown feels like going back to a life with a much better access to electricity, internet, and above all, digital devices. I do not longer feel very special having a smartphone anymore.

Box 7.2: Vignette ICT Makonkarie (Focus group 28-02-2021; Interview Diaspora, 16-03-2021)

and skills. So, it is a vicious cycle. Since most stakeholders in the educational system do not have access to ICT, they do not have the knowledge and skills needed (various focus groups, including Focus group teachers Richard Allen, 05-02-2021; Focus group students Richard Allen, 09-02-2021). One of the students participating in the focus group came from a private school and accessed a laptop at home and at school. Therefore, she has the knowledge and skills. Yet her classmates at the public school do not have access to it and therefore lack knowledge. It is often assumed that young people acquire IT knowledge easily and automatically adapt to use ICT and other technologies. This research shows that this is not the case. Similarly, it applies to teachers. Internet is also an important factor constraining quality of ICT usage. It is rarely available on schools, since it is very expensive and the quality of the internet connection is often low (Focus group ICT-lab, 12-02-2021; Interview Makombeh, 18-02-2021).

7.1.5 Attitude

Generally, having the right attitude helps to benefit most from ICT, apart from providing a reason to access ICT. This means people need to have a positive attitude. For example, they like to use ICT and know how to use ICT in a conscientious way. A positive appreciation of ICT is useful, yet a positive appreciation or attitude towards ICT can also be created by experiencing ICT. Particularly in the villages, most people have not seen ICT 'in action' and consider it an alien phenomenon (Interview STC, 30-04-2021). When they familiarize with ICT, their attitude often changes (Interview We Yone Officer, 15-02-2021). Making the children aware of the importance and risk to children is important when it comes to ICT and the learning environment. The following quote shows the reaction of children when it comes to ICT:

Proprietor: And the children can ignore the mathematics lesson. The computer lesson, they will come.

IT lady: They will be so happy to do it. Especially the initial stage, when they go to class 3 newly, they are so happy. Even when they don't have subject, they will come around. So, because of they're eager to know it. So that's the thing.

(Focus group ICT-lab, 12-02-2021)

So, ICT can reinforce to children's motivation and thereby learning. It contributes positively to the intrinsic motivation. Referring to the [Conceptual and theoretical framework](#), this is important when it comes to changing the method of learning from behaviorism towards constructivism, where the latter one requires creating an interactive learning environment where education is learner-centered (Huang et al., 2019, Ch. 2). Having the right attitude is key for successful implementation of ICT. An educational expert shows her concerns when training teachers by saying: *"Teachers refer to what they are used to"*, they tend to fall back in old patterns. Therefore, good monitoring is important to see if ICT is used for its purpose and creating added value for the teachers by using ICT (Interview educational expert, 30-03-2021; 05-05-2021).

7.2 ICT Lifespan

Apart from particularities related to ICT usage in education in Sierra Leone, the ICT lifespan is also very important when it comes to sustainable ICT usage. The ICT lifespan has been constrained in many of the schools. As mentioned, the ICT-labs in EducAid, Richard Allen and Congress used to be operational. Various causes were underlying the demise of the ICT-labs. Below, the relevant particularities related to ICT lifespan for Sierra Leone are outlined: [security](#), [maintenance](#), [repair](#), [monitoring and funding](#), and [practical issues](#).

7.2.1 Physical security

Firstly, security is important for the ICT lifespan. In Congress, there was a riot that damaged the devices (Interview Vice-Principal and ICT-manager; 12-02-2021). This is particularly challenging for urban areas. Rural areas often have societal control, which makes it hard for someone to steal, without being apprehended (Field notes, 18-11-2020). The Head Teacher of Makombeh mentions:

[...] In the village setting we don't expecting too much stealing [Female teacher confirming 'stealing']. Because if we use those metal doors on metal windows it should not be easy. And also, we can take one of the community member, we make a single room that he will be the security for those materials.

(Interview Head Teacher Makombeh, 17-02-2021)

He offers a solution that is mentioned more often by the various stakeholders: door and lock security, and security guard (Field notes, 18-11-2020; Interview ICT-manager Congress, 12-02-2021; Interview Officer We Yone, 15-02-2021). The school can pay for a security guards, who will watch the ICT-lab at the night. During the day, there are mostly people at the compound, which means the computers are safe. Therefore, it is a cost-efficient measurement. For example, the guard can sleep close to the lab. During the day, there are enough people around (Interview Head Teacher Makombeh, 17-02-2021; Field notes We Yone, 15-02-2021).

7.2.2 Maintenance, repair, monitoring and funding

Secondly, maintenance, repair and monitoring are key for an extended ICT lifespan. This is a well known fact for all kinds of newly introduced technologies and infrastructures in many places and confirmed in various research studies (for example in Ghana: Quaicoe, Pata, and Jeladze, 2016; Quaicoe and Pata, 2018; Amedeker, 2020). This has been the cause for the shutdown of the ICT-lab in Richard Allen (Interview ICT-teacher Richard Allen, 05-02-2021) and EducAid (Interview educational expert, 21-02-2021). For EducAid, the major underlying barrier has been the lack of funding. Giving incentives for the ICT teacher to maintain the lab, will encourage the ICT teacher to maintain of the lab, which extend its lifespan. This includes removing dust from the computers and maintaining proper humidity levels in the

lab room (Interview educational expert, 21-02-2021), but also repairing devices when they are broken. Most educational stakeholders depend on third parties to repair their devices. This means there is an opportunity for others to earn money, but schools funds are limited and repair priority is often 'zero', which means repair is delayed (Interview Officer We Yone, 15-02-2021; Interview Head Teacher Makombeh, 17-02-2021). An educational expert mentions that it is often hard for the administration to allocate a budget for repair for computers. A solution is long-term planning and budgeting, which is not a regular part of the culture in Sierra Leone (Interview educational expert, 15-04-2021). An opportunity

Table 7.2 ICT infrastructure in visited schools

Schools visited (in order of type of funding)	ICT infrastructure						Type of school	Funding
	ICT-lab usage	Building	Ventilation	Security	Electricity	Internet	Level/type/location	Type of funding
<i>We Yone George Brook</i>	Yes	Available (small, but building a bigger room)	Ven	Lock and physical security	+ generator	MiFi used	Primary Private Rural in urban	Foundation
<i>EducAid Lumley</i>	Before	Available (small)		Lock and physical security	+ generator/solar		Secondary Private Urban	NGO
<i>Eva Houston Thunder Hill</i>	Yes	Available	AC non-functional but ven	Door	+ generator	Network connection	Combined Private Urban	Fees paid by parents
<i>Rising Academy Calaba Town</i>	No	Available		Lock and physical security	+ generator	Network connection	Combined Private Urban	Fees paid by parents/organization
<i>Rising Academy Waterloo</i>	Yes	Available	Arranging after visit	Lock and physical security	Generator (broken during visit)	MiFi used	Combined Private Urban in rural	Fees paid by parents/organization
<i>Makombeh</i>	No	Not available			Not on the national grid (yet solar)	No network	Primary Private/ Gov-ass. Rural	Foundation/ government-assisted
<i>Richard Allen Kissy</i>	Before	Available	AC non-functional, but ven		+ generator	Network connection	Secondary Public Urban	Government/ (community)
<i>Muslim Congress Kissy</i>	Before	Available	-Ven	Improved security, yet reason for stolen devices	+ generator	Network connection	Secondary Public Urban	Government/ (community)
<i>Makonkarie</i>	No	Not available	-	-	Not on the national grid (yet solar)	No network	Primary Public Rural	Government/ diaspora

Legenda: Green = extensive ICT infrastructure Orange = limited availabilities or possibilities Red = no infrastructure at all or rarely

is funding by parents. When educational stakeholders see the need, and they often prioritize extra-curricular activities, they might want to contribute. Yet, a challenge in public schools is the well-meant 'Free Quality Education' programme. The educational policy prevents the school from requesting (financial) parent support, since education must be free (Focus group teachers Richard Allen, 05-02-2021). At the same time, community funding is identified as a new opportunity by two principals of the schools sampled. In stead of requesting parent support, the broader community is asked to provide funding. They often care much for the quality of the school in their community. While asking the parents to pay in the fee is not allowed by the government, community funding is outside government control (Interview Principal Richard Allen, 09-02-2021; Interview Vice-Principal Congress, 12-02-2021). Whenever ICT implementation would fit local needs, the best options are low-cost and low-tech, because of the lack of funding. This technology is easier to maintain and therefore will have an extended lifespan. Examples are mentioned in [Appendix G](#).

7.2.3 Practical issues: hardware charging and ventilation

Apart from ICT usage and lifespan, practical issues related to the ICT must be considered as well to ensure successful ICT implementation. In Sierra Leone, this includes charging and ventilation. An educational expert states it is regular procedure to charge continuously, since the grid is prone to failure. However, this procedure will shorten the lifespan of laptops and desktops (Interview educational expert, 21-02-2021). Besides, a lack of ventilation has caused machines to break down various times. Airconditioning systems have been functional, but are not maintained (Focus group ICT-lab Eva Houston, 12-02-2021; Interview ICT-teacher Richard Allen, 05-02-2021). An underlying barrier again is the funding.

In Table 7.2, an overview of ICT infrastructure in the various schools is given. The first column (ICT-lab usage) is based on Table 5.3 and Table 5.4. The various elements for local appropriation as just outlined, are presented. In the last column, the type of funding is shown, since this has a close link with the ICT infrastructure. It can be concluded that private schools and schools with external support in addition to government assistance, have a better overall ICT infrastructure. Yet, community-funded public schools also have a relatively good ICT infrastructure.

