Computers in Ghanaian Secondary Schools:
Where does equality come in?

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Abstract
The application of Information and Communication Technology (ICT) in schools is perceived as a means for transforming teaching and learning processes, and has thus been met with significant enthusiasm. The developing world also perceives ICT as a tool that will promote socioeconomic, political, and sustainable development. This perception underpins the introduction of computers and the internet in some secondary schools in Ghana. This paper draws on the concept of "educational equality" and the history of education in Ghana to argue that the introduction of ICT in Ghanaian schools is likely to lead to a "digital divide" between the urban schools (haves) and rural schools (have nots) and will thus exacerbate the existing disparities in Ghana's educational system. Furthermore, the lack of an adequate policy framework for implementing ICT in Ghanaian secondary schools will likely perpetuate this inequity.

Introduction
Education policymakers in Ghana have hailed the introduction of Information and Communication Technology (ICT) in Ghanaian secondary schools as a remarkable step that will contribute to knowledge production, communication and information sharing among students and teachers in the school system. This perception stems from assertions in the literature about the benefits that come with ICT literacy in schools (Mucherah, 2003; ETS, 2001; Hakkarainen et al, 2000). Hakkarainen et al (2000) points out that ICT is a transformative tool and its full integration into the school systems is necessary to prepare students for the information society they will inherit. Contrary to the promising notion of ICT as a means of knowledge production, numerous scholars have highlighted the need to address the numerous problems that the introduction of ICT will bring. These issues include: a lack of adequate planning for implementation of ICT (Mooij and Smeets, 2001); inadequate teacher training (Webb, 2002); inequalities in ICT distribution (Nachmias, Mioduser, & Shemla, 2001; Sutherland-Smith, Snyder & Angus, 2003); lack of information regarding the distribution of ICT; low levels of literacy in general, and lack of relevant content and technology applications to meet the needs of diverse societies (ETS, 2001; Hakkarainen et al, 2000). The literature identifies the tendency for ICT to lead to a digital divide between urban and rural schools (Hartviksen & Akselsen, 2002).

A review of the available literature reveals significant inequity in the implementation of ICT in Ghanaian secondary schools. The literature (Dankwa, 1997; Parthemore, 2003) reveals that ICT provision to secondary schools is skewed in favor of schools categorized as premier schools and schools in urban areas. Unfortunately, this is not a new trend. Since the introduction of formal schooling in Ghana, educational resources have been unequally distributed in the school system (Folson, 1995; Foster, 1965; Graham, 1971; and McWilliam and Kwamena-Poh). At this juncture, it is critical that policy makers

ensure that ICT does not become another tool for perpetuating educational inequalities in Ghana's school system.

The term ICT is used in Ghana to describe both the study of and the use of computers and other technologies that are used for Communication and Information Systems (See National ICT policy and plan development committee). In this article, I will utilize the following definition of ICT: "digital technology, communications tools, and/or networks that help to access, manage, integrate, evaluate, and create information in order to function in a knowledge society" (ETS, 2001, p. 1). I will utilize Farrell's (1999) "educational equality" model, particularly the concepts of "equality of access" and "equality of output," to explore ICT provision and implementation in Ghanaian secondary schools. The article employs these concepts and the history of Ghanaian educational development to examine how ICT is likely to perpetuate the existing inequalities in Ghana's educational system. "Digital divide" is defined as the absence of equity in ICT implementation (ETS, 2001, p.1) and is likely to widen the knowledge gap that exists between the urban (core) and rural (periphery) communities highlighted in the development literature (Farrell, 1999; Samoff, 1999).

The discussions in this article are based on review of literature on ICT, , review of NGO documents involved in implementing ICT in Ghana, my experience as a teacher and administrator in a Ghanaian secondary school, and informal conversations with educators including, headmasters and teachers in the Upper East, Eastern, Greater Accra and Central regions of Ghana. Accessing detailed information from the Ghana Education Service and the Ministry of Education was a methodological dilemma in the study due to lack of transparency.This paper presents a contextualized review of the phenomenon and considers the critical need for a policy framework to serve as the basis for equitable implementation of ICT throughout secondary schools in Ghana.

Educational inequality and "technology for all"

Joseph Farrell (1999) points out that schooling is a long-term process in which children may be sorted at many different points and in several different ways. Thus schooling operates as a selective social screening mechanism. It enhances the status of some children, providing them with an opportunity for upward social or economic mobility. It also ratifies the status of others, reinforcing the propensity for children born poor to remain poor as adults, and for children born into well-off families to become well-off adults. Studies on postcolonial education in sub-Saharan Africa reveal that schooling has been a mechanism for perpetuating these/such social inequalities (Farrell, 1999; Mfum-Mensah, 2003; Samoff, 1999).

