Laptop project or education project?
A comparative analysis of One Laptop per Child and
the Intel *World Ahead Program*

by

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ABSTRACT

Since the 1990s, new information and communication technologies (ICTs) have been framed as ‘great equalizers’ that can be used to help developing countries spur rapid socio-economic growth. The use of ICTs in education has received particular attention in this regard, with substantial levels of funding being invested in integrating computers and Internet access into developing country schools. Within this context, a set of best practices aimed at guiding the use of ICTs for education (ICT4E) has begun to emerge. Using a combination of content analysis and critical discourse analysis to examine the corporate public discourses of the One Laptop per Child and the Intel World Ahead programs, this thesis asks: *How are the ‘best practices’ identified by ICT4E literature reflected in contemporary ICT4E projects?* The findings suggest that both initiatives place a rhetorical emphasis on best practice, but appear to focus their efforts foremost on the provision of technology.

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Chapter 1: Introduction

The increasingly pervasive use of information and communication technologies (ICTs) on a global scale has profoundly impacted the way in which societies function and interact with one another (Castells, 1999). Since the 1990s, digital technologies—and the Internet in particular—have frequently been framed as ‘great equalizers’ that can facilitate socioeconomic growth in developing countries, which proponents posit will in turn help these countries to participate in the globalized marketplace, reap greater economic benefits and foster more vibrant civil societies (see, for example, Brynjolfsson & Smith, 2000; Culp, Honey & Mandinach, 2003; Froomkin, 2004; International Telecommunications Union, 2003). Within this context of enthusiasm about the use of ICTs for development has arisen a particular focus on utilizing ICTs in education in developing countries, with the rationale being that basic education is a key to international development and the use of ICTs in the classroom drives more progressive, effective teaching methods (see, for example, Gutterman, Rahman, Supelano, Thies & Yang, 2009; GAID, 2009; infoDev, 2010; Trucano, 2005; United Nations ICT Task Force, 2006; UNESCO Bangkok, 2004).

This optimistic vision, however, is not without its critics. Some argue, for instance, that while many technologies have historically been framed as having the potential to revolutionize education, few, if any, have actually fulfilled these promises (see, for example, Cuban, 1986; Oppenheimer, 2003). Others point to the lack of empirical evidence to support claims that ICTs foster the sorts of educational improvements with which they frequently linked (see, for example, Gutterman et al., 2009; Tolani-Brown et

al., 2009; Warschauer, 2003). In the light of the continuing emphasis being placed upon ICTs for development (ICT4D) and ICTs for education (ICT4E) combined with existing knowledge gaps about the impacts of ICT4E initiatives, scholars and practitioners have begun to work toward establishing a set of best practices. In recent years a number of studies have been undertaken with the aim of assessing and evolving these nascent best practices (see, for example, Cabrol & Severin, 2010; Chapman & Mählck, 2004; Espinosa & Caro, 2011; Farrell & Isaacs, 2007; Gutterman et al., 2009; Trucano, 2005; UNESCO, 2000; 2002; 2005; World Bank, 1998/99). Through this process, one foundational principle and five best practices for ICT4E have emerged in the literature. The foundational principle is *technology is only a tool*, and the best practices are as follows:

ICT4E initiatives *should*

1. be led by local government(s);
2. incorporate adequate, appropriate and ongoing teacher training;
3. be integrated into the existing education curriculum;
4. be monitored and evaluated on an ongoing basis; and
5. budget for the total cost of ownership (TCO).

An in-depth analysis of the components of and rationale for each of these best practices can be found in Section 2.3.

1.1 ICT4E in Africa

The African continent has been the subject of a substantial amount of ICT4D- and ICT4E-related attention. Until two years ago, Africa had the last large, inhabited

coastline without fibre-optic broadband Internet access (Juma, 2009). In 2009, the continent's first two undersea fibre-optic network systems were launched off the east coast of Africa. The first of these, the 4,500 km fibre-optic TEAMS cable, was launched on June 12 of that year and directly links the cities of Mombasa, Kenya to Fujairah, the United Arab Emirates (Cottrell, 2010). The second, the 17,000 km Seacom cable, was launched on July 23, 2009. It directly connects South and Eastern Africa with Europe and Southern Asia, using submarine fibre-optic technology (Seacom, 2011).¹ Since then, excitement has surged about the potential social and economic benefits that the availability of cheap, fast global communication may facilitate (Juma, 2009; Rice, 2008). In 2010 another three more major undersea fibre-optic cables² were launched, further improving the fibre-optic connections between East and West Africa and Europe (Cottrell, 2010). The network continues to be developed today, with at least four new cables scheduled to be active by 2013 (Cottrell, 2010).

As these technological developments continue to progress, the African Union is in the midst of a massive ongoing ICT4E initiative. In 2003, the New Partnership for Africa's Development (NEPAD)³, an economic development program of the African

¹ At the launch of the Seacom cable in July 2009, Tanzanian President Jakaya Kikwete called the network "the ultimate embodiment of modernity" (quoted in McCarthy, 2009).

² These were the EASSy cable on the East African coast, and the MainOne and GLO1 cables on the West African coast.

³ NEPAD was officially created in July 2001 at the 37th Summit of the Organization for African Unity, and is now a program of the African Union. Its primary objectives are (NEPAD, 2010):

- to eradicate poverty;
- to place African countries, both individually and collectively, on a path of sustainable growth and development;
- to halt the marginalization of Africa in the globalization process and enhance its full and beneficial integration into the global economy; and
- to accelerate the empowerment of women.

Union, launched the NEPAD e-Schools Initiative.⁴ Coordinated by NEPAD's ICT-focused arm, the NEPAD e-Africa Commission (eAC), the e-Schools Initiative's mission is, "to impart ICT skills to young Africans in primary and secondary schools as well as harness ICT technology to improve, enrich and expand education in African countries" (NEPAD e-Schools Initiative, 2008). Its primary objective is to provide computers and Internet access to over 550,000 African schools by 2020, in order to:

- Provide ICT skills and knowledge to primary and secondary school students that will enable them to function in the emerging Information Society and Knowledge Economy;
- provide teachers with ICT skills to enable them to use ICT as tools to enhance teaching and learning;
- provide school managers with ICT skills so as to facilitate the efficient management and administration in the schools; and
- to make every learner health literate (Farrell, Issacs, and Trucano, 2007, p.11, 2007; NEPAD e-Schools Initiative, 2008).

In 2007, the Commonwealth of Learning⁵ and *infoDev*⁶ released a public report entitled *The NEPAD e-Schools Demonstration Project: A Work in Progress* (Farrell et al.,

⁴ The first phase of the e-Schools Initiative was initiated in 2005 and consisted of a series of small-scale initial deployments to 'first phase countries' aimed at testing the Initiative's design and gathering experiential knowledge to inform the full, continent-wide roll-out of the e-Schools Initiative (NEPAD e-Schools Initiative, 2008). This initiative deployed projects to six schools in each of 20 countries (Algeria, Angola, Benin, Burkina Faso, Cameroon, Republic of Congo, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Mali, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, South Africa and Uganda). At the time of writing some 80 schools in 15 countries have operational, Internet connected ICT through the e-Schools Initiative (NEPAD e-Schools Initiative, 2008).

⁵ The Commonwealth of Learning is an intergovernmental organization with over 50 member countries, which aims to help improve access to quality education by encouraging the development and sharing of open learning and distance education knowledge, resources and technologies (see <http://www.col.org>).

⁶ *infoDev* is a global development financing program that focuses on the global sharing of information about ICT4D, and reducing the duplication of efforts and investments in this field. It is coordinated by the Global ICT Department of the World Bank, which is also one of its founders and key donors (see <http://www.infodev.org>).

2007).⁷ Commissioned by the e-Schools Initiative as a comprehensive monitoring and evaluation exercise aimed at summarizing the lessons learned from the early phases of this undertaking, this report hailed the e-Schools Initiative as being “without precedent in terms of its international scope, socio-economic diversity and the comprehensiveness of the partnerships it comprises” and characterized the objectives of the project as “of critical importance to development on the [African] continent” (Farrell et al., 2007, p. 1). However, it also revealed several issues that continue to have implications for the wider roll-out of the initiative, namely:

1. The implementation of the early phase took much longer than the planned one year;
2. Timelines and preparedness for implementation varied greatly between countries;
3. The eAC was seriously constrained in its ability to provide effective leadership due to inadequate fiscal and human resources;
4. Many of the assumptions about the benefits of ICT for education that underpinned the e-Schools Initiative have proven to be invalid (e.g. “A Demo was needed to understand ‘best practices’ for introducing ICT in schools” (Farrell et al, 2007, p. 13); “The Demo project would be a new ICT- in-schools initiative in the participating countries” (Farrell et al, 2007, p. 14); “The eAC could raise sufficient funds from donor sources” (Farrell et al, 2007, p. 13)); and
5. The failure to actively engage civil society in the implementations deprived the project of support and resources (Farrell et al., 2007).

As the NEPAD e-Schools Initiative demonstrates, a number of African countries are investing resources into efforts to integrate ICTs into educational programs. The establishment of best practices in the field of ICT4E is particularly important as a means

⁷ At the time of writing, this report provides the most recent publically available information about the NEPAD e-Schools Initiative. There appears to be not other additional information regarding how far along the e-Schools Initiative has progressed with its implementation process or if the project expects to meet its initial goal of providing computers and Internet access to over 550,000 African schools by 2020. The NEPAD e-Africa Commission’s website indicates only that project is ongoing (NEPAD e-Schools Initiative, 2008).

of comparing experiences and compiling lessons learned given the limited extent of empirically grounded evidence about such initiatives.

1.2 International ICT4E Initiatives

On the international stage perhaps the two most widely recognized initiatives seeking to promote and facilitate the integration of ICTs into educational programs are the One Laptop per Child Program (OLPC), and the Intel Corporation's *World Ahead Program*. OLPC is a United States-based not-for-profit organization that was founded in 2002 by Nicholas Negroponte, a Professor of Media Arts and Sciences at the Massachusetts Institute of Technology (MIT) and Chairman Emeritus of the MIT Media Lab. At the time of writing, he is the current Chairperson of OLPC. This organization defines its mission as:

To create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning (OLPC, 2010a).

The “rugged, low-cost, low-power, connected laptop” that is referred to in the above quotation is the XO laptop. It was officially introduced to the public in January 2005 at the World Economic Forum in Davos Switzerland.⁸ In November of the same year, the first XO laptop prototype⁹ was unveiled by Negroponte and former United Nations

⁸ The World Economic Forum is an independent international non-profit organization based in Geneva, Switzerland. It is best known for its annual meeting, which bring together top international business, political and intellectual leaders to discuss pressing global issues.

⁹ The XO prototype presented at WSIS 2005 was equipped with a yellow hand crank that was intended to allow users to physically generate power to charge the laptop, thereby reducing the machine's reliance upon electricity. However, by the time mass production of XO laptops began in November 2007, this feature had been phased out

Secretary-General Kofi Annan¹⁰ at the first phase of World Summit on the Information Society (WSIS).¹¹ As of 2010, the XO laptop costs approximately \$199 USD and about 1.5 million XOs have been deployed to 35 countries (Warschauer & Ames, 2010). However, over 80 percent of those laptops have actually been delivered to countries that the World Bank as high or upper-middle income (Warschauer & Ames, 2010).

There are three primary channels through which XO laptops are deployed to developing countries:

Traditional deployments. This is the most common distribution method and typically involves the purchase of large quantities of XO laptops by governments or other organization(s) for deployment within a particular country or region. For example, in 2007, the government of Peru purchased 40,000 XO laptops, which subsequently were distributed throughout the country (OLPC, 2010k).

Give 1 Get 1 (G1G1) Program. This program has been run twice, first from November 12 to December 31, 2007 and then from November 17 to December 31, 2008. According to the terms of this program, donors pay \$US 399 for two XO laptops. The first laptop is theirs to keep (i.e. the ‘get one’) and the second laptop is donated to OLPC, who distributes it to one of its partner countries (i.e. the ‘give one’). Donors can also choose to pay \$US 199 to exercise a standalone ‘give one’ option. Although the G1G1 Program is not operating at present, the latter stand alone option continues to be available for donors via the OLPC website (OLPC, 2010g).

OLPCorps. This is the “OLPC’s official field volunteer program” (OLPC, 2010g) and the organization’s most recent deployment initiative. Initially launched in February 2009, this program is open to teams of university and/or college students who are partnered with primary schools in developing countries. On an annual basis, select teams of students are provided with 100 XO laptops, introductory training and supportive funding to allow them to participate in an OLPC deployment within their partner school.

¹⁰ The United Nations continues to be involved with OLPC as the result of a 2006 memorandum of understanding signed by Negroponte and Kemal Dervis, former head of the UN Development Program (UNDP), in which the UNDP committed to assist with OLPC deployments in the countries with UNDP offices. The United Nations Relief and Works Agency (UNRWA) also is a key stakeholder in OLPC's deployments in the Middle East, and the Palestinian territory in particular (OLPC, 2010e).

¹¹ The World Summit on the Information Society (WSIS) was a United Nations-sponsored summit held in two phases. See Table 2.1 for more information.

The common feature across the three deployment models outlined above is that OLPC provides the technology and specific guidelines as to how it is to be used. For instance, OLPC requires that XO laptops be distributed to students in a 1:1 ratio and that the technology be incorporated into classrooms in accordance with the tenets of constructionist pedagogy.¹² However, the particularities of each deployment (e.g. shipping logistics, technical support systems and financing) are the responsibility of the individual entities doing the deployment (OLPC, 2009a, p. 4).

Although somewhat less well known than its OLPC, the *World Ahead Program* is one of the Intel Corporation's principal education-focused corporate responsibility initiatives. Intel Corporation is an American company and the world's largest manufacturer of semiconductor computer chips, as well as the inventor of the x86 series of microprocessors. In 2008, the company reported net revenue of some \$37 billion USD (Intel, 2008). *World Ahead* was established in 2006 and works to deploy "eLearning" in developing countries. There are five key domains in which the World Ahead Program operates. They are:

- **Access** to technologies best suited for local needs;
 - **Connections** to the world via high-speed technologies;
 - **Education** that prepares them for the future;
 - **Content** and services that improve their lives; and
 - **Healthcare** improvements via technology
- (Intel, 2007a, p. 2, emphasis in original)

¹² Constructivist pedagogy is a theory of learning initially developed by Seymour Papert, and later built upon by others including Nicholas Negroponte (OLPC, 2010d). The basic premise of this perspective is that, people learn more effectively when they are actively engaged in knowledge discovery and construction as opposed to being on the receiving end of attempts to transmit knowledge, such as in 'traditional' classrooms based on lecture-style instruction (Papert & Harel, 1991).

World Ahead projects are deployed collaboratively through partnerships between Intel and actors from local governments, industries, and non-governmental organizations. According to Intel's 2008 Corporate Responsibility Report, throughout the past decade the company has invested more than \$1 billion USD toward improving education in more than fifty countries. The most recent data from Intel reports that it is involved in some two hundred active World Ahead programs worldwide (Intel, 2008b).

Although there is no standard formula for a World Ahead deployment, Intel describes the Components of an eLearning Program as comprising the two following dimensions (Intel, 2009, p. 9):

Solution elements

1. Technology
2. Connectivity
3. Localized digital content
4. Improved teaching methods and professional development

Support Systems

5. Policy
6. Funding strategies
7. Success metrics and assessments appropriate to eLearning programs
8. Working with vendors (the "commercial ecosystem")

Of the eight components outlined above, Intel commits to taking an active role only in the provision of the *Solution Elements*. Although it states that it will help to facilitate the development of the components that fall under *Support Systems*, these are seen to be, ultimately, the responsibility of the local deployment partner(s) (Intel, 2009). In addition, World Ahead programs may also incorporate resources from Intel's other education-based initiatives, which include:

Intel Teach: A professional development program designed to help teachers effectively integrate technology into their classrooms.

Intel's skooool Learning and Teaching Technology: Provides free online resources for math and science to 20 countries, in seven languages.

Teachertube: A free educational file sharing site for teachers and students.

Intel's ICT for Education Program: Donates PCs to schools, particularly in developing countries.

Investigating the ways in which ICT4E initiatives such as OLPC and Intel's *World Ahead Program* incorporate best practices into their projects can help to address the gap in knowledge about the effectiveness of ICT4E, as well contributing to the evaluation of best practices themselves. Furthermore, there is very little academic work pertaining specifically to OLPC and Intel's *World Ahead Program*. With the exception of the recent article 'Can One Laptop Per Child Save The World's Poor?' by Warschauer and Ames (2010), the few references to OLPC and *World Ahead* in academic literature are for the most part brief, uncritical mentions of the projects as examples of ICT4D initiatives (see, for example, Ali, 2011; Ford & Taylor, 2009; Ozer, 2007).

Although the body of literature on the best practices of ICT4E is growing, it is considerably more common for studies to focus on the identification of best practices rather than *how* established best practices are implemented. In order to address this issue, this thesis is guided by the following research question: *To what extent are the 'best practices' identified by ICT4E literature reflected in the ICT4E initiatives of One Laptop per Child and the Intel Corporation's World Ahead Program?*

1.3 Structure of the Thesis

This thesis is divided into six chapters. This introductory chapter has provided a brief overview of the key issues underpinning this research undertaking. The discussion in Chapter 2 provides an analysis of the literature regarding the fields of ICT4D and ICT4E. Particular attention is paid to the major contending perspectives on the use of ICT in

education and the approaches to ICT4E that have been widely accepted as the best practices in the field.

In Chapter 3, the research methodology employed and the rationale for its use is presented. In this thesis, content analysis is paired with critical discourse analysis (CDA) to analyze the corporate public discourses of two ongoing ICT4E initiatives—One Laptop per Child and Intel’s *World Ahead Program*. The objective is to assess the extent to which the public rhetoric associated with these projects reflects best practice in the ICT4E domain.

The discussions presented in Chapters 4 and 5 set out the research findings obtained. The findings presented in Chapter 4 suggest that OLPC does not adequately reflect any of the ICT4E best practices, and that the initiative in fact demonstrates a technologically determinist orientation in both its language and design. The findings put forth in chapter 5 show that Intel’s *World Ahead Program* tends to be in line with the ICT4E best practices, as the initiative positions ICT as a tool that is most effective in facilitating improvements in education when it is combined with other supporting elements.

In Chapter 6 concludes the thesis with a comparative analysis of the findings about One Laptop per Child and Intel’s *World Ahead Program*. What emerges from this exercise is evidence that OLPC and Intel’s *World Ahead Program* incorporate many of the foundational concepts of the ICT4E best practices into their corporate public discourses, but it seems that this reflection is predominantly rhetorical. The comparative analysis is followed by brief discussions about the limitations of the thesis and avenues

for further research, and the chapter closes with concluding remarks about the implications of the findings of the thesis as a whole.

Chapter 2: Review of the Literature

Throughout the 20th century, there were numerous advancements in information and communication technology (ICT), and each new innovation was associated with progressive teaching (Cuban, 1986; Oppenheimer, 2003). This optimism was not just idle chatter. The governments of various countries, and the United States in particular, invested substantial resources into efforts aimed at introducing emerging ICTs into school systems.¹³ However, these technologies rarely lived up to the fanfare surrounding their revolutionary potential for education that accompanied their emergence (Carey, 1992; Cuban, 1986; Mosco, 2004; Oppenheimer, 2003).

Today, it is digital technologies that are under the spotlight, with much emphasis placed upon the benefits to be accrued from integrating computers into the classrooms of developing countries (see, for example, Farrell & Isaacs, 2007; Gutterman et al., 2009; UNESCO Bangkok, 2004). Throughout much of the last quarter century the international community, through such organizations as the World Bank and United Nations (UN), has articulated a focus upon using ICTs to improve access to basic education in the least developed countries (LDCs)¹⁴ (Haddad & Draxler, 2002a, p. vii; Gutterman et al., 2009).

¹³ For example, it is estimated that the United States government spent some \$70 billion on computer-centered educational programs throughout the 1990s (Oppenheimer, 2003). Since that time, the government has continued to invest heavily in ICT4E initiatives. For instance, the *American Recovery and Reinvestment Act of 2009* allocated \$US 650 million for education technology and “21st century classrooms,” as well as the funding of computer labs and training teachers to use technology (Pelosi, 2009).

¹⁴ The Least Developed Countries (LDCs) “represent the poorest and weakest segment of the international community” (UN-OHRLLS, n.d.). The United Nations officially designates a country as an LDC in accordance with three criteria: 1) low-income; 2) weak human capital status based on a Human Assets Index that measures indicators such as mortality and literacy; and 3) economic vulnerability. There are at the time of writing 49 officially designated LDCs, of which 33 are in Africa; 15 in Asia and the Pacific; and one in Latin America (see UN-OHRLLS, n.d.).

Representatives of the United Nations Educational, Scientific and Cultural Organization (UNESCO), for instance, have openly stated that “we must assume that without a doubt, ICT is a useful new teaching tool and investment in, and experimentation with, this technology should be supported” (Ngu, 2003, p. 4).

The discussion in this chapter offers an overview of the context within which the focus on ICT4E in developing countries has emerged, and outlines what are now broadly considered to be the best practices associated with the implementation of ICT4E initiatives. The chapter is divided into four sections. In the next section, a brief outline is provided of the social, political and technological factors that have converged to make the early 21st century a time of great optimism about the potential of new ICTs to contribute to international development, and education in particular. This is followed by an examination of the arguments for, and critiques of, the educational use of computer and Internet technologies in LDC contexts. Drawing from a survey of contemporary research in the field five best practices for ICT4E initiatives are set out in the third section. The chapter concludes with a presentation of the central research question guiding the thesis.

2.1 A Brief History of ICT4D

Information and communication technologies for development (ICT4D) initiatives date back to the 1950s, when the first computer in the developing world was installed at the Indian Institute of Statistics (Heeks, 2008). However, it was not until the 1990s that ICT4D as a field of research and practice really took shape. This decade was marked by a rapid uptake of new ICTs, especially in the member countries of the Organisation for

Economic Cooperation and Development (OECD).¹⁵ In 1981, the Internet only connected about one hundred computers, which were primarily based in universities and research centers located within the United States. By 2000, the Internet connected over sixty million computers, the majority of which were located in developed countries (Comer, 2006). At the end of 2009, Internet penetration in developed countries was at approximately 64% and at 18% in developing countries (or 14% if China is excluded) (International Telecommunication Union, 2010).

The story is much the same with regard to the uptake of mobile telephony. Throughout the 1990s, the mobile phone use increased exponentially.¹⁶ Although the penetration and usage rate of mobile telephony in developing countries did not take off until the early 2000s, it is now considered to be the most equitably distributed ICT (International Telecommunication Union, 2010). By the end of 2001, over 90 per cent of countries had a mobile network. At the end of 2009, there were over 4.6 billion mobile subscriptions worldwide and almost every second person in developing countries was thought to have a mobile phone (International Telecommunication Union, 2010).¹⁷

According to some observers, this technological expansion constitutes an information revolution and signals the dawn of a new era. Manuel Castells (1999; 2000), for instance,

¹⁵ The Organisation for Economic Cooperation and Development (OECD) is a Paris-based international economic organisation comprised of 30 countries, most of which are regarded as developed countries (i.e. they are high-income economies with a high Human Development Index). See www.oecd.org/

¹⁶ In 1985, there were just over 340 000 mobile phone users in the United States. By 1995, this number had grown to 28.1 million. As of June 2009, there were over 267.6 million American mobile phone subscribers, and wireless penetration in the U.S. had reached 89% (Cellular Telecommunications & Internet Association, n.d.).