7.3 ICT vs. local needs: challenges and opportunities

There are many ways in which ICT can contribute to the local needs, directly or indirectly. There are certain needs for which ICT will not provide a direct solution. These needs include provision of food, water, health and toilet facilities. Besides, ICT will not be a remedy for the lack of funding, though funds

may be redistributed to allocate more funding to ICT and less to other needs. Therefore, ICT should meet multiple local needs, so it can bring more benefit overall. Below, the opportunities to contribute to [marketing](#) opportunities for the [learning environment](#) and the challenges and opportunities for [funding](#) are outlined. In the last part, lessons are drawn from low-tech initiatives.

7.3.1 Opportunity: Marketing

Generally, ICT can help to get more children into school. Since parents often prefer schools that offer extra-curricular activities, it is a great 'marketing' activity for schools to provide ICT (Interview educational expert, 05-05-2021; Field notes, 12-05-2021): the more pupils, the more funding (Focus group teachers Makonkarie, 26-02-2021). Yet, the challenge of overcrowded classes remains. Therefore, more buildings must be build at the same time and more teachers are required. When it comes to the learning environment, ICT brings more benefits. These will be discussed below.

7.3.2 Learning environment

ICT can bring a lot of potential, as it brings content, and content is knowledge. Important aspects include the learning content, career preparation, class preparation and improvement and administration, which are outlined below. Lastly, digital security is outlined.

7.3.2.1 Learning content

Firstly, the amount of learning materials can increase. Various stakeholders, including educational experts, principals and students, mention that on the internet you can find tutorials and other information to teach yourself as a teacher or student (Interview Vice Muslim Congress, 12-02-2021; Interview Makombeh, 18-02-2021; Focus group students Richard Allen, 09-02-2021; Interview Richard Allen, 12-02-2021; Focus group students Congress, 16-02-2021; Interview We Yone, 15-02-2021; Interview Schooling for Life, 01-04-2021; Interview RAN, 16-04-2021). Though it gives an opportunity to incorporate more content, this content can also cause distraction. Teachers mention that students can use it to watch porn, play games and watch other materials that are distracting from learning (Focus group Richard Allen teachers, 05-02-2021). At the same time, the ICT teacher of Eva Houston (12-02-2021) mentions that pupils might also access YouTube videos to educate themselves on religion or play games that are educative, so they have fun. It rather depends on your focus and attitude.

7.3.2.2 Career preparation

Even more important, digital devices help children to prepare for 21st century jobs. Many interviewees and focus group participants mention that it is hard to find a formal job in Sierra Leone. It is the formal

job market that most people want to be employed in, particularly because of the higher income it provides and income sustainability. The stakeholders with digital skills themselves are the ones that often add that formal jobs are easier to acquire when having digital skills, especially in offices (for example Interview educational expert, 21-02-2021). A teacher at Rising Academy Calaba Town illustrates this by referring to himself as a case study:

“With this IT, I want to use myself as a case study. In 2006 when I applied for a job after volunteerism with [...] development. And because of the computer barrier, I went through the interview. There were 3 stages. The interview, I did very well. The written, I did very well. And the last part of the interview was just a simple sentence ‘a quick brown fox jumped over the lazy dog’, something like that. I was asked to type that one and save it. You can’t imagine. I wasn’t able. I spend over 30 minutes there. And the people really needed me there at that time, because I know the stuff and the practical aspect. But just because of that particular obstacle, I couldn’t pass it. The man that was interviewing, called me and asked, ‘did you type it?’ I said yes. I went there, they could not see it. I went outside, they called me again. Yes, they said: ‘Young man, we don’t want to lose you, try to type this thing’. I stand nervous, I couldn’t type it. After that interview, I spoke to myself that after today I would try to have some knowledge about computer. It was a very huge setback and I would never forget that one in my life. Now they’re at a very young stage. I will try for them to have some basics about knowing computer at the very early stage. It has a huge positive impact on your life in whatever area you go in the present world that we live in. We really appreciate it.”

(Teacher during focus group Rising Academy Calaba Town, 07-05-2021)

The deputy of the school reacts on it during the same focus group:

“So, to crown it all, we don’t want the mistakes that we have passed through for our kids to face the same. So, we are pleading and asking that we have that computer facilities in our schools. So, they start it at a very early stage. Not like us, when we’re old now, we try to do it. You see?”

When it comes to ICT companies, most of them train the graduates before employing them (for example interview NRA, 24-01-2020; interview owner ICT company, 19-11-2019 in De Bruine, 2020a). This illustrates the need for a workforce empowered with digital skills, which starts in primary and secondary schools.

7.3.2.3 Class preparation and improvement

For teachers, computers can help them to prepare their lesson notes. When a computer is available for them, they can prepare their lesson notes in for example Word, which will save them a lot of time. They can use this time to look for other income opportunities. This is not necessarily good for the educational quality. Besides, they can educate themselves to improve their classes. Since the curriculum is outdated and materials to prepare classes are scarce, ICT can be of great help (Interview educational expert, 21-02-2021; Interview educational expert, 05-05-2021). Yet, whether theoretical teaching will change because of ICT use, is open to debate. Many stakeholders and experts mention that people used to fall back into previous routines. They are used to the traditional method of teaching, especially the older teachers (Interview STC, 30-03-2021; Interview educational expert, 05-05-2021). At the same time, proper training combined with the teachers experiencing the benefits of ICT themselves, can make them change (Interview educational expert, 05-05-2021).

7.3.2.4 Administration

For staff, a digital administration can save them much time. It will also give more reliable and transparent grades, which can be compared. Corruption will be easily discouraged as it reveals itself more easily. Yet, this is not mentioned by most educational stakeholders, potentially since they contribute to and benefit from it themselves (Interview educational expert, 21-02-2021) and one ICT manager using a computer for the administration (Interview ICT manager Congress, 12-02-2021).

7.3.2.5 Digital security

Beside the opportunities, for the learning environment, digital security is important. Digital issues include hacks and privacy issues. This is particularly challenging for administrative staff, since they are using sensitive data. At the moment, cyber crime is not punishable. An educational expert mentions that the parliament is creating a bill on cyber crime (Interview educational expert, 05-05-2021). He illustrates this by giving an example:

“On the internet, you can easily post wrong information about persons. Some things should not be allowed to post. It cannot be true and create psychological impact. It’s now investigated by the police. They try to create a bill to be a law that will minimize cyber crime. It’s like the act of stolen money. You need evidence.”

(Interview educational expert, 05-05-2021)

This quote highlights that in the physical world, we need physical security; likewise, in the digital world, we need digital security. Digital security is, similarly to the state of ICT in education in Sierra Leone, very poor. Therefore, when implementing ICT, digital security should be prioritized.

7.3.3 Funding and low-tech initiatives

Another need is low-cost ICT. Since a major problem in the education system is funding, ICT should try to be low-cost to fit local needs. This is particularly important when it comes to the longer term, or sustainability of ICT projects. Whereas this Thesis is focused on high-tech, including laptops, desktops, tablets and smartphones, low-tech solutions will be briefly covered as some lessons can be drawn for high-tech initiatives. High-tech has not been commonly applied yet. It is the high-tech that provides pupils with skills most useful in the job market. For example, on a tablet, you cannot learn how to type, like on a computer (Interview STC, 30-04-2021). The importance of having digital skills, has been shown in the quote in [paragraph 7.3.2.2](#). Most initiatives are low-tech, and lessons can be learned from recent initiatives. In [Appendix G](#), an overview of recent EdTech initiatives is given. As explained, EdTech stands for Educational Technology. The recent initiatives are predominantly low-tech and only occasionally high-tech. This overview shows two types of projects: projects with or without a government partner. Project with government partners, are bigger than projects without a government partner. The

implementing partner is necessary to create meaning on-the-ground. Two of the initiatives are highlighted below as well as the lessons that can be drawn from it: Rising on Air and the Education Innovation Challenge (EIC). Whereas the Rising on Air is set up by Rising Academy Network (social enterprise), it partners with the MBSSE. The EIC has been directly set up by the government and partners with education providers, including Rising Academy Network.

7.3.3.1 Rising on Air

Rising Academy Network (RAN) has launched their radio programme 'Rising on air', which taught children during the Corona pandemic when schools were closed. Thanks to the experience gained during the Ebola epidemic, within a week the radio programme was launched. A 20-week programme was created with free distance learning, making use of high-quality, structured curriculum content in the areas of literacy, numeracy, languages and arts. It has been low-tech delivered via radio and SMS. Besides, it has been available online, where people and organizations can adapt it to their own context and translate it to their own language. In March 2021, the programme had reached 25 countries and over 12 million children. A study has conducted and from the sampled children, 47% listened, 3.7 times per week on average. 75% of the children who listened, listened with other children and 60% with a parent present. In 8 weeks, 88.177 text messages have been sent to about 4200 parents in Freetown. From the sampled surveys, 90% of the parents found the text messages useful and want to continue receiving them. In November 2020, an assessment of 2.413 showed that reading and numeracy had improved through the pandemic, yet it has not been possible to attribute the effect to a specific aspect of the Rising on Air (Korin, 2021). An educational expert from Rising Academy mentions that there are also constraints:

“High-tech is shiny, but expensive. My view is: how can we use technology as a tool? The radio requires engagement of parents as well. To support their children to listen. If there’s reliable internet and power, that’s a great starting point. It’s not just technical. The content quality, how to run well, etc, is very important.”

(Interview RAN, 16-04-2021)

Even the most remote areas which need low-tech most, might not have access to radios. Yet, these low-tech solutions are most promising for remote areas (Interview STC, 30-04-2021). The first lesson that can be learned from Rising on Air learned is that for high-tech, it might be a step too far to start ICT in remote areas, since the infrastructure is very poor. Having interesting and educational content is also important. A radio program has been launched during Ebola by the government, which has not been listened to often, since the content quality was poor and few people listened in. A teacher of Richard Allen confirms such concerns:

“And again and again. Few kids are interested in this radio thing. Most of them is TV, TV. For some time, we also run from radio station. Listening to news that night. Definitely we have these kids now. What did you study from the radio station? They tell you nothing. Movies. They will tell you about movies. You see?”