According to Farrell the term "equality" refers to equitable service provision as well as the actual patterns in which something (e.g. income or year of schooling) is distributed among members of a particular group. When the concept is applied to public policy, "equality" has to do more specifically with non-discrimination (Samoff, 1999). Farrell conceptualizes "educational equality" as encompassing four dimensions including equalities of access, survival, output and outcome. He (defines equality of access as the probabilities of children from different social groups getting into particular levels or portions of the school system. He applies this concept to the inequalities in the distribution of educational resources. He posits that most children residing in remote

rural areas, those in urban slums, and those belonging to groups outside of mainstream society are disadvantaged when it comes to the distribution and access to educational resources.

Farrell defines equality of survival as the probabilities of children from various social groupings staying in the school system to some defined level, usually the end of a complete cycle. He explains that in any given level poor children are generally less likely to survive educationally than are well-do-to children. Similarly, children born in rural areas are less likely to survive educationally than urban children. Equality of output, refers to the probability that children from various social groupings will learn the same things to the same levels at a defined point in the schooling system. The concept is expressed through differences in the level of achievement in nation's school system which Farrell points out as systematically associated with differing social origins. He points out that among those who have reached a given level of nation's school system, children who are poor, rural, female, or from any other socially marginalized groups learn less. Equality of outcome, refers to the probability that children from various social groupings will live relatively similar lives subsequent to and as a result of schooling. Here too, Farrell posits that in societies where the economy is expanding, and where there is no dominant group in the society, formal education becomes a predominant influence on the level of employment acquired. The "equality model" presented above by Farrell shows how formal schooling can be a powerful selective tool for ratifying or building a new social order. The model can also serve as a useful lens for analyzing the educational inequalities that have characterized the Ghanaian educational system and can be extended to analyze ICT implementation.

Since the time formal schooling was introduced in Ghana to date, educational provision has been skewed in favor of those in the urban communities and there has been inequitable distribution of educational resources and services (Asiedu-Akrofi, 1982; Graham, 1971). Postcolonial educational reforms, policies and practices have done little in terms of bridging the gap that has been created between schools in the urban communities and their counterparts in the rural and isolated communities. Most schools in the urban areas have been in existence since the colonial or early postcolonial era. Premier schools such as Achimota, Prempeh College, and Wesley Girls, were fashioned along the lines of elite British schools and are well known beyond the borders of Ghana. Most of the rural schools that were established from the 1970s onwards, especially those that proliferated in the 1990s after the implementation of the Senior Secondary School (SSS) concept, are based on the egalitarian ideology of mass secondary schooling (Ministry of Education, 1974 & 1999b).

Since their establishment, most of these rural Senior Secondary Schools have faced problems of poor infrastructure, lack of logistical support, inadequate material input, and lack of qualified teachers. In light of such general inequalities in Ghana's school system, a current challenge is the equitable implementation of ICT policy for secondary schools. This issue becomes intricate when factors such as accessibility of electricity and telephone grids, the current state of school infrastructure, and availability of technical support are considered.

Accessibility

Educational policy makers, non-governmental organizations (NGO), bilateral and multilateral donor organizations, and school administrators are making the collective efforts to promote ICT in Ghanaian secondary schools. Because of the efforts of NGOs and donor organizations in particular, ICT facilities have extended to some schools, mostly in urban communities (Dankwa, 1997; Parthemore, 2003). Parthemore (2003) points out that many secondary schools in Ghana can now boast of computer labs through which students are gaining basic computer literacy. A number of these schools have Internet capabilities, enabling students to deepen their connection to the outside world. Although this is encouraging information, extensive review of documents of NGOs that are spearheading ICT implementation in Ghanaian schools reveals that most secondary schools now benefiting from ICT are either located in urban areas or are classified as premier secondary schools (Dankwa, 1997; Hawkins, 2002; Parthemore, 2003).

According to Parthemore (2003), computer literacy education in Ghana has been concentrated in major urban areas. A few better schools in outlying areas have attempted to "catch up" with their urban counterparts by contracting with private companies to provide computer education. The costs for private computer training are prohibitive and it is rarely if ever the case that all students have access. Other schools have taken part in the Ghana Education Service sponsored scheme where for every hundred textbooks they purchase from a private firm, they receive one computer system.

Recently SchoolNet, a foundation based in Switzerland, chose fourteen schools in Ghana in which to implement ICT programs. Of these schools, five are located in Accra, three in Kumasi, four in Cape Coast, on in Tema, and one in Aburi. Of these fourteen schools, eleven belong to those schools categorized as premier schools. Apart from Aburi, the rest of the locations are all cities. Aburi, is however located about twenty minutes from Accra. Now that the distribution of ICT in schools is also progressively skewing in favor of the urban schools, as it has been with other educational services since Western-type formal schools started in the country, policy makers face the challenge of promoting equitable ICT implementation. The equitable implementation of ICT in the secondary school system is a complex issue. However, recent educational policies may offer some perspectives on this issue.