¹⁷ This figure is more than double the 2005 mobile technology density level (International Telecommunication Union, 2010)

makes the case that technological developments have profoundly affected the ways in which societies, cultures and economies exist and operate. He, and many others, have predicted that this new era will see the growth and dominance of *knowledge societies*¹⁸ (see, for example, Friedman, 2006, Mansell & Wehn, 1998; UNESCO, 2005). A central premise of the knowledge society hypothesis is that ICTs will become the most important media of social and economic transaction as bits and bytes break down barriers of space and time, thereby making information the most important resource (Friedman, 2006; Negroponte, 1995; Porter & Read, 1998; Warschauer, 2003).

Enthusiasm about the social and economic potential of the Information Age has been accompanied, however, by concerns about the digital divide or divisions between the technological ‘haves’ and ‘have nots’ (Oppenheimer, 2003; UNDP, 1999; UNESCO, 2005; Wilson, 2004).¹⁹ At one end of the spectrum, digital technology, and the Internet in particular, has been hailed as the ‘great equalizer’ (see, for example, Brynjolfsson and Smith, 2000, p. 1). Proponents of this view maintain that bridging the digital divide should be a priority because developing countries need workers with strong ICT skills to participate effectively in 21st century knowledge societies, and to reap the accompanying

¹⁸ UNESCO defines a knowledge society as one that,

creates, shares and uses knowledge for the prosperity and well-being of its people. The link between knowledge and development is fundamental to the building of knowledge societies—knowledge being both a tool for the satisfaction of economic needs and a constitutive component of all human development (UNESCO, 2005, p. 27)

¹⁹ Concerns about disparities in access to ICTs within and between countries are not new. In the 1970s-80s, UNESCO was the site of a major power struggle over ICT-related asymmetries between developed and developing countries, which led to calls for the establishment of a New World Information and Communication Order (NWICO). See The MacBride Commission (1980), Mastrini & DeCharras (2005), and Padovani & Nordenstreng (2005).

economic benefits (see, for example, Partnership for 21st Century Skills,²⁰ 2003; Culp et al., 2003; International Telecommunications Union, 2003). It also has been claimed that the equalizing abilities of ICTs can be translated to civil society by fostering, for example, greater civic engagement (Froomkin, 2004), revitalizing democracy (Norris, 2001) and allowing more minority voices to be heard (Harwood & McIntosh, 2004). To this end, Norris (2001, p. 40) likens computers to water supply, stating

In poorer villages and isolated communities, a well-placed computer, like a communal well or a irrigation pump, may become another development tool, providing information about storm warnings and crop prices for farmers, or medical services and legal land records for villagers.

By contrast, those who are less sanguine about the equalizing potential of the Internet suggest that the notion of *the* digital divide is inappropriate insofar as the singular designation “conveys a flawed view of what is, in fact, a compendium of interrelated social, economic, and technological considerations that influence Internet access and use” (Paré, 2005, p. 85).²¹ Echoing this view, Boyle (2002), Sevron (2002), and Pieterse (2005) suggest that digital divide(s) may be more accurately represented as a reflection of disparities in income and, as such, are symptomatic of the much larger problem of persistent poverty and inequality. This view is aptly summarized by Carlsson (2003, p. 28) who points out that,

²⁰ The Partnership for 21st Century Skills is an American organization that describes itself as “a unique public-private organization formed... to create a successful model of learning for this millennium that incorporates 21st century skills into our system of education” (2003, p. i). Members and key partners include Apple Computers, Cisco Systems, Dell Computers, Microsoft Corporation, National Education Association, and the U.S. Department of Education.

²¹ It is equally important to note that digital divides exist not only between countries, but within countries as well. For instance, although the majority of households in OECD countries have computers with Internet access, there are considerable documented disparities in access and usage along regional, class and gender lines (Hernes, 2002).

[e]xclusion is more than a question of material assets – it is also a question of access to knowledge and culture, i.e., the fundamentals of social development. Unless the cultural diversity inherent in society is acknowledged and represented in the public sphere, no positive political, economic or social development will be possible.

The upshot of the critics' position is that focusing on bridging the digital divide obscures the complexities of many development issues by reducing complex matters of disparity primarily to technological problems. The main concern here relates to the risk of amplifying existing inequalities and/or further fragmenting political culture by equating access to computers and connectivity to the Internet with development (DiMaggio & Hargittai, 2001; Sunstein, 2001; Boyle, 2002; Alzouma, 2005).

Despite the concerns outlined above, the early 21st century was marked by widespread investment in initiatives designed to help bridge the digital divide(s), particularly between developed and developing countries. Many of these initiatives focused on integrating ICT into the educational systems of LDCs, a trend which is examined in more depth in the next section.

2.1.1 ICT4E in the Information Age

Access to basic education²² is widely considered to be a cornerstone of social and economic development, and has long been a central focus of international development efforts (Haddad & Jurich, 2002; Selinger, 2009; UNESCO, n.d.; World Bank, 1998/99). This is reflected, in part, by the adoption of the United Nations' Millennium Declaration in 2000, which committed UN member countries to a new global partnership aimed at

²² The term "basic education" is commonly taken to encompass the notions of 'elementary' and 'fundamental' education. For the purposes of this thesis it is being used to refer specifically to primary level education (UNESCO, 2000).

reducing extreme poverty by setting out eight targets to be reached by 2015 (United Nations, 2000). Collectively, these targets are known as the Millennium Development Goals (MDGs). The eight MDGs are:

- Goal 1: Eradicate extreme poverty and hunger;
- Goal 2: Achieve universal primary education;
- Goal 3: Promote gender equality and empower women;
- Goal 4: Reduce child mortality;
- Goal 5: Improve maternal health;
- Goal 6: Combat HIV/AIDS, malaria, and other diseases;
- Goal 7: Ensure environmental sustainability, and;
- Goal 8: Develop a global partnership for development.

In the same year, the global emphasis on basic education was further underscored by the international community's reaffirmation of a commitment to the UNESCO-led Education for All (EFA) movement, which was officially launched at the 1990 World Conference on Education for All.²³ In reaffirming its commitment to EFA, the international community identified six goals targeted at meeting the learning needs of all children, youth and adults by 2015. These goals are: Early Childhood; Primary Education; Lifelong Learning; Adult Literacy; Gender Parity; and Quality Education (see Education for All, n.d).

This international re-affirmation of the importance of facilitating access to, and the delivery of, basic education in LDCs coincided with the emergence of a number of international initiatives and events that underscored global enthusiasm about ICT4D, and ICT4E as a priority area (see, for example, GAID, 2009; Gutterman et al., 2009; Haddad

²³ At the 1990 Education For All conference, delegates from 155 countries and representatives from over 150 governmental and non-governmental organizations pledged to universalize primary education and to massively reduce illiteracy by the end of the decade (UNESCO, n.d.). However, as the deadline approached, it became clear that many countries were far from reaching this goal and in 2000, the timelines was extended to 2015.

& Draxler, 2002a; infoDev, 2010; Trucano, 2005; United Nations ICT Task Force, n.d).

Some key examples of the institutional investment in ICTs to foster development, with a strong emphasis on basic education are outlined below in Table 2.1.

Table 2.1: Key ICT4E Initiatives and Developments (late 1990s – early 2000s)

Date	Initiative	Description
1997	World Bank <i>World Links</i> Program	Aimed at providing capacity-building, school-based, ICT-related solutions to schools and ministries of education in developing countries to “mobiliz[e] the necessary technologies, skills, and educational resources to prepare students and teachers to enter the Networked World” (Hawkins, 2002).
1999	World Bank World Development Report, <i>Knowledge for Development</i>	Report focusing upon “the risks and opportunities that the global information revolution is creating for developing countries.” Concluded that “knowledge gives people greater control over their destinies,” but acquiring and communicating such knowledge “involves taking advantage of new information and communication technology” (World Bank, 1998/99, p. 2).
2000	<i>G8 Digital Opportunity Task Force</i> (DOT Force)	Created in 2000 by the G8 to research and examine concrete steps to bridge the digital divide, which would be presented at the 2001 G8 Summit (Global Knowledge Partnership, n.d.).
2001	UNDP Human Development Report, <i>Making Technologies Work for Human Development</i>	Report examining “how new technologies will affect developing countries and poor people.” Argued that “without innovative public policy, these technologies [ICTs] could become a source of exclusion, not a tool of progress... But managed well, the rewards could be greater than the risks” (UNDP, 2001).
2001	The <i>UN ICT Task Force</i>	Task Force created to “help harness the power of information and communication technologies for advancing the internationally agreed development goals of the Millennium Declaration” (UN ICT Task Force, n.d).
2001	<i>SchoolNet Africa</i>	African-led and based non-government organisation (NGO) that focuses upon the “empowerment of all of Africa's children and youth through access to quality education, information and knowledge on the basis of their effective use of information and communication technologies (ICTs).” Operates as a network of practitioners, policymakers, teachers and learners that spans 31 African countries (SchoolNet Africa, 2007).

Table 2.1 cont'd:

Date	Initiative	Description
2003 & 2005	<i>World Summit on the Information Society (WSIS)</i>	A UN-sponsored World Summit held in two phases, the first in Geneva in 2003 and the second in Tunis in 2005. Its stated aim was to define “a common vision of the information society” and to identify ways to overcome the digital divide within the framework of achieving the UN MDGs. (WSIS, 2005).
2003	<i>The New Economic Plan for Africa's Development (NEPAD) e-Schools Initiative</i>	Initiative aimed at “ensuring that African youth graduate from African schools with the skills that will enable them to participate effectively in the global information society.” Currently in the pilot phase. Aims to equip more than 550,000 African schools with ICT and Internet connections by 2020 (NEPAD e-Schools Initiative, 2008).
2003	<i>Global e-Schools & Communities Initiative (GeSCI)</i>	Founded by the UN ICT Task Force as an international not-for-profit organisation dedicated to addressing issues of quality and access in developing country education systems by “providing demand-driven assistance to developing countries seeking to harness the potential of ICT to improve their education systems”(GeSCI, n.d.)
2006	<i>Global Alliance for Information and Communication Technologies and Development (GAID)</i>	Following the increasing emphasis on the importance of ICTs in achieving international development goals, such as the MDGs, GAID was launched by the UN Secretary-General as an attempt to establish a “truly global forum that would comprehensively address cross-cutting issues related to ICT in development” (GAID, 2009). The Alliance lists Education as one of its four priority areas.
2007	<i>infoDev Report Survey of ICT and Education in Africa</i>	Survey of ICT in education initiatives in Africa. The report detailed the first set of results from 53 African countries. And found that priority was being given to ICT4E policy development, but there was much variance in policies across countries (Farrell & Isaacs, 2007).

In spite of the various initiatives outlined, above there is a current of thinking within the

ICT4E domain that, within the context of a history littered with unfulfilled promises vis-

à-vis ICT4E initiatives, the faith seemingly being placed in computer and Internet

technology to achieve what film, radio and television did not may be premature. It is

important, therefore, to examine the arguments supporting computer and Internet-focused

ICT4E in LDCs and the critiques most commonly leveled against them.

2.2 To ‘tech’ or not to ‘tech’ education?

Proponents of ICT4E argue that there are several reasons why the optimism about the

benefits of bringing computer and Internet technology into the classroom is not simply a

recycling of previous rhetoric surrounding the supposed revolutionary educational potential of film, radio and television. The three most cited rationales for optimism, and their accompanying critiques are outlined below.

Rationale 1: *ICT4E is crucial to equip the next generation with the 21st century thinking and learning skills that today's high-tech global economy demands and which will, in turn, help bridge the digital divide(s).*

ICT literacy is defined by the International ICT Literacy Panel²⁴ (2002, p. 2) as the ability of people to “us[e] digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society.” ICT4E optimists maintain that an increasingly technologically literate population will speed up the rate of ICT adoption in LDCs and, in turn, help these countries to bridge the digital divide and even potentially ‘leapfrog’ into the Information Age (Wilson, 2004; de Beer, 2004). Underpinning this view is an assumption that ICT literacy and other so-called ‘21st century skills,’ such as creativity, problem-solving abilities, reasoning skills, communication skills, and other higher-order thinking skills, are critical to the future employment of today’s students (Culp et al., 2003; Trucano, 2005).

For example, Haddad & Draxler (2002b), Culp et al. (2003), and Trucano (2005) all claim that ICT literacy is fundamental to active citizenship and achieving success in the job market in the ever-more interconnected world. According to this view, it follows therefore that ICTs should be integrated into education from the earliest grade levels

²⁴ The International ICT Literacy Panel was convened in 2001 by Educational Testing Service, an international educational measurement and research organization (see, www.ets.org) The panel was composed of experts from education, government, nongovernmental organizations (NGOs), labor, and the private sector, who were primarily from Australia, Brazil, Canada, France, and the United States.

possible in order to enhance the development of ICT skills, and to ensure that populations are able to adapt to new technologies, thus becoming (or possibly remaining) competitive (Grace and Kenny, 2003).

According to Trucano (2005, p. 5) another facet of this optimism is the “widespread belief” that ICTs can empower teachers and learners by transforming classrooms from teacher-dominated to student-centered learning environments. His research findings²⁵ indicate that proponents of ICT4E generally presume that this transformation will foster increased development of students' ‘21st century skills’.

Despite the seemingly pervasive belief that ICTs can foster the development of 21st century skills, Trucano’s (2005) findings also reveal that schools within OECD countries very rarely view ICTs as central to the overall learning process. Indeed, the impact of ICT use on student achievement remains difficult to measure and, as a result, there is only very limited data to support the implied connections between ICT use, increased student achievement and development of higher-order thinking skills (Condie & Munro, 2007; Grace & Kenny, 2003; Trucano, 2005; Wainer, Dwyer, Dutra, Covic, Magalhães, Ferreira, Pimenta & Claudio, 2008).²⁶

Further, an increase in ICT-related economic opportunities in developing countries is not necessarily unambiguously positive. To illustrate this, Pieterse (2005) uses the example of the increasing trend of American companies outsourcing their call centres to

²⁵ These findings were based on a study conducted by Trucano as part of an *infoDev* research series entitled *Knowledge Maps*, which aims to identify and offer means of addressing important gaps in key areas related to the use of ICTs in education.

²⁶ This critique is premised on a positivist outlook which presumes that the development of 21st century skills can be quantitatively measured and verified.

India. Although teleservice jobs support an emerging Indian middle class, these call centres are simultaneously contributing the establishment of a dependent economy that is geared toward and revolves around clients in developed countries. As a result, Indian staff is required to adopt American accents, work odd hours for low wages—some cases in “the kind of modern-day sweatshop conditions that characterized export oriented manufacturing throughout the developing world” (Pieterse, 2005, p. 13)—and have few options for career advancement.

Similar concerns about the ‘real’ motives of ICT-proponents have been raised by Wade (2003, p. 443), who suggests that “efforts to bridge the digital divide may have the effect of locking developing countries into a new form of dependency on the West.” In his view, this is because ICTs, and the international standards that govern their use, are designed by developed countries (or entities over which developed countries have significant influence) for developed country conditions. As a result, Wade maintains that substantial investment in ICT by a developing country, such as that required by large-scale ICT4E initiatives, can make it vulnerable to the quasi-monopolistic power of key (primarily American) ICT manufactures and service providers.

Rationale 2: Providing computers in schools will help equalize access to education.

Many LDCs suffer from serious shortages of teachers and school facilities (Hudson, 2006). Proponents of ICT4E argue that one of the principal advantages of new technologies such as real-time video conferencing over the Internet is that it can eliminate the need for teachers and students to be in the same geographic space (see, for example, Culp et al., 2003 and Hepp, Hinostroza, Laval & Rehbien, 2004). To this end, Grace and

Kenny (2003) view ICT-mediated educational initiatives as an especially promising means of addressing urban-rural educational discrepancies, given that they enable communities with too few local teachers to connect students virtually with instructors, thereby decreasing a significant obstacle to accessing education.

Echoing this claim, Hawkins (2002), Haddad and Draxler (2002b), Ngu (2003), and Gutterman et al. (2009) all maintain that ICTs can help to increase access to education among other groups that have historically been under-served (e.g., women, ethnic minorities, people with disabilities, adult learners, and people unable to reach school facilities due to security concerns) insofar as the flexible learning environment facilitated by ICT can provide students with access to course materials, research resources, and collaborative tools, irrespective of time or location. Gutterman et al. (2009) also highlights the abundance of frequently updated information available on the Internet which they contend may decrease dependence upon print resources, like textbooks, which often are out of date in developing countries. These authors posit that online resources can promote more efficient delivery of educational resources because digital texts and/or multimedia modules can be updated regularly and widely disseminated at a low cost, particularly if economies of scale are reached.

The key premise underpinning the arguments outlined above regarding the relationship between access to ICTs and more equitable access to education suggest that the opportunities afforded by ICT4E outweigh the financial costs of equipping schools with computers, other digital technologies, and their related infrastructures. They also appear to assume that sufficient attention is paid to meeting human resource needs, such

as adequately trained teachers and technicians that are necessary for effectively support and maintain ICT4E initiatives in a sustainable manner. It may be argued, therefore, that an important limitation of the enhanced equitability hypothesis rests in its propensity to adhere to technologically determinist assumptions. Ngu (2003), for example, argues that the allocation of funding principally toward technology within ICT4E projects often is misplaced, given that many schools in LDCs lack teachers and even the most basic of educational infrastructure, such as electricity and basic stationary materials.

In most LDC contexts, human resources are relatively cheap, while ICTs are typically expensive and the infrastructure required to support these technologies often is not readily available. As such, it seems plausible that equipping schools with computers may not be as cost-effective as other means of improving access to education (e.g. training more teachers to facilitate a decrease in class sizes or investing in other, less expensive approaches to ICT4E such as Interactive Radio Instruction) (Grace & Kenny, 2003). For example, in 2006 the Indian government rejected a partnership with the U.S.-based One Laptop per Child program,²⁷ which aims to equip every student in developing countries with a laptop, arguing that “it would be impossible to justify an expenditure of this scale on a debatable scheme when public funds continue to be in inadequate supply for well-established needs” (India's Ministry of Human Resource Development quoted in Mukul, 2006).

Likewise, Alzouma (2005), Sevron (2002), and Boyle (2002) all point out that when a development goal such as increasing access to basic education is framed as a

²⁷ See Chapter 4 for a detailed discussion of this initiative.

technological issue (e.g. bridging the digital divide), the benefits of ICTs often are assumed to be self-evident. However, the presence of more ICTs in schools does not in and of itself guarantee more, or more equal, access for students (Guttermann et al., 2009; Warschauer, 2003). In fact, introducing computer and Internet technology into schools can actually widen existing social and economic inequalities, especially if ICTs are not made available to everyone (Pal, Nedevschi, Plauche & Pawar, 2009).²⁸

Rationale 3: Computers and the Internet facilitate “individualized interactivity,” a key ingredient that was absent from previous ICTs that failed to deliver on their promises to revolutionize education.

The key assumption underpinning this third argument about the benefits of ICT4E is rooted in the ideal that film, radio and television have not lived up to their educational potential because of limitations associated with these specific technologies, as opposed to external factors such as the way that teachers incorporate them into their classroom activities. Computers, by contrast, are seen to offer something that film, radio, and television do not; specifically, ‘individualized interactivity.’ This term refers to the ability of computers to provide users with access to information in much the same manner as film, radio, and television, as well as the ability for computer to serve as a medium for tailoring interactions in a manner that best suits individual preferences (Osin, 1998).

It is hypothesized that individualized interactivity can transform classrooms by enabling lessons to be fine-tuned to suit the unique learning styles of individual students and, thus, foster creativity, experimentation and critical thinking (see, for example, Grace

²⁸ For example, research conducted by Trucano (2005) indicated that students who have computer access at home use school computers more frequently and with more confidence than students who have no access at home.

& Kenny, 2003). This personalized approach to learning, it is claimed, can result in high-quality education through increased student motivation, more engagement in learning and a deeper understanding of concepts (see, for example, Hawkins 2002; Ngu 2003; and Warschauer 2006). The perceived advantage of this approach is that students are involved in the learning process instead of being treated as mere receptacles of knowledge.

It must be noted, however, that there is much uncertainty regarding the supposed benefits of individualized interactivity within the context of education. For instance, Trucano (2005) and Ringstaff and Kelley (2002) point to a disconnect between this ideal and the actual implementation of computer and networking technologies in the classroom. Specifically, they note that in practice, ICTs are rarely used as catalysts for innovative teaching and learning. Instead, these technologies are predominantly used to support existing pedagogical practices and to teach ICT skills such as keyboarding.²⁹

At issue here is the distinction between what ICTs as standalone technological platforms can do to facilitate learning versus *how* these technologies actually are incorporated into classroom settings. Many who question the veracity of claims made about the educational benefits of individualized interactivity within educational settings (see, for example, Cuban, 1986; Culp et al., 2003; and Carlson, 2002), argue that in order for computers or any ICT to be effective educational tools, emphasis needs to be placed

²⁹ Trucano (2005) further contends that increased computer use in classrooms may, in fact, decrease academic achievement. According to more recent research by Wainer, Dwyer, Dutra, Covic, Magalhães, Ferreira, Pimenta and Claudio (2008), there is evidence to support the claim that students who report the greatest amount of computer use outside of school have lower than average scholastic achievement, and that this trend is more pronounced in younger and poorer students.

upon meeting students' needs (e.g. by providing adequate and appropriate teacher training) rather than on the provision of technology itself.

2.3 Best Practices in ICT4E

The benefits of ICT in education often are held to be self-evident. Based upon his review of available information about the impacts of ICT4E in developing countries Trucano (2005) argues that this will likely continue to be the case for some time, noting that:

While impact on student achievement is still a matter of reasonable debate, a consensus seems to argue that the introduction and use of ICTs in education can be a useful tool to help promote and enable educational reform, and that ICTs are both important motivational tools for learning and can promote greater efficiencies in education systems and practices. (Trucano, 2005, p. 8)

One of the limitations of the faith placed in the benefits of incorporating ICTs into the classrooms of developing countries is that it appears to be based largely on anecdotal evidence, much of which has been obtained from experiences in developed countries. As a result, and despite more than a decade of increasing investments in ICT4E in LDCs, empirical evidence of success³⁰ is still lacking. Significant gaps remain in the ICT4E knowledge base (Tolani-Brown et al., 2009). Moreover, there are few comprehensive resources available that provide practical guidance for policymakers, program administrators and donor staff regarding practices that are known to work most effectively (Tolani-Brown et al., 2009). Such resources are vital to the future

³⁰ There is no universal truth in applying ICT for education. Consequently, it is a challenge to provide a broad definition outlining what constitutes 'success' for ICT4E initiatives in general. For the purposes of this thesis, success for an ICT4E project is defined as the achievement of: 1) long-term sustainability and 2) the primary goals the project *sets for itself*. This definition allows for evaluations of success to be context- and case-specific, while remaining grounded in the widely agreed-upon goal of establishing sustainable initiatives (Culp et al., 2003).

development of ICT4E, as experiential evidence provides emerging initiatives with the opportunity to avoid replicating past mistakes and thereby potentially reduce implementation costs. In acknowledging this gap, practitioners, academics and organizations have begun to examine and consolidate data into comprehensive recommendations for program and policy design.

