IT Education and Workforce Participation: A New Era for Women in Kenya?

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Abstract

“ICTs are important tools that provide the [Sub-Saharan Africa] women access to lifelong learning and training, to productive assets, and to credit. Neglecting to give women access to these tools not only deprives them and their families of income, but reduces the skill-level of a nation’s human resource, limits national productivity, and bars a country from being competitive in the global market” (International Telecommunications Union, 2003).

While Sub-Saharan Africa women have historically assumed the role as both housewives and subsistence farmers, the reality is that these women have few opportunities to become a strong and viable part of modern economies in that region. However, this trend is changing with the exponential growth of Information and Communications Technologies (ICT) globally, giving many historically poor and/or uneducated women access to computers, the Internet and other related technologies. Based on the work of an investigative team of four researchers from Kenya and the US, this paper examines the integration of women college students in the formal ICT work sector in Kenya. We do so by examining major bottlenecks and enablers to such integration from historical and contemporary perspectives. Using an interpretive approach, we conducted thirty-two interviews with women in an ICT program offered by a university in Kenya. Our findings indicate that women were highly optimistic, embracing ICT as a practical mechanism for achieving entry into the labor market. However, they perceived significant structural barriers, such as public policies that failed to facilitate the development of the ICT sector, gender discrimination by employers, and training which provided them with insufficient technical skills to enable them to effectively perform in the workplace. These findings largely confirm the gendered perspectives found in similar studies conducted in other countries. However, what appear as global perspectives are informed by the local causes.

Keywords: Women, Information and Communications Technology, Information Society, Sub-Saharan Africa, Kenya.

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Introduction

What has increasing access to, as well as training for, information technology (IT) careers meant for women in Sub-Saharan Africa (SSA)? Perhaps those supporting the empowerment of women will develop meaningful educational and employment policies to promote gender equity. Or perhaps those opposing the empowerment of women will be more effective in imposing their views, and we will see a continuation or a worsening of gender inequality (Daly, 2003).

In this paper, we begin to address this question by examining the extent to which the positive impacts enabled by ICT are realized by women in Kenya. In a special issue of the *The Information Society* on ICTs in developing countries, Sahay and Avgerou (2002) rightly stated that ICTs “are expected to play a key developmental role” in poor countries. They further stated, “Many see in these technologies the potential for turning around uncompetitive industries and dysfunctional public administration, and for providing unprecedented opportunities for the information-intensive social services, such as health and education.” In the same study, they lamented the acute lack of research which focuses on developing nations. This absence is extremely troublesome given that developing nations are home to at least 2/3 of the world’s population (South Centre, 2006). The SSA region, which is home to 34 of the 50 poorest nations of the world, is almost nonexistent in much of the mainstream ICT research (Mbarika, Okoli, Byrd and Datta, 2005; also see Appendix A).

In this paper, we focus on an IT education program at a Kenyan university which serves to redress the often intractable problem which has come to be known as the

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2 Kenya is not counted among these 34 poorest nations. Kenya has a more affluent economy than these nations.
digital divide. The concept of the “digital divide” has been useful in articulating disparities in access to ICT (Payton, 2003; Kvasny and Truex, 2001), particularly in the developing world, and it has been used to inform the development of policies and programs to promote social inclusion and economic development (Mbarika et al., 2005). More recently, the digital divide discourse has broadened to include not only issues relating to access to ICTs, but also the capability and capacity in leveraging ICT for the advancement of historically underserved populations, the development of local content on an ICT platform, and the creation of appropriate policy measures to cultivate an enabling environment for ICT use (Isaacs, 2002; Kvasny 2005; Meso, Datta and Mbarika, 2006).

In the developing country context, digital divide policies and programs typically utilize ICT to advance modernization, promote social and economic development, and improve the status of women. Gender inequality tends to slow economic growth, according to Christiaan Poortman, World Bank Vice President for the Middle East and North Africa:

“No country can raise the standard of living and improve the well-being of its people without the participation of half its population. Experience in other countries have shown over and over again that women are important actors in development - to hold them back is to hold back the potential for economic growth” (World Bank, 2004).

