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READY OR NOT, HERE ICT COMES

A case study on e-readiness and governance in Kenya's Laptop Project

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Abstract

This study explores the links between good governance and e-readiness within a case study of Kenya's Laptop Project – a nationwide ICT-in-Education implementation which aims to give one laptop to every Kenyan child entering primary education. Focus is held through two key questions, (1) How e-ready are Kenyan schools for the Laptop Project? and (2) What role has governance played in this?

Research was conducted through a mixed methods approach in seven primary schools, across four regions of Kenya. Emphasis was placed upon qualitative research methods - primarily open-ended interviews, focus groups and participative observation. This body of data was strengthened with the use of a quantitative survey of 80 primary school teachers. Musa's (2006) Technology Acceptance Model (TAM) and Cadman's (2012) model of good governance provided theoretical frameworks.

The main findings presented by this paper are (1) e-readiness in our participant schools is low, particularly important are Perceived Ease of Use, Perceived User Resources and Perceptions of the Project, and (2) non-inclusive, unaccountable and centralized governance has contributed directly to this picture. Three specific governance outcomes are highlighted as central to this; initial research and planning which did not reflect local realities, missing knowledge in the schools and over focus on simple laptop provision.

Key Words: ICT, e-readiness, education, good governance

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List of abbreviations

ICT4D	Information and Communication Technologies for Development
OLPC	One Laptop Per Child
GoK	Government of Kenya
ICT	Information Communication Technology
TAM	Technology Acceptance Model
NGO	Non-Governmental Organisation
Kshs	Kenyan Shillings
UNESCO	United Nations Educational, Scientific and Cultural Organisation
KCPE	Kenya Certificate of Primary Education
PPP	Private-Public Partnership
IT	Information Technology
USD	US Dollar
PC	Performance Contract
MoE	Ministry of Education
PU	Perceived Usefulness
PEU	Perceived Ease of Use
PR	Perceived Resources
PP	Perception of Project
IR	Interest Representation
OR	Organisational Responsibility
DM	Decision-making
IMF	International Monetary Fund
SPSS	Statistical Package for the Social Sciences
LCD	Liquid Crystal Display

Definitions of Relevant Concepts

The Digital Divide A concept showing the difference in technology access and utilisation between 'developed' and 'developing' regions of the world. The digital divide is partly made up of differences in access to technology; such as necessary infrastructure for electricity and Internet connection and availability of hardware such as mobile phones and laptops. As this thesis shows, there is however much more to the digital divide including for example ability and confidence to use technology and appropriation of technology into local contexts. Initiatives to *bridge* the digital divide often focus on how poorer countries can use ICT to increase productivity and growth, by engaging in the *new economy* (or *information economy*) and thus boost their social and economic development. For the purpose of this thesis, the digital divide and the increasing efforts to bridge the divide (or not widen it further) through investments in ICT acts as a backdrop to our case, as the Laptop Project at a macro level can be seen as a result of such efforts.

e-readiness The concept of e-readiness describes the capability of an individual, a group or a country to use ICT. Discussion on e-readiness is closely linked to that about *bridging the digital divide*, as the methods incorporated when investing in ICT4D to a great extent depend on how e-readiness is looked upon. Many different measurements of e-readiness exist. While some models focus on measuring the e-readiness for countries and regions (see for example Ifinedo, 2005), others specifically measure the e-readiness of schools (for example Awour et al., 2013) or use individual perception or abilities as an indicator for e-readiness (for example Musa, 2006). In this thesis, a modified version of Musa's extended *Technology Acceptance Model* is used to explore e-readiness through the *perceptions* of individuals' (the teachers).

ICT The term ICT is used throughout this paper to describe information and communication technologies. Examples of ICTs are mobile phones, laptops and tablet computers, but ICT entails any technology that enables the user to access, transmit, and manipulate information. Terms like "IT" or "Technology" could many times have been used interchangeably in our thesis and as Voogt and Knezek (2008) explains they often are.

ICT4D ICT initiatives in developing countries with the main aim of development are referred to by the term ICT4D (ICT For Development); this concept has a central role in this thesis. Discussion on ICT4D often focuses on how ICTs can be used to provide better access to information, increase accountability, develop the market and improve public services in developing countries.

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1 Introduction

The World Bank's Development Index (2010) highlights an interesting trend; across the developing world governments are increasingly allocating large proportions of their budgets to promoting the use of ICT in their education systems. Indeed, it has been said that ICT is increasingly perceived by developing nation governments as the key to improving education and spurring social change and economic development (InfoDev, 2013). Kenya, in East Africa, is one developing nation that is at the forefront of this trend. The Kenyan government's belief in the power of ICT-in-Education projects is typified by its *Laptop Project* - an unprecedentedly large-scale, government-led project which aims to introduce ICT to every single public primary school in the country. The scale of the project is undeniably enormous, with a total budget of more than 50 billion Kshs, substantially larger than the country's entire annual health care budget (Budget Speech, 2013). However, the motivation behind the project is not seen by all commentators as a purely education-focused move. Importantly, the project started life as an *election promise*, part of a speech made by Uhuru Kenyatta in March 2013, which was intended to sway voters and timed to coincide with the election.

The literature consistently iterates the point that the likelihood of success for ICT implementations in education depends largely on school and teacher e-readiness (Ames & Warschauer, 2010; Bladergroen et al., 2012; Chikati et al., 2013; James, 2010; Musa, 2006). Moreover, a new body of literature has begun to report that in order for an ICT-in-Education project to successfully create e-readiness, project governance is of utmost importance. There are clear signs that governance in the Laptop Project is failing. Most significantly, the project was announced in early 2013 and was initially due to launch in January 2014, but chronic delays have repeatedly pushed back the laptop deployment date. What's more, the worry is growing that Kenyan primary school teachers, who are vitally important to the success of the project, are still not ready, and will not be ready to begin using ICT in their classrooms.

1.1 Research Purpose

The purpose of this study is to explore the relationship between governance and e-readiness in the Laptop Project. We have set out to (1) systematically assess the level of e-readiness in Kenyan primary schools (which has not been done previously), (2) present the system of governance which has directed the Laptop Project and (3) uncover and analyse observable linkages between the system of governance and the level of e-readiness in the project. In doing so, we intend to add to the discourse surrounding the importance of good governance in ICT-in-Education projects with our own evidence and analysis.

We hope that the resulting analysis of concrete and specific governance outcomes which are impacting e-readiness in this case will be of use to development practitioners, governments, academics and private individuals who work within ICT-in-Education projects. As a secondary purpose we also intend that the picture of e-readiness in Kenyan primary schools which this paper shall draw should prove useful to policy makers, civil society and academia, as reliable e-readiness data for Kenyan primary schools is not currently available.

We intend to answer the following research questions;

1.2 Research Questions

RQ1**:** How e-ready are primary school teachers in Kenya for the Laptop Project?

RQ2: What role is governance playing in e-readiness in the Kenyan Laptop Project?
- *How is project design and implementation being governed?*
- *What are the main ways in which governance has affected e-readiness?*

2 Literature Review

2.1 The Role of ICT in Education and Development

The literature on ICT-in-Education is mixed. Those papers which are positive to ICT-in-Education praise it as an opportunity to overcome key challenges in accessing primary education

in developing countries (Omwenga et al., 2004; Ogembo, et al., 2012). UNESCO, for example, places a strong emphasis on the benefit of ICT-in-Education, and praises ICT for providing simple tools for information searching, presentation, communication and interactive learning methods (UNESCO, 2012: 8, 40). ICT has even be argued to constitute a necessary part of education, rather than a supplementary tool; Adeyemi & Adeyinka (2003) state that in the twenty-first century, one *must* be computer literate in order to be considered truly educated. Adopting ICT in education is seen by many development experts as a necessary step for developing countries to engage in globalisation and the new economy (Clarke, 2011; Moshiri & Nikpoor, 2011; Hosman, 2010). Such arguments stress the need for investments in ICT so that the *digital divide*, the differences in technology access and use between developing and developed countries, does not expand.

However, numerous reports have criticised the use of ICT as an engine for development. A commonly cited criticism is the mixed and null evidence for improvement in school results (Livingstone, 2012; Reynolds et al., 2003; Tolani Brown et al., 2011), which is contributed to by a lack of "pre-project assessments" and "enumerated goals for outcomes" (Hosman, 2010: 48). Moreover, there is a large discourse questioning the entire rationale for investments in ICT in developing countries (Krauss, 2013; Yusuf, 2005). Critics claim that such strategies are market driven and that there is a lack of understanding of the needs of rural, traditional societies among the international community. Harvey (2011) explains that there is a danger that ICT4D projects will inevitably clash in regions which lack an existing ICT culture. Moreover, Latour (2006) argues that technology has become the master of its users, and we allow technology too much power. Such views suggest that we should be careful before exposing impressionable children to ICT and allowing technology to dictate the way that teachers choose to teach. Thompson and Walsham (2010) argue that this emphasises the need for future research to inform ICT policy making in Africa. In the case of the Laptop Project such criticism is of particular relevance, as the project introduces ICT to areas and contexts which have previously had very low exposure to ICT, especially among children.

In recent years, the literature has begun to look critically at this mixed evidence and criticism; such discourse suggests that success in ICT-in-Education projects may not be as

straightforward as simple provision of ICT, and may rely much more on the readiness of beneficiaries to effectively utilise ICT. This has brought to the forefront the discourse on e-readiness.

2.2 The Concept of e-readiness

The factors which lie behind the success of ICT4D and ICT-in-Education projects are, of course, numerous. For example, some researchers have focused upon cultural tradition and social structures (Wilson, 2004; Harvey, 2011), while others have considered underlying educational issues within a country which must be addressed before even considering the use of ICT (Hu, 2007). However, a growing discourse in the literature centres on the idea of *e-readiness.*

e-readiness is a conceptualisation of how prepared a project's beneficiaries are to use ICT in their local context. When exploring ICT-in-Education projects the literature tends to focus upon teacher's e-readiness, rather than pupils' (as does this paper). Afshari et al. (2009) state that teachers' attitudes and perceptions towards ICT are the key to positive outcomes in ICT-in-Education projects, and Boakye & Banini (2008) conclude that successful implementation largely depends on how ready teachers feel to integrate ICT in their teaching practices. Similar conclusions have repeatedly been reached in a variety of ICT-in-Education contexts (Teo, 2006; Huang & Liaw, 2005; Sabzian & Gilakjani, 2013; Ames & Warschauer, 2010; Bingimlas 2009; Pittaluga & Rivoir, 2012). Previous studies of ICT implementation within Kenya have focused on projects in secondary rather than primary schools, but have also highlighted the importance of teacher e-readiness, suggesting that this body of literature is relevant in the Kenyan context (Awour, et al., 2013; Elizabeth & Redempta, 2012; Kiptalam & Rodriguez, 2010; Lawler & Wims, 2007).

In general the literature has reported the importance of e-readiness within four themes. First, e-readiness means that teachers should have the necessary knowledge on how to use ICT in the classroom; Pittman et al. (2008) find that "the most critical factor in the power of technology to enhance learning remains the teacher's knowledge and skills in the use of IT" (Ibid: 816). Secondly, teachers have to *want* to use ICT in the classroom; Bladergroen et al., (2012) suggest that ICT integration will only be efficient if teachers see the benefits of incorporating ICT into

their lessons, and have the desire to do so. Third, e-readiness depends upon the existence of the basic resources which are needed to use ICT in the classroom, particularly electricity, internet access and security measures such as patrolmen and secure storage rooms (Ames & Warschauer, 2010; Brunello, 2010; Chikati et al., 2013; James, 2010). Sustainability and maintenance of these resources is especially important (Afshari et al., 2009; Best et al., 2013; Nugroho, 2009). Finally, the way that beneficiaries' view and relate to a project and the project implementers is seen as crucial. For example, Bladergroen et al., (2012) find that significant problems arise when teachers have different expectations of a project than implementers intended.

These literature conclusions helped to shape our decision to focus upon e-readiness among Kenyan primary school teachers, to explore the notion of whether teachers are ready for the Laptop Project. Studying the relationship between governance and e-readiness has been suggested as an important area of research (Thompson & Walsham, 2010; Krauss, 2013), suggesting that there is a gap in the literature which this study can help to fill.

2.3 The link between governance and e-readiness

The literature reports a tendency in ICT-in-Education projects to incorporate a top-down, non-transparent and non-inclusive approach to governance (Evans, 2005; Rodrik, 2006). Such an approach, argues Hosman (2010), fails to account for societal, historical and political differences between and within nations. The importance of this is reflected in Patrick's (2008) analysis of the Mexican government's ICT implementation. Patrick concludes that the project successfully implemented ICT in over 100,000 classrooms due to the government's systematic approach to *problem solving*. This approach identified the real experienced problems which needed to be tackled (access, software, and proper training) and then systematically implemented measures to combat these problems (Ibid: 1113). This ensured that the project taught teachers to use ICT, and gave them the resources to do so - key components of e-readiness.

Chikati et al (2013) find that where a systematic approach is missing projects may over focus on simple physical provision of ICT. This comes at the expense of training, infrastructure development and thorough research. Chikati et al conclude that the digital divide will continue to

widen as long as governments of developing countries do not look beyond physical access to ICTs. Similar conclusions come from Ames and Warschauer (2010) who have looked at several One Laptop Per Child (OLPC) projects and find that "The OLPC deployments that simply tried to hand out laptops have failed because they ignored local context" (Ibid: 40). Similarly, Ogembo et al. (2012) highlight the problem of project implementers not considering contextual questions carefully by first defining *what problems* schools actually want to solve, evaluating whether ICT is a good solution and researching whether schools have sufficient infrastructure and ICT skills. Again, the suggested impact is that implementers do not properly consider or tackle the problem of low e-readiness, which can in turn further lower e-readiness.

A transparent governance structure is also often found to be important, especially in relation to creating a cohesive central goal for stakeholders to work towards. Wilson (2002) finds that ICT-in-education projects are often assumed by stakeholders outside the decision making process to be focused around "*technological determinism"* (Ibid: 80). This, says Wilson, means that the complex political factors which may drive such projects are often hidden or unquestioned. This is especially important in the context of Bladergroen et al's (2012: 108) findings that there is a "lack of alignment between what funders and project implementers intended...and the social meanings educators assign to the technology". The importance of motivation in project governance and implementation influenced our research by pushing us to critically question both the government and the teachers on the meaning that they assign to the Laptop Project, and the values which they place on technology.