As experiences with various ICT-related development initiatives are made public, there is a growing sentiment within the development community that the provision of technology should be treated as a means for achieving specific development objectives as opposed an end in itself (see, for example, Selinger, 2009). This perspective is particularly resonant within the ICT4E community, where growing evidence from failed or struggling projects illustrates that “acquiring the technologies themselves, no matter how hard and expensive, may be the easiest and cheapest element in a series of elements that ultimately could make these technologies sustainable or beneficial” (Haddad & Draxler, 2002b, p. 4). Put simply, without a strong foundational support system computers and wires are not particularly useful, not least because they cannot fix broken educational systems or compensate for poor pedagogical practice (see, for example, Chapman & Mählck, 2004; Cuban, 1986; Haddad & Draxler, 2002b; Kleiman, 2005; OECD, 2001; Oppenheimer, 2003; Warschauer, 2006). This sentiment may be expressed in the form of what has become a foundational principle of ICT4E: *technology is only a tool*.

The latter serves as a cornerstone upon which rests what practitioners, researchers and policymakers have identified as the five best ICT4E practices for ensuring successful and sustainable ICT4E initiatives. The practices are as follows:

ICT4E initiatives *should*

6. be led by local government(s);
7. incorporate adequate, appropriate and ongoing teacher training;
8. be integrated into the existing education curriculum;
9. be monitored and evaluated on an ongoing basis; and
10. budget for the total cost of ownership (TCO).

Each of the above practices is discussed in further detail below.

Best Practice 1: ICT4E initiatives should be led by local government(s)³¹

The involvement of local government in ICT4E initiatives is frequently cited as the cornerstone of a project's sustainability and scalability (see, for example, di Ferranti, Perry, Gill, Guasch, Maloney, Sánchez-Páramo & Schady, 2003; Gutterman et al., 2009; Haddad & Draxler, 2002b; UNESCO Bangkok, 2004). Drawing upon a review of ninety ICT projects in Asia, UNESCO Bangkok (2004) emphasizes the importance of the 'right environment' for the success of ICT4E initiatives. While the specific attributes of a so-called 'right environment' vary according to a particular country's context, this term broadly describes an environment in which direct and indirect support for ICT4E is systematized through the coordination of a country's education system, economic and social infrastructure, and policies and global market conditions.

The basic premise here is that the government has a twofold role to play in fostering the creation of an enabling environment. The first centers on its role in addressing

³¹ Even when not explicitly mentioned, government involvement is an implicit factor within each of the other four ICT4E best practices discussed below

financial and informational constraints that may inhibit demand for ICT4E programs. This may entail such activities as creating student loan systems, subsidizing poor families, and providing appropriate governance and funding allocation to public school systems (di Ferranti et al., 2003; UNESCO Bangkok, 2004). The second facet of government action in this context pertains to its role in facilitating the development of sound financial markets and applying effective competition policies in order to attract firms that are “willing and able to engage in adoption, adaptation, and creation of new technologies,” and which will provide employment for the skilled graduates of ICT4E programs (di Ferranti et al., 2003, p. 10).

There are three government-driven approaches to ICT4E that tend to be identified as constituting best practices, insofar as they are seen to be crucial for fostering an enabling environment for successful ICT4E initiatives. The first suggests that ICT4E initiatives should be case specific and locally driven. Rural schools often outnumber urban schools in LDCs, and there almost always are huge gaps between rural and urban areas in terms of access to, and penetration of, ICT infrastructure (Hepp et al., 2004; Farrell & Isaacs, 2007). Such intra-country disparities underscore the need for an approach to ICT4E implementation that is grounded in meticulous planning and an in-depth knowledge of the various socio-political, economic and technological contexts that make up a country.³² Hence, local government involvement is seen as imperative for leading collaborative processes aimed at identifying contextually appropriate combinations of

³² Gutterman et al. (2009) also stress the importance of ensuring that the focus remains on meeting a country's own needs and not following technological trends.

technologies, policies and approaches, as well as for formulating strategies to apply the identified tactics in national policy.

The second facet of government involvement in ICT4E initiatives focuses on macro or national level considerations. Here, emphasis is placed upon the notion that large-scale ICT4E initiatives should be part of a national education policy that eschews giving primacy to technology over other pedagogical considerations (see, for example, Gutterman et al., 2009; Haddad & Draxler, 2002b). The basic premise here is that technology alone will have little impact on education if it is not accompanied by a systematic reform at the classroom, school, and education policy levels (Haddad & Draxler, 2002b; Ringstaff & Kelley, 2002; Sánchez, Salinas & Harris, 2011; Wainer et al., 2008).³³ Put simply, while ICT infrastructure may be a necessary condition for the success of ICT4E initiatives, the mere presence of ICTs in schools will not automatically generate pedagogical reform. As observed by Heyneman and Haynes (2004, p. 55) comprehensive educational reform is “neither swift nor inevitable,” and by its very nature necessitates significant government commitment in order to be pervasive, consistent, and effective.

The third consideration regarding the role of government is grounded in the claim that national ICT policy should be established and aligned with national education policy (see, for example, Ngu, 2003; Sánchez et al., 2011; UNESCO Bangkok, 2004). According to UNESCO Bangkok (2004), the creation of a national ICT policy provides

³³ Incorporating ICTs into educational curriculum may require a systemic change in educational policy. In this respect, technology may be viewed as one of a number of tools that could be used to support a process of comprehensive curricular reform.

opportunities for systematizing interministerial cooperation on ICT in general, including education, and can provide an avenue for sharing expertise, experiences and infrastructures throughout government agencies. It also can provide governments with a framework within which to address many extraneous issues that are not directly connected to ICT4E, but which may nonetheless have an impact on its success (e.g. ICT literacy in government ministries; intellectual property law; national ICT infrastructure and connectivity) (Guttermann et al., 2009). In addition, it is claimed that addressing these broader issues has the potential to create opportunities for strategic public-private partnerships, particularly with firms in the IT sector, which Hawkins (2002) suggests may provide an avenue for governments to offset the high financial and human resource demands of ICT-related development initiatives.

Best Practice 2: *ICT4E initiatives should incorporate adequate, appropriate and ongoing teacher training*

The body of experience and knowledge in the field of professional development in ICT4E for teachers remains very much in its infancy. Despite ongoing debates about the most effective approaches and mechanisms for providing teachers with ICT training, there appears to be widespread agreement that adequately and appropriately training teachers in the application of ICT4E is neither cheap nor easy but nevertheless is absolutely crucial to the success of ICT4E projects (see, for example, Cuban, 1986; Culp

et al., 2003; Gutterman et al., 2009).³⁴ According to Hawkins (2002) and Hepp et al (2004), most teachers tend to be initially intimidated by, if not resistant to, ICTs as well as reluctant to alter the teaching styles with which they have become comfortable.³⁵ In order to address this resistance, Hawkins (2002) asserts that teachers should be provided with proper, on-going ICT training, that extends beyond utilitarian cutting-and-pasting activities to develop skills required to problem-solve and to adapt ICTs to school subjects in dynamic ways. Such training activities might include, among other things, access to sustained communities-of-practice, where teachers can compare experiences, share course materials, and learn from one another (Dhanarajan, 2002).

Studies dating back to 1999, from both developed and developing countries, suggest that teachers who receive formal ICT training tend to use technology in the classroom more frequently and in more varied ways than those who do not receive training (Mueller, Wood, Willoughby, Ross & Specht, 2008; Ringstaff & Kelley, 2002). In line with these findings, there appears to be a general consensus that ICT4E professional

³⁴ There seems to be a consensus that the most effective approach to teacher training should be ongoing and hands-on (see, for example, Carlson & Gadio, 2002; Gutterman et al., 2009; Hawkins, 2002; UNESCO Bangkok, 2004). Some specific mechanisms that have been suggested in this regard include: Internet-based communities-of-practice (Hawkins, 2002); modular courses corresponding to different levels of teacher experience and expertise with technology (Carlson & Gadio, 2002); and extending professional development in ICT4E to all school staff, including non-teaching staff and administration (UNESCO Bangkok, 2004). Overall, however, the ongoing evaluation, sharing of both positive and negative experiences, and the constant revision of teacher training programs remains imperative.

³⁵ Gutterman et al. (2009) note that some ICT4E projects have demonstrated that students often learn how to use ICTs faster than their teachers, which can compromise the learning process and dampen teachers' confidence in their abilities to use and teach with ICT.

development programs for teachers should ideally incorporate both pre-service and ongoing in-service training (UNESCO Bangkok, 2004; SchoolNet Africa, 2004).³⁶

There also seems to be a general agreement that possessing a positive attitude about the integration of ICTs into the classroom is as important as possessing the appropriate technical skills (see, for example, Condie & Munro, 2007; Hermans, Tondeur, van Braak & Valcke, 2008; Mueller et al, 2008; Ringstaff & Kelley, 2002; SchoolNet Africa, 2004; UNESCO Bangkok, 2004). This view is founded on an acknowledgment that integrating technology into the classroom poses a significant challenge and requires a substantial amount of work. If teachers do not think that incorporating ICTs will offer significant benefits to their students and/or themselves, they may be less willing to put in the effort required to make an ICT4E program a success (Condie & Munro, 2007; Hermans et al., 2008; Mueller et al., 2008; Ringstaff & Kelley, 2002; SchoolNet Africa, 2004). Consequently, it is seen to be critical that ICT training for teachers be contextually relevant, focus on improving educators' confidence in using ICTs, as well as build their capacity to integrate technology into the classroom and develop educational programming (Blackmore, Hardcastle, Bamblett & Owens, 2003; SchoolNet Africa, 2004).

³⁶ In cases where there are insufficient resources to provide such pervasive training, it is suggested that priority be given to pre-service training and equipping the next generation of teachers with ICT4E skills on that grounds that it makes more sense to train teachers early in their teacher training than to retrain them once they are in-service (SchoolNet Africa, 2004). Moreover, high quality pre-service ICT training for teachers is likely to lead to reductions in the need for introductory in-service ICT training and, over time, decrease the likelihood of technophobia in seasoned teachers (SchoolNet Africa, 2004). However, it must be acknowledge that pre-service teacher training also can pose substantial challenges insofar as many teacher training institutions in LDCs lack ICT infrastructure and ICT-trained teacher educators (SchoolNet Africa, 2004).

Best Practice 3: *ICT4E initiatives should be integrated into the existing education curriculum*

Received wisdom about ICT4E maintains that in order to maximize the positive impact of technology in the classroom, ICTs should be integrated directly into the educational curriculum. According to Ngu (2003), this notion compliments the importance given to educator training insofar as it acknowledges that in order to effectively use their training, teachers need specific pedagogical frameworks within which to work. The formal integration of ICT into the educational curriculum provides such frameworks, especially if that integration emerges from an extensive planning process wherein stakeholders work together to develop clearly articulated goals and standards for ICT use in the classroom (Haddad & Draxler, 2002b; Sánchez et al., 2011).

There appears to be two basic, but often contradictory and competing, objectives for introducing ICTs into educational curricula (Farrell & Isaacs, 2007; Haddad & Draxler, 2002b; Ngu, 2003; Ringstaff & Kelley, 2002). They are: (i) to teach technology (that is, ICT skills such as keyboarding); and/or (ii) to use technology to more effectively teach the curriculum. The former is perhaps the most straightforward. It centers upon introducing technology into an existing curriculum as a separate subject. As such, relatively little adjustment in class structure and teaching style is required. The emphasis here is on teaching ICT skills (e.g. keyboarding, word-processing) (Ringstaff & Kelley, 2002). The second objective seeks take full advantage of the opportunities afforded by ICT4E by teaching students how to use the technology as well as incorporating ICTs into classroom activities that develop critical thinking, problem solving, and collaboration skills (Haddad & Draxler, 2002b; Ringstaff & Kelley, 2002). Kleiman (2005), for

example, suggests that ICTs can be used to extend writing assignments into multimedia assignments, provide a multitude of primary sources for history classes, or change the nature of science labs through the use of real-time data collection and analysis tools.

According to Hepp et al. (2004), UNESCO Bangkok (2004) and Ringstaff and Kelley (2002), when ICTs are integrated into the larger curriculum in conjunction with teacher training that includes a clear illustration of how ICT fits into the broader instructional framework, the probability that teachers will utilize ICTs in their lessons increases significantly. The challenge rests in the fact that incorporating ICTs into courses and increasing engagement in ICT-based activities requires substantial investments of human and financial resources, and may even spark the need to develop and diffuse curriculum-related software, or 'contentware' (Guttermann et al., 2009).³⁷

Best Practice 4: *ICT4E initiatives should be monitored and evaluated on an ongoing basis*

At present, there are no widely accepted, standard methodologies and indicators for assessing the impact and success of ICTs in education. While there is a plethora of quantitative research focusing on ICT infrastructure penetration in LDC countries, some of which also examines ICT access in schools (see, for example, Chen & Wellman, 2004; Chin & Fairlie, 2007; Chin & Fairlie, 2006), these types of studies provide little insight into the processes associated with the integration of ICTs into school environments, or the influence of these technologies on teaching and learning. One of the ways of addressing this knowledge gap is through the formal monitoring and evaluation (M&E)

³⁷ Haddad and Draxler (2002b, p. 15) put particular emphasis on this issue, comparing the introduction of ICTs into schools without the provision of sufficient curriculum-related contentware to “building roads but without making cars available.”

of ICT4E projects in a manner that combines quantitative and qualitative research to assess whether initiatives are meeting their intended goals.

Guttermann et al. (2009), UNESCO Bangkok (2004) and Hepp et al. (2004) suggest that monitoring and evaluation processes should be continuous and tailored to suit the goals and approaches of individual ICT4E projects. These authors maintain that, in order to ensure transparency, the development of M&E methodologies should involve stakeholders at all levels, and include the identification of appropriate measurable indicators that can be utilized to track progress and, ultimately, to facilitate comparisons between similar types of projects.

Ideally, the monitoring and evaluation should be integrated into any ICT4E strategy from its very beginning (Guttermann et al., 2009; Hepp et al., 2004; Tolani-Brown et al., 2009). For instance, drawing upon their experiences with the Chilean ICT4E program *Enlaces* (Links), Hepp et al. (2004, p. 24) state that,

Probably because of such complexity, many programs defer evaluation until sometime in the future or include it as a separate, understated and non-central task. But, if evaluation is not an integral part of each major decision, it will be difficult to reach sound and reliable conclusions about the effectiveness of the program and to decide whether or not there is need for adjustments and change.

Despite growing advocacy for the centrality of monitoring and evaluation, such an undertaking appears to be rarely integrated into policy and, as such, remains one of the weakest components of most ICT4E programs (Guttermann et al., 2009; Hepp, 2004; UNESCO Bangkok, 2004).

Best Practice 5: *ICT4E initiatives should budget for the total cost of ownership (TCO)*

ICT4E initiatives are expensive. The financial commitment to purchase and install ICTs and their related infrastructures is only the first step. For an initiative to be sustainable, ongoing funding is necessary to cover routine tasks such as maintenance and technical support, as well as to train the individuals needed to perform these tasks. As such, it is important for countries or organizations considering implementing ICT4E initiatives to plan and budget for the initial provision of ICT and for the Total Cost of Ownership (TCO) (Haddad & Draxler, 2002b; OECD, 2001; Paterson, 2007; Ringstaff and Kelley, 2002). GeSCI (2009, p. 26) defines TCO as “all the costs of a particular purchase from 'cradle to grave' i.e. from making the decision to purchase, through the useful life of the purchase to retirement or end of life.” Estimates available suggest that annual TCO for a well-functioning ICT4E program typically falls within 10-25% of the initial investment in hardware and software, although some studies have reported annual TCO figures as high as 30-50% of initial investment (see, for example, Haddad & Draxler, 2002b; Osin, 1998, Trucano, 2005).

According to Haddad and Draxler (2002b), Osin (1998), Trucano (2005) and Ringstaff and Kelley (2002), recurring elements that may contribute to annual TCO include:

- hardware and software upgrades;
- installation and configuration;
- Internet connectivity;
- maintenance;
- support (i.e. including supplies, utilities, training, and personnel);
- replacement costs (every ~5-8 years); and

- costs related to aspects of the broader ICT4E program strategy, such as teacher training or monitoring and evaluation.

Without adequate financial resources to cover the types of ongoing costs outlined above, an ICT4E project cannot be sustainable.

2.4 Synopsis

The emerging body of recommendations regarding program and policy design in ICT4E initiatives suggests the presence of a general consensus around five best practices, each of which seemingly is underpinned by the notion that technology is only a tool. Despite ongoing debate about the effectiveness of contemporary ICT4E initiatives, continuing levels of high investment in this domain suggests that enthusiasm about the potential of computer and Internet technology to improve basic education in LDCs is unlikely to fade in the near future. As the attention shifts away from *if* to *how* to incorporate ICT into the classrooms of developing countries, the establishment of best practices is increasingly important. With this in mind, the central question this thesis seeks to address is: *To what extent are the 'best practices' identified by ICT4E literature reflected in the ICT4E initiatives of One Laptop per Child and the Intel Corporation's World Ahead Program?*

The discussion presented in the next chapter outlines the research methodology used to investigate this question, and presents evidence obtained from an empirical analysis of the corporate public discourses associated with two well-established ICT4E initiatives.

Chapter 3: Methodology

The discussion in this chapter sets out the methodology used to evaluate the ways and extent to which the best practices outlined in the previous chapter are reflected in the corporate public discourses (CPDs) of two ICT4E projects: One Laptop per Child (OLPC) and Intel's *World Ahead Program*. These initiatives were selected for analysis because they are two of the most well-established, widely publicized and widespread ICT4E projects focused specifically on developing countries.

Two techniques were used to undertake the analysis presented in the pages that follow: content analysis and critical discourse analysis. The specific media examined to undertake this analysis consists of the five types of documents that Fox & Fox (2004) identify as comprising the five most common types of text that constitute an organization's corporate public discourse. They are: mission statements; statement of principles; annual reports; media releases and/or advertisements; and organizational websites. A sixth type of public text that is specific to ICT4E also is incorporated into the analysis: deployment guidelines. The latter are public documents that often provide relatively specific outlines of the way(s) in which a particular ICT4E initiative should be established and operated on the ground. They usually are targeted at potential or current deployment implementers, as well as the public writ large. The inclusion of deployment guidelines into the corporate public discourse examined enabled an assessment of the extent to which ICT4E best practices are reflected in the instructions that are provided to participants in these initiatives.

The discussion in the first part of the chapter sets out the rationale for using the techniques adopted for this study. In the second part of the chapter attention is given to how these techniques were employed.

3.1 Methods of Analysis

Two research techniques were used to undertake the analysis presented in this thesis: content analysis and critical discourse analysis. The former is a quantitatively-oriented research technique that is used to systematically analyze text and to ascertain the frequency with which certain words, phrases and/or other rhetorical structures are used. Content analysis is commonly employed to reveal patterns in language or representation in order to draw inferences about the meaning or context of specific texts (Berelson, 2000; Krippendorff, 2004; Neuendorf, 2002),³⁸ and has been used to identify best practices in numerous fields of endeavor.

In the health sector, for example, Roter, Larson, Fischer, Arnold, and Tulskey (2000) used content analysis to identify the use of key communication skills among physicians discussing end of life care with patients, and compare the practices of experts against the normative practices of community physicians. Likewise, in their examination of how the strengthening of health development in communities can be motivated and managed, Tanvatanakul, Vicente, Amado, and Saowakontha (2007) used content analysis to scrutinize two years worth of interviews and focus groups discussions conducted in Chonburi, Thailand. Based on their research findings, these authors advanced a series of best practices for fostering successful and sustainable community health development in

³⁸ Content analysis does not, however, offer any means for drawing conclusions about the ways in which messages are interpreted by an audience (Berelson, 2000).

LDCs. Within this thesis, content analysis was utilized to examine how often, and in relation to what message, ICT4E initiatives employ terms related to the ICT4E best practice. The objective here was to understand how ICT4E initiatives frame the concepts underpinning the best practice in this domain.

While content analysis can be used to interpret the messages conveyed by a text, this technique does not provide the tools to draw conclusions that rely upon elements external to the text itself (Berelson, 2000). In order to address this limitation and thus provide a means of investigating the context within which language is used, within this thesis content analysis is juxtaposed with critical discourse analysis (CDA). The latter is an interdisciplinary, qualitative research technique that is premised upon the notion that power is enacted discursively (Fairclough, Mulderrig, & Wodak, 2011; van Dijk, 2003). That is, CDA views discourse as a social practice in which context of language use is of crucial importance (van Dijk, 2003; Wodak, 2011). From this perspective, a discursive event is positioned as both shaping and being shaped by the relationships between the event itself and the context(s), institution(s) and social structure(s) that frame it (Fairclough et al., 2011; Wodak, 2011). CDA is foremost a tool for assessing the ways in which text and speech enact, (re)produce and resist relations of power, dominance, and inequality (van Dijk, 2003).³⁹

³⁹ CDA assumes that, since certain social groups have preferential access to speak in influential situations (due, for example, to wealth, education, knowledge, or force), it is these groups that also have the power to structure the dominant discourse and, thereby, influence the understandings and expectations of less dominant groups (van Dijk, 1997). It is important to note, however, that CDA faces the same limitation as content analysis in that that it cannot provide the tools required to make inferences about audience interpretation of texts.

The use of CDA to examine issues relating to international development and relationships between technologies and societies is well established. For example, Thompson (2005) relies upon a critical discourse analysis of the rhetoric used by World Bank Group in relation to ICTs to assert that the discourse surrounding these technologies normalizes a dominant set of political and economic assumptions about the usefulness of ICT in facilitating societal development. Similarly, Stahl (2008) examined Egyptian ICT policy using CDA to identify claims that connect ICT with emancipation and empowerment, which he then contrasted with social realities. Within this thesis, CDA is used to facilitate a nuanced interpretation of how terms relating to ICT4E best practice are used, by analyzing the linguistic context within which those terms are employed and framed within the broader corporate public discourse.

3.2 How Content Analysis and CDA Are Applied

Studies that identify best practice in various domains are considerably more common than those focusing upon *how* best practices, once established, are implemented. To this end, much of the existing research in the ICT4E domain typically focuses upon project outcomes, with adherence to best practice usually being raised only when outcomes are deemed to be unfavorable. One of the shortcomings of focusing upon project outcomes is that doing so often leaves a gap in understanding how best practice actually manifests itself at the level of organizational and/or program development. Easterly and Pfutze (2008), for instance, argue that, while the debate surrounding the issue of foreign aid effectiveness is ubiquitous in international development literature, the study of *how*

established best practices are reflected in the ways that official aid actually is given remains a neglected avenue of investigation.