There are several reasons for this link. Women can play an instrumental role in lifting their families out of poverty through labor force participation. Women are also more likely to invest their earnings in their children, and to assume critical, life-sustaining responsibilities. Thus, women’s empowerment is important for determining a country’s economic success and sustainability. The extent to which women and girls
benefit from development policies and programs has a major impact on a country’s overall development success and growth prospects (World Bank, 2004; Hafkin and Taggart, 2001; Liu and Wilson, 2001). Moreover, women’s participation in the workforce and the associated economic benefits that result from this participation engender nation building and development.

In using the term “development”, we borrow from the work of Sen (1999), in which he argues that development is a process of expanding the real freedoms that people enjoy. This differs from theories of economic development, such as growth in gross national product (GNP), technological advances, and rise in personal incomes or social modernization. While GNP and personal income provide means to expand freedoms, Sen expands this notion by including determinants of freedoms, such as health care, education, political and civil rights. Development requires the eradication of sources of oppression, such as gender and racial discrimination, social and economic deprivation, neglect of public facilities, intolerance or over-activity of repressive states. Viewing development from this standpoint prepares us to consider the extent to which pre-existing gender inequalities are reflected in the ability of women to appropriate ICT. Throughout the world, there has been much speculation as to the existence and causes of, and the remedies for, gender inequality. Women around the globe have had to deal with the kind of oppression that does not allow them to have the same goals and objectives sought by men. Conventional roles of not only motherhood, but also one’s place in the broader society, affect how women engage in diverse practices such as education, career progression, public mobility, and female-male interactions.
ICT is being proposed by international aid organizations and Western corporations as playing a central role in empowering women, especially women in the “4th world”. In addressing gender discrimination as a worldwide phenomenon, Castell (1998) defines the term “4th World” as social exclusion and its deliberative opposition to the first through third world views, which enjoy a certain degree of connectivity to global economic systems. This connectivity is absent in the 4th World, where women, even in the developed world, live at a substantially lower economic state compared to their male counterparts. Further, the “4th World” including Sub-Saharan Africa, rural South America, South East Asia, and American inner cities (where some live even poorer than many parts of SSA) stands as an underclass.

While the market for ICT-related jobs has dwindled in recent years for the developed world, the same is not true for the SSA region. In most African countries, most ICTs are still at the early stages of development (Mbarika et al., 2005), and skilled human capital to develop and motivate these technologies continues to be highly demanded (Aynu, Okoli and Mbarika, 2003). Despite these tremendous growth opportunities, a large percentage of mostly skilled male ICT workers migrate to other countries (especially Europe and the US). This leaves a large window of opportunity for women in SSA to play an important role in the exponential growth of ICT in the region. To leverage such opportunities, a growing percentage of Kenya’s women are now obtaining some form of ICT education to either get into ICT careers by filling positions in the many companies that so urgently need technology workers, or to start their own ICT businesses.
Our research therefore sets forth to examine the question: \textit{How have women responded to and been empowered by ICT-focused educational initiatives/programs?} To examine this question, we seek to understand the specific differences that ICT training has made socially, economically and politically for urban-based women in an ICT educational program at Strathmore University in Nairobi, Kenya.

In what follows, we describe the longstanding barriers, such as access to education and traditional divisions of labor, which help to explain the low participation rates of women in ICT. Next, we describe our research approach along with data collected from women in Kenya. We conclude by offering our analysis and interpretation of this data.

\section*{Literature Review}

In this section, we discuss gender equity issues in terms of SSA in general, and then we narrow down our discussions specifically for Kenya. The SSA region suffers from major gender inequalities in the work place in many sectors, including technology (Kifle, Solomon, Mbarika and Okoli, 2004). Even though ICT has become a global industry, there are traditional bottlenecks that have hindered the SSA woman from participating effectively in the formal technology labor force. Because the women in this region have always been active in agriculture, local trade and other economic pursuits, a large majority of working women are found in the informal sector of the labor force (Hafkin and Taggart, 2001).