In 1987, the Government of Ghana expanded the secondary school system by establishing rural Senior Secondary School (SSS) to accommodate the growing numbers of Junior Secondary School (JSS) students in rural communities. The government made promises to ensure the standardization of all SSS in terms of resources and quality of output (Ministry of Education, 1999a, 1999b). Over the years, the government did not embark on its promises, hence the persistent wide urban and rural gap in the standards of secondary school system. To date secondary schools that have been established in rural communities in Ghana are faced with the problems of poor infrastructure, lack of material input, inadequate logistics, and lack of qualified teaching personnel. The environment in which the majority of these schools operate does not promote any serious learning and academic advantage. Many of these rural schools, like the one in which I taught and served as the school administrator, do not have standard resources

or well-equipped facilities. For example, throughout my three years teaching in this rural school, my students never had physical access to basic scientific instruments such as beakers, test tubes, and burners, apart from seeing this equipment in science textbooks.

Recently, the government reiterated its commitment to extend computers to all schools in the country in the news media. The government also emphasized its commitment to promote equitable ICT in the school system so that all students will equally benefit from ICT regardless of their geographical location. The successful implementation of such a policy would be a great achievement in the educational system. However, existing inequality, poor infrastructure and the nation's present economic situation (as a highly indebted country) is likely to pose a challenge to implementing equitable ICT in the school system.

Accessibility of ICT in secondary schools also interconnects with other development issues, such as accessibility and connectivity to electricity and telephone grids. The themes that emerged from the policy arena challenges to ICT in rural schools are lack of telecommunication and resources (finance, infrastructure, personnel and their training, software, and textbooks). The telecommunication and expenses will be considered in this section while the issue of resources will be considered in the next section. Since 1998, the government of Ghana has extended electricity to many rural communities in the country. However, many rural communities are yet to be connected to the electricity grid. Most rural communities that have secondary schools do not currently have access to electricity and telephone services. In such localities, the idea of promoting computers in classrooms will require more financial backing, and a considerable amount of time, considering the pace of development in Ghana. In a recent Ghanaian case study (Ismail, 2002), it became apparent that the high costs for providing electricity (where there is none) and connectivity to telephone services are major setbacks to providing ICT in rural areas in Ghana. Students enrolled in premier schools like the Achimota School, Wesley Girls School, and Prempeh College and those in urban areas who have easy access to computers and Internet cafés have already made a considerable increase in the use of computers and the Internet do not face such challenges. On the contrary, most students enrolled in rural secondary schools have never set eyes on a computer. While students in urban areas can now boast of their proficiency in the use Internet and basic computer programs, the silent majority of their colleagues in the rural secondary schools do not have a clue as to how to click a mouse.

Availability of an appropriate environment for ICT facilities is another issue that will determine accessibility of ICT for rural schools. Some schools have successfully implemented ICT projects because they possess the infrastructure to accommodate ICT equipment donated by benevolent organizations. Inadequate infrastructure is a problem facing many rural secondary schools. The infrastructure of most rural schools lacks the appropriate environment and the needed security for storing ICT equipment, even if they become available. Such concerns are also setbacks to ICT implementation in rural schools.

Technology for all and equality of output

The use of ICT in secondary schools will soon be a policy mandate in the Ghanaian educational system. The government has made the promise to extend computers and Internet services to every secondary school in the nation. The Ministry of Education has developed a curriculum for ICT training. The Ministry has also indicated its plan to include ICT in the Senior Secondary School Certificate Examination. These developments at the policy levels show that ICT will soon become a tool for assessing students' ability and determining their fitness for transition to post-secondary education and employment. This is where the equality of output concept comes into play. Farrell (1999) posits that among those who have reached a given level of the school system, children who are rural or those from marginalized groups learn less. Will the school system be able to ensure that students who are at the same level of the secondary system are provided with the same ICT knowledge and skills? The history of Ghana's educational development and recent case studies all point to the fact that the distribution of educational resources especially, material inputs, teaching personnel, and well-equipped facilities, have always been skewed in favor of some section of the society. (Folson, 1995; Glewwe and Jacoby, 1994; Graham, 1971; McWilliam and Kwamena-Poh, 1975; Mfum-Mensah, 2003). These educational resources pointed out above have direct effect on students' acquisition of knowledge and learning, and hinder equal implementation of ICT policies.