Finally, including relevant partners has been identified as a crucial element of governance to ensure sustainability of project and that the best expertise is included (Farrell & Isaacs, 2007; Hosman, 2010; Pittman et al., 2008; Hoachlander et al., 2001). This includes both engaging the wider local communities and establishing private-public partnerships (PPP). For example InfoDEV, a partnership of international development agencies with a focus on ICT, emphasises collaboration as an enabling feature for national ICT implementation (Farrell & Isaacs, 2007: 27), and Pittman et al. (2008) specifically point to PPP as a way to ensure sustainable financing, transparency and effective implementation.

The literature shows that despite the generally accepted importance of good governance in ICT-in-Education projects, the importance of e-readiness and the suggestion of an important link between the two concepts, good governance is often overlooked in practise and e-readiness suffers as a result.

3 Background - The Laptop Project

It is important to place Kenya's Laptop Project in its global context. Kenya is one in a line of African nations which have turned to ICT-in-Education projects; projects promoting ICT have been implemented in Algeria, Chad, Democratic Republic of Congo, Senegal, South Africa, Namibia and Tunisia (Grosclaude et al., 2014). In 2006 the members of the African Union agreed to a 10-year plan for integrating ICT into their education systems (African Union, 2006), and an infoDev report from 2007 found that 39 countries across Africa had drawn policy on ICT use in education (Farrell & Isaacs, 2007: 6).

Importantly for Kenya one of its close neighbours is already 'one step ahead'. The East African nation of Rwanda cites integration of ICT into its schools as a key goal, and began materialising this ambition by giving one laptop to every primary school, as early as 2006 (Rubagiza et al., 2010). With so many African nations undertaking large ICT projects, there has been considerable and growing pressure upon Kenya to be seen as occupying a space at the forefront of ICT implementation, to be seen as a successful and progressive nation.

In 2012 the Kenyan government announced a relatively conservative, manageable plan for its future ICT roadmap - a plan to distribute one laptop per 15 primary school students and one per teacher, over a 10 year period (Ministry of Education, 2012). The importance of a manageable plan was emphasised in this roadmap, which stated that "only about 2 % of the schools in the country have the necessary ICT infrastructure" (Ibid: 17). However, these plans fell by the wayside in April 2013 when Uhuru Kenyatta was voted into power in the national elections. Kenyatta had centred his election campaign on the idea of being 'digital', rather than 'analogue' and this digital platform promised that, if elected, Uhuru Kenyatta would provide every child entering the first year of primary education in Kenya with a personal laptop computer by January 2014 (The Star, 2013).

The magnitude of the project is enormous and is expected to cost more than Kshs 53 billion (610 million USD), with an additional Kshs 20 billion (230 million USD) set aside for electrification of the 10,500 schools without electricity. This budget includes an allocation for providing Internet access, printers and LCD projectors to each school and a teacher training program. For comparison, the annual budget for Kenya health care in 2013 was Kshs 34.7 billion (400 million USD) (PC MoE, 2013; The Guardian, 2013).

The project has been widely contested and critics claim it to be a waste of resources which could otherwise go to more pressing needs in primary education (oAfrica, 2013). Further, the project has been criticised for being another populist election promise, following earlier promises of free primary school education and free school milk (Standard Digital, 2013). However, despite the critique that the project has certainly faced, the simple fact that this election promise was chosen to help win a democratic election is indicative of the fact that there is a majority of support for the basic idea of the project. Kenyan president Uhuru Kenyatta argues that the project will help to leapfrog Kenya's education system and "that early exposure to technology will inspire future innovation and be a catalyst for growth and prosperity" (Capital FM, 2013). The government argues that the project fits within its plans to make Kenya the ICT hub for East Africa (The Ministry of ICT, 2013).

The project was announced for the first time on the 2nd of March 2013 by Uhuru Kenyatta during his election campaign. Once the project had been announced and the election won, the tendering process to find a manufacturer for the laptops began (Margaret). In January 2014 the tender was won by the Indian company Olive Telecommunications. However, the decision was challenged, and accusations of corruption and unfair dealings were levied against Olive and the Ministry of Education. The Public Procurement Administrative Review Board ruled that Olive Telecommunication had been awarded the tender unfairly and decided in March 2014 to cancel the tender. The Board stated that (i) Olive did not have the capacity to supply 1.2 million laptops, (ii) Olive received preferential treatment and more information than other bidders, (iii) Olive altered the price after being awarded the contract and (iv) Olive weren't a producer of laptops themselves, and were acting as a middleman (Standard Digital, 2014). After

the contract was cancelled the tender was reissued and open for vendors again. This process is by April 2014 still under-way (Ibid), and has meant that the laptop program was not able to launch on the planned January 2014 launch date.

4 Frameworks

This study has been designed to *explore* the concepts of e-readiness and governance in Kenya, rather than explicitly test a pre-existing theory or body of academic literature. Theory is used as an *analytical frame* to guide the research along its path (Ragin and Amoroso, 2010: 61, 74-75; Creswell, 2013: 68). We identified two theoretical models which could be modified to act as a lens, through which we could view our case.

4.1 Model 1: Teacher and school e-readiness - Technology Acceptance Model

The TAM, created by Davis in 1989, is based upon the idea that an individual's adoption of new technology is decided by that individual's (1) Perceived Usefulness and (2) Perceived Ease of Use. This model has become "One of the most widespread and empirically tested models of technology acceptance using a psychological framework" (Thatcher & Ndabeni, 2011: 128). The TAM was extended by Musa in 2006 to apply in developing country contexts by including 'Perceived User Resources' as a variable and adding 'Perceived Socio-Economic Context' into the background of the model.

This model fits closely with our literature review which found that *Perceived Usefulness*, *Perceived Ease of Use* and *Perceived User Resources* were all important parts of e-readiness. Our literature review also found that teachers' *Perceptions of the Project* were an important factor in e-readiness, and we made the decision to modify Musa's TAM model[1] to include this. As such, we shall use the following framework as a lens through which we shall frame our analysis of e-readiness in Kenya;

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[1] Musa also included "Accessibility of Technology" in his model, to account for which technologies that are available for use. This component of the model was taken out to adjust the model for our case; perceived access is not as relevant in the context of the Laptop Project, where access is given by the government.
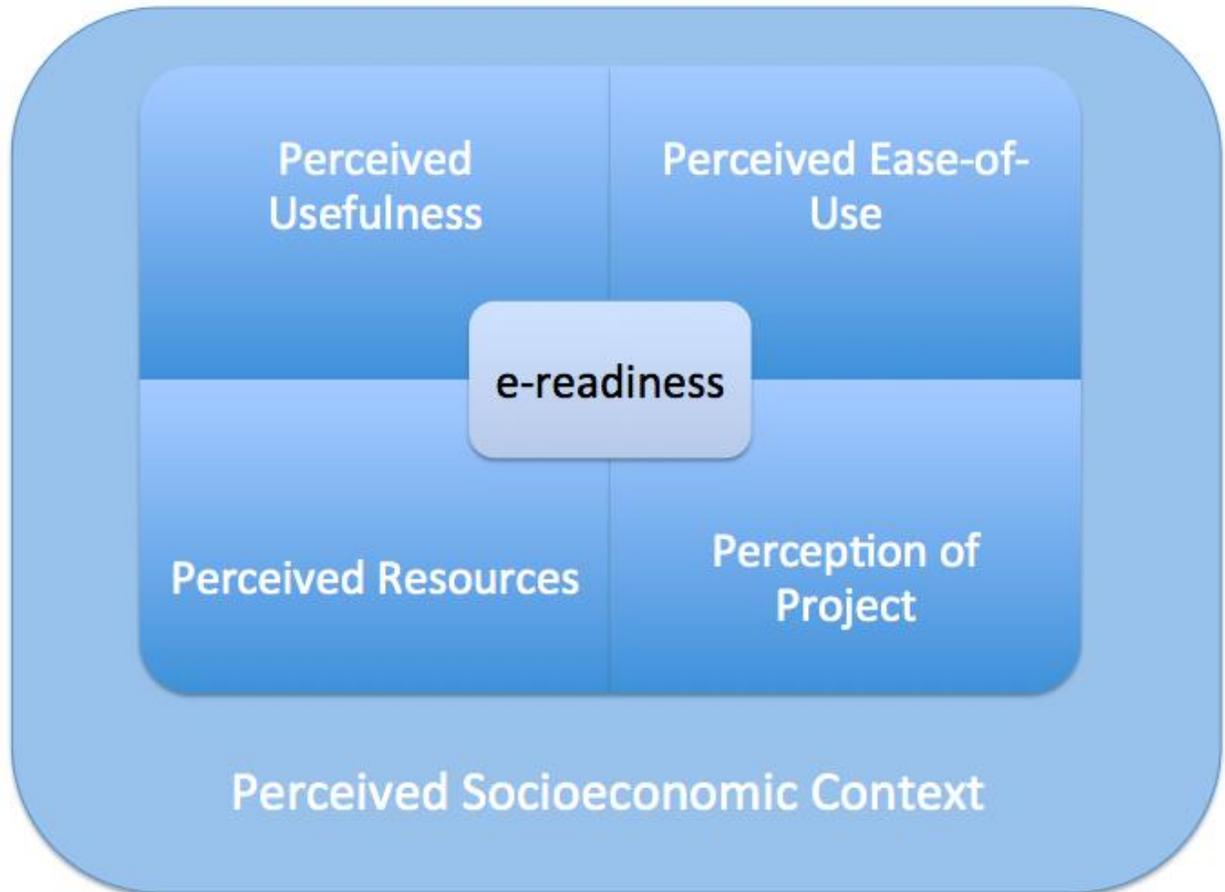
Figure 1: Our modified Technology Acceptance Model, based on Musa's revised TAM (2006)

We believe that taking this approach and working through this model allowed us to capture school readiness holistically and contextually. It was especially beneficial for us to view e-readiness in terms of *perceptions* - an approach favoured by du Plessis & Webb (2012). This is best explained with a simple hypothetical example. Imagine a school which is in possession of a very sophisticated security system which no-one at the school has the training to switch on. On paper the school would have high security, but by asking the teachers about how secure they perceive their school to be, it becomes clear that the school is insecure.

4.2 Model 2: Cadman's Good Governance

The concept of good governance was developed by the World Bank and the IMF during the 1990s to improve governance in borrowing countries and increase project efficiency. The concept combines transparency, accountability, efficiency, fairness, participation and ownership

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(Woods, 2000). Our literature review of governance in ICT4D projects found that top-down, centralised governance which did not include stakeholders and lacked transparency was a common problem, and affected e-readiness concepts like training, infrastructure development and sustainability.

We used a simplified version of Cadman's (2012) model of good governance to frame this section of analysis. Cadman's framework was designed as a tool by which governance could be evaluated to explain how complex government-led development projects can achieve legitimacy. The central tenet of Cadman's framework is that governance should be analysed in terms of governance *inputs* and *outcomes*.

Governance inputs are the processes and structures which direct a governments' actions. Cadman separates inputs into three categories;

- **Interest Representation**: ensuring that all stakeholders are *included* in the planning process, given *equal voice* to direct the process, and that they possess the necessary *resources* to engage with the process
- **Organisational Responsibility:** there should be both *accountability* and *transparency* within the entire research, planning and design process.
- **Decision Making:** a measure of *democracy* within the planning process, the reaching of *agreements* and the settlement of *disputes*.

Governance outcomes are the fruits of these processes and structures - the observable and specific changes that occur as a result of the governance inputs. It should be possible to draw a direct line between governance inputs and outcomes, showing how the first led to the creation of the second. Although there will be many governance outcomes within this project, our study chooses to explore those which we identify as having directly impacted e-readiness among teachers, as defined through the TAM.

Although Cadman's original framework was designed as a general analysis tool, the closeness of Cadman's governance themes to those raised through our literature review on ICT-

in-Education projects (ideas of contextual awareness, cohesive goals, a systematic approach to problem solving, inclusion and transparency), is indicative of the relevance of this model.

In sum, within this thesis' analysis Cadman's central ideas will be employed to analyse governance and the effect that this project has had upon e-readiness. As we move from simply saying *what* is the level of e-readiness to asking *what are the processes and structures behind this,* we shall work through Cadman's structure of **Inputs** and **Outcomes**, as described by Figure 2.
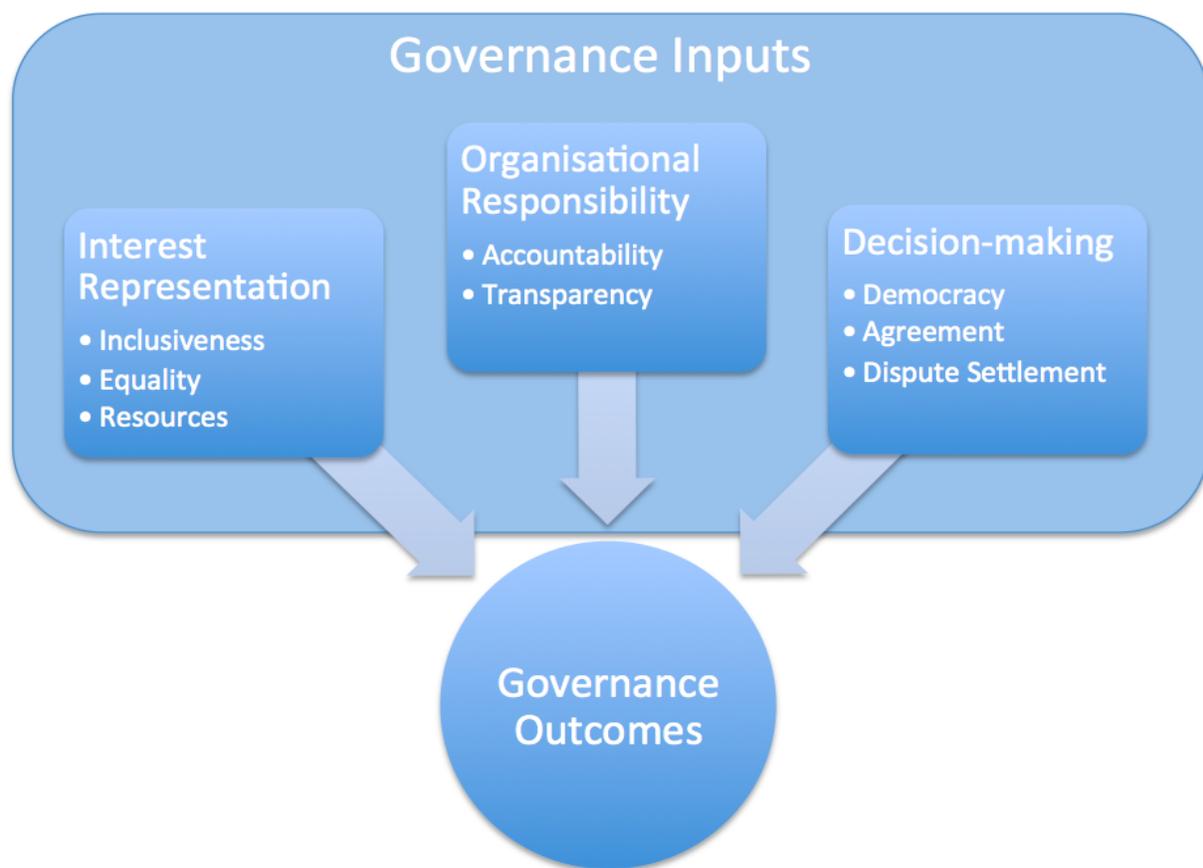

Figure 2: Our Simplified version of Cadman's (2012) model of good governance

5 Methodology

We elected to conduct a mixed methods case study. The Laptop Project represents a useful case to explore the importance of governance in country-wide ICT-in-Education implementations; this project is one of the first to be completed on such a large scale. We set our boundaries in time from the point when the project was announced to the present day. More specifically, a multi-site case study was conducted in 7 of the 20,000 Laptop Project primary schools. A similar approach was taken by Linden (2008) and Light et al (2008) who explored similar themes with successful results.