In this thesis the corporate public discourse (CPD) associated with two internationally recognized ICT4E initiatives are analyzed. Corporate public discourse is the means through which corporate identity⁴⁰ is constructed. It comprises a set of open, publicly visible texts about an organization that are created by a community of stakeholders who affect, and who are affected by, the achievement of that organization's purpose (Fox and Fox, 2004). Although traditionally associated with the private sector, corporate identity increasingly is seen as an essential part of strategic management for virtually all organizations, including those in the public and not-for-profit sectors (see, for example, Celly and Knepper, 2010; Kong and Farrell, 2010; Sargeant, 2005; van Ham, 2001).⁴¹

The first initiative analyzed is One Laptop per Child (OLPC). As explained in Section 2.1, OLPC is a not-for-profit American organization led by the Media Lab at the Massachusetts Institute of Technology (MIT). It is most widely known for its

⁴⁰ The International Corporate Identity Group describes corporate identity as follows:

Every organisation has an identity. It articulates the corporate ethos, aims and values... When well managed, corporate identity... can also provide the visual cohesion necessary to ensure that all corporate communications are coherent with one another and result in an image consistent with the organisation's defining ethos and character. (Balmer & Gray, 2000)

⁴¹ Fox and Fox (2004) assert that a corporate identity is a collective identity through which members of a given group share a social representation that defines the group's 'social self', as well as its knowledge, attitudes, and ideology. It is important to note, however, that corporate identity and corporate ideology are not equivalent. The former constitutes a purposeful articulation of an organization's 'values' as a strategic tool with the primary function of: (i) distinguishing the corporation from its competitors; and (ii) encouraging stakeholders' loyalty and personal identification with the corporation (Fox and Fox, 2004). Ideology, on the other hand, is a more complex concept. Corporate ideology is not necessarily created by or restricted to a specific corporation. For the purposes of this thesis, an ideology is understood as a shared sociocognitive belief system that serves to naturalize certain types of knowledge, opinions, and attitudes, often through (re)productions of discourse(s). See van Dijk (1995).

development of the \$100 laptop, or the XO laptop, which currently retails for approximately \$199 USD. This initiative proposes to deliver a laptop computer to every child in the developing world in order to facilitate “collaborative, joyful, self-empowered learning” (OLPC Blog, 2009; OLPC, 2010a).

The second initiative of interest is the Intel corporation’s *World Ahead Program*. As mentioned in Section 1.2, Intel Corporation is also based in the United States and is the world’s largest manufacturer of semiconductor computer chips and the inventor of the x86 series of microprocessors. In 2008, it reported net revenue of some \$37 billion USD (Intel, 2008). Intel places a strong emphasis on corporate responsibility leadership and was ranked number one on the *Corporate Responsibility Officer* magazine’s⁴² 100 Best Corporate Citizens of 2008 (Intel, 2008). Intel’s *World Ahead Program* is an international initiative led by Intel that aims to increase access to technology in developing countries by “integrat[ing] and extend[ing] Intel’s efforts to advance progress in four areas: accessibility, connectivity, education and content” (Intel, n.d.).

As noted earlier, the five most common types of text that make up corporate public discourse are an organization’s mission statement; statement of principles; annual report; media releases and/or advertisements; and website. In order to gather the most recent available information, the analysis of the corporate public discourse emanating from OLPC and Intel’s *World Ahead Program* focused on texts published in the period

⁴² *Corporate Responsibility Officer* magazine is a trade publication that is published quarterly by SharedXpertise, an American corporate responsibility, human resources, and financial management consultancy firm. Its target audience consists of senior corporate executives. See <http://www.thecro.com/>

Table 3.1: CPD Corpora Analyzed

	One Laptop per Child (OLPC)	Intel <i>World Ahead Program</i>
Mission Statement	One Laptop per Child <i>Vision</i> < http://laptop.org/en/vision/mission/index.shtml >	n/a
Statement of Principles	OLPC Mission Video (Part 1) < http://laptop.org/en/participate/get-the-message-out.shtml >	<i>Intel World Ahead Program Executive Summary and Fact Sheet</i> < http://www.intel.com/pressroom/kits/worldahead/WorldAheadFactSheet_0507.pdf >
Annual Report	n/a	<i>2008 Corporate Responsibility Report</i> < http://www.intel.com/about/corporateresponsibility/report/index.htm >
Media Release or Advertisement	<i>XO Is For Hope</i> Commercial < http://laptop.org/en/participate/get-the-message-out.shtml >	Intel World Ahead Brochure: <i>Connecting people to a world of opportunity: the Intel World Ahead Program.</i> (2007) < http://www.intel.com/Assets/PDF/Article/WA_brochure.pdf >
Website ^α	<i>One Laptop per Child: a Low-cost Connected Laptop for the World's Children's Education</i> < http://laptop.org/en > (18 webpages, excluding the <i>Vision</i> page, which is counted as OLPC's Mission Statement)	<i>Intel World Ahead Program: Connecting the Next One Billion</i> < http://www.intel.com/intel/worldahead > (1 webpage)
Deployment Guidelines	<i>OLPC Deployment Guide for Administrators, Educators and Project Managers.</i> (2009) < http://wiki.laptop.org/images/c/c8/OLPC_Deployment_Guide_--_jul09.pdf >	<i>Intel eLearning Deployment Guide: How to integrate ICT in education for the 21st century.</i> (2009) < http://www.intel.com/Assets/PDF/Article/WA-Intel-eLearning-Deployment-Guide.pdf >

^α For the purpose of this thesis, a website includes all text embedded in webpages that: 1) are directly accessible through the given ICT4E initiative's official main website; 2) attribute authorship to the initiative or its sponsoring organization; and, 3) are not alterable by the public

between 2005 and 2010 under each of the latter categories, as well as a sixth type of text that is specific to the ICT4E domain: deployment guidelines. In total, some 10 documents were examined: five for OLPC and five for Intel's *World Ahead Program* (see Table 3.1).

In conducting the content and discourse analyses, the CPD corpus of each initiative was first analyzed by hand and, subsequently, using the textual analysis software suite *AntConc*. The latter is a freeware textual analysis program for Windows that can generate word frequency lists for a text or set of texts, as well as show where those words are located within a given sentence or the text as a whole (Anthony, 2008).⁴³

The process of analyzing the corpus of materials proceeded as follows. First, the CPD corpus of each initiative was read in its entirety several times in order to permit the author to familiarize herself with the contents of the documentation. The author then proceeded to colour code by hand the terms most frequently identified within each of the documents in relation to the central concepts⁴⁴ pertaining to the foundational principle of ICT4E and/or the best practices outlined in Chapter 2. This was used as a means of generating preliminary subsets of terms frequently used in each corpus in relation to each of the six the central concepts being examined.

⁴³ Although the *Nvivo* qualitative analysis software suite presently is the standard tool for content/discourse analysis, due to its prohibitive cost and the comparable capabilities of the freeware program *AntConc*, the latter was chosen for this analysis. Prior to *AntConc* being employed for the qualitative analysis undertaken for his thesis, the program was tested by coding the same text electronically and by hand, and then comparing the results.

⁴⁴ A 'central concept' is the main issue with which a best practice is concerned. As outlined in Chapter 2, the ICT4E literature suggests that each central concept is integral to a successful ICT4E initiative and should, therefore, be approached a particular way, which is articulated in the corresponding best practice. For example, in ICT4E initiatives should be led by local government(s), the central concept is 'government.'

The *AntConc* program was then configured to generate a word frequency list identifying every word used and the number of times it appeared in the documents comprising each initiative's CPD corpus. Comparing this list to the preliminary subsets generated by the hand coding process enabled the author to establish subsets of the ten terms used most frequently in each corpus in relation to each of the six central concepts being examined (see Table 3.2). The terms identified as being most frequently used in each initiatives corpus of documents were then tabulated and further analyzed by: (i) configuring *AntConc* to present the term(s) in the context of where they were located in the larger document; and (ii) colour coding the terms by hand in order to identify trends of use, particularly in wording, modality and metaphor. Through this process, usage patterns were identified and compared to the central tenets of the ICT4E best practices.

Once the quantitative analysis was completed, a critical discourse analysis was conducted to interpret the norms and values underlying the reflection of ICT4E best practices in the corporate public discourses of the two ICT4E initiatives studied. The findings of these analyses are discussed in the next two chapters.

3.3 Synopsis

This chapter has set out the way in which content analysis and critical discourse analysis will be applied in this thesis, in order to determine the extent to which OLPC and Intel's *World Ahead Program* reflect the ICT4E best practices in their corporate public discourses. The following two chapters present the findings of the resulting analysis, with Chapter 4 centering on OLPC and Chapter 5 focusing on Intel's *World Ahead Program*.

Table 3.2: Subsets of terms most frequently associated with central concepts

Best Practice	Central Concept	OLPC Corpus		Intel <i>World Ahead Program</i> Corpus	
		Terms	Frequency	Terms	Frequency
<i>Technology is only a tool</i>	Technology	Laptop	238	Technology	267
		Laptops	107	Access	119
		XO	83	Digital	77
		Software	51	Internet	68
		Server	43	PC	57
		Network	36	Software	55
		Information	30	Connectivity	54
		Hardware	23	PCs	52
		Connectivity	22	Network	52
		Internet	22	Computer	50
<i>ICT4E initiatives should be led by local government</i>	Government	Country	47	Local	121
		Countries	29	Countries	106
		Policy	22	Policy	106
		Regional	11	Government	55
		National	9	Stakeholders	40
		Government	5	Governments	39
		Ministry	5	Collaboration	36
		Nations	5	Collaborating	30
		Economy	3	Collaborate	18
		Nation	3	Regional	15
<i>ICT4E initiatives should incorporate adequate, appropriate and ongoing teacher training</i>	Teacher training	Teachers	30	Teachers	195
		Preparation	22	Training	85
		Teacher	19	Teacher	83
		Training	15	Professional	
		Workshop	14	development	52
		Pedagogical	8	Intel Teach <i>or</i>	
		Workshops	8	Intel@Teach	38
		Educators	2	Methods	36
		Professional development	2	TPP <i>or</i> Teacher	
		Continuous	1	PC Program	26
				Administrators	16
				Prepare	13
				Train	11

Table 3.2 cont'd

Best Practice	Central Concept	OLPC Corpus		Intel World Ahead Program Corpus	
		Terms	Frequency	Terms	Frequency
<i>ICT4E initiatives should be integrated into the existing education curriculum</i>	Education curriculum	Learning	69	Content	305
		Education	57	eLearning	265
		Constructionist	8	Classroom	73
		Systems	7	Integrate	59
		Constructionism	4	Curriculum	43
		Curricula	3	21 st century skills	31
		Collaborative	2	Integration	19
		Curriculum	2	Integrated	12
		Instruction	2	Lessons	7
		Constructivism	1	Integrates	5
		Self-empowered	1		
<i>ICT4E initiatives should be monitored and evaluated on an ongoing basis</i>	Monitoring and evaluation	Goal	8	Standards	94
		Feedback	7	Success	79
		Evaluation	6	Assessment	60
		Show	6	Assessments	53
		Demonstrate	4	Metrics	47
		Evaluating	4	Improve	45
		Impact	4	Quality	30
		Accomplish	2	Effective	37
		Goals	2	Objectives	32
		Improvement	2	Successful	44
<i>ICT4E initiatives should budget for the total cost of ownership (TCO)</i>	Budget	Resources	13	Funding	39
		Donate	11	Cost	30
		Cost	11	Funds	22
		Costs	7	Strategies	17
		Donation	3	Affordable	16
		Donates	3	Capital	16
		Funding Donated	2	Fund	14
		Fundraising	2	Funded	8
		Funded	1	Donate	7
		Donors	1	Sponsor	7
		Donor	1		
		Allocate	1		
			1		

Chapter 4: Analysis of the One Laptop per Child Program

It's an education project, not a laptop project.

Nicholas Negroponte, Founder and Chairman, One Laptop per Child⁴⁵

As was noted in Chapter 2, the success of ICT4E initiatives is seen to be largely contingent upon effectively managing myriad complex, interconnected factors of which technology is but one, albeit important, variable. An overview of the history and primary goals of OLPC was provided in Section 1.2. In this chapter OLPC's corporate public discourse is analyzed in order to assess the extent to which its framing of the role of technology in education and development aligns with ICT4E best practices. The discussion is divided into two broad segments. In the first, the data emerging from the content and critical discourse analyses of OLPC's corporate public discourse is presented. The second part of the chapter describes the implications of the findings in terms of what they suggest about the extent to which OLPC incorporates the best practices of ICT4E into its operations.

4.1 Laptop project or education project? OLPC's framing of technology

The quotation cited at the start of this chapter— “It's an education project, not a laptop project” —often is used to summarize the mission and core principles of OLPC (see, for example, OLPC, 2010d). The discussion in this section assesses the veracity of this assertion in the light of OLPC's broader design and rhetoric.

⁴⁵ Quoted in Best (2006) and rephrased on the OLPC website as “It's not a laptop project. It's an education project” (OLPC, 2010d).

Table 4.1: Frequency by document of top-ten technology related terms in OLPC corpus

	<i>Annual Report</i>	<i>Deployment Guidelines</i>		<i>Media Release or Ad</i>		<i>Mission Statement</i>		<i>Statement of Principles</i>		<i>Web Site</i>		<i>Total Frequency</i>
		Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Laptop	N/A	104	43.7	2	0.8	1	0.4	5	2.1	126	52.9	238
Laptops	N/A	70	65.4					2	1.9	35	32.7	107
XO	N/A	19	22.9	1	1.2			4	4.8	59	71.1	83
Software	N/A	27	52.9			1	2	2	3.9	21	41.2	51
Server	N/A	42	97.7							1	2.3	43
Network	N/A	33	91.7							3	8.3	36
Information	N/A	6	20							24	80	30
Hardware	N/A	6	26.1							17	73.9	23
Connectivity	N/A	21	95.5							1	4.5	22
Internet	N/A	17	77.3							5	22.7	22

As indicated in Table 4.1, of the ten most frequently identified terms pertaining to the central concept of technology, the three most commonly used were *laptop* (n= 238), *laptops* (n=107) and *XO* (n=83). The presence of each of these three terms was largely constrained to the OLPC *Deployment Guide* and the OLPC website. In fact, only there were only 15 instances in which these terms were identified in the other documents comprises the OLPC corpus. Notable differences were observed, however, in the ways in which these terms are used across the various mediums.

Within OLPC's *Deployment Guide*, the terms *laptop*, *laptops* and *XO* are used predominantly in relation to technical and logistical aspects of an OLPC deployment. More specifically, these terms tend to be used in conjunction with instructions about such tasks as setting up a school server and conducting routine laptop maintenance. For instance, the *Deployment Guide* provides readers with information such as “you can

upgrade/customize the software on the laptop in the warehouse prior to activating them” (OLPC, 2009a, p. 6); “the power adapters for the laptops should be the proper ones for the country” (OLPC, 2009a, p. 19); and, “without the school server, the XO laptops use multicast to communicate with each other which puts a heavy load on the network” (OLPC, 2009a, p. 10).

By contrast, on the OLPC website there is a propensity to use the terms laptop, laptops, and XO as vehicles for framing technology as a root cause of change. Indeed, the rhetorical positioning of the XO laptop as a key driver of change is manifest throughout the OLPC website. Connections also are repeatedly made between the provision of a laptop, empowerment and, ultimately, societal improvement. Some characteristic examples of the propensity to credit technology with causing global socioeconomic change, and of essentially equating “full development and participation” in society with the possession of a laptop include:

1. The claim on the *OLPC Website: Education* that, “When every child has a connected laptop, they have in their hands the key to full development and participation. Limits are erased as they can learn and work with passionate experts around the world; they can access high-quality, modern materials; they can engage their passions and develop their expertise.” (OLPC, 2010c)
2. The claim on the *OLPC Website: Laptop Software* that, “The XO Laptop will bring children technology as a means to freedom and empowerment” (OLPC, 2010f);
3. A description of the OLPC’s mission on the *OLPC Website: Mission* as being “to empower the children of developing countries to learn by providing one connected laptop to every school-age child” (OLPC, 2010d);
4. The assertion on the *OLPC Website: Vision* that “The XO connects them [children] to each other, to the world, and to a brighter future” (OLPC, 2008a);
5. A request on the *OLPC Website: Education* page that asks readers to “put this ultra-low-cost, powerful, rugged, low-power, ecological laptop in their hands and contribute to making a better world” (OLPC, 2010c); and
6. A description of the XO laptop on the *OLPC Website: Laptop Hardware* page as being simply “A real world laptop for real world change” (OLPC, 2010b).

Of the 15 appearances of the terms *laptop*, *laptops* and *XO* in documents other than the OLPC *Deployment Guide* and the OLPC web site, there were four cases wherein the framing of the XO laptop as a root cause of societal change was evident. The first was the identification of the phrase, “the XO connects them [the children] to each other, to the world, and to a brighter future” in the OLPC’s *Statement of Principles* (OLPC, 2008a). The three remaining instances were all manifest in the *XO is for Hope* advertisement. In the closing statement of this advertisement it is claimed that:

X is for XO, the laptop that will bring education and a future to every child in the world. All because of Y, you. And your help to change places like Z, Zambia. And other developing countries. Give a laptop, change the world. (OLPC, 2009b)

The remaining 11 occurrences of *laptop*, *laptops* and *XO* were all in reference to the way in which the OLPC project is organized. For instance, both the Mission Statement and *Statement of Principles* point out that the purpose of OLPC is “to create educational opportunities for the world's poorest children by providing each ... with a rugged, low-cost, low-power, connected laptop” (OLPC, 2010a; OLPC, 2008a).

The relatively consistent positioning and valorization of the XO laptop throughout the OLPC corpus as a change agent in and of itself stands in stark contrast to the notion that providing technology is the easiest and cheapest step in the process of making that technology beneficial for education, let alone real world change. Moreover, within the corpus of OLPC documentation analyzed, little to no empirical evidence supporting the connections drawn between the provision of technology and improvements in education was found.

Of the 655 occurrences of the ten most frequently used terms in the *technology* subset, 41 were connected to claims about the impacts of the OLPC project. Only five of these claims, however, were accompanied by supporting evidence, all of which was anecdotal.⁴⁶ The remaining 36 statements in which the use of terms from the *technology* subset is employed in relation to OLPC's impacts consist of unsubstantiated assertions the benefits of the OLPC project. For instance, on the *OLPC Website: Children* it is stated that,

after nearly two years, we know it's [OLPC] working. Almost everywhere the XO goes, school attendance increases dramatically (OLPC, 2010h).
The emphasis placed upon providing technology within the sample of OLPC

materials analyzed, combined with the notable absence of empirical evidence to support the claims put forth about the extent to which educational systems are being effectively transformed by OLPC deployments, is suspect given the now widely accepted premise that the provision of technology alone (including Internet access) cannot fix a broken educational system or compensate for poor pedagogical practice (Behar, 2010; Chapman & Mählck, 2004; Cuban, 1986; Haddad & Draxler, 2002b; Warschauer & Ames, 2010). Indeed, quaint claims such as “time has proven” (OLPC, 2010e) the benefits of ICT4E are contradicted by much of the research in this field (see, for example, Condie & Munro, 2007; Grace & Kenny, 2003; Trucano, 2005; Wainer et al., 2008).

⁴⁶ The anecdotal accounts of OLPC's impact on education consist of four quotes relating to the deployment of laptops in different countries: two from Nicholas Negroponte about deployments in Peru and Cambodia; one from General Director for Education Technology at Peru's Ministry of Education; and one from a Mrs. M who is reportedly affiliated with a school in Nigeria.

4.2 Government Involvement

The information presented in Table 4.2 reveals that the three most frequently identified terms pertaining to the central concept of government are: *country* (n= 47), *countries* (n=29) and *policy* (n=22). Here too the presence of each of these three terms was constrained almost exclusively to the OLPC *Deployment Guide* and the OLPC website. Given that OLPC does not officially require local government involvement in, or support of, its laptop deployments,⁴⁷ it was not particularly surprising to find that in approximately half (n=64) of the 139 instances in which the ten terms in this subset are employed they were used in the context of deployment planning that is *not* necessarily or directly connected to a government per se.

For instance, in the case of the subset's most prevalent word, *country*, 41 of its 47 appearances are contained within the OLPC *Deployment Guide* wherein its use is in reference to the duties of the in-country teams.⁴⁸ The next most commonly used terms in the government subset are *countries* and *policy*. What is noteworthy about their use is the fact that these terms are predominantly used in headings employed on the OLPC website, with 17 of 29 total occurrences of *countries* and 17 of 22 total occurrences of *policy* appearing in this context.

⁴⁷ The OLPC makes it clear that government involvement is not a necessity by stating in its *Deployment Guide* that deployments can be headed by either governmental, non-governmental organization(s), or a combination thereof (OLPC, 2009a).

⁴⁸ According to OLPC's *Deployment Guide* (2009a), in-country teams are normally comprised of at least 4 lead members: a technical lead; a pedagogical lead; a logistics lead; and a political (i.e. Ministry of Education) lead. These individuals are responsible for organizing specific teams, which OLPC states may include a learning team; hardware team; software team; server-/connectivity-infrastructure team; power-infrastructure team; finance team; and/or logistics team. Other potential team members include, an OLPC liaison; a community liaison; an independent evaluation team; a university liaison; a diaspora liaison; and a local volunteer liaison.

Table 4.2: Frequency by document of top-ten government related terms in OLPC corpus

	Annual Report	Deployment Guidelines		Media Release or Ad		Mission Statement		Statement of Principles		Web Site		Total Frequency
		Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Country	N/A	41	87.2							6	12.8	47
Countries	N/A	1	3.4	1	3.4					27	93.1	29
Policy	N/A	5	22.7							17	77.3	22
Regional	N/A	9	81.8							2	18.2	11
National	N/A	3	33.3							6	66.7	9
Government	N/A	2	40							3	60	5
Ministry	N/A	2	40							3	60	5
Nations	N/A	3	60							2	40	5
Economy	N/A									3	100	3
Nation	N/A									3	100	3

A further 16% (n=22) of all the uses of the terms in this subset are in reference to specific OLPC deployments that have already occurred or are in progress, in statements such as “Thanks to the generosity of Give One Get One participants in 2007, 10,000 laptops were donated to Rwanda and are already in use across the country” (OLPC, 2010l) and “Peru holds a special place in the progress of the OLPC Foundation, being one of the first countries to pilot the prototype XO” (OLPC, 2010k).

There were only eight instances in which the terms in the government subset were used in direct reference to government-related considerations, all of which appear in the *Deployment Guide*. In addition, each of these references to government involvement is quite vague, insofar as they do not detail any specific rationales for choosing to pursue, or not pursue, government involvement in an OLPC deployment. Within the *Deployment*

Guide, ‘government’ is listed as one of several in-country stakeholders on two occasions, and the Ministry of Education is specifically named as a potential stakeholder in three other instances. It is also noted within this document that,

You’d [the deployment team] also gain benefits from including:

- The appropriate department of education if possible. At least let them know about it if nothing else as their support would make a national difference in some cases

(OLPC, 2009a, p. 3).