(Focus group teachers, 05-02-2021)

Low-tech offers a solution for the poor funding in the education system, yet shows other challenges. Moreover, compared to high-tech solutions, low-tech users do not need that many skills (Interview RAN, 16-04-2021). The second lesson is that the content quality is important to get children and other stakeholders involved. Overall, this programme was very successful because of its high quality-content and the opportunity to adapt content locally and translate content into different languages. These factors are also very important in high-tech solutions.

7.3.3.2 Education Innovation Challenge

The current government launched the Education Innovation Challenge (EIC), which is coordinated by the DSTI. The EIC is an innovation challenge involving education providers. Government schools have been assigned to cooperate with the providers. The providers include: EducAid, Save The Children, Rising Academy, World Vision International and National Youth Awareness Forum. They have to offer an innovation related to a numeracy and literacy approach, for which they get \$25 per pupil per year from the government. In the initial phase, the focus is on primary school in rural areas, and the aim is to reach 500 schools. In this phase, EducAid got 60 schools, Save The Children 15, Rising Academy Network 25, World Vision International 40 and National Youth Awareness Forum 30. In phase two, they want to reach 250.000 pupils, after which phase three is expanded nation-wide. Low-tech solutions include radio, TV, SMS, low-data mobile devices and tablets. The government and funding parties observe which approach has optimum impact. Each provider receives support for three years, with a baseline assessment and a yearly assessment. After 3 years, the innovation is rolled out (Interview educational expert, 30-04-2021; SLEIC, 2019; EIC, 2021).

As can be seen in [Appendix G](#), the EIC has finished phase one around September 2020. The goal has been to reach 500 schools in phase one and currently, 340 schools have been reached. In January 2021, the Midterm assessment has been done. A total of 9908 students have been reached, consisting of 4905 male and 5002 female. Besides, 15 districts and 110 chiefdoms have been reached. In [Appendix H](#), results are presented, including the baseline and midterm assessment of literacy level overall (Figure H2), overall numeracy level score (Figure H3), numeracy/math score per class (Figure H4) and literacy level per class (Figure H5). In Figure H1, an overview of the literacy and numeracy skills required is given. As can be seen in Figure H2 (literacy) and Figure H3 (numeracy), the overall literacy and numeracy have significantly increased. Figure H4 (math skills per class) presents a clear divide between the lower classes

of primary level (class 1-3), which have lower scores, and higher classes of primary level (class 4-6), which have significantly improved scores. This suggests that low-tech solutions work better for the higher classes of primary school than lower classes of primary school. This is confirmed by Figure H5, which shows that the EIC projects have had a more positive impact on the higher classes than on the lower classes of primary level. Overall, the positive impact of the EIC on numeracy levels in higher classes is more positive compared to the increase of literacy scores. This suggests that low-tech initiatives have a more positive impact on literacy. Yet, these suggestions are made based on data collected during the Corona pandemic. During the Corona pandemic schools have been closed. The effect of the Corona pandemic is yet to be researched.

Education providers faced various challenges along the way. Early 2021, Rising Academy has not been receiving funds from DFID for the second phase. Corona is challenging the funds (Mullan and Taddese, 2020; Interview RAN, 16-04-2021; SLEIC, 2019). Therefore, the lesson that can be drawn from the EIC is confirming earlier findings: funding is very important, for both low- and high-tech solutions. Besides, communication has not always reached the schools concerned. An educational expert mentions that after 6 weeks, a deputy director no longer communicated with project partners and low(er) level staff. People on-the-ground in the schools did not know about the project and the education provider was not taken seriously. The education provider highlights that monitoring, support and backing, and 'the eyes-on' attitude are important to make sure their approach is being conducted as a proper experiment. Unfortunately, none of that happened, according to the educational expert (Interview, 21-02-2021). Here we see a top-down project not creating the desired on-the-ground meaning, which makes it hard to consider local needs. The two major lessons learned from the EIC is the need for proper funding and communication to create local meaning and realize longer-term sustainable projects. Besides, focusing the technology on the right students might reinforce impact. For the EIC, results in maths have been better for higher classes than lower classes in primary school. Yet, these suggestions are drawn from a situation where most schools were closed due to the Corona pandemic.

7.4 Sub conclusion

Whereas ICT might not be the solution for some problems, it might be for others. It could not contribute directly to the poor water, food, health, and toilet facility, but it has benefits. When it comes to ICT usage, ICT should be prioritized and usage depends on when you have access when and where. When implementing ICT, this can be considered. The electricity and internet availability and quality are negatively affecting opportunities for ICT. Therefore, when implementing ICT in primary and/or secondary schools, electricity and internet facilities should be in place. When it comes to the ICT lifespan,

a proper security, good maintenance, monitoring and repair system should be in place and hardware charging and ventilation should be carefully considered. ICT has the potential to increase attendance of children since it triggers their enthusiasm, and likewise for most parents. The increased content can help children to invest more in their school assignment, help teachers to prepare their classes better and faster and staff to do their administration reliably. Lots of challenges remain: the overcrowded classes and the need to raise teachers salaries. Lastly, to fit local needs, ICT should consider the funding system and lack of resources. Therefore, most initiatives have been low-tech and low-cost. Yet, there are opportunities for high-tech, since that is what is mostly required to enter the workforce. This is one of the lessons that can be drawn from the low-tech initiatives reviewed: Rising on Air and EIC. Two other lessons are that high-quality content is required for successful involvement of children and other stakeholders, and rural areas might be a step too far for starting up ICT. Besides, the EIC suggests that tech-interventions work better for higher classes of primary school and works better to improve numeracy in those higher classes compared to literacy.

8. Discussion

First, the contribution to literature will be discussed, related to the concepts and debates presented in the [Conceptual and theoretical framework](#). Afterwards, a short reflection is provided.

8.1 Contribution to education, technology and development

The goal of education is to create productive workers, responsible citizens and lifelong learners (Spector, 2015). One way to measure the impact is the 'employability' of students. 'Employable skills' are mostly 21st century skills, including critical thinking, problem-solving and digital skills. To get a formal job, being able to type is often a requirement. The low-tech initiatives that are currently undertaken on a large scale in Sierra Leone might increasingly provide students with 21st century skills like critical thinking and problem-solving, because of increasingly available learning materials. Yet it does not sufficiently prepare students for the job market sufficiently. While low-tech solutions offer an opportunity for the current challenges of a poor digital infrastructure and funding system, it does not provide sufficient training of digital skills. High-tech solutions, including desktops and laptops, do. Therefore, high-tech solutions are very desirable, yet they face significant challenges as identified in [Chapter 7](#). However, a question that should be asked is: How does ICT contribute to the desired shift from behaviourism to constructivism, or from the traditional towards the interactive education? As explored in [paragraph 7.1.5](#), teachers and other educational stakeholders tend to fall back into their old patterns. It seems that targeted training, monitoring, persistence and patience is required.

This Thesis has taken a constructivist approach towards education, where the user is at the centre. Instead of a single linear path to development, the perspective of local needs and appropriation has been taken. Technology gets its meaning through its social construction: without users using it and creating legitimacy, technology is nothing (Jasanoff, 2002). Bottom-up interventions are crucial for the social construction. This Thesis has provided an opening for development organizations to look at local needs, which have been identified, and see the value of bottom-up interventions with local stakeholders and communities involved to create more meaning on-the-ground. This requires development organizations to move away from considering technology inanimate, a one-size-fits-all tool or quick fix, as mentioned by Jasanoff (2002). This Thesis has given a voice to the people that are usually not heard: teachers, students and parents. While they are affected most by the education system, they are often not the ones that have a voice. By giving them a voice, social justice can be enhanced. As mentioned, it is not only a redistribution of resources and recognition that is required for social justice. It is representation, or decision-making power that is even more important (Fraser, 2007), which this Thesis

has aimed to promote for teachers, students and parents. One student was happily surprised when she was part of the focus group, as she mentioned that not even the school leaders ask for their views and opinions. Noddings (2005) illustrated this with the earlier mentioned question: “Do educators know what children need?”. Unless they ask children, they cannot be sure. This Thesis contributed to technology and development debates by providing a unique case of a resource-poor and donor-dependent country, Sierra Leone. Technology is made appropriate by considering local needs, and in donor-dependent countries, it is often the donors who dominate the decision-making process. Giving a voice to the recipients and making them not mere recipients, but co-constructors, creates self-realization, meaning on-the-ground and promotes sustainability of the project, since the project is legitimized by its users (Jasanoff, 2002).

This Thesis has also contributed to the concepts of project management, needs assessment and e-readiness. Firstly, as mentioned in the [Conceptual and theoretical framework](#), this research has placed itself in the needs assessment or initiation phase of project management as identified by Bogra (2014). This Thesis has contributed to a modern approach, in which a dynamic environment must be considered, and the related different perspectives. These different perspectives have been outlined in the result chapters. Taking the dynamic environment in combination with a bottom-up approach will provide legitimization in the further stages, including implementation and evaluation. Secondly, this Thesis has contributed to the concept of needs assessment. This Thesis has aimed to include specifically marginalized or rarely heard stakeholders. Beside key players (principals, staff and educational experts),

ICT access – How is the schools’ access to ICTs? – 4 indicators

1. Information infrastructure
2. ICT availability, affordability and quality
3. Internet availability, cost and affordability
4. Electricity availability, cost and quality

ICT perception and usage – How do local stakeholders perceive and use ICT? 3 indicators

5. Schools’ culture and attitudes towards ICT
6. ICT usage in everyday life
7. ICT usage in the workplace

ICT and the learning environment – How can ICT be integrated in the learning environment? – 3 indicators

8. Educational curriculum
9. Teaching and learning ways
10. Library/ lab

Institutional environment - To what extent does the institutional setting promote or hinder ICT introduction and usage? – 3 indicators

11. Schools’ strategy and plan, e.g. for maintenance
12. Financing and funding
13. Human capital

Box 4.2 E-readiness indicators (repetition)

subjects (pupils, teachers and parents) have been highly involved in the research. When ICT projects would involve those people in later stages as well, it is more likely that legitimacy is created for ICT implementation in a just way (Fraser, 2007). Lastly, this Thesis has contributed to the concept of e-readiness and local appropriation of technology. See Box 4.2 repeated on the next page. The results of this Thesis show that overall e-readiness is very poor. ICT access is poor in Sierra Leone, as well as the ICT perception and usage. Besides, ICT is not much integrated in the learning environment, neither does the institutional setting promote ICT introduction and usage. At the same time, it is found that the situation greatly differs per type of school. Particularly the private and urban schools perform better in the different categories identified. The various levels are found to be relevant for ICT implementation. Yet, the concept of e-readiness in the global South is not like the global North. A high level of e-readiness cannot be assumed for schools in Sierra Leone. Instead, all the indicators have to be adapted to the local African context and therefore the needs identified by the local stakeholders.