We used qualitative methods as the primary engine of research, to construct a deep and complex picture of the case. This involved the use of open-ended interviews, focus groups, document analysis and participant observation. However, we decided that we would land much closer to our destination by using quantitative research methods as a secondary engine, to support our qualitative findings. Kaplan and Duchon (1988: p 572) explain that information systems are intricate and complex, with too many "uncontrolled - and unidentifiable - variables" to rely on either qualitative or quantitative methods alone. They conclude, "No one method can provide the richness that information systems, as a discipline, needs for further advance" (Ibid: p 583). Tolani-Brown et al. (2011) emphasise the need for a mixed methods approach using a triangulation of different sources because qualitative studies have shown a tendency to give biased, overly positive attitudes towards ICT.

In practise, this meant conducting a survey of 80 primary school teachers and embedding these quantitative findings into our qualitative results, resulting in more robust and detailed data. This closely resembled a triangulation mixed methods design, where "different but complementary data" is obtained on the same topic (Morse 1991: 122) and an embedded mixed methods approach.

5.1 Philosophical Assumptions

Our predominant position is constructivism, but the analysis which we present in this thesis has also been influenced by ideas of pragmatism and the advocacy approach.

Our constructivist viewpoint leaves us aware of our role as researchers, who help to shape the knowledge which we draw from the field (Kaplan and Duchon, 1989). As such it was important to remain consciously aware of our own position within the research, acknowledging the inevitable impact of our own personal and cultural experiences upon our findings. This strengthened our decision to lay the groundwork of our thesis upon *qualitative analysis* and to focus upon participants' perceptions of the Laptop Project; focusing purely on quantitative data would make our conclusions much more a prisoner of our own interpretation.

Practically speaking, constructivism supported the use of open-ended questions which allow participants to talk more freely within a subject. The constructivist should consider the participants' context in order to understand cultural settings (Creswell, 2012). To better understand the participants' context considerable time was spent observing, talking informally, participating in meetings and taking walks with teachers. In short, we spent as much time as possible in schools, government meetings and training sessions.

We also believe that there is a clear taste of a pragmatism perspective in our thesis. The purpose of our study is rooted in the practical need for better understanding of ICT4D projects, following the trend of increasing ICT4D investment and the high project failure rate. Thus, our thesis is concerned with *addressing the right questions* to find solutions to an existing problem, while using an adapted research methodology. We also see that our study includes elements of the advocacy approach. This comes naturally as our research strives to give a voice to the teachers; as we build towards a set of suggestions for future policy - we aim to help our participants' voices be heard in an otherwise top-down governed project (Creswell, 2013).

5.2 Sampling

5.2.1 Schools and teachers

Identifying school and teacher[2] participants took place in two stages: (1) identifying schools and

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[2] As it is very common for deputy headteachers and headteachers to also carry out teaching roles, we use the term 'teachers' to refer to all school staff, regardless of position in the school

(2) identifying teachers within these schools. Schools were selected based on four key variables: location (rural/urban), number of pupils, KCPE examination results and infrastructure, in order to avoid including outliers from the national average while still providing a useful variation. We disallowed schools which were private or which already had extensive ICT implementation, as these schools would not be targeted by the Laptop Project. The decision to include schools from different regions followed on from Harvey's (2011) findings that attitudes towards ICT can vary largely between different areas within a country. Seven schools were approached and all agreed to take part in our research - this gave us three urban and four rural schools. The location of these schools is shown in Figure 3 below. For specific data on the individual schools see Appendix II.
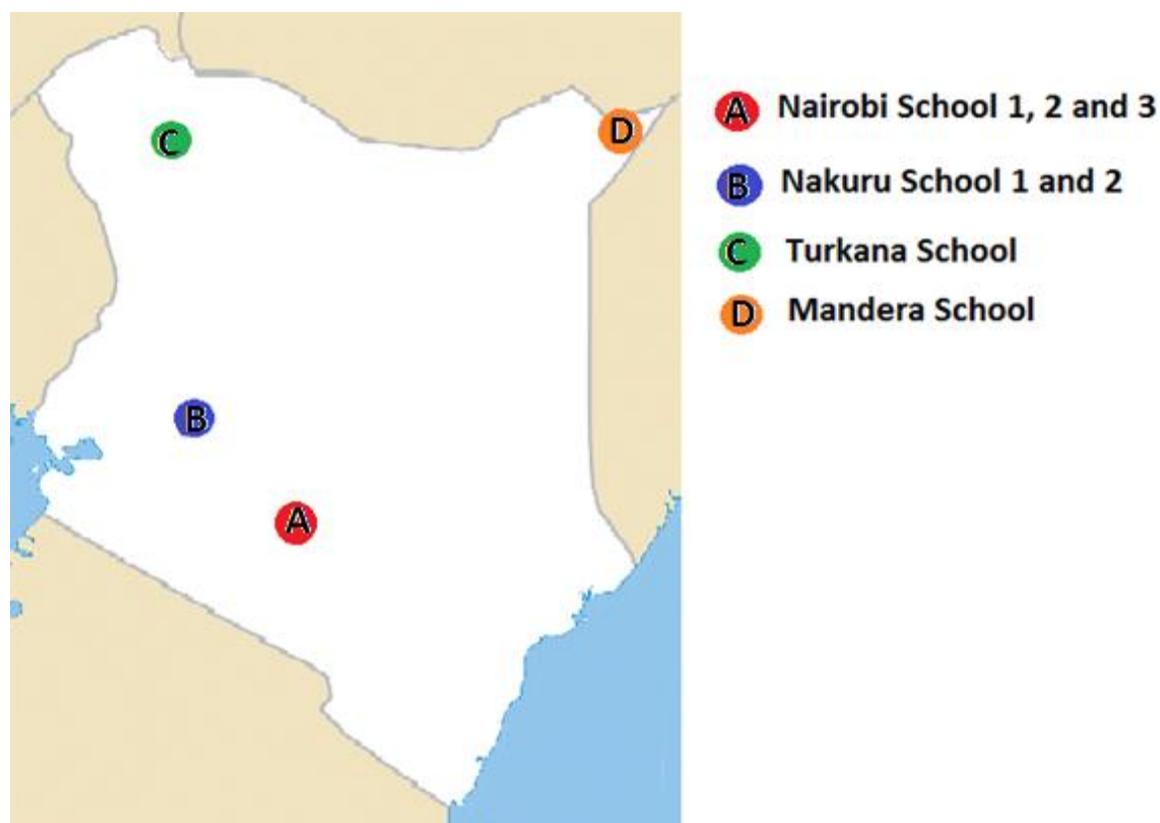
Figure 3: Map of Kenya showing the locations of the schools included in our research. Source: adapted from Rand McNally (2014)

Participant teachers within each school were chosen to give maximum variation and provide us with multiple perspectives on the project, as recommended by Creswell (2012). Sampling variation criteria were age, gender, subject taught and ICT training. Studies have shown significant difference in computer attitudes between males and females (Margolis & Fischer, 2002; Markauskaite, 2006). For example, Campbell (1990) and Culley (1988) reported

females having more negative views of computers than males due to a more masculine image of computers. We also wanted to include teachers of varying ages, as age has been found to have a significant impact on e-readiness, especially in attitudes to technology which have been found to have a negative relationship with age. Thus, younger teachers may be more receptive to using ICT in the classroom than older teachers (Nair et al., 2005). Earlier experience of using ICT, either through training or earlier usage have also been shown to impact attitudes towards ICT, as well as subject taught by the teacher (Teo, 2008). For example, length of computer usage has been found to correlate to improved confidence and attitudes (Ibid). Interestingly, however, research has also found that unsuccessful earlier computer usage can act as a barrier instead of facilitating e-readiness (Huang & Liaw, 2005; Lim & Khine, 2006).

5.2.2 Government and non-government interviewees

It was important for our research to include government representatives and actors from civil society with relevant insight into the governance of the project. We included two representatives of the Ministry of Education, one is the head of the Laptop Project's training program (Alexander) and the other is one of the project's 15 'core' trainers [3] (Elizabeth). These participants were picked to give us insights into the project and an understanding of the internal processes within the ministry. We also included two representatives from civil society. One is the head of a e-learning content development enterprise which has a high profile in the e-learning sector in Kenya and regularly works in collaboration with the Ministry of Education (Margaret). The other interviewee is head of an NGO working closely together with GoK in ICT related governance projects (Solomon). These two participants were selected because of their close knowledge of the project and its governance, and non-government status.

5.3 Limitations

The Laptop Project was originally intended to launch in January 2014, but through problems with the laptop tendering process this launch date was missed, and has been nudged into the future. This means that we were forced to evaluate teacher's e-readiness *before* the actual launch

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[3] There are 15 *core trainers* in the Laptop Project, whose job it is to teach the *trainers,* who will teach individual *teachers*

of the project and are aware that more preparations may be made by the government between our research (conducted between November and January 2014) and the eventual launch date. However, as the delay in the launch date was unplanned, we do believe that it makes sense to evaluate e-readiness at the time of the *planned* launch date.

Secondly, limited access to official government documents meant that we were at times forced to rely on secondary sources such as newspapers to complement the few officially released project documents. Fortunately, we had access through our own government contacts to government planning documents, particularly the performance contracts for each ministry. Directly interviewing government officials provided another avenue for information. The existence of limited documentation was subsequently included within our research and led us to question why so little information was given to the public.

5.4 Qualitative Methods

5.4.1 Open-ended Interviews

Open-ended interviews were an important tool to create a complex and dynamic picture through our research (Creswell, 2012). Interviews were conducted with 12 primary school teachers, 2 deputy headteachers and 4 headteachers, as well as our government and civil society participants. These interviews were not bound to stick to a script and moved with the participant. Our general interview guidelines can be found in Appendix IV. Some open-ended interviews were combined with narrative walks around the school grounds. This allowed interviewees to show us key concepts like secure locked rooms and faulty electrical wiring and helped participants to explain themselves in a more natural setting (Jovchelovitch & Bauer, 2000). This also gave us the opportunity to question when what participants told us ('yes we have electricity') did not match up with what we saw ('why are the lights not turned on?').

We initially entered the field and conducted participant observations through our role as ICT instructors in three of the participant schools. As such we were conscious of Kvale (2006) and Kvale and Brinkmann's (2009) findings that power relations are important for interviewers to consider where the interviewer can be seen as a teacher, or has had a position of power.

Creswell (2012) says that such problems cannot be overcome with a one-size fits all approach, and must be combated with *awareness* of the situation and a dynamic response. We tried to minimise this effect in our open-ended interviews with indirect questions, such as 'how easy do you think *other* teachers think computers are to use?'. We also explained to the teachers that their responses would be completely anonymous.

5.4.2 Participative Observation

Participative observation, taking part in the daily activities of the people being studied is a means of exploring the explicit and tacit aspects of a culture (Dewalt and Dewalt, 2010). We conducted participative observation with teachers from three of the schools as we led them in ICT educational courses. This allowed us to work directly with participants and to witness their attitudes, ability and access to technology in a natural setting while we took part in their daily routine. For example, instead of interviewing a participant about mobile phone use, we were able to observe their mobile phone usage throughout a working week - how often they used it, and which functions they used.

As we take a constructivist viewpoint, participative observation represented a good tool for us to use in the early stages of research, as it "disallows selective learning about a people" (Dewalt and Dewalt, 2010: 261). ICT-in-Education is currently a widely debated topic in Kenya which enabled us to conduct non-participative observation and gain a feeling of different attitudes towards the topic simply by reading the newspaper or watching the local news.

5.4.3 Focus Groups

We decided to use focus groups early on in our research to approach certain topics with participants in a group setting. By asking participants to answer in front of others, participants can be encouraged to be more reflective, to think more deeply about their answers and to face challenges from peers if their views were not representative of the group (Stewart et al., 2007). This was important in our research as some of the key factors behind e-readiness are factors which (1) can change rapidly and (2) are often indirect and as such are easy to assume, generalise or quite simply forget about. For this reason we conducted two small focus groups, each with

three participants. The participants came from four very different areas of the country, covering both rural and urban areas. Five participants were primary school teachers while one was a parent of primary school aged children.