For instance, SSA women grow 80\% of the food produced, and yet few are allowed to own the land they work. They work twice as long as men, often 15 to 18 hours a day, but often earn only one tenth of the wages of their male counterparts. Our
claims that SSA women are discriminated against should in no way be taken to mean that women in developed countries are never discriminated against. Similar to their American counterparts, SSA women experience the gender gap along both economic and social contexts – thereby impacting the degree to which workforce participation is reached along gender and compensation dimensions (Hafkin and Taggart, 2001). According to the Dice 2004 Annual Salary Survey, the pay gap between U.S. women and men remains in the double digits at 11%. Among Kenyan and other SSA women, this disparity is even greater.

As SSA women attempt to move into contemporary forms of employment and finance, they face a variety of legal, economic, and social constraints. For instance, it is often more difficult for women to gain access to ICT resources and credit. Agricultural extension and formal financial institutions are biased toward the male and against the female clientele, this despite women's major role as producers. In fact, some laws in many countries in this region still treat women as minors. In Zaire, for example, a woman must have her husband's consent to open a bank account. As a result, they are less equipped than men to take advantage of the income-generating opportunities that have emerged in the region. The positive side is that these factors have spurred the growth of women's groups and co-operatives that give loans, health care and educational initiatives, and provide other relevant services to women (See the Federation for American Women Educationalists\(^3\), and FLAMEE\(^4\)). These organizations provide access to wage earning activities for many women who are excluded from formal sector work and credit services. A growing proportion of these wage-earning

\(^3\) [http://www.advanceafrica.org/index.html](http://www.advanceafrica.org/index.html)
\(^4\) [http://flamme.org/index.html](http://flamme.org/index.html)
activities take place in the “informal sector”, which is defined as “economic activity that takes place outside the formal norms of economic transactions established by the state and business. It is not clearly illegal in itself. Generally, the term applies to small or micro-businesses that are the result of individual or family self-employment.” (Cross, 2001, p. 512). While we are excited by the potential for micro-credit and informal sector work to uplift women in the “4th World”, we must remain cognizant of the familial, social, legal, and cultural constraints within which these women continue to function. We must also consider the constraints that diminish their agency and power. Moreover, we should not ignore the huge gap which remains between the lives of these women and the lives of more privileged women and men (Narayan, 2004).

Traditional Bottlenecks Specific to Kenya

With a population of about 30 million people, Kenya stands as one of the most populated countries in SSA. Nearly 53% of Kenya’s populace is under the age of 20. Demand for education by this demographic group is extremely high, but access to education is limited. As is the case with most SSA countries, such low levels of education date back to when the West colonized Kenya. The main focus was on exploiting low-cost labor and rich natural resources, not developing human capital. When educational opportunities were provided, priority was given first to the sons of chiefs. Eventually, more and more families started to send their children to school. For most Kenyan families, the boys were given the first priority to attend school before the girls. The rather limited view of women in society at the time was that of housewives and child-bearers (Lewis, 1999). This impact of the colonial era cannot be discounted as
affecting prevailing education levels in Kenya, albeit Herculean steps taken by the
country to improve its educational institutions.

As years passed, the Kenyans began to have more opportunities to learn, and
the government of the country, the private sector, and foreign investors/donors invested
substantially in education at all levels. While education in Kenya has grown in leaps
and bounds since the colonial era, only 68% of children are enrolled in primary
education programs. Enrollment in secondary education drops to 23.1% (World
Development Indicators Database, 2005). The percentage of secondary school
graduates that attend college is 17.5%, with more men attending than women, and a
high drop out rate of men (AllAfrica, 2003). Although a great improvement from years
past, adult literacy rates are still at about 70% in Kenya (Encarta, 2003). Despite
Kenya’s approximately 20 universities, a large number of high school graduates still can
not make it to the university due to insufficient space to accommodate them.
Consequently, admission to universities is extremely competitive.