As mentioned in the [Conceptual and theoretical framework](#), Jeladze et al (2017) identified three dimensions of a digital ecosystem: mediating, transformative and flow components. Besides, they created three clusters: cluster one with low ICT access and primarily used for administration, cluster two with medium access but top-down, and cluster three with a functional digital ecosystem which is bottom-up. For Ghana, they concluded that most schools are in cluster one and two. The same applies for the research conducted for this Thesis, as there has been no school with a fully functional digital ecosystem. Besides, most schools that do operate non-functional ICT-labs, have suffered top-down interventions, without direct local involvement. Returning to social justice, in the ladder of participation, most projects have been executed at levels 3 'informing' or 4 'consultation'. This can be concluded from the low-tech initiatives of the EIC too, where stakeholders in the schools often did not know about the project, due to lacking communication.

8.2 Recommendations and suggestions

The findings of this Thesis can be used as an opening for further research and new directions for NGOs and policy makers.

Further research can focus on bottom-up approaches for the next phases of project management: planning and design, execution, monitoring, and evaluation and closing. These phases are interconnected, yet categorization helps to focus. Follow-on research cannot be executed without moving through initial phase research, neither does it make sense to research the initiation phase if projects are not executed and further monitored and evaluated to enable a sustainable approach. Besides, follow-on research can be conducted to find whether the different e-readiness indicators are

similar to those in other samples taken in Sierra Leone and other countries in the region, Africa or the global South. As mentioned, Ghana and Nigeria are relatively much researched, while other Anglophone West-African countries like Liberia, are less researched. The researcher has more experience in the Anglophone countries, but of course the same applies for the Francophone West-African countries. The advice of the researcher is to particularly research in the under researched countries, as confirmed by Samarakoon et al (2017). Lastly, the unique case of Sierra Leone can be used to compare with findings in countries in the global North. Similarities and differences can be identified. At the same time, it is good to be careful to allow for pluralism and differences and not aim for a uniform world, since there is not one linear path to 'development' and the binary distinction between 'developed' and 'development' countries is akin to assigning a superior position to the global North. Instead, lessons from Sierra Leone can be used for countries in the global North as well.

As mentioned, my recommendation is that NGOs and policymakers consider the bottom-up approach to developmental projects, specifically in the area of ICT in education. In the ladder of participation, involving the end users will likely provide more support and finally funding for the projects. Whereas co-construction might be very-time consuming for NGOs and policymakers initially, it can save a lot of time in the later phases and give much more satisfaction when you visit the school concerned. The researcher also encourages NGOs and policymakers to visit the project regularly to acquire situational awareness and be closer to the people which should be at the centre.

9. Conclusion

9.1 Answering research questions

Part 1: Present state of ICT and its emergence

The first sub question is "How did the present state of ICT in primary and secondary education in Sierra Leone emerge?". First, the Thesis had looked at the present state, and next outlined how ICT emerged.

Present state

The present state of ICT in primary and secondary education in Sierra Leone is poor. Firstly, the findings for access are discussed, after which usage is outlined.

First, access at home is very poor for the various educational stakeholders, including pupils and teachers. Therefore, the various educational stakeholders are mostly dependent on their access at school to develop their digital skills or IT literacy. ICT access for schools is better in private, internationally-supported and urban schools compared to public and rural schools. Whereas literature shows that primary schools have less access than secondary access, this has not been observed in the sample. Yet, all rural schools visited are primary schools. In Sierra Leone, secondary schools are concentrated in the urban areas.

Secondly, when it comes to ICT usage within primary and secondary schools, in the sample, the pupils and staff are mostly better off compared to teachers and parents. In most schools, ICT usage is mostly limited to students. Except for internationally-supported schools, where most staff and teachers have access and most pupils do not. Yet, for the internationally-supported schools in the sample, it is rather opposite. Whereas staff and teachers have access to ICT, pupils do not have that access now. This is related to the different usages of ICT. Whereas pupils use it to acquire digital and other skills in an ICT-lab, teachers use it to prepare their classes and for personal development either in an ICT-lab or via personal usage. Lastly, staff uses computers often outside the ICT-lab for its administration.

Emergence

The poor state of ICT in education in Sierra Leone has its roots in the education system itself. Due to its history of a long civil war, Ebola and Corona outbreak, the education system has collapsed: schools have been destroyed, as well as the state provision of government services and salaries. It is characterized by its poor governance, donor-dependency and lack of government funding. Firstly, the poor governance can be seen in the substandard school approval system. The poor school approval system results in poor teaching being approved as well, resulting in 'ghost teachers' who are on the payroll but not teaching

and at the same time plenty of teachers that are working but not on the payroll. Related challenges include corruption and lack of monitoring. Secondly, funding has been lacking throughout the system. The government cannot provide for all public schools. Therefore, external parties are funding most schools. Therefore, there are many private schools in the country. Overall, there are many more other priorities which have been assigned higher priority than ICT. Besides, the lack of money explains another part of the poor state of ICT in primary and secondary schools in Sierra Leone. The government has only prioritized ICT since 2018 and therefore ICT development is in a starting phase.

Part 2: Educational needs

The second research question is “What needs in primary and secondary education in Sierra Leone are identified by local stakeholders and how do they differ in the various schools?”. This is divided in educational needs identified by local stakeholders and next how they differ per category (urban/rural, primary/secondary and public/private).

Educational needs

The education system is poor. One of the signs is high year repetition. This is shown in the high GERs compared to NERs, which assumes over-age enrolment. Other signs are the high drop-out rates and poor results. The first identified need is improved access to education. Secondly, quality of education is identified, which is subdivided in other needs and barriers. Barriers to quality education include a poor learning environment: overcrowded classes, lack of learning materials, low teacher qualification and motivation and general issues, including water, toilet, health and food supply. Underlying the low teacher qualification and motivation is the issue of under-payment, and the lack of professional development and promotion opportunities. Besides the learning environment, the curriculum is ready for an update and content-overladed. Additional needs are the behaviour of pupils, poor parental control and identified by the educational experts maltreatment of girls and disabled children. Related to parents’ priorities, extra-curricular activities and exam results are key factors when choosing a school. Besides, parents often have high expectations and offer various levels of support, yet generally low.

Needs per category

The need to improve access is particularly demanding in rural areas. The need for quality improvement is country-wide, yet more demanding in rural areas and public schools. Underlying is the particular lack for those areas. The specific needs are country-wide, yet parental demand for extra-curricular activities is only mentioned in urban areas. Parental expectations and support levels are particularly determined by the education of the parents. Therefore, parental expectations and support in urban areas are higher.

Part 3: ICT meeting needs

The third question is “How can ICT meet needs identified by local stakeholders?”. In the response both barriers and opportunities are covered.

Barriers

Large barriers to the ICT usage in primary and secondary education in Sierra Leone are the electricity and internet. Both are insufficiently available, and when available of poor quality due to the lack of funding. Besides, other needs are prioritized and therefore ICT does not have the focus of policy makers, though it can offer many benefits. When ICT is introduced, other barriers appear: the overcrowded classes and the need to raise teacher salaries. Therefore, ICT-based education is hampered by the insufficient number of computers available to serve full classes and insufficient teachers to teach with proper ICT support and more importantly, with proper motivation on the part of the teachers. Related issues are substandard ICT skills and knowledge among teachers, which is typical of the current situation in the education system in Sierra Leone. Besides, the poor ICT lifespan is challenging, due to poor security, maintenance, monitoring, repair and ventilation. Considering local needs, ICT should also consider its lack of funding and resources. Finally, money can motivate people to teach, put the infrastructure in place and train people.

Opportunities

Whereas ICT might not be the solution for some problems, it might be for others. It could not contribute directly to the poor condition of water, food, health and toilet facilities, but it has benefits. Yet, there are opportunities in other fields. When ICT is implemented in a primary or secondary school, electricity and internet facilities should be in place. Alternatives to the national grid include solar power and generator use, yet they are highly expensive as well. When it comes to the ICT lifespan, opportunities will appear if proper security, maintenance, monitoring and repair, as well as charging and ventilation facilities, are provided. ICT has the potential to increase attendance of children since they are enthusiastic, likewise in case of most parents. The expanded content can help children to raise their performance level when completing school assignments and sitting exams, and teachers to prepare their classes better and faster, and staff to perform their administrative duties more reliable. This will motivate the various stakeholders to continuously use ICT and learn more and potentially teach others. Because of the poor funding and ICT infrastructure, most initiatives have been low-tech and low-cost. Low-tech solutions include radio, television and SMS. This is an identified opportunity. Yet, there are opportunities for high-tech, since that is what is mostly required to enter the workforce. High-tech solutions include desktops, computers and tablets. Typing is one of the skill often required when applying for a job. An overview has been provided of recent EdTech initiatives, which are mostly low-

tech. Besides the funding that must be available, opportunities have been identified: high-quality content and potentially starting up in urban areas which have sufficient ICT infrastructure and funding structures compared to rural areas. Therefore, although not directly contributing to reaching the most marginalized sections of the population, the decision can be made to start in urban areas, where start-up conditions are better. ICT seems more appropriate in the urban areas. Lastly, the EIC suggests that tech-interventions work better for higher classes of primary school and work better to improve numeracy rather than literacy in those higher classes. Yet, these suggestions have been drawn in times of corona, when schools have been closed for a while.