To give a simple example of the benefit of this method, in one focus group a teacher from the rural northeast mentioned that the high number of nomadic pupils in her school could cause difficulties for ICT use. This mention of nomadic pupils reminded another teacher from the rural northwest that his school faced a very similar problem and he had not previously considered the impact on ICT. Our experience here reinforced Kaplan and Duchon's (1988) conclusion in our minds - it would have been impossible for us to extract such intricate responses with quantitative methods alone.

5.4.4 Document Analysis

Analysis of various government documents allowed us to gain another angle from which to approach governance. Rather than relying on on-the-spot responses from individual respondents, by analysing publicly government documents we could also capture data which had been written, reviewed and agreed upon by a larger team of government employees. Thanks to the bureaucracies of government there was a wealth of government documents that were available to us. Documents used can be split into three general types;

- Documents from the tendering process
- General government reports linked to ICT and Education
- Performance Contracts from the relevant ministries[4]

5.4.5 Qualitative Data Analysis

As suggested by the *Data Analysis Spiral* (Creswell, 2012: 183), we started our analysis by organising a database with our research material, including transcribed interviews, field notes

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[4] Performance Contracts are written agreements, completed by all government entities which set out the specific targets, activities, measurements and success criteria for those entities over a 12 month period. Performance Contracts list the specific minimum activities which that entity **has agreed to** complete within that time frame, and will be accountable to answer for if they do not.

and documents. Following this, we created a code book, organising our data into codes based upon our theoretical models, literature review and our own observations. Thoughtful coding was especially important as we were two individuals, looking at one dataset. Lean coding was used; we began with a just a few general codes and let these evolve into multiple sub-codes as our analysis of the data became more nuanced. Lastly, we organised our codes into overarching themes, a process that enabled us to more easily interpret and *make sense* of our data (Creswell, 2012).

5.5 Quantitative Methods

A sample of 80 teachers was surveyed. Participant teachers came from the 2 rural schools in the Nakuru region and 3 urban schools in the capital city, Nairobi. Each school had between 20 and 40 teachers. The surveys were designed specifically to complement our qualitative research on *e-readiness*, although the results also (perhaps somewhat unsurprisingly, as the concepts are so interlinked) brought up interesting analysis of governance of the project.

The surveys were given out in paper form during visits to each school. Despite the increasing use of online-survey tools (Sue & Ritter, 2007), the decision was made to conduct our survey on paper to make it easier for teachers to respond regardless of ICT literacy. Of the 100 surveys which were handed out, 80 sufficiently completed responses were received (see Appendix VIII). Due to the high number of responded surveys, we do not expect significant *response bias* (Fowler, 2002). The average age of the respondents was 43 and the average years teaching was 19. These figures satisfied us that the sample was unlikely to be biased regarding age; the average age of civil-service teachers in Kenya is also 43 (Duflo et al., 2012; Pallant, 2007).

The questionnaires were rather detailed, consisting of 20 main questions, yielding 57 data points and taking between 15 and 20 minutes to complete. Surveys were completed individually without direct assistance. The majority of the questions demanded simple tick-box responses, for example, one question consisted of a number of events which respondents were asked to rate in terms of likelihood. A few questions prompted the respondent for written response in a blank textbox. For example, respondents were asked to list specific ways they perceived laptops to be

useful (See Appendix IV). This technique allowed us to see what teachers would report without any prompts, an approach suggested for such situations by Pallant (2007). The variables included in the survey were derived from the TAM model, but the overall design was also influenced by the qualitative research which we had in our possession at that point (several open-ended interviews with teachers, one focus group and our own observations).

5.5.1 Quantitative Data Analysis

Analysis was done using IBM SPSS 20. Through univariate analysis all variables were deemed clean and their distribution analysed through the use of histograms (Ibid.) Univariate analysis was conducted with all variables to show mean values, standard deviations and range of scores (Creswell, 2013). All the textbox answers were categorised in accordance with our literature review to enable us to analyse responses quantitatively. For a complete list of these categories, please see Appendix VI.

Bivariate analysis was conducted to get a better understanding of correlations between the e-readiness variables (our dependent variables) and key teacher characteristics; remoteness (V44), amount of training (V8) and age (V1) (our independent variables). These characteristics were tested because of their indicated effect upon e-readiness to provide us with a better understanding of e-readiness and give us new perspectives on the project implementation (Nair et al., 2005; Teo, 2008; Harvey, 2010). New categorical variables were created for amount of training and age with an equal and satisfactory amount of respondents in each group (Pallant, 2007). When conducting bivariate analysis with age and amount of training the gamma test and the chi-square test were used. For correlations between remoteness and e-readiness we used the chi-square test, and relevant assumptions for the tests were controlled.

Being explorative in nature, we wanted to test the effect our independent variables might have on all different features of e-readiness. While this procedure includes the risk for Type 1 errors[5], we minimised this risk by ensuring that assumptions were met, sample sizes were satisfactory, placed particular attention on effect sizes and alpha levels as well as observing our

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[5] Type 1 error refers to rejecting a null hypothesis when it is actually true.

findings with scatter plot (Ibid).

6. Results

6.1 How e-ready are primary school teachers in Kenya for the Laptop Project?

6.1.1 Perceived Socio-Economic Context

Socioeconomic context can serve both as an enabling and constraining factor when adopting new technologies; it runs through the background of all other factors of e-readiness and is therefore important to conceptualise first (Musa, 2006). In our study we found that perceived socio-economic context was very low, characterised by insecurity, high levels of poverty and lack of opportunities for legitimate business. Poor socio-economic context was perceived by teachers as a significant threat to the project. For example, all schools had experienced burglaries in the past, with four schools reporting very recent burglaries;

> *We don't have 100% security in school. The other day, I don't know if this has come to your attention, some robbers had broken the headteacher's office.* (Martin)

The poor socio-economic context led some teachers to report an imbalance in the project, since many of the students lack basic needs such as sufficient food and clothing.

> *...some of [the pupils] are too poor even to afford lunch...some of them are so needy that even the clothing coming to school is a problem...when we see the computers are here but the very basic needs of the children are not being catered for, we don't see the balance.* (Marion)

However, there was some agreement amongst the teachers that as well as posing a threat, the poor socio-economic context represented a clear indication of the need for the project; teachers explained that the Laptop Project could help to improve the situation. Within many of the open-ended interviews this led us naturally on to discuss perceived usefulness of the project.

6.1.2 Perceived Usefulness

Perceived usefulness is regarded as one of the main factors that influences technology adoption. It measures the degree to which an individual believes that ICT will enhance her job performance (Musa, 2006). In general perceived usefulness was relatively high among the participant teachers, meaning that the teachers saw potential benefit in using ICT in their classrooms. This was perhaps the most uniform of all the e-readiness factors, with all teachers reporting *at least some degree* of positivity towards how useful ICT could be in their school. Moreover, many teachers were able to list several concrete and direct examples of just how ICT could be useful. This helped to convince us that the teachers' positive reactions were specifically linked to ICT and not the result of teachers wanting to appear positive. By coding the specific examples that the teachers gave we were able to identify teachers' perceived usefulness as fitting into three fairly distinct areas - usefulness for students' education, usefulness for teachers' work and usefulness for the wider economy.

Usefulness for Students' Education

Teachers felt that ICT could be useful to help their students learn; usefulness for students' learning was regularly cited in the interviews with teachers. In general, teachers felt that ICT could help to improve students' attendance in school, engagement in the classroom and schools' resources, meaning that children would be in school, ready to learn and able to learn:

> *...children will learn more on their own than with the teachers. You see when I go to class I teach them, but when I leave the class the children will definitely want to find out if they have a question they want to ask, they will just go back to [the computers] and they will get more information.* (Jane)

These views were corroborated by our quantitative results where 42% reported strongly agreeing, and 94.9% agreeing with the statement "computers help students to learn". The majority (63 %) of the responding teachers felt that computers could be useful for all subjects, not only subjects linked closely with ICT skills.

Despite the general positive attitudes, around a third of the teachers (35 %) feared that computers would have some ***negative*** effects on student learning. Here the largest perceived

threat was that children would access and look up inappropriate material, such as pornography; a worry which also was a recurring theme in our interviews.

Usefulness For Teachers

Teachers told us that they expected computers to be a useful tool for themselves when preparing lessons and managing their work, especially for preparing material and managing exams and student records:

> *In fact we are very much excited because it will make our work easier. For example I am a science teacher, but I am not good in drawing. So maybe I can get some drawings from the laptop, so it will make my work easier.* (Lucy Kamenya)

Accordingly, almost all teachers (95%) ranked laptops as being very useful or quite useful for teaching. The benefits reported in our research fit in line with those that advocators of ICT-in-Education tend to highlight - laptops as a tool for information searching (for students and teachers), presentation (for teachers) and communication with other schools (UNESCO, 2012).

For the Nation

A number of teachers also spoke positively of the usefulness of ICT outside of school, particularly in promoting Kenya's economic growth and development. Obadiah said:

> *Because I think the whole world is going with computers, and you realize in most sectors the work is being done using computers. So really, to introduce children to these computers is a very good idea*

To confirm that these categories of usefulness were not results of our own biases, one section of the questionnaire provided a blank textbox and asked teachers to list specific ways they thought that ICT could be useful. The graph below shows that most teachers thought of educational benefits within their subject (61%), followed by helping in teacher's work, and then benefits for the nation.
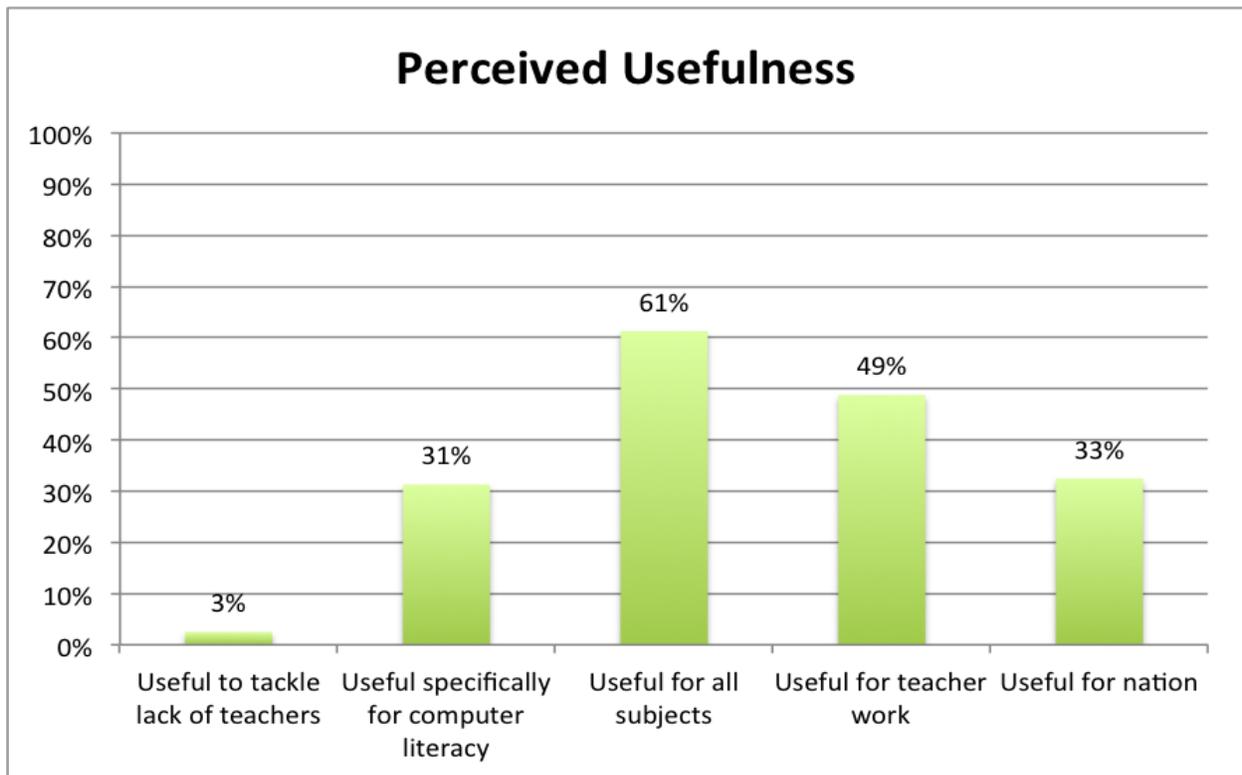
Figure 4: Teachers' Perceived Usefulness (V31Recoded; Appendix VI)

Unexpected Perceived Usefulness Results

Counter intuitively, we found a significant correlation between age and perceived usefulness; younger teachers saw laptops as **less useful** than older teachers, expressed more negative feelings towards the project and were more worried about laptops costing too much and taking too much time from lessons. This finding does not fit with literature which says that younger teachers are more positive to ICT (Nair et al., 2005), or, importantly what our government interview participants reported to us.

Along the same lines we found a significant negative correlation between amount of IT training and perceived usefulness (Appendix VII). Trained teachers were more worried that laptops would distract students from learning or take up too much time. One possible explanation offered by theory is that, if earlier computer usage has been unsuccessful it can instead act as a barrier and shape negative attitudes towards technology use (Huang & Liaw, 2005; Lim & Khine, 2006).

These unexpected results could be interesting areas for further research. Although it is beyond the scope of this thesis to satisfactorily explain these findings, their simple existence is important, as it helps to highlight the **complexity** of the case and the difficulty (and danger) in making assumptions about e-readiness. This reinforces the importance of high quality research within local contexts.

6.1.3 Perceived Ease of Use

Whether the user expects the technology to be easy to use or not is considered to be a main indicator of actual technology use (Musa, 2006). We found that perceptions here were mixed. Firstly, the majority of teachers reported that they did not expect the computers themselves to be too difficult to use. One of the most common explanations given for this fact was the increasingly widespread use of ICT in everyday Kenyan life, particularly mobile phones[6]. Many teachers explained to us that they expect to adapt to using the computers quickly because they successfully learned-by-doing with their mobile phone. From the quantitative survey, 78 % of respondents said that they thought that laptops were easy or quite easy to use (Appendix VI).

There was a vocal minority of teachers who felt that computers were not easy to use. Although this view was uncommon it was more severe, with some teachers explaining that they did not feel that they could use a computer at all. These teachers reported feelings of anxiety and worry linked to the Laptop Project.