Competition also comes from women who were once treated as “second class”
citizens and who are now paving their way into these institutions. In fact, female
enrollment has now surpassed male enrollment in private institutions (See Appendix B
for Kenya’s government statistics). Similarly, as presented in Figure 1 below, the literacy
gap between males and females in Kenya is closing rapidly. Gender does not appear to
be a significant barrier to women’s access to educational institutions.
Figure 1: Kenya’s Gender-Based Adult Literacy Rate for Years 1980, 1990 and 2000
Source: World Resources Institute
http://earthtrends.wri.org/text/population-health/country-profile-96.html

Despite these statistics, which largely support the fact that Kenya has seen great improvements in female education, the harsh reality is that women largely lag behind men in technology related fields. Female students make up only 30% of total enrollment in the public universities, but 54.5% of total student enrolment at private universities. (See Appendices B and C). Most women enroll in private universities because they fail to secure admission into public universities which have stringent requirements for the hard sciences such as Physics and Mathematics. Kenyan girls avoid the hard sciences for several reasons including: perceiving the subjects as 'hard'; lack of quality time as they often have more family responsibilities than their male counterparts; and lack of focus on future careers such as Computer Science which requires both Physics and Mathematics. This lack of career preparedness is due, in turn, to lack of appropriate career counselling for girls under the assumption that they will either get married or pursue traditional careers. Many of these factors also contribute to the relative poor performance of girls on the Kenya Certificate of Secondary Education (the equivalence
of the U.S. high school diploma) (Ngome, 2003). Figures from Kenya’s Ministry of Education, Science and Technology show that even within the last five years, female enrollment in technical institutions such as in National Polytechnics and other tertiary technical institutions is about 3/5 of male enrollment in the same institutions (See Appendix C). For example, in 2003, the ratio of male to female enrollment in technical institutions was 19,831 to 12,887. While this ratio mirrors those found in the developed world, there is need to research how current Kenyan female students enrolled in these technical programs feel about technology in general and ICTs in particular. Attempting to use findings from the developed world to draw inferences for the Kenya (and other SSA countries) will not only be limiting but risks painting a picture that is far from reality, given inherent socio-economic and cultural dissimilarities between the two worlds.

**Parting with Tradition**

Breaking the traditional role of the SSA woman presents a challenge to the government agencies, international development agencies, educational institutions and companies working to broaden the participation of women in ICT-related fields. However, SSA also presents many opportunities. Despite their relatively low involvement\(^5\), women represent a potential economic force in the region, partly because they constitute a larger part of the population and partly because of the sheer size of the female workforce (Hafkin and Taggart, 2001; Liu and Wilson, 2001).

While the dissemination of information has become a necessity in development throughout the world, the positive aspects of ICT have largely bypassed SSA women.

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\(^5\) We acknowledge that many African countries have made major improvements in women involvement in their governments, but the reality is that those are just exceptions, and not the rule. These countries still have a long way to go in the area of gender discrimination.
The few women who have access to ICT typically hold clerical positions, which often do not lead to promotions up the corporate ladder. Therefore, there are very few women at the systems analyst, managerial or consultant levels. The few women who have reached these ranks are likely to have been trained privately by their employers. A few women have obtained their computing qualifications abroad, mainly in the USA, Canada and UK. Thus, SSA women are grossly under represented in ICT management jobs but rather are often limited to data entry and other lower paying and status positions (Liu and Wilson, 2001). Further, a limited number of Kenyan women (less than 2%) study in science, technology and engineering curricula, according to Hafkin and Taggart’s (2001) study of ICT education among women in developing countries. It is apparent that the impact of ICT on women and the role women are playing in the ICT field is minimal because of the general status of women in the region.

Our preceding argument about the role of women is also strongly grounded in mainstream gender studies. Anand and Sen (2003) offer gender-equity-sensitive indicators (GESI) to analyze gender deprivation which is inclusive of gender (in)equality. The model mathematically depicts systematic and large differences between groups based on factors such as regional populations, racial ethnicities, gender and socio-economic status. For women and men, Anand and Sen (2003) assess relative inequality in achievement based on distinct dimensions such as literacy, biological life expectancy, earnings and employment. Generally, in developing countries like Kenya, literacy averages are higher among men than women, while life expectancy proves counter with a predicted 5-year longer duration among women. Wage disparities between men and women are asymmetrical in nearly all societies, including developing countries. Women
work as hard, or harder, than males, but the work of women is often uncompensated – hence failing to attribute to a corresponding component in the authors’ mathematical calculations. Thus, the degree of precision of women’s earnings is more difficult to estimate.