The most specific reference to government-related considerations identified is in the use of the term *policy*. Although this term appears predominantly as part of a heading on the OLPC website (17 of 22 total appearances), it also twice appears in the context of discussions about Internet safety. Specifically, within the *Deployment Guide* it is stated that,

A sustainable cyber-safety program typically has four elements: technology, policy, education, and support...

Policy/regulation

This is an interesting challenge. The work that has gone into updating laws to consider the impact of technology is incredible. Many nations might not have the appropriate legal capacity and infrastructure for a digital age. The project will provide a summary document that outlines all the areas technology challenges the legal system so that they can review their own laws. (OLPC, 2009a, p. 16)

The above quotation seemingly implies that a sustainable cyber-safety program should be part of an OLPC deployment and, in turn, that local government should be involved in the review and revision of ICT-related policy, law and infrastructure to ensure that such a program is adequately supported. However, within the corpus materials examined, no direct reference to ‘national ICT policy’ or ‘ICT policy’ was identified. This is noteworthy because, as noted in Chapter 2, one of the three government-driven

approaches to ICT4E that is linked to ICT4E to best practice is the presence of a national ICT policy.

The ICT4E literature also positions projects that are case specific and locally driven as best practice, and further posits that the involvement of local government is imperative in leading collaborative processes aimed at achieving these goals. The *Deployment Guide* contains 11 references to incorporating the consideration of general local contextual factors into OLPC deployments. These are evident in suggestions such as: “a toolkit should be brought with the implementer, though acquisition of local tools and supplies is encouraged” (OLPC, 2009a, p. 18) and “local customs, beliefs and ways of doing things should be incorporated within the implementation” (OLPC, 2009a, p. 19). The document also suggests on 10 occasions that deployments should involve local people and institutions, such as universities, secondary schools, authorities (e.g. police, church groups, and industry groups), as well as local volunteers in general (OLPC, 2009a). Further, the provision of hardware, software or content in the local language is mentioned eight times (OLPC, 2009a).

Despite this rhetorical framing of OLPC as an initiative “amenable to localization and customization” (OLPC, 2009a, p. 6), its Five Core Principles appear to be at odds with such practices. They are

Child ownership: “Kids get to keep the laptops. They have to be free to take them home and use them whenever they want. That's kind of the point.”

Low ages: “We're focused on early education, which means kids about six to twelve years old.”

Saturation: “We have to deal in large numbers of laptops, so whole classrooms and schools get them at the same time, so no one gets left out.”

Connection: “Kids should have a connection to the Internet. Cause there's neat stuff to learn on the Internet.”

Free and open source: “The XO must include free and open-source software, then the laptop itself can easily grow and adapt with the needs of the child.” (OLPC, 2008a)

These five principles are prescriptive in nature, and mandate:

1. the use of specific technology (i.e. the XO laptop; Internet connection; free and open source software);
2. the way in which that technology is distributed (i.e one XO laptop per student; no shared ownership; large numbers distributed simultaneously); and
3. the demographic that may be targeted (i.e. children 6-12).

It seems plausible to conclude, therefore, that these Five Core Principles might make it exceptionally challenging for deployments to facilitate the sort of “localization and customization” to which OLPC claims to be amenable (OLPC, 2009a, p. 6). This, in turn, risks stymieing the incorporation of other approaches to ICT4E that may be incompatible with these Five Core Principles.⁴⁹

While OLPC does not require the involvement of local government, or the incorporation of deployments into national education or ICT policy, a degree of government involvement nonetheless appears to be taking place (see Table 4.3). Indeed, some 73% of the ten largest education-related OLPC deployments to date appear to involve local government as a stakeholder. However, the precise nature and extent of this involvement is unclear.

⁴⁹ Alternative approaches to ICT4E that are incompatible with OLPC’s approach include those that incorporate community, school and classroom computer labs and computers shared between children or classrooms.

Table 4.3: Ten largest OLPC deployments for educational purposes⁵⁰

Project	No. of XO laptops Delivered, Shipped or Ordered	Deployment Location	Lead Stakeholders in Deployment	
			Local Government	Other (base country)
OLPC Uruguay [†]	420 000	Uruguay	Technological Laboratory of Uruguay National Agency for Research and Innovation The Agency for the Development of Government Electronic Management and Information Society & Knowledge The Ministry of Education and Culture The National Administration of Public Education	The National Telecommunications Administration (Uruguay) The Primary Education Council (Uruguay)
OLPC Peru	290 000	Peru	Ministry of Education	
OLPC Rwanda	120 000	Rwanda	Government of Rwanda	
OLPC Mexico	50 000	Mexico	Secretariat of Public Education	
OLPC Haiti	13 700	Haiti	Government of Haiti	OLPC (through G1G1) (USA) Inter-American Development Bank (International) Waveplace Foundation (USA)
OLPC Small Groups	13 500 ⁺	Various		Various
OLPC Mongolia	10 000	Mongolia	Ministry of Education	OLPC (through G1G1) (USA) The World Bank's Rural Education and Development Project (International)

⁵⁰ This table does not include figures related to non-educational deployments (i.e. the 78 500 laptops deployed to donors who participated in the 2007 Give 1 Get 1 program).

Table 4.3 cont'd

Project	No. of XO laptops Delivered, Shipped or Ordered	Deployment Location	Lead Stakeholders in Deployment	
			Local Government	Other (base country)
OLPC Nigeria	6 000	Nigeria	Sokoto State Ministry of Education	
OLPC Ethiopia	5 900	Ethiopia		Engineering Capacity Building Program (Ethiopia) German Technical Assistance (Germany) University Groningen (Netherlands) EduVision/BlankPage (Switzerland)
OLPC Nicaragua	5000	Nicaragua		LAFISE BANCENTRO Finance Group (Nicaragua) Zamora Team (Nicaragua) Open Wijs.nl (Netherlands)
OLPC Afghanistan	5000	Afghanistan	Ministry of Education Ministry of Communication and Information Technology	USAID's Afghanistan Small and Medium Enterprise Development (USA) Roshan Telecom Development Company (Afghanistan)

[†] The data about OLPC Uruguay provided on the *Deployment* Wiki is inconsistent with the data provided on the OLPC website. It is stated on the Wiki that OLPC Uruguay has 420,000 XO laptops, whereas the information provided on the OLPC website specifies a deployment of 395,000 XO laptops.

[‡] This figure refers to the deployment of laptops through the 2008 *Give Many* program. The latter allowed individuals and groups to purchase between 100 and 1,000 XO laptops at a cost of \$US 259 each, to be donated to the school or deployment of the donating party's choice.

Source: Adapted from information available from the OLPC Wiki's *Deployments* page on April 27, 2010. The OLPC Wiki was not part of the corpus analysis, as its authors are not restricted to official OLPC personnel. However, given that the OLPC Wiki is the only publically accessible source of specific information and statistics on OLPC deployments and the OLPC website itself directs users to the Wiki's *Deployments* page as a frequently updated information resource, all of the data presented in Table 4.3 was obtained from this Wiki.

Overall, the analysis the central concept of government suggest that despite placing a rhetorical emphasis on the notion of localizability, OPLC does not focus heavily upon opportunities for integrating local government into its deployments. This appears to be a result of the structure of OLPC and its Five Core Principles, which seemingly limit the extent to which deployments may be customized to suit local contexts.

4.3 Teacher Training

It should be noted from the outset that the OLPC *Deployment Guide* is the only text in the sample corpus that specifically addressed the issue of teacher training. Within this document the latter is referred to as “teacher preparation” (OLPC, 2009a, p. 12).

Paralleling the situation identified for the central concept of government involvement, the ten most frequently identified terms pertaining to the central concept of teacher training (see Table 4.4) were found to not always be employed in direct reference to pedagogical training. Of the 120 instances in which these terms were identified, the majority of these occurrences were in relation to unspecified types of training. For example, slightly more than one third (n=47) of the uses of the top ten teacher training related terms appeared in relation to general training activities, wherein the target audience is teachers but the specific type of training is not specified. Indeed, only 21 instances of the top ten terms in this category were used in reference to a specifically identified type of training: 11 in relation to pedagogical training and five for each technical training and Internet training (see Table 4.5).

Table 4.4: Frequency by document of top-ten teacher training related terms in OLPC corpus

	<i>Annual Report</i>	<i>Deployment Guidelines</i>		<i>Media Release or Ad</i>		<i>Mission Statement</i>		<i>Statement of Principles</i>		<i>Web Site</i>		<i>Total Frequency</i>
		Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Teachers	N/A	23	76.7							7	23.3	30
Preparation	N/A	21	95.5							1	4.5	22
Teacher	N/A	18	94.7							1	5.3	19
Training	N/A	14	93.3							1	6.7	15
Workshop	N/A	14	100									14
Pedagogical	N/A	6	75							2	25	8
Workshops	N/A	8	100									8
Educators	N/A	2	100									2
Professional development	N/A	2	100									2
Continuous	N/A									1	100	1

Overall, it seems that OLPC places an emphasis on teacher training in general, but is quite vague in terms of elucidating what such training should or does entail. This lack of specifics is evident throughout the *Deployment Guide*. For instance, this document specifies that OPLC “runs monthly weeklong learning workshops where we [OLPC] introduce the learning model behind the laptop experience” (OLPC, 2009a, p. 12), yet it is unclear where these sessions take place, whether attendance is mandatory, and whether participation includes any or all of in-service teachers, administrators or technical-support personnel.

Table 4.5: Frequency by context of top-ten teacher training related terms in OLPC corpus

	Type of Training					Other (unrelated to training)
	Unspecified General	General Teacher	Pedagogical	Technical	Internet Safety	
Teachers	1	3	3	2	-	21
Preparation	3	14	-	-	-	5
Teacher	-	15	1			3
Training	4	1	-	3	5	2
Workshop	5	9	-	-	-	
Pedagogical	-	-	5	-	-	3
Workshops	1	5	1	-	-	1
Educators	-	-	-	-	-	2
Professional Development	-	-	-	-	-	1
Continuous	-	-	1	-	-	
TOTAL	14	47	11	5	5	38

While the *Deployment Guide* does refer to helping in-country teams learn how to ‘train trainers’ and thereby initiate more wide-scale teacher preparation, it is unclear at what point in the deployment process these workshops are initiated. Likewise, within this document brief reference is made to the provision of electronic forums for teacher collaboration, including wikis, chat rooms and call centers, which OLPC describes as being intended to facilitate “a sense of community for the teachers who are ‘on the front lines’ ” (OLPC, 2009a, p. 14).⁵¹

The available information regarding the OLPC’s learning workshops suggest that these sessions focus upon cultivating a constructionist conception of learning among teachers and emphasizing the diverse possible applications of laptops in classrooms (see Box 4.1). In addition, no mention of basic ICT skills training was identified. It seems

⁵¹ This idea of “teachers helping teachers” is listed as a source of peer-to-peer support by OLPC, as is “children helping teachers” (OLPC, 2009a, p. 15).

Box 4.1: OLPC Learning Workshops – Excerpt from the OLPC Deployment Guide (2009a, p. 12-13)

Workshop content and activities vary based on the needs and experience of the participants. However, the basic approach/methodology and some content are common to all workshops.

- They are hands on—we expect teachers as well as students to “learn through doing”.
- They include a discussion of the “Constructionist” theories of learning pioneered by Seymour Papert more than 40-years ago as well as a discussion of how to augment and enhance existing curricula, educational goals, and evaluation with the laptop.
- They emphasize community building and a discussion of how to involve parents in the learning process and, often, they culminate in a “fair”, where participants share their accomplishments with each other in a manner similar to a science fair.

The primary objectives of learning workshops are:

- a progressive deepening of understanding of the learning process;
- how the XO laptop enables more effective learning through construction, expression, and collaboration;
- the roles of technology in general and one-to-one environments in particular;
- the pragmatics of children, laptops, and learning;
- plans for successful deployment at scale (i.e., a discussion of the contents of this document);
- development of and participation in an international network of practitioners of 1:1

plausible, therefore, that OLPC’s teacher training program might provide little, if any, instruction related to building teachers’ basic ICT skills. Indeed, the only reference to basic ICT skills identified within the sample corpus was a statement on the OLPC website indicating that, “we [OLPC] do not focus on computer literacy, as that is a by-product of the fluency children will gain through use of the laptop for learning” (OLPC, 2010f).

This approach is potentially problematic because, as noted in Chapter 2, teachers often are initially intimidated by, if not resistant to, the incorporation of ICT into the classroom.⁵² As such, the omission of basic ICT skills training and reliance upon peer-to-peer support—in particular the explicit mention of “children helping teachers” as an encouraged approach (OLPC, 2009a, p. 15)—may negatively impact upon the

⁵² Recent research also suggests that a teacher’s lack of confidence in her/his abilities to use and teach with ICTs may negatively impact her/his attitude toward ICT4E initiatives, particularly if the students learn how to use the ICTs more quickly than the teacher. See, for example, Gutterman et al. (2009).

effectiveness of the teacher training program, and thereby the OLPC deployment writ large.⁵³

There were 38 cases in which the top ten terms pertaining to teacher training were identified as being employed in contexts that were not directly related to training. Of these, there were eight occurrences in which reference was being made to the general roles and responsibilities of teachers in an OLPC deployment. Half of these were references to the School Server, where teachers' roles include moderating and overseeing students' journals and publications in the Digital Library, as well as adding new resources to the Digital Library (OLPC, 2009a). Other teacher responsibilities entail participating in the facilitation of learning workshops and providing peer support to other teachers (OLPC, 2009a). The relatively few mentions of teachers' roles within the sample corpus emphasize concrete responsibilities, implying a view of teachers as being foremost facilitators of students' development and beneficiaries of an OLPC deployment second.

One statement offering insight into OLPC's framing of teachers was identified on the *OLPC Website: Mission* page (OLPC, 2010d). It reads:

Most of the nearly two billion children in the developing world are inadequately educated, or receive no education at all... experience strongly suggests that an incremental increase of "more of the same"—building schools, hiring teachers, buying books and equipment—is a laudable but insufficient response to the problem of bringing true learning possibilities to the vast numbers of children in the developing world... Our answer to that challenge is the XO laptop, a children's machine designed for "learning learning."

⁵³ Confirming this hypothesis, however, would be contingent upon, at minimum, the undertaking of interviews with teachers who have participated in the OLPC teaching training program. No such interviews were conducted for this thesis.

A similar sentiment was identified at the *OLPC Website: Education* page (OLPC, 2010c), which states that

educational systems remain rooted in the past. The gaps in equity in education and subsequent opportunity are increasing. Simply doing more of the same is no longer enough, if it ever was.

No firm conclusions can be drawn from the two above statements. However, OLPC appears to be suggesting here that ‘traditional’ responses to the challenges developing countries face in providing education for their children (e.g., hiring more teachers, building schools and buying books) have proven to be insufficient, and that the effectiveness of these approaches may be bolstered by supplying students with XO laptops.⁵⁴ This suggests the presence of a contradiction between what OLPC practices in the realm of teaching training and what has been identified as the best practices of ICT4E. Namely that, as evidenced by the contents of the sample corpus, the approach adopted by OLPC seemingly attributes improvements in education systems and practices primarily to the provision of technology. This runs counter to best practice and seemingly undercuts the findings of a sizable body of education research showing that teachers play a central role in the success of ICT4E initiatives.

4.4 Education Curriculum

Of the ten most frequently identified terms pertaining to the central concept of education curriculum, the two most frequently employed were *learning* (n=69) and *education* (n=57) (see Table 4.6). These two terms were predominantly used in the abstract rather

⁵⁴ OLPC bases this argument on the premise that “experience strongly suggests” that these responses have been insufficient to date, but provides no evidence of the experiential evidence to which it is referring (OLPC, 2010d).

than in reference to specific pedagogical methods or approaches toward integrating ICT into education curricula. In some 80% (n=55) of the instances where the term *learning* is used, it is applied in abstract contexts, such as in the Mission Statement which positions the XO laptop as a machine “designed for collaborative, joyful, self-empowered learning” (OLPC, 2010a). In seven other instances this term was applied in reference to OLPC and the XO fostering what OLPC refers to as “learning learning” (OLPC, 2010c; OLPC, 2010d).⁵⁵ Of the 14 cases in which *learning* is applied to refer to a concrete practice or approach, eight were in relation to OLPC’s emphasis of a constructionist pedagogical model. These same instances also account for 75% (n=6) of total appearances of the term *constructionist*, which is the third most frequently occurring term pertaining to education curriculum.

In 22 of the 57 instances in which the term *education* was employed, it was used in an abstract context. For example, a phrase in OLPC’s Mission Statement states, “It’s an education project” (OLPC, 2010a), and another in the *XO is for Hope* advertisement stipulates that “the laptop that will bring education and a future to every child in the world” (OLPC, 2009b). In the 13 cases wherein *education* referenced a concrete concept, the majority (n=8) of these occurrences were within the title of government departments

⁵⁵ According to the OLPC website, “learning learning” is a phrase coined by Seymour Papert, one of the pioneers of the constructivist approach to learning, to describe the fundamental education experience emphasized by constructionism (OLPD, 2010d). It refers to the notion that technology can be used to teach individuals, and children in particular, new ways of learning (Papert, 1993).

Table 4.6 Frequency by document of top-ten education curriculum related terms in OLPC corpus

	<i>Annual Report</i>	<i>Deployment Guidelines</i>		<i>Media Release or Ad</i>		<i>Mission Statement</i>		<i>Statement of Principles</i>		<i>Web Site</i>		<i>Total Frequency</i>
		Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Learning	N/A	35	50.7	1	1.4	1	1.4			32	46.4	69
Education	N/A	7	12.3	2	3.5	1	1.8	1	1.8	46	80.7	57
Constructionist	N/A	4	50							4	50	8
Systems	N/A	5	71.4							2	28.6	7
Constructionism	N/A	2	50							2	50	4
Curricula	N/A	3	100									3
Collaborative	N/A	1	50			1	50					2
Curriculum	N/A											2
Instruction	N/A									2	100	2
Constructivism	N/A	1	100									1

and ministries.⁵⁶ The remaining five occurrences consisted of the use of the term education in relation to specific types of education, namely cyber safety, basic, early childhood and primary education (OLPC, 2008a; OLPC, 2009a; OLPC, 2010j; OLPC, 2010k).

These findings suggest the presence of only vague notions of what exactly constitutes improvements in learning. As noted above, in the majority of cases in which the term *learning* was employed in direct relation to a concrete practice or approach emphasis was placed on the adoption of a constructionist pedagogy. Indeed, the latter is embedded in the very design of the OLPC program.⁵⁷ OLPC's support of constructionism appears to be

⁵⁶ The remaining 22 instances in which the term education was identified consisted of occurrences in headings within the *Deployment Guide* and on the OLPC website

⁵⁷ On the *OLPC Website: Mission* web page it is stated that constructionist pedagogy has been “extensively field-tested and validated among some of the poorest and most remote populations on earth” (OLPC,

based, in part, on one of the commonly cited rationales for ICT4E initiatives discussed in Chapter 2. That is, the desire to equip the next generation with 21st century thinking and learning skills, which OLPC maintains are demanded by today's global economy and necessary for bridging the digital divide(s).

This position is evidenced by a combination of four recurring elements on OLPC's website and, most resoundingly, on the organization's *Education* and *Mission* pages:⁵⁸

1. A depiction of the world as rapidly changing and increasing in speed, due in large part to technological development (OLPC, 2010c; OLPC, 2010d).
2. The argument that these changes create an urgent need to prepare children to be “full citizens of the emerging world” (OLPC, 2010c) and that a computer “uniquely fosters *learning learning* by allowing children to think about thinking, in ways that are otherwise impossible” (OLPC, 2010d).
3. The framing of the XO laptop as “a window to the outside world, access to vast amounts of information, a way to connect with each other, and a springboard into their future” (OLPC, 2010d), which echoes the first rationale for the adoption of ICTs in the classroom (Chapter 2, section 2.2.1); that is, that digital technology is uniquely suited to equip students with the 21st century skills required to thrive in a contemporary knowledge society.
4. A framing of present educational approaches and systems as “remain[ing] rooted in the past” and consequently ill-equipped to provide children with the skills needed to thrive in the 21st century (OLPC, 2010c; OLPC, 2010d).

There are two primary concerns that emerge from the analysis of OLPC's use of the terms in its *education curriculum* set. The first centers upon the way in which the constructionist pedagogy embedded within the OLPC initiative may potentially limit opportunities for localization. At issue here is the fact that OLPC explicitly incorporates a

2010d). However, only anecdotal evidence in the form of comments about the way in which OLPC founder Nicholas Negroponte “experienced first-hand how connected laptops transformed the lives of children and their families in a remote Cambodian village” is provided to support this assertion (OLPC, 2010d).

⁵⁸ See, *OLPC Website: Education*: <http://www.laptop.org/en/vision/education/index.shtml>, and *OLPC Website: Mission* <http://www.laptop.org/en/vision/mission/index.shtml>.

constructivist approach to pedagogy into its deployment design.⁵⁹ This seemingly contradicts OLPC's claim that "local customs, beliefs and ways of doing things should be incorporated within the implementation" (OLPC, 2009a, p. 19) insofar as adherence to a constructionist pedagogical approach could conflict with precisely the local customs and beliefs OLPC espouses to uphold.

OLPC's assertion that the XO laptop "embodies the theories of constructionism" (OLPC, 2010d), from which follows the hypothesis that the provision of this technology will *necessarily* facilitate a particular, in this instance constructivist, pedagogy also is questionable. The presence of this assumption is evidenced by the finding that the specific terms and phrases OLPC uses describe its approach to constructionism (e.g. *learning learning*, *constructionist*, *constructionism*, *constructivism*) rarely appear in reference to specific facets of the deployment process (see Table 4.7).

For the three cases identified when the terms *learning learning*, *constructionist*, *constructionism*, and *constructivism* were employed in the context of a general suggestion that constructionism be incorporated into OLPC deployments, emphasis was squarely placed upon the role that technology plays in deployments. There was only one instance that the latter terms were employed in relation to another key factor that may

⁵⁹ OLPC's incorporation of constructionist pedagogy into its project design is evidenced by such aspects as the emphasis on constructionist theories of learning in teacher training workshops (see Box 4.1); the focus on building a laptop that laptop "embodies the theories of constructionism" (OLPC, 2010d); and the statement that "technical know-how should be passed on to school and country teams through a Constructionist Learning approach" (OLPC, 2009a, p. 15). That said, although OLPC emphasizes the importance of incorporating constructionist pedagogy in its deployments, it is unclear how strictly adherence this is monitored and enforced in practice.