However, generally high ease of use was not consistently reflected in the survey. Only 8% of responding teachers reported that they felt adequately prepared to use laptops in their classrooms (Figure 4). Clearly there was more at play. In-depth interviews with teachers allowed us to dig deeper into the concept of ease of use and uncovered an important difference between perceived ease of everyday computer use and **applied computer use -** being able to use a computer in teaching, in front of students. Teachers explained that although they felt that it was possible to simply be handed a computer and learn to use it, applying that knowledge in a classroom setting was not so simple. Obadiah told us that the training that he received in teacher

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[6] Since 2006, mobile phone usage in Kenya has exploded from around 10% to over 90% of the population (Farrell & Isaacs, 2007; Dhemombynes & Thegeya, 2012)

training college on ICT use was of low quality, and was too short. As one teacher explains:

> *There are quite a number of things I can do, but when it comes now to the class...I don't know how we are going to apply that knowledge, that the computer has, and you want to impart this knowledge now to the children. I don't know how exactly it is going to work.* (David)

This finding was corroborated by our quantitative analysis, which found that around 60 % of respondents said that they needed more training and more time to practice before being ready to teach using laptops (Figure 5).
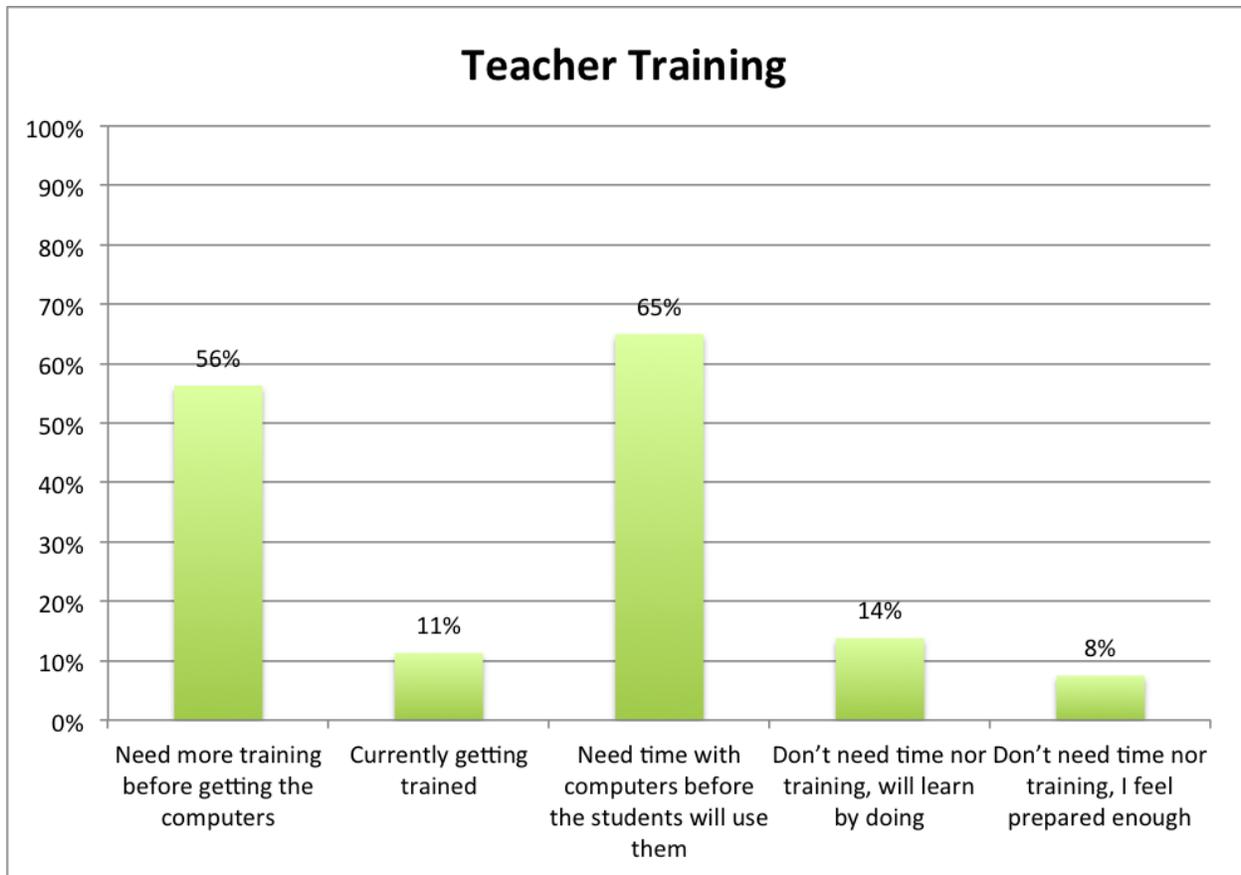

Figure 5: Teachers' attitudes towards ICT training (V12-V16; Appendix VI)

This phenomenon has been observed in evaluations of many other ICT-in-Education projects. For example one analysis of an OLPC project in Tanzania concluded that the most

fundamental obstacle was that the teachers did not know how laptops should be integrated in their teaching (Best et al., 2013), while a similar study in Rwanda concluded that teachers did not know how to integrate ICT into their curriculum, although they saw the need for, and were positive towards, using ICT (Apiola et al, 2011).

Amongst our study participants, one of the most significant challenges to applying ICT in the classroom was time constraints. Teachers were afraid that at only 35 minutes, Kenyan primary school lessons are too short to use computers if teachers are unprepared and unpractised, and computers will take time from the other learning. As one teacher put it:

> *I think it will be a big challenge to cover the syllabus, because we only have 35 minutes in each lesson...for using the laptops and these things.* (Ann)

Time constraints reappeared as one of the greatest fears among teachers in our survey[7]. Teachers wrote that the limited time they had to cover the syllabus would leave little time to use computers, while they feared that students would spend too much time waste time and playing games on the computers (Appendix VI).

Another specific concern regarding applying ICT in the classroom was that students would learn to use the computers quicker than their teachers. Teachers feared being overtaken in knowledge by their students and losing face and authority in the classroom. This is a concern that has been repeated in the literature, where teachers have reported that new technology will lead students to challenge their authority (Best et al., 2013). ICT changes power relations inside the classroom, as the teacher is no longer the sole owner of information and can be proven wrong by the student and, while we generally observed positive attitudes towards making learning more student-centred, some teachers expressed concerns about this change.

Lastly, we found a significant correlation between amount of IT training and feelings of preparedness to use laptops in the classroom. More trained teachers felt more prepared than untrained teachers (Appendix VII). We did however not find any correlation between

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[7] for an entire list of perceived negative effects, please see Appendix VI

preparedness and the Laptop Project's training program. Teachers who worked at schools which had been through this training program did not feel more prepared than other teachers. Interviews with Alexander, the head of the government's training program and Elizabeth, a core trainer explained why, the training program is relatively short and small-scale. The (on-going) training program selects just 3 teachers from each school in a region to attend a 5 day training, after which teachers are expected to return to their schools to teach their colleagues. We found that besides the teachers that had attended the training, teachers seemed to be unaware and uninformed about the training even existing.

6.1.4 Perceived User Resources

Perceived user resources conceptualises the extent to which an individual believes they have the resources needed to use technology (Musa, 2006). Teachers generally reported very low perceptions of their school's resources. Lack of security measures, particularly night guards and secure storage rooms, was seen as a big problem at all schools regardless of location. Considering the high levels of insecurity and low perceptions of socio-economic environment, it was understandable that threat of laptops being stolen once they arrive was perceived as the biggest threat to the project, together with the threat laptops becoming damaged (Appendix VI). As one teacher expressed this worry;

> *We do not have enough security here. I know this wire mesh is just a matter of seconds. The thieves will come and take it all.* (Josephine)

A majority of the teachers expected that the government would support the school with creating a secure solution once the laptops arrived. Some schools planned to involve the community in finding solutions to create security at the school or to hire an extra watch man.

Electricity was not perceived to be a major threat to the project and only a fifth of the teachers thought that lack of electricity was a problem at their school. Most of the schools currently used only minimal electricity, mainly for lighting, but this problem was seen by teachers as *simple* to fix, and one which would not cause too much trouble. There was a belief that where electricity supply was lacking, the government would provide solar panel solutions, or

connect the school to the mains power grid.

Learning materials such as textbooks, proper tables and chairs as well as more classrooms were the resources that teachers reported lacking most regularly. As Figure 6 illustrates, nearly 60% of teachers reported that they lacked tables, chairs and textbooks (Appendix VI). In Nairobi School 1, we observed that the textbook per student ratio can be as high as 15 students per textbooks, even for core subjects like mathematics and sciences. The problems posed by these deficiencies were presented very clearly by the teachers. For example, lack of desks was seen as a challenge to children physically being able to sit down with the laptops[8]:

> *If you can imagine 150 children to a classroom and 3, 4 girls sharing [a desk]. So conditions will be, not advantageous. (*Benjamin)

Although many perceived resource problems were shared between all schools there were also significant context dependent challenges. In some rural schools, protecting the laptops from dust was seen as a very important issue. In another, frequent and sudden rainfalls were seen as a threat since the school lacked proper windows to keep out the rain. We also found a significant relationship between school remoteness and costs; teachers in rural schools were more worried that using the laptops would become too expensive than teachers in urban schools (Appendix VII). Figure 6 summarises;

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[8] For an example of a standard 1 classroom which illustrates this, please see Appendix IX
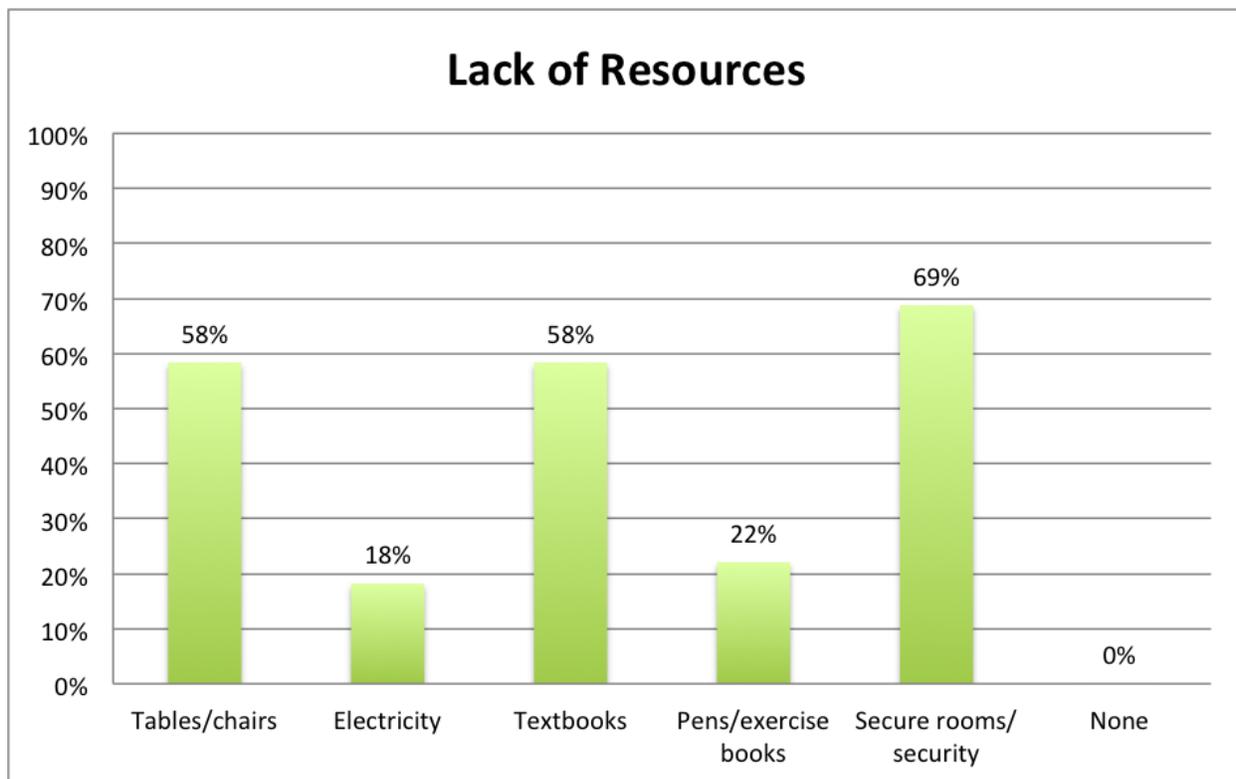
Figure 6: Teachers' Perceived Resources (V40; Appendix VI)

6.1.5 Perception of Project

Teachers' perception of the specific project design and implementation is another factor in e-readiness that may act as a major determinant to whether or not technology will be used (Bladergroen et al., 2012). Our study finds that attitudes among teachers towards the Laptop Project are generally positive. The project is seen as part of a nation-wide digital modernising movement in Kenya, perhaps partly due to the effectiveness of the election campaign rhetoric. One third (29 %) of the teachers reported that the election slogan, 'shifting from analogue to digital' was the main purpose of the project. Variations on this phrase were repeated to us by many teachers through the interviews:

> *No, in fact nowadays we want to be digital, not analogue...We need the change. What we lack here is for people to make us change. Otherwise we are eager for the change.* (Lucy)

Generally we observed positive attitudes towards the idea of the project and receiving laptops. When asked in our survey to choose one word to fill in the blank in the sentence "When

I think about the government's Laptop Project I feel ____", 75% of the teachers used a positive word. Figure 7 displays individual responses:

Figure 7: Teachers' attitudes towards the project expressed in one word, illustrated in a word cloud (V41; Appendix VI)

However, our quantitative study also revealed that while attitudes to the project were generally positive, 63% would have preferred the government to invest in something other than laptops. Given the general excitement towards the project, this finding is very telling about the lack of resources in the schools. Most commonly suggested were investments in resources and infrastructure, such as new classrooms, textbooks and desks (Figure 8).