In sum, wage and earning disparities are heightening for women, in general, but particularly acute in SSA among women. Hence, while ICT may offset some of the disparities, the work of Anand and Sen (2003) illustrates that generations of unearned wages and/or low wages hinder the progress of women. This would suggest that it becomes important to give women an opportunity to play a major role in the ICT sector because of the potential advantages for improving a broad array of life chances. For example, ICT can facilitate access to education and health care, minimize isolation, facilitate economic growth, alleviate poverty and provide empowerment. Training women in ICT can help alleviate the acute shortage of ICT skills needed by employers in SSA (Mbarika et al., 2002). Moreover, women may possess useful skills such as business and management aptitudes, and people and communication skills that could prove useful towards the improvement of Africa’s overall economic development.

To leverage the prevailing higher proportion of women to men in Africa, as well as the skill sets they possess that could help in Africa’s development, many African governments and private investors have launched multiple projects to help women benefit from the many opportunities provided through the use of ICTs. In the section that follows, we detail some existing initiatives and the rationale that guided our decision to study Kenyan university women.
Selecting an ICT Project

When we began this project, we considered many types of ICT initiatives aimed at increasing the involvement of women in ICTs. For instance, the Cisco Learning Institute (CLI) and the Cisco Systems, Inc. established the Gender Initiative in 2000 to increase women’s participation in the field of information technology by making ICT training and career opportunities more accessible. Successful participants receive Certified Networking Associates (CAN) and the Certified Networking Professionals (CNP) credentials which are highly recognized in the IT industry (CISCO, 2004).

We also considered ICT programs being offered by international aid organizations, such as the World Bank Group’s Global Information & Communications Technologies (GICT) department. GICT serves as the World Bank Group’s core department for ICT programs, projects, and policies directly aimed at helping women become more socially and economically independent in SSA and other developing countries (Global ICT Department, 2004).

After careful deliberation, we decided against these types of organizations. We do not view the involvement of multinational interests such as Cisco Systems and World Bank as inherently empowering. Quite the contrary, we see the current discourse around development and ICT as tools for women’s empowerment as somewhat worrisome because gender equality tends to be narrowly constructed around ICT skills and access. It provides a neat, technical solution to the complex, longstanding and pervasive problem of gender equity. Therefore, we found it crucially important to examine ICT in relation to the needs, rights and perspectives of women. Moreover, we
wanted to gain these insights by engaging with the women who are subjects of the discourses produced by these large and powerful multinational entities.

This led us to consider non-government organizations (NGOs), such as the Zimbabwe Women’s Resource Center and Network (ZWRCN) and Women Connect, which serve as information providers to African women. Recognizing that the lack of information is a major hindrance to the development of women, ZWRCN provides information on gender, women’s health, and legal issues in Zimbabwe. Women Connect assists female-led NGOs in Uganda, Zambia, and Zimbabwe to use ICT to advance women’s health (Mukenge 2002). Women Connect works with ZWRCN to train women at dissemination workshops (Mukenge 2002) and to set up IT facilities in rural areas. These facilities provide vital health-related information to rural women, training them in email as well as Internet access to download health information that meet their particular needs (Mukenge, 2002; Women Connect, 2003a; Women Connect, 2003b).

As we conducted initial analysis of these locally-situated organizations using available reports, research papers, policy documents, and web sites, it was difficult to determine how and why the women were using ICT, and whether this has lead to improvements in their workforce participation. While optimistic about the potential for ICT to improve the life chances of women in SSA, we needed primary empirical evidence to support this claim. Thus, we saw the need to gather a richer set of data to better understand the intended beneficiaries of these technologies, and we had to find a creative way of constructing this data from afar. We also knew that we needed to work with women who were fluent in English, as this was the common language among the research team. To the best of our ability, we wanted to “hear” the voices of the women.
Finally, we wanted to leverage our experience as both information systems researchers trained in American business schools and as practitioners working in technology firms. Given our focus on workforce participation, it seemed that the university setting would be most appropriate for gaining access to women with credentialed skills which would be recognized in both the local and the global labor markets.