Table 4.7: Frequency and distribution by context of terms used by OLPC to describe its constructionist approach

		Term or phrase			
		Constructionist	Constructionism	Learning learning	Constructivism
Total frequency		8	4	3	1
Deployment aspect	General suggestion of incorporation of constructionism into OLPC deployment	3			
	Technology (i.e. XO, laptop)			2	
	Teachers	1			
	Curriculum				
General theories of learning		4	4	1	1

Instead these terms tend to be mainly used to refer to either:

1. the broad philosophy of learning to which the organization is attached (n= 10) (e.g. “[Peru has] a deep experience in the constructionist approach to basic education” (OLPC, 2010k)); or
2. the general suggestion that constructionism be incorporated into deployments (n= 3) (e.g. “The country team should... be able to resolve the detailed challenges [related to a deployment], which include... Constructionist Learning approach” (OLPC, 2009a, p. 19)).

influence pedagogical style: teachers. However, this occurrence was not in any way related to OLPC deployments.⁶⁰

⁶⁰ The term *constructionist* was used in relation to teachers on the *Website: Project* page (OLPC, 2010e), but not in the context of OLPC. Instead, it appeared in reference to a 1988 project by Seymour Papert wherein, “Working with the Omar Dengo Foundation in Costa Rica, Papert and a team from the Media Lab help design and implement a constructionist program that includes the training of a dozen Costa Rican teachers at MIT.”

In sum, the findings from the analysis of the OLPC corpus content pertaining to educational curriculum reveal a propensity to assume that: (i) that the presence of the XO laptop is key to encouraging the adoption of a constructivist style of learning and teaching; and (ii) attribute changes in education practices and learning foremost to the provision of technology.

4.5 Monitoring and Evaluation

It must be noted from the outset that OLPC does not monitor or evaluate deployments, nor does it mandate in-country deployment teams to engage in such practices. Therefore, it was not surprising to find that the frequency of occurrence for the top ten terms pertaining to this central concept was minimal (see Table 4.8). The most frequently occurring of these terms was *goal* (n=8). Five of these occurrences were in relation to descriptions of OLPC deployment objectives, two of which position learning as a key goal for deployments. In two other instances, the 1:1 saturation of XO laptops to students is described as a primary goal. The fifth identified use of the term *goal* was in connection with objectives for OLPC deployments as set out in the *Deployment Guide*, wherein it is clearly stated that “One sub-goal of OLPC is self-sufficiency” (OLPC, 2009a, p. 7). In none of the above five instances was any elaboration provided about tangible ways in which OLPC actually is facilitating the attainment of these goals.

For two of the remaining instances in which the term *goal* was identified, it was used to refer to technological developments which OLPC is striving toward, but has yet to achieve (e.g. “a cost-effective school server that can be powered off of the grid” (OLPC, 2009a, p. 8) and “a laptop to serve the role of the School Server” (OLPC, 2009a, p. 10)).

The final instance in which this term is employed was in relation to the goals of each days' activities in the Sample Workshop Schedule provided in the *Deployment Guide* (OLPC, 2009a).

Table 4.8: Frequency by document of top-ten monitoring and evaluations related terms in OLPC corpus

	Annual Report	Deployment Guidelines		Media Release or Ad		Mission Statement		Statement of Principles		Web Site		Total Frequency
	N/A	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Goal	N/A	5	62.5							3	37.5	8
Feedback	N/A	7	100									7
Evaluation	N/A	5	83.3							1	16.7	6
Show	N/A	1	16.7							5	83.3	6
Demonstrate	N/A	3	75							1	25	4
Evaluating	N/A	1	25							3	75	4
Impact	N/A	2	50							2	50	4
Accomplish	N/A									2	100	2
Goals	N/A	1	50							1	50	2
Improvement	N/A									2	100	2

The second most frequently identified word in the monitoring and evaluation category was *feedback* (n=7). It appears only in the *Deployment Guide* wherein it is used either to describe public electronic forums that can be voluntarily used by deployment participants to give and receive feedback on their initiatives (e.g. wikis, chat rooms, email lists) (n= 3), or in reference to the exchange of feedback between the Core Team and local stakeholders throughout the initial implementation process (n= 4). Although the *Deployment Guide* states that “the OLPC country deployment should provide feedback to the team for improvements daily or every other day” (OLPC, 2009a, p. 19) and the Sample Workshop Schedule allocates an entire day for a feedback “talk and discussion”

(OLPC, 2009a, p. 25), specific mechanisms to facilitate such a feedback process are not elaborated upon.

Of the six instances in which the term *evaluation* was identified, only two were related to deployment evaluation, with the remaining four occurrences being in relation to the context of student/teacher performance (n= 3) or determining the most appropriate additional software to ship with the XO laptops (n=1). The first reference to deployment evaluation is a suggestion in the *Deployment Guide* that in-country teams include an “independent evaluation team” (OLPC, 2009a, p. 4). However, no further details about what this entails (e.g. the purpose of deployment evaluations, evaluation methodologies, reporting criteria) are provided. As such, there does not appear to be any established form of accountability monitoring and tracking that would seemingly make deployment evaluation a priority for in-country teams.

The second reference to the evaluation of a deployment appears on the *OLPC Website: Children, Countries, Peru* page, which reads “An early evaluation of progress in Peru released in May 2009” (OLPC, 2010j). Yet, this claim is not accompanied by any further information and an Internet search conducted at the time of writing did not return the document referenced. As a result, there is no way to verify that such an evaluation was conducted and, if it was, what type of or how rigorous a methodology was employed.

Of the 24 instances in which the remaining terms in this category were identified, only seven occurrences were in relation to the outcomes of deployments. Of these, four referred specifically to the deployment in Peru. The other three instances consist of links

being provided on the *OLPC Website: Children; Laptop; and Participate* pages to a World Bank Blog post⁶¹ on the planned evaluation of the Sri Lanka deployment.

Given this seeming lack of consideration paid to monitoring and evaluation, a question that arises is: *How does OLPC measure success?* Addressing this question is further complicated by the fact that OLPC provides no midterm goals, benchmarks or deployment-specific objectives through which to make any such assessments. The term *success* is itself only present in three occasions within the sample corpus. Two of these instances entail references to “the success of the [OLPC] project” without any accompanying discussion of what such success entails, while the third is not connected in any way to OLPC, and refers instead to the success of the United Nations’ Relief and Works Agency in improving performance in its Palestinian schools. In the light of the lack of any explicit definition of what constitutes success for OLPC, one can only draw upon the organization’s mission statement and Five Core Principles to hypothesize that it is defined by this organization as the complete saturation of 1:1 distribution of Internet-connected XO laptops to students in all schools, in all developing countries.

Overall, the seeming lack of recognition of monitoring and evaluation with the OLPC sample corpus may be interpreted as reflecting an adherence to more widespread assumptions made about the effectiveness of ICT4E. Namely that, as articulated by UNESCO, “we must assume that without a doubt, ICT is a useful new teaching tool and

⁶¹ See <http://blogs.worldbank.org/edutech/node/551>. In this blog post, it is noted that the evaluation was to be conducted at the end of the 2010 school year and led by Professor Anil Deolalikar from the University of California at Riverside. This suggests that at least one deployment team has taken OLPC up on its suggestion that deployments organize independent evaluation teams (Aturupane, 2010).

investment in, and experimentation with, this technology should be supported” (Ngu, 2003, p. 4).

4.6 Budget

Given the significant long-term investment required by an OLPC deployment and the fact that OLPC specifically states that it “does not have the resources to have substantial direct involvement with deployments” (OLPC, 2009a, p. 4), budgetary self-sufficiency is a logical – and, indeed, necessary – requirement for ensuring project sustainability over the long-term. In line with the findings for the other central concepts, the ten most frequently identified terms pertaining to the central concept of budget were found to not always be employed in direct reference a deployment’s finances (see Table 4.9). While the most frequently identified term for the budget category was *resources* (n=13), none of its identified occurrences were explicitly in reference to a deployment’s financial resources. Instead, the term was most often used in connection with “local resources” relating to education in general (n= 5), which may or may not be interpreted to include monetary resources. This term also was identified in five instances as being employed in relation to OLPC’s available instructional resources (i.e. technical manuals and reports).

The second most frequently identified terms within the budget category were *cost* and *donate*, with each being identified eleven times. For the term *cost*, ten of its identified occurrences were in relation to the cost the XO laptop. The term *donate* and its derivatives (e.g., *donate*; *donation*; *donates*; *donated*; *donors*; *donor*; or *fundraising*) comprised slightly more than one-third of all identified occurrences of the use of terms pertaining to the central concept of budget. All of the appearances of the term *donate* and

its derivatives were within the context of suggestions pertaining to actions that members of the general public can take to financially assist OLPC (e.g. donating a used vehicle (OLPC, 2010q); hosting a fundraising drive (OLPC, 2010g); or giving cash (OLPC, 2010q)). This implies that OLPC relies significantly upon external donations to support a sizable portion of its activities, or alternatively, that the OLPC website—in which all of the instances of the above terms are located, except for *donor* which is found in the *Deployment Guide*—is designed as a fundraising mechanism.

Although OLPC does not explicitly discuss budgeting, finances, or total cost of ownership (TCO), within the *Deployment Guide* it is stated that in-country teams may include a finance team. The *Deployment Guide* also provides a sample Pricing Worksheet

Table 4.9: Frequency by document of top-ten budget related terms in OLPC corpus

	Annual Report	Deployment Guidelines		Media Release or Ad		Mission Statement		Statement of Principles		Web Site		Total Frequency
		Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	Freq.	%age	
Resources	N/A	8	61.5							5	38.5	13
Donate	N/A									11	100	11
Cost	N/A	6	54.5			1	9.1	1	9.1	3	27.3	11
Costs	N/A	6	85.7							1	14.3	7
Donation	N/A									3	100	3
Donates	N/A									3	100	3
Funding	N/A	1	50							1	50	2
Donated	N/A									2	100	2
Fundraising	N/A									1	100	1
Funded	N/A									1	100	1
Donors	N/A									1	100	1
Donor	N/A									1	100	1
Allocate	N/A									1	100	1

that offers a format for deployment implementers to calculate costs.⁶² Another tool contained within the *Deployment Guide* is the *Deployment Workbook* designed by OLPC for “estimating the cost of a large-scale deployment of One Laptop Per Child,” which, in turn, facilitates the calculation of TCO (OLPC, 2009a, p. 30).⁶³

The most detailed financial explanation for the OLPC initiative identified appears on the *Mission* page of OLPC’s website (OLPC, 2010d). The segment related to finance reads as follows:

Given the resources that developing countries can reasonably allocate to education—sometimes less than \$20 per year per pupil, compared to the approximately \$7500 per pupil spent annually in the U.S.—even a doubled or redoubled national commitment to traditional education, augmented by external and private funding, would not get the job done. Experience strongly suggests that an incremental increase of “more of the same”—building schools, hiring teachers, buying books and equipment—is a laudable but insufficient response to the problem of bringing true learning possibilities to the vast numbers of children in the developing world.

The above quote suggests that a developing country's government may only have the resources to allocate \$20 USD per student annually, and that doubling or quadrupling this figure to invest further in 'traditional education' would not improve the existing system. However, in the first year of an OLPC deployment, a government would need to provide an XO laptop to each student while maintaining its current per capita investment, so as not to cut educational resources in order to afford the new technology. As a result, with each XO laptop currently costing \$199 USD, in the first year of a deployment *the*

⁶² No suggested pricings are provided, however (OLPC, 2009a, p. 31).

⁶³ OLPC’s *Deployment Workbook* was not part of the corpus analyzed. However, a link to it is provided in the OLPC *Deployment Guide*. The version of the OLPC *Deployment Workbook* that is referenced in this thesis is the most current at the time of writing, and is available in Microsoft Excel format at http://wiki.laptop.org/images/b/bc/Deployment_Workbook_v14.xls

provision of the laptop alone requires approximately ten times the present annual financial investment, per student for a government providing only \$20 USD/student/year.

This increase does not include other factors that should also be considered in the total cost of an initial deployment, such as additional technology (e.g. servers), infrastructure (e.g. electricity), training, transportation, and hardware/software maintenance.

OLPC's *Deployment Workbook* also provides estimates for the annual cost of operating an XO laptop, based on school size, power supply and the price of commercially available ICT components. One such estimate, contained within this document suggests that a medium sized school that has 100 XO laptops and receives power from a preexisting electricity grid, would require an additional \$2.34 USD per student per year to provide adequate power for the laptops (see Box 4.2). This may not seem like much, but for a government that allocates only \$20 USED per student per year, it is a permanent increase of almost 12% per student annually, *just to power the laptops*. Schools that need to establish a connection to a power grid, or obtain solar panels or a generator, would face even higher initial and long-term power-related costs. As the estimates derived in Box 4.2 indicate, OLPC is, in effect, suggesting that a government currently allocating only \$20 USD per student, per year should increase spending per student by about 1000% in the initial deployment year, and by at least 12% every year thereafter to provide laptops to students *in lieu of* continuing the “incremental increase” of investment in so-called ‘traditional’ approaches to education, like hiring more teachers (OLPC, 2010d).

Box 4.2 Estimated Annual Costs for Power and Related Infrastructure

Example #2: Medium School, with Grid Power		
Equipment	Quantity	Estimated Power Requirements (per day)
Laptops /students (incl. XO power adapters)	100	4.9 kVAh
Servers	1	0.13 kVAh
Networking	n/a	0.27 kVAh
TOTAL power requirements/day		5.3 kVAh
Estimated costs		
<i>Assuming apparent power (kVAh) = usable power (kWh)</i>		
Estimated cost of grid power		\$0.12 / kWh
Cost per day		\$0.64
Cost per year		\$233.60
Annual cost per student		\$2.34

Source: Adapted from *Deployment Workbook*

<http://wiki.laptop.org/images/b/be/Deployment_Workbook_v14.xls>

There are two shortcomings with this line of reasoning, however. First, OLPC seemingly fails to provide any concrete evidence to support its claim that “an incremental increase of ‘more of the same’ [i.e. building schools and hiring teachers]... is ineffective,” (OLPC, 2010d). Perhaps even more troubling, the financial models being compared in its documentation are not equivalent. An investment in OLPC does not constitute an incremental increase in funding for a national education system. Rather, it entails substantial immediate cost increase and a long-term investment. This suggests the need for more appropriate comparisons of the benefits of investing in traditional education methods versus OLPC’s version of ICT4E, with a focus on the impacts of *the same increase in investment* in each approach.⁶⁴

Second, OLPC frames the financial issue as a “doubled or redoubled national commitment to traditional education... would not get the job [of improving education]

⁶⁴ As discussed in Chapter 2, the lack of such information is a widely recognized knowledge gap in the field of ICT4E.

done,” and their answer to this challenge is “the XO laptop, a children’s machine designed for ‘learning learning’” (OLPC, 2010d). These rhetorical choices imply that an investment in a particular technology (the XO laptop) can achieve what OLPC argues traditional approaches to education are not (i.e. “collaborative, joyful, self-empowered learning” (OLPC, 2010a)). Yet, as discussed above, OLPC provides no empirical evidence to support its claim that investing in laptops will improve educational outcomes *or* that a comparable investment in ‘traditional’ education would not achieve the same (or better) outcomes. As a result, the financially-based arguments that OLPC presents in support of investment in its approach to ICT4E appear to be at best empirically unsubstantiated, and at worst fundamentally flawed.

4.7 Conclusions

The evidence obtained from this analysis of a sample corpus of OLPC’s corporate public discourse suggests that none of the established best practices in the ICT4E domain are adequately addressed in OLPC’s approach to ICT4E. Indeed, some elements of established best practice seem to be contradicted, as with the incompatibility of OLPC’s design with the localization of deployments and the lack of sufficient evidence to support the arguments OLPC makes about financial feasibility. The findings presented in this chapter also suggest, contrary to the foundational principle of ICT4E and OLPC’s own rhetoric, that this initiative adheres to a technologically determinist orientation in both its language and design insofar as the central perspective advanced is that the XO laptop in and of itself is an inherent agent of positive change.

The analysis further suggests that OLPC may retain little influence on—and, in fact, may have little knowledge of—how the XO laptops actually are used in classrooms. The project neither requires formal accountability for deployments through standardized monitoring and evaluation processes, nor mandates the involvement of individuals or institutions with the capacity to implement the systemic changes that the Five Core Principles of OLPC suggest. As a result, even what may seem to a prescriptive restriction (i.e. the requirement of 1:1 XO distribution) may in practice be little more than a non-enforceable suggestion as to how the XO laptops should be employed in the classroom.

In sum, when OLPC is analyzed in the context of the prevailing best practices of ICT4E, the evidence of the organization's technologically deterministic tendencies—and its lack of influence following the initial deployment—suggest that the only concrete elements OLPC are guaranteed to provide are the XO laptop and its supporting technologies. As a result, it seems that OLPC not primarily an education project. Rather, it's a laptop project.

Chapter 5: Analysis of the Intel World Ahead Program

At Intel, our focus is not simply on what we make—it's on what we make possible.

(Intel, 2008b)

Intel Corporation is a United States-based organization that specializes in the development of integrated digital technology products, and is the world's largest semiconductor chip manufacturer (Intel, 2008a). Intel articulates a strong focus on corporate social responsibility and in 2008 held the top spot in the *Corporate Responsibility Officer Magazine's*⁶⁵ ranking of the 100 Best Corporate Citizens (Intel, 2008a). Intel's *World Ahead Program*, which was introduced in Section 1.2, is a key component of the company's portfolio corporate responsibility initiatives. Despite appearing to be remarkably similar to the OLPC initiative in both structure and aim—indeed, the two programs were briefly united from 2007 to 2008 (Intel, 2007b; Jana, 2008)⁶⁶—Intel's *World Ahead Program* has received relatively little attention from international media and academics. The analysis presented in this chapter is based upon an examination of a sample of the corpus of the corporate public discourse associated with the World Ahead program. The objective is to assess the extent to which this initiative manifests ICT4E best practices and, ultimately, whether the apparent similarities between World Ahead and OLPC extend into the realm of rhetoric. The chapter begins with an overview of the Intel Corporation and the company's World

⁶⁵ *Corporate Responsibility Officer Magazine* is a publication focusing upon corporate ethics and corporate social responsibility. Since 1999, it has published an annual list of the 100 Best Corporate Citizens. See www.thecro.com.

⁶⁶ The end of the short-lived collaboration between OLPC and Intel was largely due to Intel's refusal to comply with OLPC's demands that it stop production of its Classmate PC, a direct competitor of OLPC's XO laptop, which led to Intel backing out of the partnership (Jana, 2008; Krazit, 2008).

Ahead Program. The results from the analysis of the World Ahead's corporate public discourse are then presented. The chapter concludes with a discussion of the implications of the research findings.

5.1 “The computer is little more than an interesting toy”: Intel’s framing of technology

The data presented in Table 5.1 reveal that, of the ten most frequently identified terms pertaining to the central concept of technology within the sample corpus of *World Ahead* materials, the three most commonly used were *technology* (n= 267), *access* (n=119) and *digital* (n=77). With regard to the 267 occurrences of the term *technology*, 52 if these were in section headings (see Table 5.1).

Table 5.1: Frequency by document of top-ten technology related terms in *World Ahead* corpus

	Annual Report		Deployment Guidelines		Media Release or Ad		Mission Statement	Statement of Principles		Web Site		Total Frequency
Technology												
Technology	137	51.3	93	34.8	19	7.1	N/A	13	4.9	5	1.9	267
Access	36	30.3	62	52.1	11	9.2	N/A	7	5.9	3	2.5	119
Digital	23	29.9	42	54.5	6	7.8	N/A	4	5.2	2	2.6	77
Internet	15	22.1	45	66.2	5	7.4	N/A	3	4.4			68
PC	14	24.6	36	63.2	1	1.8	N/A	4	7	2	3.5	57
Software	5	9.1	44	80			N/A	3	5.5	3	5.5	55
Connectivity	3	5.6	40	74.1	2	3.7	N/A	6	11.1	3	5.6	54
PCs	11	21.2	18	34.6	8	15.4	N/A	13	25	2	3.8	52
Network	19	36.5	31	59.6	1	1.9	N/A	1	1.9			52
Computer	21	42	27	54			N/A	2	4			50

Of the remaining 215 occurrences in which the word *technology* was identified, 55% (n=119) were in the context of statements regarding the utilization of technology to

address societal issues. The specific issues that are most frequently noted as being subject to improvement through the use of technology were education (n=57), environment (n=16), and health (n=1). A closer look at the composition of the 119 instances in which technology was directly connected to societal issues revealed 71 references being made to the need for technology to be provided in combination with at least one supporting element in order to have an impact. These supporting elements included teacher training (n=21), increased access to technology (n=17), enabling policy environment (n=11), particular approaches to environmental sustainability (n=8), curriculum integration (n=6); teaching of 21st century skills (n=7), and affordability (n=1).

The notion that the provision of technology alone is not sufficient to improve educational opportunities is most frequently iterated within Intel's *eLearning Deployment Guide*. This document advances the claim that, in order for an ICT4E initiative to be effective, ICTs should be employed in conjunction with other supporting elements.⁶⁷ For example, within this document it is stated that,

If one of your objectives is to provide Internet access to schools that are isolated by geography, it's not enough to say, "The solution is laptops for students and teachers, and a network for the school." That's moving to the answer without first asking all of the questions (Intel, 2009 p. 16).

However, despite the rhetorical positioning of technology as a tool within this context, technology provision remains Intel's top priority in its *World Ahead* deployments. This is illustrated by the use of the second most frequently occurring term within the technology category, *access*. Some 78% (n=92.5) of the occurrences of this

⁶⁷ According to the *eLearning Deployment Guide*, the following supporting elements are fundamental to successfully implementing an ICT4E program: professional development for teachers (n=11); enabling policies (n=7); increased access to technology (n=6); and the teaching of 21st century skills (n=6).

word within the sample corpus examined were in reference to the goal of increasing physical access to ICTs by increasing the number of available ICTs. Indeed, 31% (n=262.5) of the 851 total occurrences of the top ten terms associated with the central concept of technology are in relation Intel as a company and/or its products.

Intel's focus on technology provision also is underscored by its description of the Components of an eLearning Program.⁶⁸ As previously mentioned in Section 1.2, Intel commits to only being actively involved in provision of what it identifies as *Solution Elements* (e.g. technology; connectivity; localized digital content; and improved teaching methods and professional development). As a result, and despite the seemingly multifaceted approach to ICT4E implied by the Components of an eLearning Program defined by Intel, two of the four aspects of a World Ahead deployment (i.e. technology and connectivity) that Intel commits to actively engage in focus specifically on technology provision, while a third (i.e., localized digital content) is dependent upon the provision of technology.

It seems plausible that this apparent focus on technology provision derives from Intel being a private corporation whose central objectives is, after all, to sell Intel products. To this end, 18% (n=48) of all instances in which the word *technology* appears in the sample corpus of Intel's corporate public discourse were found to refer specifically to Intel products. On two occasions, specific reference is made to the benefits that Intel derives

⁶⁸ Recall that according to Intel (2009, p. 9), the Components of an eLearning program are divided into two categories: *Solution Elements*, in which Intel takes an active role (1. Technology; 2. Connectivity; 3. Localized digital content; and 4. Improved teaching methods and professional development) and *Support Systems*, in which Intel takes a facilitator role (5. Policy; 6. Funding strategies; 7. Success metrics and assessments appropriate to eLearning programs; 8. Working with vendors).

from supporting eLearning programs. Within Intel's *Corporate Responsibility Report* it is stated that "Intel's investments in education provide opportunities for young people and also result in significant benefits to Intel" (Intel, 2008, p. 85). Second, in the *eLearning Deployment Guide*, reference is consistently made to the "full range of Intel-based notebooks and laptops [that] provide excellent choices for education environments" (Intel, 2009, p. 31). The latter clearly suggests that Intel derives financial benefit from the eLearning initiatives that it supports.