Preferred Investments

Meeting child needs	13%
Teacher capacity building	5%
Resources & infrastructure	45%
Raise of teacher salary	4%
More teachers employed	10%
Security	5%
Other technology	3%

Figure 8: Teachers' preferred government investment (V28Recoded; Appendix VI)

Furthermore, while teachers are generally positive to the idea of the project, there is considerable uncertainty and negativity about *how* the project is being run. Specific criticisms were aimed at the lack of research carried out before the project and the poor implementation of teacher training. There was also doubt about the durability of the project, as teachers were unsure whether current and future governments would guarantee sustainability of the project. One teacher explains:

> *We feel like we are not sure whether it is a long-term providence, whether it is a long-term issue or it's just a project for those who are in the office. We are not sure that when another leader comes, that it will continue.* (Marion)

This leaves us with the following picture of e-readiness;

E-readiness Component	Level	Summary
Perceived Socio-economic Context	Low	Poor socio-economic context perceived as threat to project, specifically lack of security and unmet children needs
Perceived Usefulness	High	Teachers generally think computers are useful for teaching and learning
Perceived Ease-of Use	Mixed/Low	Ease of general computer use perceived relatively moderate. Ease of use in classroom low
Perceived Resources	Low	Both teacher and school resources perceived to be very low
Perception of Project	Mixed	Attitudes positive towards ICT but negative to project implementation, especially lack of training and lack of investment in other needs

Table 1: Summary of e-readiness

Lack of teacher confidence, competence and resources are critical signals of low e-readiness which pose serious threats to the success of ICT-in-Education projects (Bingimlas, 2009). We were especially interested in teachers' negative perceptions of the way that the project is being run, despite positivity towards the idea of the project. For us, this was an indication of possible problems in the project's governance. In the next section we take a closer look at the governance processes at play and explore if and how they have impacted e-readiness.

6.2 What role has governance played in e-readiness?

6.2.1 How has the project design and implementation been governed?

Before exploring how governance has affected e-readiness we must first present our findings on how the Laptop Project has been governed. Therefore we now turn to our model of good governance to draw a picture through our three types of governance input; Interest Representation, Organisational Responsibility and Decision Making.

6.2.1.1 Interest representation (IR)

Cadman's framework of good governance suggests that it is important for governance to be inclusive and equal, providing all stakeholders with the access and resources to have their voices heard. Evidence from other ICT-in-Education projects reflects this clearly; interest representation has played an important role in projects that reported success (Patrick, 2008; Lee et al., 2008; Linden, 2008; Light et al., 2008; Hosman, 2010). This study finds that the Laptop Project in Kenya has not been governed in an inclusive or equal manner. Communication in the project has been almost entirely one-way, with the government sending instructions to schools through official letters and the press. This attitude was typified by the one stakeholder meeting which had been held - a three day conference to which every headteacher in the country was invited. This meeting was held in September 2013 well after the project's planning stage and while the tender process was already in motion. This limited the conference to an information giving exercise where new input from headteachers could have little impact. When asked if headteachers had been consulted about the project before it was announced, one headteacher told us,

> *No we were not ready for it, we just heard they announced it, so we as teachers were not prepared.* (Evelyn)

This is important, as IR has been shown to be particularly important in ICT-in-Education projects in order to; include the expertise of a diverse range of interest groups, ensure that locally specific features are considered, maximise sustainability and avoid misalignments between implementers and beneficiaries (Harvey, 2010; Bladergroen et al, 2012; Best et al, 2013). One specific example of this comes from Jordan, where teachers were not only taught to use ICT, but also encouraged to innovate how ICT could be applied in their own context. In this way, educational reform was brought about that was meaningful within the local context and broad based community support was created (Pittman et al, 2008).

If stakeholders are not actively brought into discussions and processes it is important that they are at least given the **resources** to engage themselves (Cadman, 2011). In this project we find that lack of resources have presented a considerable barrier to teacher participation. To give a specific example - the tender documents which give details of the infrastructure and hardware

to be provided to schools were only made available at a cost of 5000 Kshs. This fee was insignificant for the multinational private companies who attended the tender, but represented an insurmountable hurdle to the average headteacher or interested member of the community. No concession was made to such groups.

Another important resource which was critically lacking was time. Between the project's announcement and its planned implementation date there was very little time to include interest groups. Margaret told us that Turkey and state of Maine in the USA took 6 years to implement similar projects in order to incorporate interest groups, while Kenya attempted the same in one year. Solomon explained:

> *Cabinet in itself only came in around May 10th. The budget statements had to be read first by June 28th, so that was really the cut-off date to start working around this Laptop Project. So it means everything had to start from there.*

We also found that teachers did not have a clear understanding of how they could have their voices heard. A critical missing resource was a forum through which individuals could contact project representatives. We encountered many teachers and headteachers with very clear and constructive ideas on how to improve the project, but without any idea of where to direct these ideas.

Teachers are not the only interest groups to be excluded from Laptop Project discussions; the government made the conscious decision to avoid any outsourcing to foreign experts. Solomon explained to us that significant sources of data were missed by the government because they did not involve relevant government departments and non-governmental organisations with knowledge and expertise:

> *...its something that the communications commission of Kenya has statistics on. And government agencies of regulation and communication and technology. It means that government should have known that based on those numbers, it was almost impossible.*

The decision to keep the project as centralised and in-house as possible was, reported Margaret, a partly political decision, as the government wanted the project to be seen as a

Kenyan initiative. This exclusion is perhaps even more striking, given that the country has had a functioning platform to work together with private partners (The Kenyan ICT Fund), and numerous earlier projects that could have helped inform the project (Farrell & Isaacs, 2007).

6.2.1.2 Organisational responsibility (OR)

Organisational responsibility is another important dimension of governance and can be viewed as how accountable and transparent a governance system is. Accountability and transparency are very important in large ICT4D projects which have complicated finance structures, involve working closely with private industry who have separate incentives, and vague, long term outcomes (Moyle, 2008; Thomas & Knezek, 2008; Lee et al., 2008; Hosman, 2010). Earlier projects have shown that creating a sustainable financial plan for both deployment and running of the project, and focusing on local ownership, can promote accountability to long-term outcomes (Hosman, 2010; Patrick, 2008; Farrell & Isaacs, 2007).

One of the clearest characteristics of OR in this project is a lack of accountability. A glaring example, which was first presented to us by the government's head of training (Alexander), is the selective manner in which changes to the government's implementation plan are conveyed to the schools and the wider public. Some changes have been kept entirely out of the public domain, for example the government no longer plans to provide finance for schools to build secure storage rooms - this has been hidden from public discussion. Other changes have been communicated informally to teachers during training sessions, to avoid contact with the press (Alexander, Margaret, Solomon). Through our interviews and focus groups with teachers we found that participants were aware that the government was not being completely open with regards to project specifics. John told us "there are whispers that they will be sending ICT teachers" and "whatever the ministry has been planning has not been, you know, given out as now". The overall effect is simple; the government has been able to avoid answering any questions or considering any concerns when changes are made which affect the whole project.

A lack of accountability is also apparent through more formal channels. The Ministry of Education's performance contract for 2013-2014 lists the specific deliverables which the Laptop

Project must create in order to be labelled a success and avoid formal review. These deliverables can be seen in Figure 7 below;

21. ×× Laptop Project in Public Primary Schools (ICT Integration in Education)

The Ministry will:
- (i) Develop a concept paper and Cabinet Memo on ICT integration in primary schools and present them to the Cabinet;
- (ii) Develop and publish the project implementation plan;
- (iii) Hold stakeholder consultations on the project;
- (iv) Prepare bid documents and advertise the tender to procure laptops, printers and LCD projectors;
- (v) Adjudicate the tender for supply of ICT equipment; and
- (vi) Deliver laptops to 20,000 Public Primary Schools.

Figure 9: Excerpt from the Ministry of Education's Performance Contract for 2013/2014

None of these six deliverables sets a specific requirement and all are relatively easily satiated. The greatest emphasis, specificity and challenge comes from variable (vi), to deliver a non-specified number of laptops to 20,000 public primary schools (not specified which schools, or which time-frame). Deliverables (i) - (v) could be achieved with the most cursory of attempts, particularly 'hold stakeholder consultations on the project'. The government has, to the best of our knowledge, so far not upheld (ii), develop and publish the project implementation plan.

The failure to publish the project implementation plan, despite this being specifically promised in the performance contract, typifies the project's lack of transparency, which is closely related to the lack of accountability. The process as a whole, from first conception to delayed implementation has been remarkably closed and lacking transparency. Solomon and Margaret both explained that many of the government's choices, for example the decision to use laptop computers rather than tablet computers, have been very murky, with no data, reasoning or logic pointed to by the government.

6.2.1.3 Decision making (DM)

The final characteristic of good governance that we shall delve into is decision making, which Cadman separates into democracy, agreement and dispute settlement. With a project such as this, in a context like Kenya where accusations of corruption[9], conflicting interests and vested powers have been commonplace, democratic decision making and a system to settle disputes when processes fail is critical (Farrell & Isaacs, 2007; Hosman, 2010). Studies of earlier projects show that by setting up feedback systems through which opinions from beneficiaries and partners can be included in the decision making process, projects can incorporate a more democratic bottom-up approach - even those beginning life as top-down initiatives (Hosman, 2010; Pittman et al., 2008).

As touched upon in the discussions on inclusion and accountability - decision making in this project has been centralised; neither democracy nor agreement have been particularly sought. Indeed, the project is viewed primarily as the President's pet project, and a lot of the power lies in his hands. As a result, many of the key decisions within the Laptop Project have been made with political, rather than educational, reasoning (Solomon, Alexander). The government's head of training told us that the decision making process began with the president and his office, who drew up the basic project and its characteristics, announced the project to the public and then passed everything on to the Ministry of Education to find a way to deliver on the promise and construct a useful project. Margaret explained to us that each of the Ministry of Education's new decisions must be passed through the president's office, to be agreed to by the president who gets an overruling and undemocratic vote.

> *So, in a way I would say it would be very difficult to change, regardless of anything, to change that direction, simply based on how government works.* (Solomon)

Non-governmental organisations that could potentially influence the project are explicitly held out of decision making. For example, private business was invited to tender for laptop provision, but was specifically told within the tender documents that any suggestion for possible alternative plans or improvements would not be accepted.

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[9] Kenya comes at position 136 out of 177 countries in Transparency international's, an international NGO monitoring political corruption, *Corruption Perception Index* (Transparency International, 2013)

However, the project has shown some signs of healthy dispute settlement. The investigation and subsequent rescinding of the Olive tender, which was carried out by an independent body in reaction to genuine public challenges to the decision making process, evidenced that although the system of decision making is flawed, there are signs of life - an olive branch from an Olive problem.

With an understanding of the governance inputs which have directed the Laptop Project, we are now ready to move on to exploring the governance outcomes which have derived from these governance inputs, and are affecting e-readiness.

6.2.2 What are the main outcomes of the project governance which have affected e-readiness?

6.2.2.1 Governance Outcome 1: Original research and project plan did not reflect schools' reality

High quality research and project design are crucial to ICT-in-Education implementations (Tolani-Brown et al., 2011; Pittman et al., 2008). A crucial aspect of high quality research and project design is the extent to which beneficiaries' experienced realities and specific contexts are reflected. This paper finds that the Laptop Project's initial research and project plan failed to meet this criteria, primarily as a result of the lack of inclusion in the project governance (although improvements have been made). We purport that this outcome of poor governance has directly reduced e-readiness.

Firstly, even the briefest of interactions with the school and teachers uncovered a clear misalignment between the project's original plan and the schools' context. The project's original plan to deliver laptops to Class 1 pupils was unanimously contested by teachers in all Classes in our interviews. Participants generally responded that laptops should either be provided to older students, as Class 1 students' work would not be suited to laptops, or that laptops should be made available for use by all children, regardless of age. Below are listed the main reasons given, which were given without specific prompting from the interviewer.

- Class 1 children cannot read English
- Class 1 lessons involve very simple tasks which would be a waste of the laptop's power
- Class1 attracts very old, near retirement age teachers who are not inclined to learn new techniques
- Excludes non-Class 1 children from an important subject
- Non-Class 1 children will become distracted/disenfranchised

This finding fits well with Ogembo et al. (2012), who report that ICT-in-Education projects often fail to properly account for contextual questions, such as what problems the schools actually want to solve, before beginning the designing process. Similarly, based upon its initial research the government designed its initial plan so that children would be given personal laptops which they should take home with them. This has since been rescinded and laptops will stay in the schools. But importantly, even from the earliest stages of this paper's research it became very apparent that such a plan could never have been successful and does not reflect the school's context. Teachers unanimously expressed through our interviews and focus groups their opinion that within the socio-economic context it would not be possible for students to take laptops home due to the risk of theft. Considering the Kenyan government's great efforts to be seen as keeping their promises, it is remarkable that they would announce such a plan when very basic research would indicate a high likelihood of having to retract this promise. This indicates a systematic lack of research.

The systematic, and damaging, lack of quality research was highlighted in our interview with Solomon, who said that the government's project design as a whole was indicative of a lack of research, citing the particular example of the illogical (in the participants' eyes) decision to provide laptops rather than tablet computers. The scale of deployment, moving straight to country-wide deployment and eschewing a pilot was, according to Solomon, another sign of this failure. Solomon continued to say, "that is a fundamental flaw. Nobody goes to scale a pilot. Again, that is a serious doubt".

It is this paper's proposition that such systematically poor quality research and a contextually mismatched initial plan derived directly from poor project **governance inputs,** primarily the severe **lack of inclusion** in the research and design process. We found no evidence that the views of teachers and schools were sought, or that there was an impetus to consider stakeholders' context in the planning stages; neither schools, non-governmental organisations or even other relevant government departments were brought in to help with initial research (Solomon). A deputy headteacher (George) in an urban school told us that the lack of research for this project was a common characteristic within the government, and that his feedback is very seldom welcomed by the government. Indeed, these findings are consistent with those from other countries. Tolani-Brown et al. (2011), for example, find that decision makers are guided more by intuition and other influences, rather than evidence when choosing to invest in ICT in schools.

The effects of such low quality initial research and project plan become easier to grasp when considered in terms of the impact upon **e-readiness**. Here, we find that e-readiness is primarily impacted in terms of Perceived Ease of Use and Perceptions of Project. In the first section of analysis this paper found that PEU in Kenya is complex - that general PEU is relatively high, but applied PEU is very low. Uncovering such a complex picture requires thorough and critical research. In the absence of such research we found in our observations of government lessons that the teacher training program has become too heavily focused upon teaching simple ICT skills such as using Microsoft PowerPoint, rather than the more specific applied skills which this study finds that teachers wanted. As such, the training program does not reflect the experienced context, and its potential impact in improving PEU is reduced.