This led us to consider female undergraduate students studying IT in an urban university. In as much as NGOs and international organizations bias the perspectives, attitudes, and values that women within their sphere of influence place on ICTs, the faculty at the university has the same influence on the female students attending their courses. In all cases, the students acquire skills imparted to them. However, we believe that the university setting provides us with a higher level of familiarity which would increase our ability to provide a credible interpretation of the data. Universities would provide, perhaps, the newest technological advances as well as access to women with high levels of IT literacy. This, we believe, is novel in that most representations of African women tend to be pessimistic, focusing on severe poverty and the social evils that it creates and reproduces.

It was also feasible for us to form a collaborative relationship among US and African researchers, which would help us to overcome distance and cultural barriers. We also believe that university women may stand the best chance of breaking into the technology industry. These women have the credentials and training recognized and rewarded by the Western companies influencing IT policy and industry formation in Sub-Saharan African countries. We, therefore, believe that these university women have a higher level of readiness to leverage ICT skills in the labor market. However, we realize
that, in making this choice, any interpretations derived from our findings would be limited to the small number of women who are afforded the opportunity to garner a tertiary education.

Research Approach

The question guiding our research is, how have women responded to and been empowered by ICT-focused educational initiatives/programs? To examine this question, we sought to understand the specific differences ICT training has made in the lives of the Kenyan women. Given traditional bottlenecks, empowerment is concerned with women’s capacity to make meaningful education and employment choices which result in transformative outcomes. Central to the notion of empowerment is agency – the ability to define one’s goals and act upon them. Agency encompasses observable action as well as meaning, motivation and purpose which individuals bring to their activity. Our notion of empowerment is centrally concerned with the women’s sense of agency to define ICT and pursue career-related goals, even in the face of opposition from others.

This view of empowerment led us to conduct interviews with women who were the intended benefactors of the numerous digital divide initiatives. Using Cameron’s (1992) notion of “empowering research”, we conducted interviews to solicit the views of the researched group about the phenomena under investigation. We advocate that empowerment means more than just getting computer hardware and software, Internet access, and IT skills to women who previously had no access to these resources. Empowerment, herein, insinuates that women are afforded opportunities to play an integral part in the emerging digital environment. Gender discrimination in the workplace
and in schools, social class, illiteracy, and geographic location are structural barriers to women’s empowerment. ICT is then overlayed onto an existing landscape of entrenched gender, class, ethnic, economic, and other geopolitical power divisions. Given these structural obstacles, we seek to understand how women fare in ICT-related educational programs and employment fields.

However, a particular danger associated with researching and writing about disadvantaged groups is that the researcher may contribute unwittingly to the oppression of the group by making statements which could be interpreted to support popular prejudices (Herring, 1996). Accordingly, we are careful to avoid generalizations that could contribute to the pessimistic discourses about all women in SSA. We also are cautious about romanticizing the technology and seeing only its positive and beneficial impacts. The notion of ICT as empowering women is situated in the logic of technology determinism. Such forms of technology determinism give far too much weight to technological change in explanations of social change. ICTs are, therefore, not considered as inherently empowering for women. Instead, we are interested in examining the ways in which these technologies are being absorbed into existing gender politics.

Finally, we acknowledge that our reading of the data is informed by our position as scholars of African-American and African descent residing in the US. While geographic location separates three of the researchers from the women in our study, we do share commonalities that we believe help us to provide a culturally sensitive analysis of the data. We, like the women in our study, are members of the African Diaspora engaged in IT-related professions. The African Diaspora represents the global
experiences of people of African descent who are dispersed throughout the world. We have held ICT-related positions in both industry and academia. Based on the challenges that we face as members of a profession in which we are woefully under-represented (Payton, White and Mbarika, 2005), we share in the experience that comes from being an outsider, an Other. We have firsthand experience in being seen as incompetent simply because of gender, race, and/or country of origin. Further, we continue to contend with the devastating effects that this psychological and institutional violence imposes on our self-esteem and confidence. We genuinely appreciate the inner strength and integrity of Kenyan women who, despite these obstacles, continue to fight for a place in this profession because we, too, are engaged in a similar struggle.