Overall, Intel appears to frame technology primarily as a tool that requires the support of several additional elements in order to be an effective educational resource. Even so, the company's concrete role in *World Ahead* deployments seems to focus heavily upon the provision of technology. We now turn our attention toward examining how this depiction of technology as a tool and the role that Intel outlines for itself manifest themselves in the design of *World Ahead* deployments.

5.2 Government Involvement

The information presented in Table 5.2 reveals that that the three most frequently identified terms pertaining to the central concept of government within the sample corpus of Intel documents are: *local* (n= 121), *countries* (n=106), *policy* (n=106), and *government* (n=55). In 68% (n=82.5) of all instances in which the term *local* is used, it is applied in reference to collaboration with local stakeholders during an ICT4E deployment.⁶⁹ The specific types of stakeholders mentioned in this regard include

⁶⁹ The use of the terms *collaboration* and *collaborating* also refer to engagement of local stakeholders, with 67% (n=12) of the uses of *collaborate* and 36% (n=13) of the uses of *collaboration* being applied in this context.

government (n=12), local non-governmental organizations (n=16), businesses (n=15) and communities (n=10).

The second most frequently occurring terms identified in this category were *countries* and *policy*. The former, however, offers little insight into the role of government in *World Ahead* deployments. In some 71% (n=75) of instances in which the term *countries* was identified, it was employed in the context of presenting quantitative data (i.e., statistics) relating to Intel's ongoing projects in x country(ies) or number of countries.

Table 5.2: Frequency by document of top-ten government related terms in *World Ahead* corpus

	<i>Annual Report</i>		<i>Deployment Guidelines</i>		<i>Media Release or Ad</i>		<i>Mission Statement</i>	<i>Statement of Principles</i>		<i>Web Site</i>		<i>Total Frequency</i>
	Freq.	%age	Freq.	%age	Freq.	%age		Freq.	%age	Freq.	%age	
Local	74	61.2	35	28.9	6	5	N/A	6	5			121
Countries	65	61.3	25	23.6	8	7.5	N/A	8	7.5			106
Policy	57	53.8	49	46.2			N/A					106
Government	21	38.2	30	54.5	2	3.6	N/A	2	3.6			55
Stakeholders	36	90	4	10			N/A					40
Governments	22	56.4	10	25.6	2	5.1	N/A	4	10.3	1	2.6	39
Collaboration	15	41.7	17	47.2	0	0	N/A	4	11.1			36
Collaborating	27	90	2	6.7	0	0	N/A	1	3.3			30
Collaborate	12	66.7	5	27.8	1	5.6	N/A					18
Regional	7	46.7	4	26.7	1	6.7	N/A	3	20			15

The remaining occurrences of the term *countries* appear in the following contexts: general information about the structure of the *World Ahead* program, unrelated to the role of government (n=13); existing policies and/or laws within countries (n=8); development work in general in developing countries (n=6); and collaboration between countries unrelated specifically to *World Ahead* (n=4).

In 92% (n=97) of the cases in which the term *policy* was identified it was used in relation to public policy or public policy makers. Within the sample Intel corpus examined, the use of this term was most often associated with the evaluation and modification of public policy in general (n=66). However, numerous examples of the term being used to refer to other contexts also were identified, including references to ICT policy (n=10), environmental policy (n=10), educational policy (n=8) and communication policy (n=3).

Figure 5.1: Intel's eLearning Program Cycle

Source: Reproduced from *Intel eLearning Deployment Guide*, 2009, p. 11

Intel also explicitly states within its *eLearning Deployment Guide* that it is necessary to examine policy whenever technology is deployed in an educational setting in order to foster an enabling policy environment, as “policy provides the foundation that enables

technology planning and deployment to take place” (Intel, 2009, p.46).⁷⁰ As suggested by Intel’s eLearning Program Cycle (see Figure 5.1), Intel views public sector policy makers as being largely responsible for shaping the objectives and defining success for the *World Ahead* program in their country.

Within the Intel-related documentation examined, local government is consistently presented as a key stakeholder in *World Ahead* deployments. However, nowhere in the sample corpus is it explicitly stated that government involvement is a prerequisite for a *World Ahead* deployment. The support for government involvement in *World Ahead* deployments is illustrated by the finding that 56% (n=31) of the occurrences of the term *government*, and 79% (n=23) of the occurrences of *governments* explicitly position local government as a stakeholder or partner in an eLearning initiative. More specifically, government is depicted as a key source of funding for ICT4E initiatives. Of the 54 instances identified in which reference is made to government(s) as a stakeholder, 44% (n=24) relate to government as a potential primary source of financial support for a *World Ahead* deployment. In fact, in the *eLearning Deployment Guide*, Intel states outright that “governments and government agencies are typically the primary sources of funding for large-scale national initiatives” (Intel, 2009, p. 47).

The analysis of the sample corpus of Intel’s corporate public discourse also suggests an emphasis on the adaptability of the *World Ahead* program to local contexts through the

⁷⁰ Intel does not provide a definition of what an ‘enabling policy environment’ entails, but the company’s acknowledgement of the centrality of policy analysis and reform to the success of all of its initiatives—including, but not limited to, *World Ahead*—implies, at least nominally, that the company sees the engagement of government and other public institutions as important to the successful implementation of an ICT4E deployment.

engagement of local stakeholders. Indeed, the *eLearning Deployment Guide* outlines specific way(s) in which the *World Ahead* model can be adapted to local contexts. In this regard, it states that,

eLearning programs can take a number of forms. Programs can focus on SOME, MANY, or ALL of the solution elements, depending on country needs and resources to implement Intel, 2009, p. 11

Figure 5.2 outlines what Intel calls its “four typical eLearning environments” and possible ways in which program components may be combined and adapted, according to a particular deployment’s objectives and resources.

Figure 5.2: eLearning Environments

Source Reproduced from *Intel eLearning Deployment Guide*, 2009, p. 26

Ultimately, the analysis of the three most frequently occurring terms pertaining to the central concept of *government* reveals that while Intel’s *World Ahead Program* does not require government involvement, the structure of this initiative has a strong focus on elements that would likely necessitate government involvement—public policy in

particular. The emphasis on engaging local stakeholders and the design of the *World Ahead* program itself also appears to support the adaptation of the *World Ahead* model to local contexts insofar as participation by potential project beneficiaries in deployment design seems to be encouraged.

5.3 Teacher Training

Within the sample corpus of Intel's corporate public discourse examined, much of the discussion about teacher training is revolves around Intel Teach, the company's official professional development program for teachers. This program has been in operation since 1999 and, since the commencement of the *World Ahead* program in 2006, the two initiatives have frequently been employed in tandem.⁷¹ Another striking feature of this facet of Intel's corporate public discourse is that teachers are consistently framed as primary stakeholders in *World Ahead* deployments, with much emphasis being placed upon their professional development.

As the data in Table 5.3 indicates, the three most frequently identified of the top ten terms pertaining to the central concept of teacher training were: *teachers* (n=195); *training* (n=85); and *teacher* (n=83). The emphasis that Intel places upon teacher training is well illustrated by the ways in which the term *teachers* is employed throughout the sample corpus, and through the observation that 42% (n=234) of the total 555 occurrences of the top ten terms in this category appear within the context of teacher training.

⁷¹ As of 2008, Intel reports that over 6 million teachers in more than fifty countries have been trained through Intel Teach (Intel, 2008).

Table 5.3: Frequency by document of top-ten teacher training related terms in *World Ahead* corpus

	Annual Report		Deployment Guidelines		Media Release or Ad		Mission Statement	Statement of Principles		Web Site		Total Frequency
	Freq.	%age	Freq.	%age	Freq.	%age		Freq.	%age	Freq.	%age	
Teachers	37	19	148	75.9	5	2.6	N/A	5	2.6			195
Training	64	75.3	19	22.4			N/A	2	2.4			85
Teacher	6	7.2	75	90.4			N/A	1	1.2	1	1.2	83
Professional development	5	9.6	46	88.5			N/A	1	1.9			52
Intel Teach or Intel® Teach	22	57.9	12	31.6	2	5.3	N/A	2	5.3			38
Methods	8	22.2	27	75			N/A			1	2.8	36
TPP or Teacher PC Program			33	100			N/A					26
Administrators			16	100			N/A					16
Prepare	1	7.7	9	69.2	2	15.4	N/A	1	7.7			13
Train	8	72.7	1	9.1	1	9.1	N/A	1	9.1			11

In 88% (n=172) of the 195 total instances in which the term *teachers* appears, it is used in a context that positions these individuals as primary stakeholders in ICT4E initiatives. To this end, teachers frequently are referred to as key stakeholders requiring significant support (n=53) and as leaders in the process of educational transformation (n=15). Within the sample corpus numerous teacher-related considerations that Intel states should be addressed in a *World Ahead* deployment also were identified, including ensuring that teachers are provided with appropriate technology (n=20).

The term *teachers* is also frequently employed within the context of providing appropriate teacher training (n=72). Echoing the findings of Hawkins (2002), Hepp et al

(2004), and Gutterman et al. (2009), Intel argues that adequate professional development is particularly important in the early stages of an ICT4E deployment noting that,

many teachers are not yet comfortable using these [ICT] tools, and need to learn how to effectively integrate technology into the classroom to support improved learning outcomes. Professional development helps teachers develop these skills in a meaningful way” (Intel, 2009, p. 38).

The Intel documentation also emphasizes that professional development for teachers should be ongoing throughout an ICT4E deployment. In order to facilitate such undertakings, Intel suggests that ICT4E initiatives first focus on training ‘Master Teachers,’ as leaders and visionaries within the school community. Intel maintains that this type of approach “builds a core of expertise and eagerness in the teaching community” (Intel, 2009, p. 65), which can then be made available to other teachers through mentoring and training programs. This, in turn, is hypothesized to create “a self-reinforcing and ever-widening circle of capability” over time (Intel, 2009, p. 65).

In conjunction with professional development, Intel also identifies the early provision of appropriate technology to teachers as a cornerstone of any successful ICT4E initiative. Indeed, 54% (n=45) of the instances in which the term *teacher* was identified were in relation to the process of providing teachers with appropriate ICTs. Intel calls this approach a *teacher PC program* (TPP), which is also the seventh most frequently used term in this category (see Table 5.3). According to Intel’s *eLearning Deployment Guide*, the rationale for focusing upon providing teachers with technology first is that:

One of the most effective ways to create near-term, high-impact results is by implementing a simple teacher PC program (TPP). This starter program can put technology quickly into the hands of teachers. A teacher PC program is most effective when it includes professional development to

help teachers make the best use of technology in the classroom (Intel, 2009, p. 17)

Overall, the findings pertaining to the issue of teacher training suggest that Intel places much emphasis upon providing teachers with adequate and ongoing professional development opportunities. The rhetorical framing of teacher training as critical to the success of an ICT4E initiative, in combination with the history of the Intel Teach program, suggests that Intel not only states the importance of teacher training, but also has a well-established system through which such training can be practically implemented.

5.4 Education Curriculum

The ten most frequently occurring terms pertaining to the central concept of education curriculum within the sample corpus of Intel documents were identified in 819 total instances (see Table 5.4). Of these, 305 occurrences were within the context of document section headings. The frequency of occurrence of the four most common terms within section headings were as follows: *curriculum* (n=144); *eLearning* (n=95); classroom (n=29); and *integrate* (n=37).

Of the remaining 514 instances in which the top ten terms in the education curriculum category were identified, 23% (n=120) of occurrences were in reference to integrating technology into educational curriculum. The most frequently occurring terms within this particular context were: *curriculum* (n=29), *classroom* (n=24), *content* (n=21), *integrate* (n=16), *eLearning* (n=12) and *integration* (n=12). In each instance, the integration of ICT into the education curriculum was found to be framed as being central to an ICT4E project's success. Particularly noteworthy in this regard is Intel's list of Components of

an eLearning Program that is provided in the *eLearning Deployment Guide*, which defines *Solution Element #3: Localized digital content* as “Collaborative rich-media applications, content, and curriculum material, localized for language and culture, and mapped to local curriculum standards” (Intel, 2009, p. 9).

Table 5.4: Frequency by document of top-ten education curriculum related terms in *World Ahead* corpus

	Annual Report		Deployment Guidelines		Media Release or Ad		Mission Statement	Statement of Principles		Web Site		Total Frequency
	Freq.	%age	Freq.	%age	Freq.	%age		Freq.	%age	Freq.	%age	
Content	152	49.8	136	44.6	6	2	N/A	6	2	5	1.6	305
eLearning			263	99.2			N/A	1	0.4	1	0.4	265
Classroom	20	27.4	53	72.6			N/A					73
Integrate	7	11.9	49	83.1	1	1.7	N/A	1	1.7	1	1.7	59
Curriculum	9	20.9	34	79.1			N/A					43
21 st century skills	3	9.7	27	87.1			N/A			1	3.2	31
Integration	5	26.3	14	73.7			N/A					19
Integrated	9	75	3	25			N/A					12
Lessons			7	100			N/A					7
Integrates	1	20			1	20	N/A	3	60			5

Other examples of the framing of educational curriculum as central to successful *World Ahead* deployments include Intel’s statement with *eLearning Deployment Guide* that in determining a program’s requirements “the way the eLearning will be integrated into the curriculum must be considered” (Intel, 2009, p. 16) and the suggestion that successful curriculum integration is a continuous process, and so “resources used for ongoing [teachers’] professional development may also be used for ongoing curriculum and content integration” (Intel, 2009, p. 64).

Although Intel claims to take an active role in the provision of the Solution Elements (e.g. technology; connectivity; localized digital content; and improved teaching methods and professional development) and the integration of ICTs into the curriculum, within the sample corpus of Intel documentation examined no specific information was identified with regard to the specific type of support Intel is prepared to provide. For example, the process described within the *eLearning Deployment Guide* through which curriculum materials may be “localized for language and culture, and mapped to local curriculum standards” —and the role that Intel is prepared to play in that process— is not expounded upon beyond the broad observation that “the way the eLearning will be integrated into the curriculum must be considered” (Intel, 2009, p. 16).

The aspect of World Ahead deployments that most directly suggests a need for curricular integration and adjustment is Intel’s emphasis upon the use of technology to develop students’ 21st century skills.⁷² To this end, the phrase ‘21st century skills’ is itself the sixth most frequently occurring term within the education curriculum category (see Table 5.4). Intel’s rationale for focusing on fostering of 21st century skills is articulated as follows:

Countries today increasingly recognize that educated citizens are critical to its chances for success in the worldwide digital economy. Students need to develop 21st century skills to be best prepared for this reality, and to have the opportunity to succeed. These skills... are best developed in effective eLearning environments that include information and communications technology (ICT). (Intel, 2009, p. 8)

⁷² Intel defines 21st century skills as creativity and innovation; critical thinking; problem solving; communication; collaboration; information fluency; and technological literacy (Intel, 2009).

In line with its support for the use of ICTs as a means of facilitating the development of 21st century skills, Intel the company suggests that student assessment methods may need to be reformed in order to better reflect students' development of these skills. To this end, of the 22 instances in which the phrase *21st century skills* was identified contexts other than section headings, seven were in relation to the issue of student assessment.

A central facet of Intel's corporate public discourse appears to be a rhetorical emphasis upon the importance of integrating ICT and digital content with the established educational curriculum. With the exception of the recommendation that student assessment methods should be reformed to be able to adequately capture the development of 21st century skills, this emphasis was found to be quite broad within the sample corpus examined.

5.5 Monitoring and Evaluation

As previously mentioned, Intel does not actively engage in the non-technical components of *World Ahead* deployments, including the monitoring and evaluation thereof. Even so, within the corpus of Intel materials analyzed, the importance of project evaluation was acknowledged and found to be framed as being deployment-specific. For example, within Intel's list of Components of an eLearning Program, *Support System #7* is identified as "Success metrics and assessments appropriate to eLearning programs" (Intel, 2009, p. 9). The phrase 'success metrics' appears to be used by Intel as an equivalent to monitoring and evaluation insofar as Intel defines success metrics as the means to

measure the success of your eLearning program, and demonstrate that it is working as you would like it to work. Success metrics also measure the return on investment (ROI) provided by the eLearning program (Intel, 2009, p. 50).

The information in Table 5.5 provides a breakdown of the frequency of occurrence of the top ten terms pertaining to the central concept of monitoring and evaluation within the Intel sample corpus. The use of the terms listed in the table predominantly occurred in reference to the monitoring of *World Ahead* deployments (n=99) and assessment of student progress, especially in the attainment of 21st century skills (n=43).

Table 5.5: Frequency by document of top-ten monitoring and evaluation related terms in *World Ahead* corpus

	Annual Report		Deployment Guidelines		Media Release or Ad		Mission Statement	Statement of Principles		Web Site		Total Frequency
	Freq.	%age	Freq.	%age	Freq.	%age		Freq.	%age	Freq.	%age	
Standards	33	35.1	59	62.8			N/A	1	1.1	1	1.1	94
Success	15	19	59	74.7	2	2.5	N/A	2	2.5	1	1.3	79
Assessment	34	56.7	26	43.3			N/A					60
Assessments	19	35.8	34	64.2			N/A					53
Metrics	8	17	39	83			N/A					47
Improve	24	53.3	10	22.2	7	15.6	N/A	3	6.7	1	2.2	45
Quality	34	77.3	8	18.2	2	4.5	N/A					44
Effective	14	37.8	18	48.6	1	2.7	N/A	4	10.8			37
Objectives	11	34.4	20	62.5			N/A	1	3.1			32
Successful	1	3.3	29	96.7			N/A					30

The most frequently occurring monitoring and evaluation related term was *standards*. It was identified as being employed most often within Intel's *Corporate Social Responsibility* report wherein it was used in reference to: the company's operational standards (n=33), student assessment (n=15) and *World Ahead* project assessment (n=9)

A chapter in the *eLearning Deployment Guide* entitled "Success Metrics, Standards, and Assessments" covers monitoring and evaluation in the greatest depth of all the Intel documents within the sample corpus. While this chapter deals primarily with the issue of

updating student assessment methods in order to account for the development of 21st century skills, it is noted that

The application of success metrics is a critical part of an effective eLearning program. You need to be able to determine if your program is successful or not, as measured against government standards for specific, expected learning outcomes (Intel, 2009, p. 51)

This statement implies that the overall success of *World Ahead* deployments should be assessed in terms of improvements in student achievement as measured by existing government educational standards. Although *success* (n=79) was the second most frequently occurring term within the monitoring and evaluation category, little was found in the way of elaborations about the specificities of what ‘success’ entails for *World Ahead* projects. Instead, the term *success* is found to be most often employed in connection with the development of success metrics. Indeed, for some 38% (n=30) of the total instances in which the term is used it was employed in this manner.

For the remaining 62% of the times in which the term success was employed, it was used in reference to: skills and elements—such as adequately trained teachers, appropriate technology and supportive policy—required for success (n=18); Intel’s corporate successes (n=13); how projects might define long-term success for *World Ahead* deployments (n=6); specific examples from *World Ahead* deployments (n=5); the importance of measuring success for students (n=4); and the importance of measuring success for societies (n=3).

As noted earlier, the *eLearning Deployment Guide* instructs program implementers to “create [success] metrics to measure progress to each of your objectives” (Intel, 2009, p. 61), and acknowledges the need for measures of success be defined by existing standards

in the deployment context (i.e., government standards for learning outcomes). This implies that Intel views the success of *World Ahead* deployments as context-specific. The context-specific nature of success metrics is further corroborated by Intel's provision of an example of metrics developed for an existing *World Ahead* project in Portugal. For this particular project the key success metrics are:

- Government targets for 2010 for broadband penetration
 - Internet usage
 - PC ownership
 - 21st century skills development
- Additional metrics include local economic development, program participation, and selling units into other countries.

(Intel, 2009, p. 55)

In sum, the analysis of the sample corpus of Intel documents indicates Intel seems to consistently suggest that 'success metrics' are an important part of an ICT4E project that should be context-specific and measure the outcomes of specific goals, which is in accordance with this ICT4E best practice.

5.6 Budget

The three most frequently employed of the top ten terms pertaining to the central concept of budget were *funding* (n=59), *cost* (n=30), and *funds* (n=22) (see Table 5.6). The findings of the content analysis undertaken for the budget concept suggest that Intel's primary role vis-à-vis the financial aspects of *World Ahead* deployments is to facilitate fundraising by other stakeholders. To this end, the analysis indicates that 51% (n=30) of the occurrences of the term *funding*, 68% (n=15) of the occurrences of the term *funds*, and 47% (n=8) of the occurrences of the term *strategies* are relation to potential sources of funding and fundraising strategies.

Table 5.6: Frequency by document of top-ten budget related terms in *World Ahead* corpus

	Annual Report		Deployment Guidelines		Media Release or Ad		Mission Statement	Statement of Principles		Web Site		Total Frequency
	Freq.	%age	Freq.	%age	Freq.	%age		Freq.	%age	Freq.	%age	
Funding	11	18.6	48	81.4			N/A					59
Cost	15	50	11	36.7	1	3.3	N/A	3	10			30
Funds	8	36.4	13	59.1			N/A	1	4.5			22
Strategies	8	47.1	9	52.9			N/A					17
Affordable	2	12.5	9	56.3	3	18.8	N/A			1	6.3	16
Capital	13	81.3	1	6.3	1	6.3	N/A	1	6.3			16
Fund	9	64.3	5	35.7			N/A					14
Funded	3	37.5	3	37.5	1	12.5	N/A	1	12.5			8
Donate	6	85.7					N/A	1	14.3			7
Sponsor	5	71.4	2	28.6			N/A					7

The most extensive discussion of financial issues for World Ahead deployments was identified in the “Funding Sources and Strategies” chapter within the *eLearning Deployment Guide*. The discourse contained within this part of the Guide primarily consists of funding ideas for programs, which takes the form of a list of groups that projects may wish to approach for funding, as well as strategies outlining ways for doing so. The groups that Intel identifies as potential sources of funding include: Government and Agency Funding; Non-government Agencies; Public-Private Partnerships; Telecommunication Companies; Banks; Universal Service Funds; and Teachers, Students, and Parents (Intel, 2009).

Intel itself also provides financial support for *World Ahead* deployments. The company states that “as part of the Intel Education Initiative, Intel invests \$100 million per year in education in collaboration with governments and educators in 50 countries”

(Intel, n.d., p. 2), which it reports has amounted to over \$1 billion over the last decade (Intel, 2008). However, it is not clear how much of this funding went to *World Ahead* deployments, or how much of a deployment budget Intel typically covers.⁷³

Cost is the second most frequently used term relating to the budget concept. Sixty percent of the occurrences of this term appear in the context of the cost of technology for (n=16) or general implementation of *World Ahead* deployments (n=2). Each of the latter references identified within the sample corpus, however, were abstract insofar as they were not associated with the presentation of concrete figures relating to cost. It must also be noted that that no mention of Total Cost of Ownership was identified.