This outcome of systemic problems within the governance of the project has also had observable impact upon teachers' Perception of Project. We found that the teachers' scepticism of the plan that the government initially proposed, with students taking laptops home and laptops only being used by Class 1 pupils, has contributed clearly to teachers' negative views of the way that the project is being implemented. The plan which the government announced was so far from what we found the teachers would have suggested, that the teachers themselves told us that they are doubtful whether any research was conducted, and this has left them much less likely to trust the government's commitment and the long term nature of the project (Lucy). Interestingly,

the government **has** since changed its project plan by officially announcing that laptops will stay in schools and unofficially telling teachers that laptops are to be used by all students, yet, this does not seem to have improved the teachers' negative perceptions. This may be explained by the second governance outcome.

6.2.2.2 Governance Outcome 2: Teachers and schools have missing or even incorrect knowledge about the project

Giving a computer to a school and asking for a systemic change in the way that teachers teach, students learn and the school runs is, undoubtedly, quite a large demand. As such, it is understood in the literature that beneficiaries in ICT-in-Education projects should be supported by getting clear and accurate information about the project (Pittman et al., 2008). For example, Afshari et al., (2009) argue that teachers must be told exactly what will be expected of them in the classroom, and which tasks they will be expected to perform with the computers. We find that in the Laptop Project poor governance, coming from the lack of inclusion, accountability and centralised decision making has contributed to breakdowns in communication which have left teachers and schools with insufficient or even incorrect information, and this has had serious impacts upon e-readiness.

The list of missing/insufficient information which we observed in our participant schools was extensive. The most important areas of missing information were (i) when computers would come, (ii) how many computers would come, (iii) when training would come, (iv) how many teachers would be trained, (v) which preparations were the responsibility of the school. However, more worrying than the extensive missing information was the widespread misinformation. The most common misconceptions among the teachers were that (i) the computers were still only for Class 1, (ii) the students would take the computers home, (iii) the government would provide finances for building secure rooms.

The beneficiaries' low levels of information can be seen as both unintentional and intentional effects of poor governance. Firstly, the unintentional impact has come primarily through inconsistent communication and the general lack of inclusion. Teachers and schools have not been brought on board the project and so opportunities for communication are low. The

strongest evidence for this is the fact that information in the schools seems to reflect very closely the plan as it stood in September - at the time of the national headteacher conference. While the plan has since changed, the lines of communication do not exist to easily pass on this knowledge. For example, in our research we had to dig deep into official government documents to find an answer to a simple question - how many laptops will each school receive? In the end we found the answer in a tender document produced by the government to find suppliers of electrical wiring - the government has tendered electricity for just 30 laptops per school, far below what was promised (Rural Electrification Authority, 2014); even the government's head of the training programme did not have this information (Alexander).

Somewhat more worryingly, this effect appears to have been compounded by deliberate action - there is evidence that the government has chosen to withhold information from the public, or pass on this information informally during training sessions. Most notable was the example cited above, that both of the government trainers that we interviewed told us that the government had asked them to inform teachers informally during training sessions that laptops should be used by all students, regardless of age. This is a poor method of communication as only three teachers from each school attend training. It is the general lack of accountability and centralised decision making in this project which have allowed the government to mute their failures and hide any changes to their original election promise. The outcome has been very effective - even Solomon, a Kenyan ICT expert who has followed the project closely, was unaware of this change to the plan.

Here we find impact upon e-readiness in terms of low Perceived User Resources and Perceived Ease of Use. In some cases, misinformation had led to inactivity because schools were unclear on what preparations were needed. For example, one rural school had not begun constructing a strong room to store laptops because, with an average cost of over 1 million Kshs, constructing a strong room without concrete justification would not have been possible. This affected the teachers' perceptions of security at this school. In other cases misinformation had actively negatively affected the schools' resources; in one school we interviewed a teacher who had been moved by the school to teach Class 1, despite the fact that he was trained to teach Classes 6,7 and 8, because he was the school's most ICT literate teacher. Here misinformation

had a double effect - this teacher's talents were being used inefficiently, and the teacher that he had replaced did not expect to use ICT and so had not sought training. Such examples were common in our participant schools.

6.2.2.3 Governance Outcome 3: Over emphasis on the provision of laptops (and a lack of investment elsewhere)

Overemphasis on physical provision of computers is identified by the literature as a common cause for failure in ICT integration into education (Ames & Warschauer, 2010; Pittaluga & Rivoir, 2012). Overemphasis on simple provision of computers threatens ICT-in-Education projects because it necessitates a reduction in focus on other important factors, particularly those affecting e-readiness such as training, infrastructure, sustainability and attitudes (Hosman, 2010; Hu, 2007; Bladergroen et al, 2012). We find that the government has focused heavily on simple provision of hardware (laptops) to the detriment of other important areas, particularly teacher capacity building, school resources and project sustainability. In doing so, we have observed linkages between this governance outcome and the governance input *lack of accountability,* which runs throughout the existing governance processes. This outcome has had concrete impacts upon e-readiness in our participant schools.

Both government trainers told us that it is a common view within the project that the two main aims of the government are (i) delivering the laptops and (ii) ensuring that teachers want to use the computers. Indeed, this view is shown more formally through various technical documents. The five deliverables listed in the Ministry of Education's performance contract, shown above in Figure 9, are a clear demonstration of this belief - the only deliverable with set figures ascribed is that for procurement and delivery of laptops to 20,000 schools. There is no set deliverable for training, provision of resources or meaningful inclusion. This is also reflected in the fact that the training program is currently running months behind schedule - well past the planned implementation date.

This over emphasis on simple provision has been allowed and promoted by the relative lack of accountability in the governance of the project. A number of our participants expressed that monitoring and evaluation would be important to conduct on factors other than simple

provision, for example the number of teachers who feel satisfactorily trained and the number of schools with secure storage rooms. However, due to the socio-economic context and the geographical remoteness of many of the country's schools, this task has proven sufficiently difficult as to evade completion. As a result, deliverables beyond simple laptop provision are not monitored or evaluated sufficiently, if at all, and there is no impetus for such tasks to be completed.

We found impacts of this outcome upon Perceived User Resources, Ease of Use and Perceptions of the Project. Firstly, there has been a direct impact on Perceived User Resources; schools have not been provided with some of the most basic supporting infrastructure, particularly secure rooms and desks, but also context dependent infrastructure such as dust and rain protection. Ease of Use has been affected negatively by the lack of focus on teacher training. Most significantly, there has been very little planning for, or monitoring of what happens after the government training, when the three trained teachers return to their respective schools. The government has not made any specific plan for what action schools should take to ensure that all teachers will be trained, some schools plan to organise their own training, others have no plan.

> *Because now the government is just starting to introduce, and we've had the issue of training teachers to come and handle the computers. Yet we haven't seen it being done.* (Marion)

The respondent above worked in a school that **had** already been through the government's training a month previously; she was unaware of this fact. Bingimlas (2009) emphasises that building teacher capacity and giving sufficient time and technical support is crucial for a successful implementation. Evidence from other national ICT implementations casts doubt on whether the amount of training provided in this project could be sufficient (Farrell & Isaacs, 2007). Farrell and Isaacs looked at one ICT-in-Education project in Algeria where teachers received between 30-60 hours of training, and found that this was insufficient time to have significant impact on teachers' capacity (ibid, 2007: 6).

Finally, the mixed Perceptions of the Project may have been contributed to by the government's perceived lack of focus on sustainable planning. There was a general feeling

among the teachers that while the idea of the project was good, the government may not have shown long term thinking or commitment. One teacher (Marion) expressed that the government's commitment to the project was political and, if the political landscape should change, the government may drop the project. Other participants who challenged the short-sighted nature of the project implementation cited the continued high risk of theft or damage. Durable support and investments in teacher and school capacity is a necessity that is often neglected (Brunello, 2010; Koo, 2008; Lau & Sim, 2008). Teachers' questioning of the project's long-term nature has affected their motivation to engage with it by, for example, seeking out private training or planning new lesson types to fit ICT use.

Table 3 provides a brief overview of our findings on how governance inputs have moved through governance outcomes, to have affected e-readiness in the project:

Governance Input	Governance Outcome	E-readiness Impact
- Lack of Inclusiveness	Initial research and original plan did not reflect experienced reality	- Perceptions of Project - Perceived User Resources - Ease of Use (Applied)
- Centralised Decision Making - Lack of Inclusiveness - Lack of Accountability	Schools have missing/incorrect knowledge	- Perceptions of Project - Perceived User Resources
- Lack of Accountability	Overemphasis on provision of laptops	- Perceived User Resources - Ease of Use (Applied) - Perceptions of Project

Table 2: Overview of linkages between governance and e-readiness

7. Conclusions

The purpose of this thesis was to explore the level of e-readiness and the links between e-readiness and project governance in Kenya's Laptop Project by answering two research questions.

1. How e-ready are primary school teachers in Kenya for the Laptop Project?

We found that our participant schools were not e-ready, with the most important characteristics being low Perceived Ease-of-Use, Perceived User Resources and a negative perception of the way that the project was being run. This picture of e-readiness was created to be threaded through our analysis of governance, but can also stand up on its own and could prove a useful data source for those interested in the project, which was a secondary purpose of ours.

2. What role is governance playing in e-readiness in the Kenyan Laptop Project?

We found significant evidence that incompatible governance has played a large role in the low e-readiness, most importantly through the *lack of inclusion*, *poor accountability* and *centralised decision making*. This fits in line with the general themes of the literature. What we hope to offer to the literature beyond reinforcing these general themes and the importance of good governance is **specific, observable impacts** of governance upon project implementation, e-readiness and in turn, likely success in the Kenyan Laptop Project. Three such governance outcomes were presented;

1. **The original research and project plan did not reflect schools' needs**
2. **Teachers have missing or even incorrect knowledge about the project**
3. **There is an over emphasis on the provision of laptops (and a lack of investment elsewhere)**

Some reflections on these conclusions

A recurring theme that has been brought up throughout this thesis is **complexity.** ICT-in-Education projects are inherently complex because they offer complicated solutions which have to be applied in a wide range of diverse contexts. However, despite the evidence for considering governance in ICT-in-Education projects, cases like the Laptop Project are commonplace and

project implementers repeatedly favour simple, shallow implementations - particularly across sub-Saharan Africa, where governments are increasingly turning to ICT as a 'silver bullet' to target a wide range of social ills. As national ICT-in-Education projects become more commonplace, this misalignment between theory and practise threatens to cause serious problems for education systems, as well as wider development - especially for policy makers investing in ICT as a means of social and economic development.

Literature which has come before us has emphasised similar conclusions on the general governance themes which are best suited to such complex ICT-in-Education projects, but despite the evidence for inclusive and accountable projects cases like the laptop project are the norm. Project implementers are regularly ignoring these findings and favouring simple, shallow implementations.

As a result, the answers which this thesis focuses upon (the 3 governance outcomes) are not intended to be exhaustive or conclusive. Rather, we hope to have provided specific, well researched examples, bound within a case study. These are clear and non-jargon based evidence for reasons why good governance is an important concept to consider within such projects, which add to the wider conclusion that ICT-in-Education, and ICT4D projects more generally, *are* complex and that simple solutions with a shallow consideration of project governance are inherently unsuitable.

Therefore if we could pass one sentence to the Kenyan government, it would not be the concepts of accountability, inclusion or centralised decision making, which seem so regularly ignored. Rather, it would simply say *your teachers really like the idea of using laptops, but they just do not feel ready.*

Closing Thought

In closing, our choice of title for our thesis was critical and deliberate. At present, the weight of literature suggests that with insufficient e-readiness, the project is likely to fail. However, the Laptop Project was a key election promise - one which the government will not back out of. The delays in the tender process have bought the government a little

time and the project has not yet launched, but the project will launch; *Ready or Not, Here ICT Comes.*

7.1 Further Research

The tremors of this earthquake of an election promise have been felt throughout Kenya; the project has massively redesigned Kenyan ICT and educational policy. We found some evidence that the system of governance which we have studied was shaped strongly by this. The focus of our thesis did not lead us to directly answer the question of why governance took the form that it did, and how much this was affected by being an election promise, but we did find much of interest in that area, and suggest that this would make a profitable and interesting avenue for further research.

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9. Appendix

Appendix I: List of Interviews

Name	Role	Location
Josephine	Teacher	Nakuru School 2, Rural
Lucy	Teacher	Nairobi School 1, Urban
Cecilia	Teacher	Nakuru School 2, Rural
Marion	Teacher	Nakuru School 1, Rural
Martin	Teacher	Nakuru School 1, Rural
Obadiah	Teacher	Nakuru School 1, Rural
Mary	Teacher	Nairobi School 1, Urban
Preston	Teacher	Nairobi School 1, Urban
Theresa	Teacher	Nairobi School 1, Urban
Christine	Teacher	Nairobi School 1, Urban
Daisy	Teacher	Nairobi School 1, Urban
Jane	Teacher	Nairobi School 1, Urban
Hope	Deputy Headteacher	Nairobi School 2, Urban
George	Deputy Headteacher	Nairobi School 3, Urban
Peter	Headteacher	Nakuru School 1, Rural
Evelyn	Headteacher	Nairobi School 1, Urban
Peggie	Headteacher	Nairobi School 2, Urban
Joan	Headteacher	Nairobi School 3, Urban
Margaret	CEO, eLimu, Private ed-tech content developer	Nairobi, Urban
Solomon	Director, Infonet, Tech/Governance NGO	Nairobi, Urban
Elizabeth	Government, Core Trainer, Rural	Nakuru, Rural
Alexander	Laptop Project Head of Training	Nairobi, Urban

List of focus group participants

Name	Role	Participant From	Interview Location
Benjamin	Teacher	Turkana School,	Nairobi, Urban

		Rural	
Ann	Teacher	Turkana School, Rural	Nairobi , Urban
Richard	Teacher	Mandera School, Rural	Nairobi, Urban
David	Teacher	Nakuru School 2, Rural	Nakuru, Rural
Beth	Teacher	Nakuru School 2 , Rural	Nakuru, Rural
John	Parent	Nairobi, Urban	Nakuru, Rural

Appendix II: List of schools included in our research

School Name	Location	Rural/Urban	Number of Pupils	KCPE Results	Electricity	Secure Room
Turkana School	Lodwar, Turkana	Rural	1200	Average	Solar only	In progress-donor funded
Mandera School	Mandera, Mandera	Rural	800	Average	Solar only	No
Nakuru School 1	Mwigito, Nakuru	Rural	700	Very Poor	In a few classrooms	No
Nakuru School 2	Hyrax, Nakuru	Rural	1200	Average	In a few classrooms	Yes, but insecure
Nairobi School 1	Embakasi, Nairobi	Urban	900	Good	Yes	Yes
Nairobi School 2	Mbagathi, Nairobi	Urban	1300	Poor	In a few classrooms	Needs minor upgrades
Nairobi School 3	Muranga, Nairobi	Urban	425	Average	Yes, but regular power cuts	No

Appendix III: Survey

A Quick Survey on the Laptop Project

V1 Your Age …......