9.2 General implications

The main research question of this Thesis is “How can ICT implementation in primary and secondary schools in Sierra Leone meet local stakeholders’ needs?”. Most children grow up in a challenging environment where it is hard for parents to provide in their livelihood. In this context, education does not always have the highest priority. Unsurprisingly, a big challenge is the many other needs in the education system. Besides, new challenges arise when implementing ICT in education. Yet, it is education and specifically ICT that can provide relief in many other problem situations and help to develop the country. Education prepares the students for future citizenship, workforce and leadership, and ICT can increasingly equip students with the very much required 21st century skills to get a formal job. Therefore, the quality of education is highly important and ICT in education is highly desirable.

Considering local barriers and opportunities based on identified needs, is the most appropriate approach to ICT implementation. From the findings of this Thesis, lessons can be drawn internationally. The findings are highly relevant for other countries in the global South, which are often resource-poor. Yet, the extreme donor-dependency of Sierra Leone is unique. Appropriation of technology should be a high priority for each country, and if possible in Sierra Leone, is likely to be possible in other countries as well. A lesson that is universally applicable is that ICT implementation cannot be copied, but should be made locally appropriate time and again. Other general lessons include the need to reduce the gap between ICT access in school and at home, which determines educational outcomes. In fact, ICT can either reduce or expand the gap between privileged and marginalized people, also within the global North. As mentioned, it is likely for NGOs to start with the ‘better prepared schools’, which are privileged. Another lesson from this case is that radical inclusion of local stakeholders will result in further customization in technology to local needs. Yet, specific needs might differ per locality.

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Appendix A: Overview research Maxim Nyansa

This Thesis is written in a range of other research conducted by Master students. Firstly, Maarten Smulders, graduate Business Informatics at the Utrecht University has finished writing his Thesis Dissertation about impact assessment of ICT projects in education in West-Africa in November 2020. Finally, he created a situational method to monitor ICT implementation in education in West-Africa. The researcher of this Thesis just finished her Bachelor Thesis about ICT implementation in Ghana and Sierra Leone in close collaboration with Maarten. There has been occasional collaboration with Maarten to make the Thesis fit in with his work. Tiny Le, similarly a student of the research master Business Informatics, is conducting a follow-up study for her Master Thesis on how to visualize the impact, how to implement the tool Maarten created. She has started writing her proposal since October 2020 and her aim is finalize the research in August 2021. Lastly, Gayathri Sarayala is a Master student IT Architecture at the TU Twente. Her Thesis is parallel with Tiny and this Thesis research. Her research topic is ICT intervention in rural areas and her goal is to find an appropriate method to introduce ICT in rural areas, considering the poor ICT infrastructure. Her aim is also to finish in August 2021. This research can be helpful for particularly Sierra Leone, considering the poor ICT infrastructure. Between the different researchers, there is close contact. In the beginning, a meeting once per month has been planned. Besides, a two-weekly meeting with the Diana van der Stelt, the co-founder and board member of Maxim Nyansa IT Solutions, has been scheduled. An overview of the research can be found in Table A1 on the next page.

Table A1 Overview research Maxim Nyansa

Students	University	Study	Thesis title/ topic	Starting date	End date
Laura de Bruine	Wageningen University	Honours Programme (during BSc)	Country Investigation Report MAXIM NYANSA IN SIERRA LEONE: DESIRABLE AND FEASIBLE? [Thesis extension]	November 2019	February 2020
	Wageningen University	BSc Internationale Ontwikkelingsstudies	ICT-intervention in primary and secondary education Case study of Ghana and Sierra Leone	May 2020	July 2020
	Utrecht University	MSc International Development Studies	ICT introduction in primary and secondary schools in Sierra Leone from a bottom-up perspective	February 2021	August 2021 (expected)
Maarten Smulders	Utrecht University	MSc Business Informatics	Situational Method Engineering for ICT4D Performing Impact Assessments for Educational Programs	November 2019	November 2020
Tiny Le	Utrecht University	MSc Business Informatics	Impact Visualization	October 2020	August 2021 (expected)
Gayathri Sarayala	TU Twente	IT Architecture	ICT infrastructure rural areas	November 2020	August 2021 (expected)

Appendix B: Overview activities + photos

Table B1 Overview activities

Date	Type of research (amount)	Type	Where/ who
18/11/20	Observation (1)	Private/ government-assisted primary school – rural	Makombeh
17/02/21	Interview (1)		
18/02/21	Online interview (1)		
15/01/21	Participant observ. (1)	Syndicate programme – secondary school rural	Rokel
22/01/21	Participant observ. (1)		
03/02/21	Observation (1)	Public/ government-assisted secondary school – urban (Eastern of Freetown)	Richard Allen
05/02/21	Focus group (1) Interview (1)		
09/02/21	Interview (2) Focus group (1)		
12/02/21	Focus group (1)	Private primary and JSS – urban (Eastern of Freetown)	Eva Houston
16/02/21	Focus group (1) Observation (2)		
24/02/21	Focus group (1) Interview (2)		
12/02/21	Interview (2)	Public/ government-assisted secondary school – urban (Eastern of Freetown)	Muslim Congress
16/02/21	Focus group (2)		
24/02/21	Focus group (1)		
15/02/21	Observation (1) Interview (1)		George Brook (We Yone)
22/02/21	Interview (1)	Private secondary school – urban (Eastern of Freetown)	EducAid
01/03/21	Interview (1)		
02/03/21	Observation (1)		
15/04/21	Interview (1)		
28/02/21	Focus group (1)	Public primary school - rural	Makonkarie
16/03/21	Online interview (1)		
01/04/21	Online interview (1)	-	Schooling for Life
16/04/21	Online interview (1)	Private secondary school - urban	Rising Academy
01/05/21	Online interview (1)	Public primary and secondary schools - rural	Save The Children

Rising Academy Calaba Town (similar set up as Rising Academy Waterloo)



We Yone



Eva Houston



Makombeh



EducAid Lumley



Appendix C: Research guides

Focus Group Guide – semi-structured

Introduction (5-10 minutes)

Welcoming, introducing the researcher, research and goal and set-up of the focus group. Ask if they have any questions.

Opening round (10-20 minutes)

- Ask everyone to introduce themselves.
 - Parents: Why did you send your children to this school?
 - Pupils: Why did you chose this school?/ What is your favourite subject?
 - Teachers: Why did you chose this school to teach?

Core discussion (20-60 minutes)

Education system

- Ask for challenges faced in the education system.
 - Pupils: What would you change if you were the teacher?
- Ask for opportunities in the education system.
 - Example questions: What works well in the school?/ What can be improved?

ICT

- Ask whether they are familiar with ICT/ could give a definition of ICT as ‘digital devices’/ giving examples (smartphone, computer, tablet, etc.)
- Ask for the challenges they face related to ICT in education.
 - Example probes:
- Ask for the opportunities they see related to ICT in education.

Closing discussion (10-15 minutes)

- Ask for their vision in two years.
 - Parents: Where do you see your children in 2 years?
 - Pupils: Where do you see yourself in 2 years?
 - Teachers: Where do you see the school in two years?

Interview Guide – expert interviews/ principal

Introduction (5-10 minutes)

Welcoming, introducing the researcher, research and goal and set-up of the interview. Ask if the interviewee have any questions.

Opening questions (10-20 minutes)

- Ask for an introduction of the interviewee.
 - Expert: Organization/ role in organization.
 - Principal: History and background of and decision making in the school.

Core questions (20-60 minutes)

Education system

- Ask about challenges in the education system.
- Ask about opportunities in the education system.

ICT

- Ask about challenges in the education system related to ICT.
- Ask about opportunities in the education system related to ICT.

Closing discussion (10-15 minutes)

- Ask for their vision in two years.
 - Expert: vision for education system
 - Principal: vision for school

Appendix D: Coding tree

Category: EDUCATION

Subcategories + codes

Teachers

Codes: placement, approval, payment, status, professional development, way of teaching, qualification, class preparation, materials, transport, attendance, behaviour, gender

Parents

Codes: literacy, money, control of children, expectations

Children

Codes: behaviour, attendance, promotion, examination, materials, career perspective, transport, gender

School compound

Codes: health facility, buildings, classrooms, furniture, library, band, ICT-lab, blackboard, ground, water facility, food facility, toilet facility, location, administration, handle issues

✓ *Educational system*

Codes: history, curriculum, Corona pandemic, treatment of disabled, funding, schedule, decision making, policies, corruption, monitoring

Category: ICT

Subcategories + codes

Access

Codes: affordability, electricity, building, time, device (phone, laptop, desktop, computer, tablet, projector, printer)

Lifespan

Codes: monitoring, security, charging, maintenance, funding, ventilation

Quality

Codes: internet, content, skills, knowledge, electricity, attitude, support, amount of devices, e-learning

Category: Background information

Codes

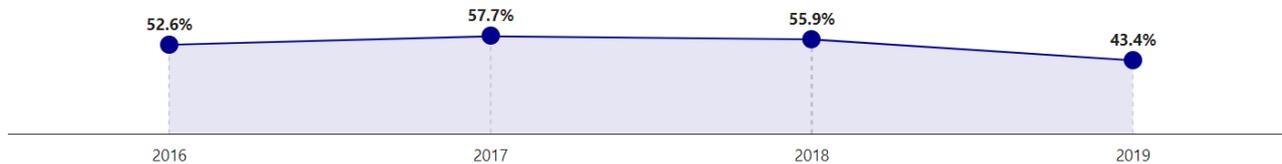
Research, demographic information, school, summary, contact information, moderating

Layer: DESCRIPTION | SUCCESSES | VISION | CHALLENGES | OPPORTUNITIES

Appendix E: Student Pass Rates

Student Pass Rate

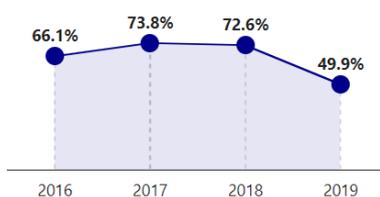
Percentage of students who passed (National average)



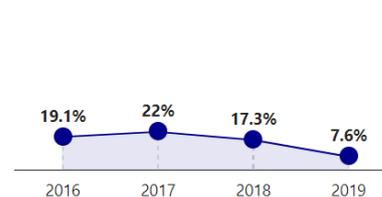
Primary



Junior Secondary



Senior Secondary



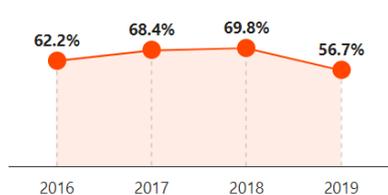
Student Pass Rate is the percentage of students who passed in an examination for a particular program at the next level (NPSE for Primary, BECE for Junior Secondary, and WASSCE for Senior Secondary).