Many urban secondary schools in the nation have now implemented ICT as part of their schools curriculum. However, most secondary schools in rural areas do not yet have access to ICT. Students in schools that have ICT facilities are using this tool for projects and are able to connect with schools around the world. Through ICT students and teachers in these schools are contributing to the knowledge production and information sharing with other students and teachers around the world. Analysis of the NGO documents and other emerging case studies in Ghana reveal some interesting themes, which we need to consider in the light of equality of output. First, the implementation of ICT has resulted in positive impacts in secondary schools that have ICT programs. Second, the dimension of impact extends to include students and teachers. Third, the provision of technical support for ICT has been a challenge for its effective implementation (Ismail, 2002). The World Bank impact assessments reveal that through ICT, students in Ghanaian schools have gained knowledge and skills. The case study also points out that through ICT, students have gained positive attitudes toward school, and collaborative learning projects have been implemented in schools. Similarly, the tool has contributed to teacher's professional satisfaction. These revelations show how some schools and students have taken the lead in the acquisition of ICT skills and knowledge even before its inclusion in the school curriculum.

The literature and other emerging Ghanaian case studies on ICT implementation reveal that technical support is a challenge to ICT implementation (Amenyo, 2003; Ismail, 2002; Ministry of Education, 2002). This body of literature points out that the major challenge for schools that have ICT is lack of resources and proper implementation by trained personnel. As can be seen through previous policy implementation processes and case studies, due to the scarcity of educational resources in rural areas, there is the probability that the distribution of educational resources will skew in favor of those in urban schools (Folson, 1995; Glewwe and Jacoby, 1994; Mfum-Mensah, 2003). It is most

likely that a situation will be created where schools that have the technical support will get comparative learning advantages over those without, therefore creating a digital divide in the school system.

Ghanaian ICT policy framework

Milli et al (2002) define a framework as a set of interacting objectives that together realize a set of functions. A framework for educational policy and practice is therefore a working objective that highlights the participants, the relationship between the participants, and the set of interaction scenarios between the participants. An educational policy framework can help to define the roles and responsibilities of educational actors, which include policy makers, administrators, teachers, students, funding agencies, development organizations, and civil society. As a blueprint, an educational policy framework can be a process through which various actors and policy makers translate educational policy into practice.

In spite of the benefits of a policy framework highlighted above, to date, Ghana's Ministry of Education has not established a clear framework for the implementation of ICT. Almost six years after some premier and urban schools ushered into their first experience with ICT, the Ministry of Education has now submitted a draft ICT policy to the Cabinet for approval. Because of the lack of a policy framework, ICT implementation in the school system is currently uncontrollable and irrespective of government initiatives. The literature on Ghana's ICT policy (Republic of Ghana, 2003; Ismail, 2003) reveals that there is currently no coordination on the proposed national ICT policy. Second, the other ministries are not actively involved in the policy formulation process. Third, there is lack of human resource capacity to devise and implement an appropriate ICT policy for Ghana. These policy level issues make the implementation of ICT in the educational sector more challenging. This problem does not pertain only to the Ghanaian education system but also most educational systems in the developing world. Hawkins (2002) posits that while many educational ministries around the world have made the commitment to computerize schools, few have developed coherent strategies to integrate its use fully as pedagogical tools in the classrooms. Despite the above challenges, education policy makers are quite enthusiastic about the introduction of ICT in Ghanaian secondary schools (Ministry of Education, 2002).

Conclusion

The introduction of ICT in school systems in Ghana and other sub-Saharan African nations is a major step to promoting innovation. However, like Ghana, many of these educational systems currently do not have any coherent ICT policy framework in place. The current lack of policy frameworks for ICT implementation in these educational systems shows that they are not equipped to keep up with the ICT revolution that is taking place. However, education policy makers in this region still have the chance to take advantage of the technology that is becoming more widely available. Amenyo (2003) cautions that any attempt to implement a well-meaning ICT project in a haphazard and context-independent manner would not help in sustaining it.

Nations in the developing world are not the only regions caught in the "digital divide" phenomenon, brought about by ICT implementation. Recently emergent in-country case studies and other comparative studies (Harding, 2002; Hartviksen & and Akselsen, 2002;

Nachmias et al, 2001; Sutherland-Smith et al, 2003) point out that even in advanced countries like Australia, Canada, Israel and United States, there is evidence of a persisting digital divide, despite a significant growth in computer ownership and usage overall. In the United States, evidence exists of this disparity between whites on one hand and blacks and Hispanics on the other hand. Similarly, in Canada we find the same problem between rural and urban areas where approximately 53% of rural households have access to the Internet, compared to 68% of urban households (Harding, 2002). Because of the need for equitable educational provision in school systems, the emerging revelations pose serious policy implications for governments, educators and the development community. For the Ghanaian society, the disparity in ICT provision in schools can be seen as an example of the digital divide that is likely to be created between the "haves" and "have nots" in the Ghanaian school system.

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