Only two instances relating to financial considerations for the implementation of a *World Ahead* deployment were identified. Both were present in the *eLearning Deployment Guide*. The first consisted of a statement in which deployment stakeholders are advised to:

Keep overall cost in mind when choosing an operating system, not just the cost of the software itself. Additional costs can include user support, security, upgrade costs, localization fees, and other expenses related to efficiency and usefulness of the OS for the specific task at hand (Intel, 2009, p. 33).

The second was contained in the “Sample Request for Proposals” provided in the Appendix of the *eLearning Deployment Guide* wherein “nonrecurring and recurring cost structure” is listed as an item that all potential vendors and suppliers should include in their proposals (Intel, 2009, p. 78).

⁷³ On one occasion within the chapter, reference is made to in-kind donations of technology that Intel supplies to ICT4E initiatives, stating that “To support the effective use of technology in education, Intel plans to donate 100,000 PCs to classrooms in developing communities. In 2006, Intel has already shipped 10,000 PCs” (Intel, n.d.).

Other than these two brief mentions, no other elements relating to the cost of *World Ahead* deployments were identified. Indeed, within the sample corpus examined, no information was provided about the pricing of the ICT components that Intel supplies other than the claim that the latter is generally ‘affordable.’ *Affordable* is, in fact, the fifth most frequently occurring term within the budget category. In 94% (n=15) of cases in which it is used it is employed in reference to the technology that Intel can provide to *World Ahead* deployments.

It seems plausible that the lack of financial specifications identified with the sample corpus may be attributable Intel’s classification of “funding strategies” as *Supporting Element #6* within its list of Components of an eLearning Program. If this is indeed the case, it implies that local stakeholders are primarily responsible for devising and implementing funding strategies, with Intel’s function being primarily of a facilitatory nature.

All in all, no explicit mention of financial sustainability or Total Cost of Ownership was identified in the documents comprising the Intel sample corpus analyzed. This suggests the presence of a notable gap in the information available about a central component of any ICT4E project.

5.7 Conclusions

The full quotation of the text used in the subtitle to section 5.1 reads, “If the student isn’t provided both—the technological resources depicted above, and the ability to use that technology effectively—the computer is little more than a interesting toy or possibly even a distraction” (Intel, 2009, p. 28). This statement implies that Intel views the metal and

wires supplied by its technological products as insufficient to foster real educational reform without the presence of other supporting elements. The analysis of a sample of Intel's corporate public discourse presented in this chapter appears to corroborate this interpretation, with the empirical data suggesting that Intel positions ICT as a tool that is most effective in facilitating improvements in education when it is combined with other supporting elements.

While government involvement is not a prerequisite for World Ahead deployments, Intel positions the government as a key stakeholder and potentially important financial partner. The emphasis placed upon fostering enabling policy environments which, while lacking specific reference to incorporating ICT4E initiatives into national education and/or ICT policies, appears to be broadly in line with the best practice of involving local government in ICT4E initiatives. Furthermore, the focus upon the localizability of the *World Ahead* project model, as illustrated by the emphasis on engagement of local stakeholders, the flexibility suggested by the *World Ahead* design and the emphasis on integrating deployments with the educational curriculum, also parallels the recommendations associated with best practice.

An area of particular strength appears to be the emphasis that Intel places upon teacher training. Intel's efforts in this domain are linked to its well-established professional development program Intel Teach, and are seemingly well-aligned with the best practice of incorporating adequate, appropriate and ongoing teacher training

The findings presented in this chapter suggest that there are two areas within which there appears to be some deviation from best practice. The first is the apparent lack of

ongoing monitoring and evaluation. That said, Intel's acknowledgement of the importance of establishing 'success metrics' for deployments reflects, at minimum, a rhetorical sensitivity to these facets of best practice. The second area of concern is Intel's treatment of the financial aspects of the *World Ahead* program. Budgetary details of *World Ahead* deployments were not present within the sample corpus examined, nor were any mentions made of the Total Cost of Ownership concept. On the basis of the analysis undertaken for this thesis, the levels of financial resources required to support and sustain a World Ahead deployment remains unclear.

Overall, Intel's approach appears to offer a flexible ICT4E model that requires high degrees of collaboration between itself and local stakeholders. In *World Ahead* deployments, Intel explicitly assumes responsibility for areas in which it has expertise and is heavily dependent upon local involvement in areas where the company has less experience and/or resources. This delineation of responsibilities, in conjunction with the overarching *World Ahead* model suggests that this approach has the potential to produce deployments that reflect the best practices of ICT4E.

Chapter 6: Conclusion

Despite the well-documented lack of empirical evidence regarding the impact of ICT4E initiatives, significant investments in ICTs for education continue to be made, particularly in developing countries. In effort to address some of the gaps in the ICT4E literature, this thesis set out to answer the following central research question: *To what extent are the 'best practices' identified by ICT4E literature reflected in the ICT4E initiatives of One Laptop per Child and the Intel Corporation's World Ahead Program?* Using a combination of content analysis and critical discourse analysis to examine the corporate public discourses of these initiatives, this thesis has investigated the ways in which they rhetorically frame the foundational principle of ICT4E and what current research identifies as best practice for projects working in this area. The discussion in this chapter is divided into four sections. In the first section the areas of overlap and divergence across the OLPC and *World Ahead* programs are examined with the aim of addressing the central research question guiding this study. This is followed by a brief discussion of the limitations of this study and directions for further research. The fourth section provides some final concluding reflections.

6.1 Comparative Analysis of the OLPC and *World Ahead* initiatives

The central research question that has guided this study was: *To what extent are the 'best practices' identified by ICT4E literature reflected in the ICT4E initiatives of One Laptop per Child and the Intel Corporation's World Ahead Program?* The findings of this thesis reveal that each of the ICT4E best practices are represented, albeit to varying degrees, within the sample OLPC and the Intel World Ahead corpuses examined. The

results of this thesis further suggest Intel's approach to ICT4E appears to be somewhat more in line with best practice than OLPC.

The mission and core principles of OLPC are often summarized by the adage, "It's an education project, not a laptop project" (see, for example, OLPC, 2010d). Similarly, Intel's *eLearning Deployment Guide* (2009) states that, "If the student isn't provided both—the technological resources... and the ability to use that technology effectively—the computer is little more than a interesting toy or possibly even a distraction" (p. 28). Both of these statements are illustrative of the foundational principle of ICT4E insofar as they imply technology is a tool that can be used in conjunction with other elements to facilitate educational change. However, and despite the presence of a strong rhetorical emphasis upon the notion of technology as a tool within both of the sample corpuses analyzed, only the corporate public discourse of the Intel World Ahead program was found to consistently reinforce this position. Within the OLPC corporate public discourse important contradictions were identified. Specifically, the notion of technology as a tool seemingly is at odds with the propensity within OLPC's corporate public discourse to frame technology as a root cause of positive or developmental change.

The notion that ICT4E initiatives should be led by local governments was the first best practice to be considered for this study. As was noted in Chapter 2, this best practice is actually comprised of three elements which specify that ICT4E initiatives should be: 1) case-specific and locally driven; 2) part of a national education policy that prioritize pedagogy over ICT provision; and 3) supported by a national ICT policy that is ideally aligned with the national education policy.

While both the OLPC and World Ahead initiatives position local governments as key stakeholders, neither *requires* local government involvement in their respective deployments. That said, the analyses of the sample corpuses found that the Intel documentation contained a greater number of and more specific reference to government as a stakeholder in project deployments than the OLPC publications, which is illustrated by the four terms that appear in both organization's subsets of terms related to the central concept of *government* (see Table 6.1).

Table 6.1 Frequency of shared government related terms in the OLPC and Intel Corpuses

Keyword	OLPC Total Frequency	Intel Total Frequency
Countries	29	106
Policy	22	106
Regional	11	15
Government	5	55

Of the 67 occurrences of the terms *countries*, *government*, *policy* and *regional* within the OLPC corpus, only 12% (n=8) are in relation to government-related considerations. By contrast, these same four terms appear 282 times in Intel's corpus, with 52% (n=146) of these occurrences being oriented toward government-related considerations for *World Ahead* deployments.

With regard to the issue of localization and customization, both OLPC and Intel rhetorically position their initiatives as being amenable to this process. However, the prescriptive nature of OLPC's Five Core Principles and the concomitant mandating of key aspects of deployments raise the prospect that its deployments may be less adaptable in practice than those of the *World Ahead* program.

In terms of ways in which policy considerations are presented in the corpuses of these two initiatives Intel's approach appears to be more in line with best practice than that of OLPC. This is evidenced by the finding that occurrences of the term *policy* within the Intel corpus were most often in reference to the evaluation and modification of public policy in order to support the development of an enabling environment that "that enables technology planning and deployment to take place" (Intel, 2009, p.46). By comparison, within the OLPC sample corpus the term *policy* was identified as occurring most frequently as a component of headings on its web site.

The second best practice to be considered is the idea that ICT4E initiatives should incorporate adequate, appropriate and ongoing teacher training. The findings of this thesis reveal that, while both OLPC and Intel place an emphasis upon incorporating teacher training into deployments, it is the latter organization that seemingly gives teacher training more weight insofar as its rhetoric positions teachers as key stakeholders and beneficiaries. By advocating for the incorporation of ongoing teacher training that includes concrete ICT skills and creative uses of technology in the classroom, Intel's approach is very in line with the tenets of this best practice. Conversely, the contents of the sample OLPC corpus examined for this study offer little insight into the skills that it would like teachers to acquire during their training.

Differences in the rhetorical emphasis that the two organizations place on teaching training also is evident in the frequency of occurrence of four terms that were included in the top ten lists of terms pertaining to the central concept of *teacher training* for both organizations: *professional development*, *teacher*, *teachers* and *training*. As can be seen

from the information presented in Table 6.2, these four terms are employed much more frequently in the corporate public discourse associated with World Ahead than that of the OLPC.

Table 6.2: Frequency of shared teacher training related terms in the OLPC and Intel Corporates

Keyword	OLPC Total Frequency	Intel Total Frequency
Teachers	30	195
Teacher	19	83
Training	15	85
Professional Development	2	52

The difference in perspectives on teacher training between the two organizations is perhaps best illustrated by the ways in which the term *teachers* is employed in their respective corporates. For OLPC, this term is used in reference to training in 30% (n=9) of the instances in which it appears. The remaining 70% (n=21) of occurrences with the sample OLPC corpus are in relation to contexts that are not directly related to training. Within the sample Intel corpus, some 37% (n=72) of occurrences of the term *teachers* is in relation to the provision of appropriate teacher training, with the remaining 63% (n=123) not directly related to training. What is particularly noteworthy about the way in which *teachers* are framed within in the Intel, however, corpus is the emphasis on their being primary stakeholders in deployments. This was found to be the case in some 88% (n=172) of all the occurrences of the term *teachers*⁷⁴ are used to frame teachers as primary stakeholders in ICT4E projects.

⁷⁴ Although these statements are not always directly related to training, as a result of teachers being key stakeholders in ICT4E initiatives Intel argues that they should receive significant support (n=53),

Complementing the provision of training for teacher, the third best practice of interest for the purpose of this study relates to the notion of integrating ICT4E initiatives into existing education curriculum. As was discussed in Chapter 2, there are two basic objectives behind the drive to integrate ICTs into educational curricula: (i) to teach technology (i.e. ICT skills such as keyboarding); and (ii) to use technology to more effectively teach existing curricula. The findings emerging from the analyses of the sample corpuses suggest that both OLPC and Intel rhetorically prioritize the second objective through their focus on using ICT to develop students' 21st century skills.⁷⁵ However, only Intel appears to explicitly connect the achievement of the first objective to the integration of ICT4E into the existing curriculum. Indeed, within the sample OLPC corpus no explicit mention curriculum integration was identified.

Although there is no widely accepted, standard methodology for monitoring and evaluating ICT4E initiatives, it is generally accepted that incorporating ongoing, context-specific monitoring and evaluation constitutes a best practice for ICT4E. However, the findings from this study suggest that neither OLPC nor Intel actively lead, or require, the monitoring and evaluation of their deployments. That said, the ways in which the two initiatives frame this particular best practice differ considerably.

including the provision of professional development opportunities (n=72) and appropriate technology (n=20).

⁷⁵ OLPC does not use the exact phrase '21st century skills.' Its corpus references the importance of ICTs, specifically the XO laptop, in nurturing what it calls "learning learning." This latter concept is described as a way of teaching "children to think about thinking, in ways that are otherwise impossible" (OLPC, 2010d), a definition that suggests "learning learning" encompasses abilities that are part of the 21st century skill set (i.e. creativity, problem solving, higher-order thinking skills).

Whereas only a handful of vague references to monitoring and evaluation were identified with in the sample OLPC corpus, monitoring and evaluation was found to be incorporated into Intel's list of Components of an eLearning Program. Another notable difference between the two organizations is how they define 'success,' the latter being a central part of developing indicators to monitor and evaluate projects. The evidence suggests that OLPC seldom defines success. Indeed, it appears to mention very few tangible goals for deployments, beyond the notion of fostering learning in general and reaching 1:1 saturation of Internet-connected XO laptops to students. Although Intel also never explicitly defines success, it does frame this concept as something that should be determined by each individual deployment based on its unique baseline, resources and desired outcomes.

The fifth and final best practice of interest for the purposes of this thesis is the claim that ICT4E projects should budget for the total cost of ownership (TCO) when planning a deployment. The analyses of the sample corpuses of both OLPC and Intel's *World Ahead Program* identified no explicit mentions of TCO. Moreover, and despite the claims by each organization that that they provide some financial support for deployments, the findings of this study suggests that such assistance is likely to be comprised foremost of assistance with fundraising. Evidence of this may be seen in the occurrences of four terms that were included in the top ten lists of terms pertaining to the central concept of budgets for both organizations: *cost*, *donate*, *funded* and *funding* (see Table 6.3).

Table 6.3: Frequency of shared budget related terms in the OLPC and Intel Corporates

Keyword	OLPC Total Frequency	Intel Total Frequency
Cost	11	30
Donate	11	7
Funding	2	59
Funded	1	8

Of the 129 total instances in which these four terms occurred in both corporates, 41% (n=53) position external and/or public donations as a key source of funding for deployments. Another interesting trend in relation to these terms is that both organizations use the term *cost* more often in reference to the cost of technology than any other aspect of an ICT4E deployment. In fact, in 91% (n=10) of the occurrences of this term with the sample OLPC corpus and 53% (n=16) of the occurrences of this term in the sample Intel corpus the term *cost* is employed precisely in this manner.

Overall, comparison of the key differences emerging from the analysis of the corporate public discourses of OLPC and Intel's *World Ahead Program* suggests that Intel's approach to ICT4E is perhaps better attuned to current best practices in the field than is OLPC. One possible explanation for the differing degrees to which the corporate public discourses of OLPC and Intel incorporate ICT4E best practices rests in the structure of the two initiatives. Namely, OLPC's approach to ICT4E is considerably more prescriptive in nature than that of Intel. OLPC's Five Core Principles imply the presence of, and adherence to, potentially limiting requirements for deployments including, restrictions upon the specific technology to be employed (i.e., the XO laptop) and how that technology is to be distributed (i.e., 1:1 ratio of laptops to students). In addition, OLPC advocates for the adoption of a particular pedagogical approach, constructionism,

in its deployments. Taken together, it seems plausible to conclude that such structural requirements potentially impede the ability of OLPC deployments to align themselves with what is recognized as best practice.

Conversely, Intel's *World Ahead Program* seemingly incorporates a stronger focus upon the integration of the ICT4E best practice into its deployments which, in turn, appears to be supported by a more flexible approach to ICT4E. For instance, Intel does not prescribe the use of certain technologies, distribution methods or pedagogical approaches. Instead, several options were put forth and deployment teams were actively encouraged to combine those options to design a program that best address the needs and resources of their particular education contexts. It is precisely this apparent flexibility that seemingly gives Intel an upper hand in adhering to best practice when compared to OLPC.

As a result, the evidence from this study suggests that the answer to the research question posed by this thesis is that, although the establishment of best practices in ICT4E is relatively new and continues to evolve as more empirical evidence about the outcomes of ICT4E initiatives emerges, OLPC and Intel's *World Ahead Program* are already incorporating many of the central ideas of the ICT4E best practices into their corporate public discourses. The analysis also reveals that the way in which OLPC and *World Ahead* reflect the ICT4E best practices is predominantly rhetorical. That is, most of the ICT4E best practices have a significantly stronger presence in OLPC and *World Ahead*'s rhetoric than they do in the organizations' practical project design. This suggests

the existence of a gap that should be addressed as ICT4E projects work to incorporate and implement the ICT4E best practices in the future.

6.2 Limitations of the Research

This thesis is not without limitations. First, the results of this study cannot be generalized to other ICT4E initiatives. Part of the issue here is that OLPC and Intel World Ahead were not randomly selected, but were chosen to a certain extent based on their readily available, substantive corporate public discourses, which contained sufficient data for analysis. While collecting enough data to conduct a comparative analysis of smaller or less well-documented ICT4E initiatives may have expanded this study's findings, that process would be very challenging and likely generate a volume of data that would exceed the normal expectation of a Master's thesis.

Second, the research was constrained by the content of the OLPC and Intel's corporate public discourses. As such, the analysis was dependent upon publically available information about the form and structure of OLPC and World Ahead, which was at times unavailable, limited or incomplete. Ideally, the project would have triangulated the findings of the content and discourse analyses with information obtained from in-depth interviews with project representatives and deployment implementers, as well as analyses of internal documents. This would have enabled the researcher to get a more accurate reflection of the way in which OLPC and Intel's *World Ahead Program* frame their activities. However, the inquiries made to the two organizations regarding arranging interviews and acquiring internal documents were met with reluctance.

Third, the coding and content analysis for this thesis was conducted by a single researcher. Established practice usually entails at least two coders working together in order to provide inter-observer reliability (Frey, Botan, & Kreps, 2000). In this thesis, the context in which key terms were identified as appearing had a significant impact on the results of the analysis. However, with only one coder, there is a possibility that some interpretations of context were potentially more biased than others, which may have influenced the results of the analysis. Put simply, it is the participation of a second coder that may have altered the interpretation of the data and potentially enhanced the reliability of the analysis (Frey, Botan, & Kreps, 2000).

Despite the minor shortcomings outlined above, the work presented in this thesis nonetheless advances our current understanding of the ways in which ICT4E best practices are framed within the corporate public discourses of the OLPC and *World Ahead* initiatives. That is, these two initiatives tend to reflect the ICT4E best practices rhetorically, but do not adequately incorporate them into their program design. In turn, this trend suggests the existence of a broader gap that needs to be addressed in ongoing and future ICT4E projects.

6.3 Directions for Further Research

In the future, it would be beneficial to conduct similar analyses of the corporate public discourses of other ICT4E initiatives in order to see whether the findings presented by this study are corroborated. It would be particularly useful to look at ICT4E initiatives that operate on a smaller scale than OLPC or Intel's *World Ahead Program*, as well as ICT4E initiatives that originate in countries other than the United States. In this way, the

volume of comparable data would be increased, and in so doing provide a stronger indication of whether any of the results of this study are generalizable and, thereby, have implications for ICT4E initiatives writ large.

As this study identified a possible gap between the rhetorical incorporation and practical integration of the ICT4E best practices, another avenue for further research would be to conduct a broader study that incorporates interviews with key personnel and internal documents related to the ICT4E initiative being examined. This would allow a researcher to move beyond studying the way(s) in which ICT4E initiatives rhetorically frame the ICT4E best practices in publically available materials, and begin to analyze how they manifest within the organizational culture and structure. This research would contribute to a more profound understanding of the extent to which ICT4E best practices are interpreted and incorporated into an ICT4E initiative, which may be useful in the design of future ICT4E initiatives as well as the continuing development of the ICT4E best practices themselves.

Further to this, it would also be beneficial to examine deployments of ICT4E initiatives to study how the ICT4E best practices are incorporated on the ground. Such a study could be part of an ICT4E initiative's monitoring and evaluation activities, and the findings could be compared with the way in which the best practices are rhetorically framed by the organization and applied to improve that initiative's approach to ICT4E. On a broader level, such studies would also help to address gaps in the ICT4E literature, as well as potentially contribute to the evolution of the ICT4E best practices themselves.

6.4 Concluding Remarks

In 1922, Thomas Edison said, “I believe that the motion picture is destined to revolutionize our educational system” (as cited in Cuban, 1986, p.9). In the 1930s and 40s, radio was called a “vibrant and challenging textbook of the air” (as cited in Cuban, 1986, p.19) and was predicted to become “as common in the classroom as is the blackboard” (as cited in Oppenheimer, 2003, p.4). In the 1950s, television supplanted radio as the darling of educational technology enthusiasts as “radio with its eyes open” (Cuban, 1986, p. 26). Yet, time and time again, new ICTs have failed to meet these expectations.

Today, it is computer and Internet technologies that are being positioned as the technological gateways to educational improvement. Massive, global investments are currently being made in the improvement of ICT infrastructure and the institution of information and communication technologies for education in developing countries, as evidenced by ongoing projects such as the NEPAD e-Schools Initiative. The recent movement to establish a set of best practices for ICT4E—driven by scholars and practitioners alike—may also be interpreted as an increasingly collective acknowledgment that it is not a technology itself, but the effective provision of elements to support its employment, that has the potential to make ICT an educational asset. As the ICT4E best practices continue to plant roots and evolve in the field, their impact may be observed by considering the extent to which an ICT4E initiative’s representations of technology’s role in education changes—or does not change—to reflect them.

The analysis of the data emerging from this thesis suggests significant variance in the ways in which One Laptop per Child (OLPC) and Intel's *World Ahead Program*, two leading contemporary ICT4E initiatives, reflect the ICT4E best practices. Although both initiatives demonstrate a rhetorical emphasis on most of the ICT4E best practices, they are for the most part not frequently or fully integrated into the initiatives' practical project design. Furthermore, the analysis also indicates that both OLPC and *World Ahead* are underpinned, to varying extents, by largely unsubstantiated assumptions about the inherent benefits of incorporating ICT into education. It is these very assumptions that the ICT4E best practices are working to replace with supporting elements proven to facilitate the improvement of education using ICT as a tool and concrete evidence of success. As the ICTE best practices continue to be developed, the hope is that ICT4E initiatives so too will grow to incorporate them and thereby be founded on the knowledge that, as Warschauer and Ames (2010, p. 46) put it,

For an [ICT4E] effort of that sort to be successful, it requires an understanding of how to organize large-scale social improvement efforts involving technology and how best to support learning in diverse contexts. Racing ahead without this understanding can waste precious resources required for development and divert attention from more promising approaches to educational and social reform. Regrettably, there is no magic laptop that can solve the educational problems of the world's poor.

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