Figure E1 Student Pass Rate (per level) (DSTI – EDH, 2020)

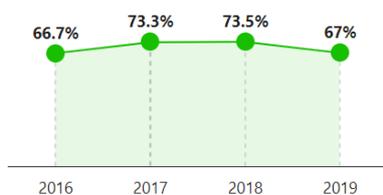
Student Pass Rate by Owner

All education levels ▾

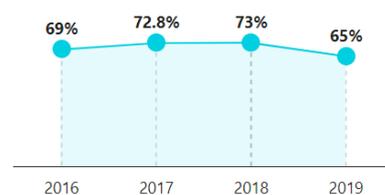
Community



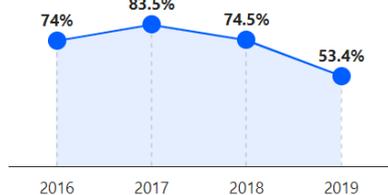
Government



Mission/religious group



Other ?



Private

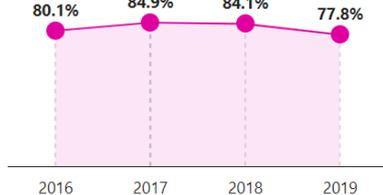
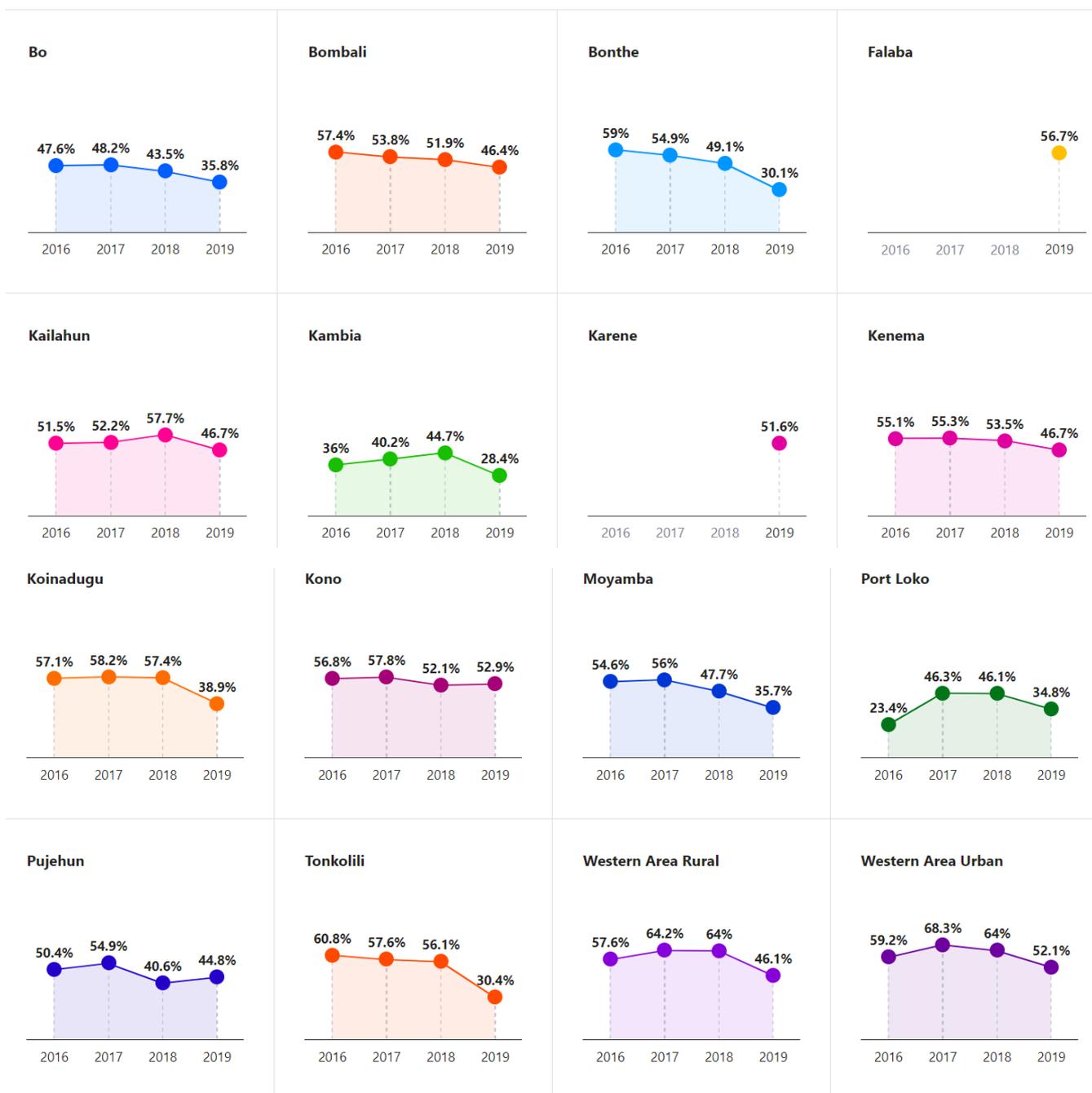


Figure E2 Student Pass Rate by Owner (all levels) (DSTI – EDH, 2020)

Student Pass Rate by District

All education levels ▾



Karene and Falaba Districts are two new districts formed in 2017 and data was not collected for them from 2016 – 2018. Thus, the missing data.

Figure E3 Student Pass Rate (SPR) by District (all levels) (DSTI – EDH, 2020)

Appendix F: Educational figures Sierra Leone

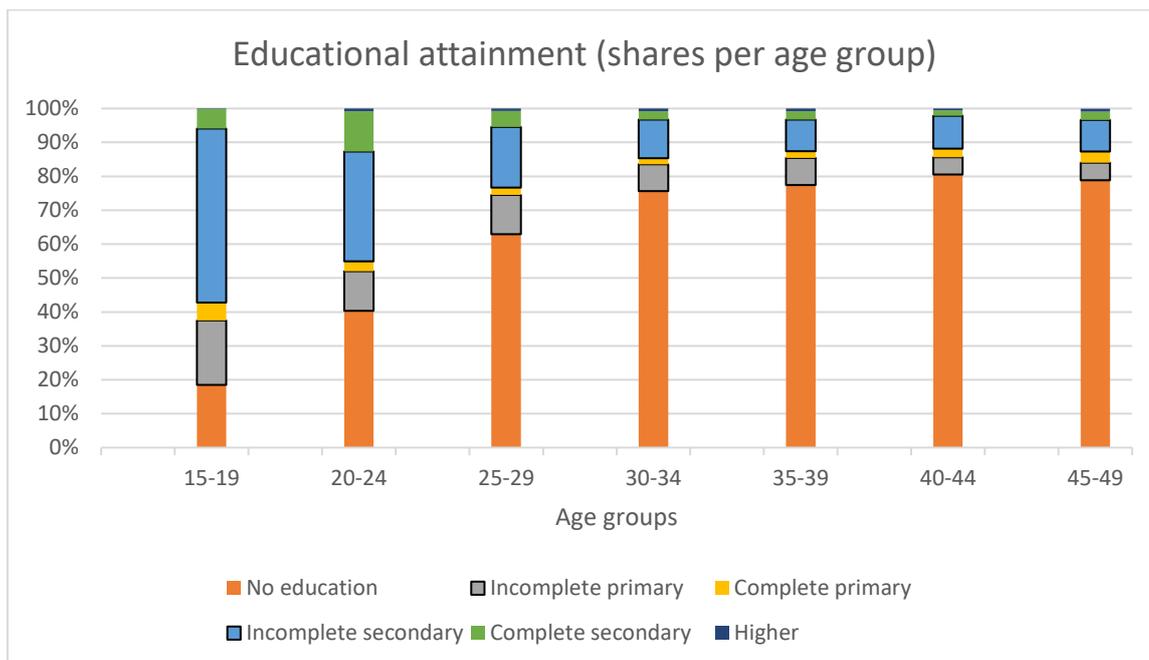


Figure F1 Educational attainment based on age group (adapted by researcher from DHS, 2016)

Note: The black line shows the incomplete education, for primary and secondary education