V2 How many years have you been a teacher? ……..

V3 Phone Number ………………………….

V4 Do you have an email address? Yes / No

V5 How often do you use your email address?
- Every day
- Once a week
- Very rarely
- Never

V6 Do you have any of the following in your household? (tick as many as you like)

- Computer/laptop
- Mobile Phone
- Tablet computer
- Television
- Radio
- Internet
- Electricity

V7 Have you ever received training to use computers? Yes / No

V8 If yes, how many days of training have you received? …………

V9 Who ran the training which you received? ……………………………………….

V10. How prepared do you feel to use computers in your lessons?

- **Very prepared**
- **Quite prepared**
- **Not very prepared**
- **Not prepared at all**

V11. How important do you think that it is to have enough training before using the computers in your lessons?

- **Very important**
- **Quite important**
- **Not very important**
- **Not important at all**

V12-V16 Which of these statements apply to you? You can tick more than one.

- **I need more training before getting the computers**
- **I am currently getting training to use computers**
- **I need time to use the computers before the students will use them**
- **I do not need any more time or training, I will learn by using the computers in the classroom**
- **I do not need any more time or training, i feel prepared enough**

V17- 25. Below we have listed nine things that could stop computers being used effectively in lessons, if they happened. Please circle how likely you think each factor is to happen in your school.

1 = **No threat** (it won't happen)
2 = **Mild threat** (there is a small chance)
3 = **Medium threat** (this could happen)
4 = **Strong threat** (there is a good chance that this will happen)
5 = **Inevitable** (will definitely stop ICT being used)

FACTOR	How likely is this to stop computers from being used in lessons?				
Laptops will get stolen	1	2	3	4	5
Laptops will get damaged	1	2	3	4	5
There will be no electricity	1	2	3	4	5
Laptops will be too difficult for teachers to use	1	2	3	4	5
Laptops will be too difficult for students to use	1	2	3	4	5
Children will not be in school to use the laptops	1	2	3	4	5
Using laptops will take too much time from the lessons	1	2	3	4	5
Teachers will not want to use the laptops	1	2	3	4	5
The government will not deliver the laptops	1	2	3	4	5

V26 Can you think of any other factors not listed?

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V27. The government is spending a lot of money to buy laptops for your school. Do you think that this is a good use of their money in your school?

- **Yes**
- **Maybe**
- **No**
- **Not sure**

V28 What would be *more* important for the government to spend money on in your school, if anything?

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V29. Do you think that computers are a useful tool for teaching?

- **Very useful**
- **Quite useful**
- **Not very useful**
- **Not useful at all**

V30. How often do you think the computers should be used in your lessons?

- **Everyday**
- **A few days a week**
- **A few days a month**
- **Never**

V31. In what ways do you think that using computers can help in your school? List as many as you like.

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V32. In what ways do you think that using computers could have a negative effect on your school? List as many as you like.

V33-V38. Below we have listed some possible negative outcomes. How worried are you about each of them?

1 = Not worried at all
2 = Not very worried
3 = Worried
4 = Very worried

FACTOR	How worried do you feel?			
The students will look up inappropriate content	1	2	3	4
Using the computers will take up too much time during lessons	1	2	3	4
The computers will distract the children from learning	1	2	3	4
Computers will not fit into the way that I teach	1	2	3	4
The students will use the computers too much	1	2	3	4
Using the computers will be too expensive	1	2	3	4

V39. Do you think that computers are easy to use?

- **Very easy**
- **Quite easy**
- **Not easy**

- **Very difficult**

V40. Which of the following resources does your school not have or not have enough of?

- **Tables/chairs**
- **Electricity**
- **Textbooks**
- **Pens/pencils/exercise books**
- **Secure room/security**
- **None of the above**
- **Other (please specify)**

  _____

V41. Please choose one word to finish the sentence below;

"When I think about the government's laptop project I feel ………………….."

Some examples of words which you could choose;
Worried   Excited   Annoyed   Scared Confused

V42. To what extent do you agree that computers can help students to learn?

- **Strongly agree**
- **Agree**
- **Disagree**
- **Strongly disagree**

V43. What do you think should be the main purpose of the laptop project? Please choose just one answer.

- **Move Kenya from analogue to digital**
- **Improve students test scores**
- **To help Kenya compete with other countries**
- **Help learning become more student centred**
- **To make it easier to teach**
- **Other**

If you chose 'Other', please write it in here;

V44. Remoteness (Urban/Rural)

V45. Been through Laptop Project training (Yes/No)

Appendix IV: Interview Guides

Questions	Answers
Interview Guidelines: Government Representatives How do you define readiness? What does it mean to be ready? Does the government have a 'readiness criteria'? Describe the Laptop Project, including implementation plan What has the government done so far, what are they currently doing and what do they plan to do regarding: -infrastructure -human capital -content Rank barriers/factors by importance Rank priorities in successful implementation How ready do you think schools in Kenya are? What do you define as the end goal of this programme? How do you define 'success'? How was the project created? Was research conducted before the project started? Did schools ask for this?	
Interview Guidelines: Civil Society Representatives What is your view on how and why the project was created? What is your view on the way the project is being run? What do you think are the reasons for shortcomings, e.g. in communication between government and schools?	

Do you think the way it is being run has been affected by the fact that it was an election promise? Do you think the project reflects what schools want on the ground? How do you think the Kenyan government defines success in this project? Do you think they will be successful? How are decisions being made in the project? Do you think the project fits into the Vision 2030? What's your view on the (now failing) tendering process?	
<u>Interview Guidelines: Teachers</u> Will the computers be useful for you? Do you think you will teach in a different way when you have the computers? How? Do you think teachers will be resistant if they have to change the way they are teaching? Have you been trained? Would you like to get training? What is the attitudes towards using computers among other teachers at your school? Do they want to use them? Are they excited about the project? What does your school need to do to get ready? How ready is your school today? What are the challenges regarding infrastructure, (ii) teacher ability and (iii) teachers attitudes. Why do you think the government is doing this? Before the project was announced, do you think this was something that people wanted? What do you think are the main things that could stop other schools from being ready? What are the main challenges that need to be addressed? What would a successful project lead to? Apart from the laptops, what other things do you think the government should do in your school?	

Additional Questions Headteachers: How do you define readiness? Do you think your school is ready? In what ways? If no, in what ways not ready? What needs to be done? Has the government prepared you for it? Are you ready to integrate ICT in your education? In what ways? In what ways not?	
Focus Group Guidelines The 'focus group' began at the end of a full day of training, led by us. We sat at one table with three of the teachers, two from Lodwar and one from Mandera and informally discussed themes around ICT readiness. Many of the themes had already come up during our participative observation with these participants. However, this focus group gave us a chance to cover the themes in a more structured manner, and with the aid of a recording device. The themes covered were the following: Are you using technology in your school at the moment? How do you feel about receiving the computers? Do you feel like your schools are ready for the technology? In what way? In what ways not? Do you think teachers in your school would prefer other things, like chairs and tables instead? What are the main challenges in your school (regardless of ICT)? Are teachers in your school using technology today (e.g. smartphones)? What do you think is important for other schools when getting ready for this?	

Appendix V: List of other qualitative research

Method	Where?	Data
Participative Observation of ICT training and use	Nairobi School 1 Turkana School Mandera School	Typed up notes, photographs, written documents

Open Ended Interviews	Nairobi School 1 Nairobi School 2 Nairobi School 3 Nakuru School 1 Nakuru School 2 Various Offices in Nairobi	Transcriptions, written notes from interviews
Narrative Walks	Nairobi School 1 Nairobi School 3 Nakuru School 1 Nakuru School 2	Written Notes
Observation	Parent Meeting at Nairobi School 1	Written notes, photographs
Document Analysis	Documents from various schools, headteachers' offices ● School budgets ● Student/textbook ratio ● School's strategic plans Documents about Laptop Project released by government ● Budget Speech 2013 ● Various Tender Documents for Laptop Provision, Electricity supply etc ● Q&A document, Laptop Tender ● Jubilee Manifesto: Transforming Kenya, 2013-2017 ● Performance Contract, Ministry of Education ● Performance Contract, Ministry of Energy ● Performance Contract, Ministry of ICT ● Ministry of Education's report on re-alignment of education sector, 2010	Documents

Appendix VI: Univariate Analysis

Descriptive Statistics for Relevant Variables
V1 (Age) Mean age: 43.59 Minimum age: 20 Maximum age: 59
V10 (Preparedness to use laptops in classroom) The percentages of preparedness were the following: Very prepared: 26.6% Quite prepared: 32.9% Not very prepared: 29.1% Not prepared at all: 11.4 There was 1 missing answer (1.3%)
Need for more training or preparation V12. Need more training before getting the computers: 56.3% V13. Currently getting trained: 11.3% V14. Need time with computers before the students will use them: 65% V15. Don't need time nor training, will learn by doing: 13.8% V16. Don't need time nor training, I feel prepared enough: 7.5% There were no missing values.
Threats to project Threats to the project ranked 1-5, where 1 was no threat and 5 inevitable V17. Laptops stolen: 2.7 V18. Laptops damaged: 3.0 V19. Lack of electricity: 2.1 V20. Too difficult for teachers: 1.9 V21. Too difficult for students: 2.0 V22. Children not in school to use them: 1.5 V23. Take too much time from lessons: 2.3 V24. Teachers don't want to use them: 1.5 V25. Government will not deliver laptops: 2.3
V28Recoded (Would have preferred that government invested in) 63% of all teachers preferred investments in something other than laptops. Answers were recoded into the following 7 categories: Meeting child needs: 13% Teacher capacity building: 5% Resources/infrastructure: 45% Raise of teacher salary: 4% More teachers employed: 10% Security: 5% Other technology: 3%
V29 (Laptop's usefulness for teaching) The percentage of teachers ranking of usefulness: Very useful: 60.8%

Quite useful: 34.2% Not very useful: 2.5% Not useful at all: 2.5% There was 1 missing value (1.3%)	
V39 (Ease-of-use of laptops) Very easy: 26.3% Quite easy: 51.2% Not easy: 21.3% Very difficult: 1.3%	
V40 (Lack of resources) Tables/chairs: 58.4% Electricity: 18.2% Textbooks: 58.4% Pens/exercise books: 22.1% Secure rooms/security: 68.8% None: 0% There were 3 missing values (3.8%)	
V41Recoded (Feelings towards the project) Positive feelings: 75% Negative feelings 25%	
V42 (Extent agree that laptops help students to learn) Strongly agree: 42.3% Agree: 52.6% Disagree: 2.6% Strongly disagree: 2.6% There were 2 missing values (2.5%)	
V43 (Main purpose of project) Move Kenya from analogue to digital: 28.7% Improve students' test scores: 3.8% To help Kenya compete with other countries: 7.5% Help learning become more student centred: 45% To make it easier to teach: 3.8% Other: 3.9% There were 5 missing values (6.3%)	
V31Recoded (Perceived useful areas of laptops) Answers were coded into 5 different categories: Useful to tackle lack of teachers: 2.5% Useful specifically for computer literacy: 31.3% Useful for general school work: 61.3% Useful for teacher work: 48.8% Useful for 'real world'/work life: 32.5%	
V32Recoded (Perceived negative effects of laptops) Children access inappropriate material: 26% Bad effects on children learning: 35% Maintenance of project (costs, political support etc.): 14% Increased insecurity: 10%	

Create more work/change for teachers: 9% Other negative effects: 10%
Worries about project Worries ranked by teachers from 1-4, where 1 was "Not worried" and 4 was "Very worried" V33. Look up inappropriate material: 2.55 V34. Take too much time from lessons: 2.26 V35. Distract children from learning: 2.26 V36. Will not fit how I teach: 1.90 V37. Students will use laptops too much: 2.10 V38. Will be too expensive: 2.33
V44 (Remoteness) The percentage of teachers in urban schools was 62.5%. The percentage of teachers in rural schools were 37.5%. No missing values.
V45 (Received Government Training) The percentage of teachers at schools that had been through the government training was 62.5%. The percentage of teachers at schools that hadn't been through government training was 37.5%

Appendix VII: Bivariate Analysis

Variables with significant correlation with V39 (Remoteness (Rural/Urban)):

Variable	Cramer's V	Chi-Square
V33 (Too Expensive)**	0.367	0.020

Variables with significant correlation with V1Recoded (Age: Below 40, 40-49, Above 50)

Variable	Gamma	Approx. Sig.
V33 (Too expensive)*	-0.377	0.001
V24 (Too Much Time)*	-0.398	0.025
V29 (Useful Tool)**	-0.488	0.009
V23 (Too Much Time)*	-0.425	0.015

Variables with significant correlation with V7Recoded (Training: 0 days, 0-1 month, 1-2 months, more than 2 months)

Variable	Gamma	Approx. Sig.
V35 (Distract Children)*	0.297	0.014
V34 (Too Much Time)*	0.293	0.015
V10 (Preparedness)*	-0.294	0.022

Non-significant correlation with V40 (Received Government Training)

Variable	Chi-Square

V10 (Preparedness)	0.257

*=weak relationship
**=moderate relationship
***=strong relationship

Appendix VIII: List of Survey respondents per participating school

School	Number of Surveys Received
Nairobi School 1	20
Nakuru School 1	17
Nairobi School 2	16
Nairobi School 3	14
Nakuru School 2	13
Total answered	*80*
Not returned	*20*

Appendix IX: Picture of Standard 1 classroom in Nakuru School 2