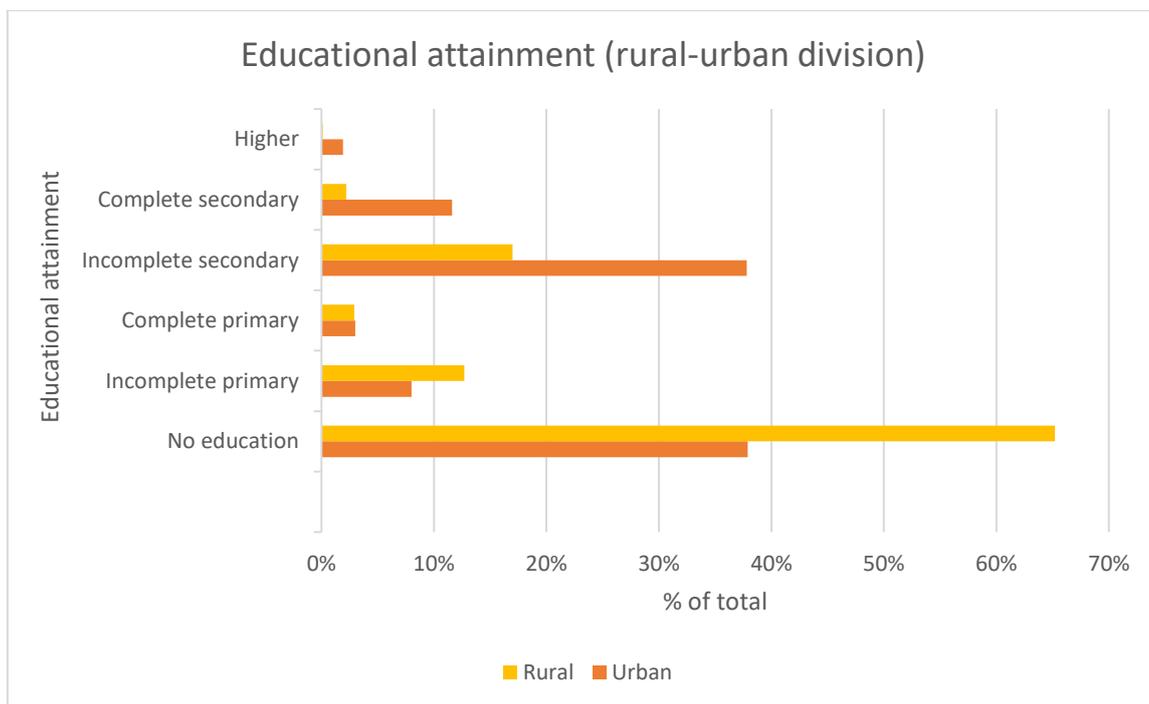


Figure F2 Educational attainment based on rural-urban division (adapted by researcher from DHS, 2016)

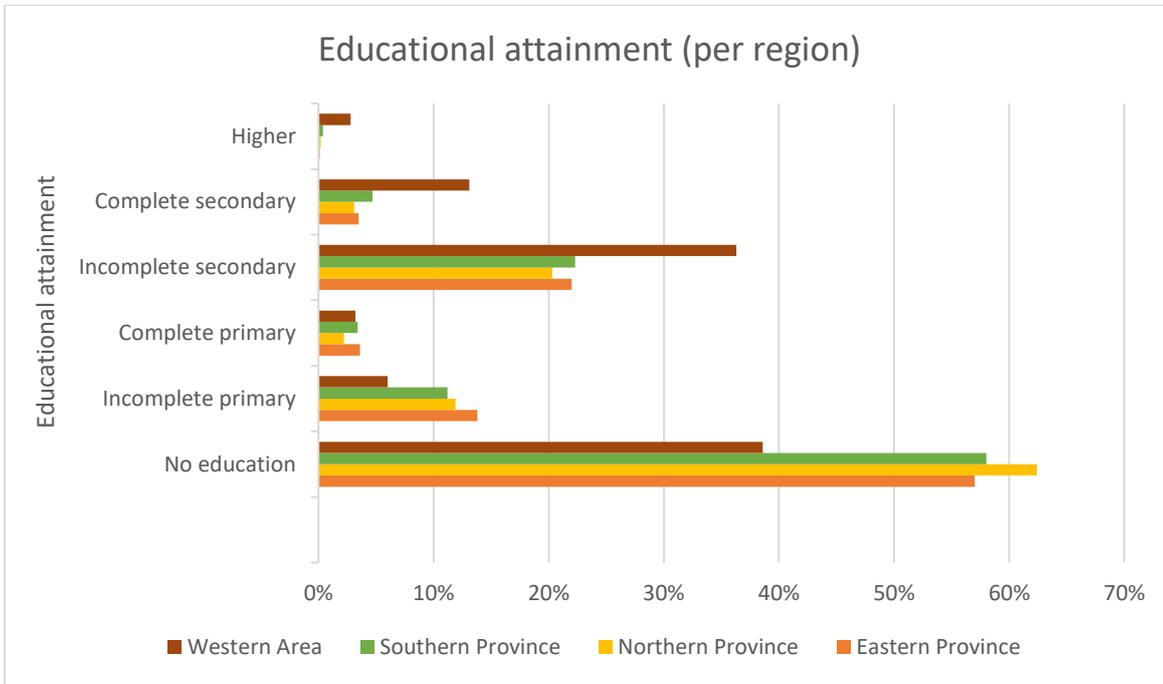
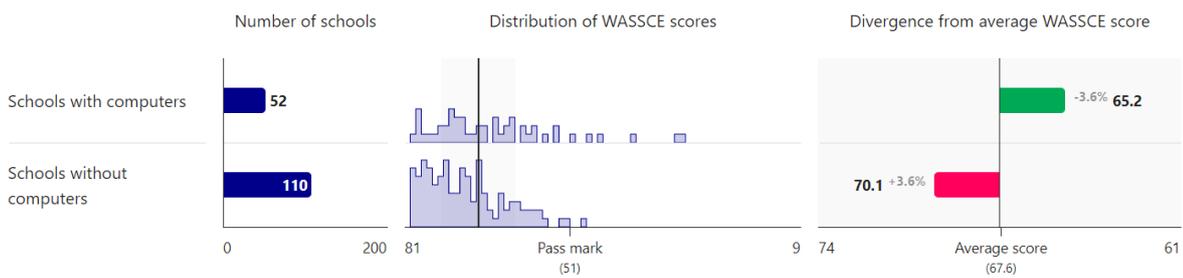


Figure F3 Educational attainment based on region (adapted by researcher from DHS, 2016)

In Senior Secondary schools, what effect does having computers have on exam performance?



1 schools did not answer this question.

Figure F4 Effect of available computers on exam performance (DSTI – EDH, 2020)

Appendix G: Recent EdTech initiatives Sierra Leone

*The overview of EdTech initiatives below is extracted from Mullan and Taddesse, 2020

Sierra Leone Education Innovation Challenge (SLEIC, 2019)

- **Overview:** Programme will set target literacy and numeracy learning outcomes in schools needing additional support. Innovative interventions will be implemented by non-state providers using an outcomes-based payment model (with up to US\$20m available from government and donors).
- **Target group:** Learners in primary schools, particularly in rural areas.
- **Technology:** Not yet finalised, but Phase II of the programme likely to include radio, TV, SMS, low-data mobile delivery and potentially tablet access. Phase II has been focused on distance learning and EdTech in light of the Covid-19 pandemic.
- **Reach / scale:** 500 schools, 250,000 pupils in Phase II, country-wide in Phase III.
- **Implementing organisations:** Education Outcomes Fund, Tony Blair Institute for Global Change. Phase I partners are Save the Children, Rising Academy Network, EducAid, National Youth Awareness Forum, Sierra Leone and World Vision.
- **Government partners:** Ministry of Basic and Senior Secondary Education; Directorate of Science, Technology and Innovation.
- **Status of implementation:** Phase I Pilot running in 2019 / 20. Phase II scale-up from September 2020. Phase III National.

Sierra Leone Free Education Project (World Bank, 2019)

- **Overview:** A major strand of this US\$86m World Bank-led programme is a US\$19m investment in developing and delivering a scalable technology-enabled, continuous, in-service teacher training programme. Also includes data capacity-building support for the Ministry and support for the use of tablets to conduct an Annual School Census.
- **Target group:** Primary school teachers.
- **Technology:** Solar-powered tablets.
- **Reach / scale:** Country-wide.
- **Implementing organisations:** World Bank. Co-financing from DFID, Irish Aid and EU.
- **Government partners:** Teacher Services Commission, Ministry of Basic and Secondary Education.
- **Status of implementation:** Pipeline. 2019–24.

Rising On Air (Rising Academies, 2020)

- **Overview:** Radio programme that provides lessons scripts and re-recorded audio content designed specifically for radio. Radio content is supplemented by complementary SMS content aimed at parents, and phone calls aimed at parents and students (Lamba and Reimers, 2020).
- **Target group:** Parents and students (5 levels from early childhood education through to senior secondary school)
- **Technology:** Radio, SMS, audio files, phone calls
- **Reach / scale:** International — with an aspiration to reach 10 million learners. Materials are uploaded online and free to re-use and adapt.
- **Implementing partners:** Rising Academies, local radio stations.
- **Government partners:** Ministry of Basic and Secondary Education (MBSSE)
- **Status:** 2020 –

World Reader (World Reader, 2020)

- **Overview:** 3 small-scale projects making e-Readers loaded with content available to primary school pupils, community members.
- **Target group:** Primary school pupils.
- **Technology:** eReaders.
- **Reach / scale:** c. 700 pupils across 3 projects. A further 3,500 Sierra Leoneans access World Reader content via mobile phones.
- **Implementing organisations:** World Reader, Street Child.
- **Government partners:** n/a
- **Status of implementation:** 2015–Present.

Integrated In-Service Teacher Training Project for Junior Secondary School Teachers (Commonwealth of Learning, 2020)

- **Overview:** Aims to improve teacher quality through “scalable technology-enabled, school-based teacher development”. Activity in Sierra Leone has principally involved capacity-building and resource development. This has included training workshops, creation of a community of practice for participants and development / contextualisation of a toolkit and implementation guide.
- **Target group:** Teachers in junior secondary schools.
- **Technology:** Open Educational Resources (OERs).
- **Reach / scale:** 12 schools.
- **Implementing organisations:** Commonwealth of Learning, Freetown Teachers College .
- **Government partners:** Former Ministry of Education, Science and Technology.
- **Status of implementation:** 2018–Present.

Mobile Learning Lab (60 million girls, 2018)

- **Overview:** Makes learning resources / content available to off-grid communities without electricity and internet.
- **Target group:** Grade 4, 5 and 6 students in rural northern Sierra Leone (Koinadugu district).
- **Technology:** Tablets, solar charging system, RACHEL-Plus rechargeable server, OERs.
- **Reach / scale:** Five communities, 750+ pupils (pilot project).
- **Implementing organisations:** 60 million girls Foundation, CAUSE Canada.
- **Government partners:** None.
- **Status of implementation:** 2013–2018

Leh Wi Learn – Sierra Leone Secondary Education Improvement Programme (MBSSE, 2020)

- **Overview:** £62.5m DFID-funded programme focused on improving attendance and learning outcomes for girls and children with disabilities in government secondary schools. The programme has seen new lesson plans and textbooks designed and widely disseminated (Ministry of Basic and Senior Secondary Education, 2020).
- **Target group:** Girls and children with disabilities in secondary schools.
- **Technology:** Tablets (as a management tool), Radio. The open-source Tangerine platform has been used to collect data on school performance, as an input into planning and policy development. Another component of the programme has seen the distribution of 2,640 wind-up radios pre-loaded with lessons on gender, adolescence, sexual and reproductive health and reporting violence in schools.
- **Reach / scale:** Country-wide.
- **Implementing organisations:** UK Department for International Development, UNICEF, Cambridge Education, PwC, International Rescue Committee, World Vision.
- **Government partners:** Ministry of Basic and Senior Secondary Education.’
- **Status of implementation:** 2016–2021.

Appendix H: Results Education Innovation Challenge (EIC)

Class Level	Literacy	Numeracy	
		Number Identification	Math Operation
Class 1	Identify letters, words	One Digit	
Class 2	Identify letters, words	Two-Three Digit	Addition and Subtraction
Class 3	Paragraph/Story Level		Addition and Subtraction (more complex)
Class 4	Paragraph/Story Level		Multiplication and Division
Class 5	Paragraph/Story Level		Multiplication and Division (more complex)
Class 6	Story Level (all Questions Correct)		Fractions and decimals up to thousandth

Figure H1 Literacy and numeracy skills required (according to Sierra Leone's Basic Education Curriculum)

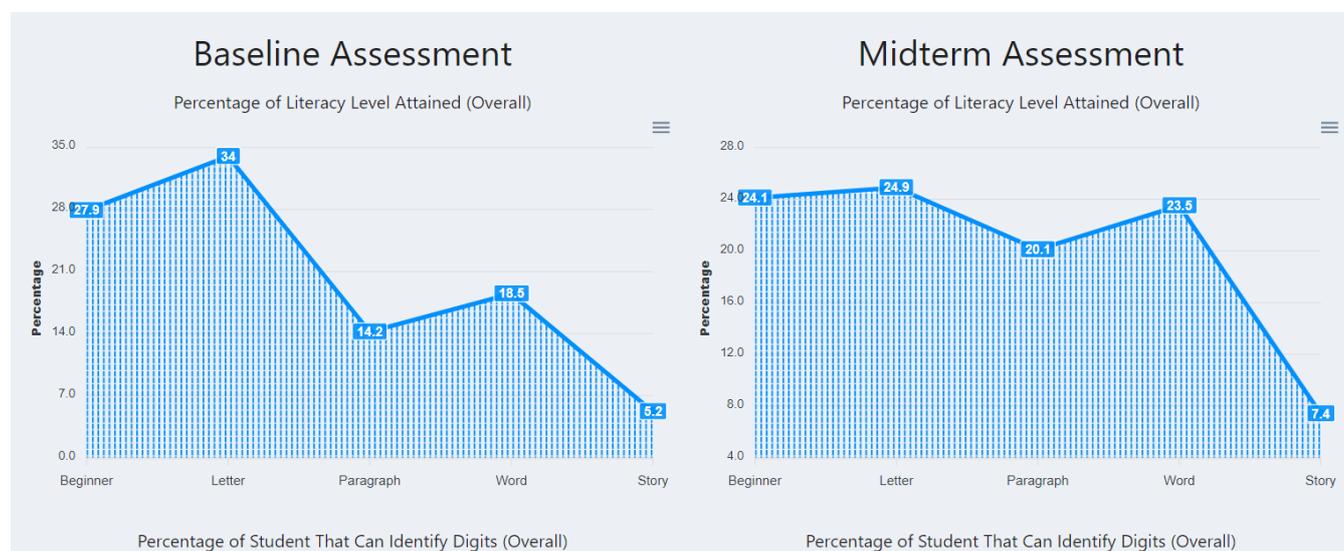


Figure H2 Baseline and Midterm assessment literacy level (in percentage overall) (EIC, 2021) 1

Measurement Literacy:

- Beginner: cannot identify letters of the alphabet
- Letter Recognition: can identify letters of the alphabet both lowercase and uppercase
- Word: can read words
- Paragraph: can read simple sentences at standard 1 level
- Story: can read and comprehend a story at standard 2 level



Figure H3 Percentage of students that can identify digits (overall) (Basement assessment left, Midterm assessment right) (EIC, 2021)

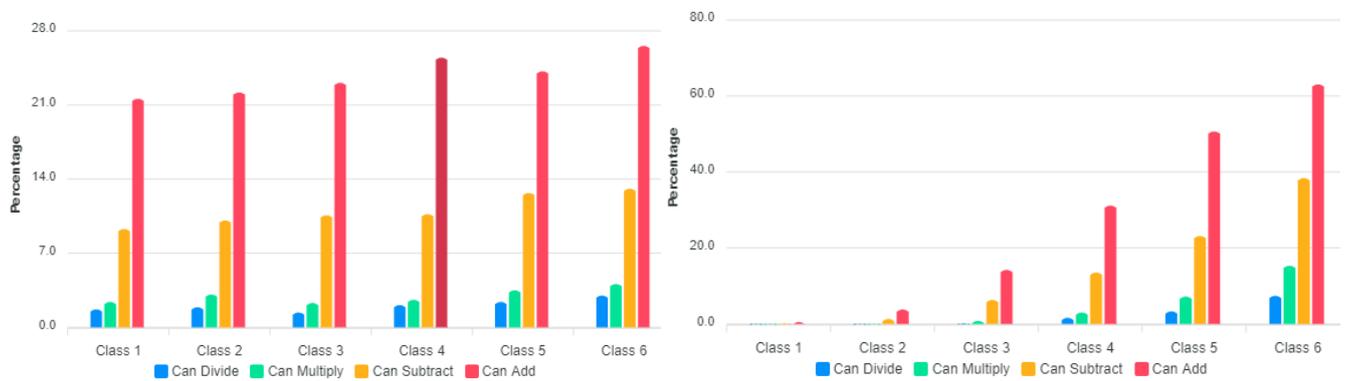


Figure H4 Percentage of students that can do math (Basement assessment left, Midterm assessment right) (EIC, 2021)

Numeracy: Math Operations

- Addition: can correctly perform additions of two-digit numbers
- Subtraction: can correctly perform subtractions of two-digit numbers
- Multiplication: can correctly perform multiplications (two digits time one digit number)
- Division: can correctly perform divisions (two digits time divided in one digit number)

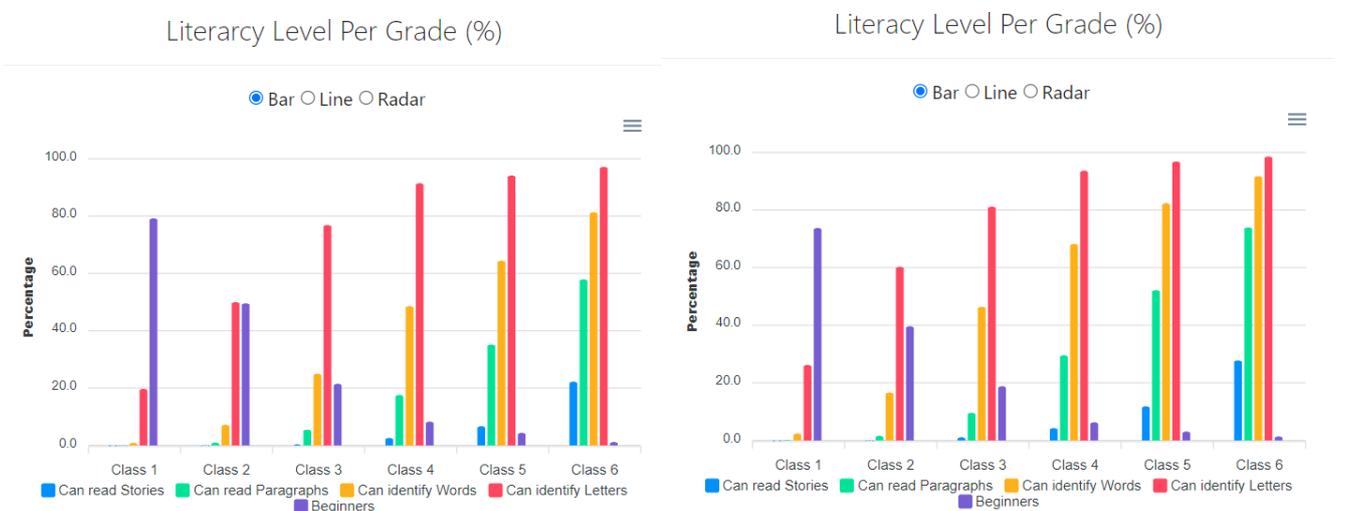


Figure H5 Literacy level per grade (Basement assessment left, Midterm assessment right) (EIC, 2021)