The unveiling of our backgrounds and statement of solidarity with our informants is an important philosophical orientation underlying this research. Feminist scholars argue that academic and other knowledges are always socially situated, and are always produced by positioned actors mediating various research locations and relations (Haraway, 1988; Hooks, 1989; Collins, 1998). These positions shape the conceptualization, conduct and dissemination of research. Hence, the practice of constructing academic knowledge is a relational rather than a straightforward process. Although no point exists from which to objectively evaluate the merits of any particular knowledge, what has usually been taken to be legitimate knowledge has been based primarily on the lives of men in dominant races, classes, and cultures (Allen, 1998). In locating our social position, we explicitly express our connection with the African Diaspora. In doing so, we seek to produce an account which is embodied, locatable,
and makes it possible for readers to make critical and politically progressive connections to the findings.

**Data Collection**

In July 2004, we conducted structured interviews with 80 students (32 women and 48 men) enrolled in the Bachelor of Business Information Technology program at Strathmore University in Kenya. In this paper, we focus exclusively on the 32 female respondents. All of the woman were in their third or fourth year of study, and were enrolled in the “Social Impact of ICT” course which was being taught by the fourth author. All the women are of Kenyan nationality, recent graduates from secondary schools, 20 to 22 years of age, and mostly single. The women were primarily fee paying students who financed their education through work, loans and scholarships. Most of the women have completed or are currently engaged in an internship with a company. These characteristics of the informants are summarized in Table 1.

<table>
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<tr>
<td>Gender</td>
<td>Female</td>
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<tr>
<td>Age</td>
<td>20-22</td>
</tr>
<tr>
<td>Year of undergraduate study</td>
<td>3 to 4 years</td>
</tr>
<tr>
<td>Industry attachment (internship)</td>
<td>Completed or in-process</td>
</tr>
<tr>
<td>Date of interviews</td>
<td>July, 2004</td>
</tr>
<tr>
<td>Length of interviews</td>
<td>20 – 25 minutes</td>
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**Table 1: Characteristics of Informants and Interview Process**

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<th>Arusi</th>
<th>Aza</th>
<th>Badu</th>
<th>Becca</th>
<th>Bibi</th>
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<td>Desta</td>
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<td>Fola</td>
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<td>Issa</td>
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<td>Kesia</td>
<td>Loiyan</td>
<td>Makena</td>
<td>Marjani</td>
<td>Nazi</td>
<td>Ndila</td>
<td>Neema</td>
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<td>Selam</td>
<td>Sharik</td>
<td>Thairu</td>
<td>Wanabui</td>
<td>Zahara</td>
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20
We constructed an interview guide based on a prior study of the conceptualization of ICT by African American women in a technology education program in the US (Kvasny, forthcoming). We believe that the questions contained in this interview guide are appropriate because they seek to uncover how women in the African Diaspora think about ICT, the values that they ascribe to ICT, their strategies for appropriating ICT in their struggles to improve their life chances, and the barriers that they face in doing so. The themes and representative questions are included in Table 2, and are consistent with prior studies in developing countries as documented by the Women’s ICT-Based Enterprise for Development\(^6\) and the site’s well-regarded case studies by information systems scholars, such as Morgan, Heeks and Arun (2004).

<table>
<thead>
<tr>
<th>Themes</th>
<th>Interview Questions</th>
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<tbody>
<tr>
<td>Motivation for learning about ICT</td>
<td>In your opinion, why do women participate in this ICT program?</td>
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<tr>
<td></td>
<td>What is at stake if you do not learn about ICT?</td>
</tr>
<tr>
<td>Challenges &amp; barriers to learning about ICT</td>
<td>What barriers and challenges did you face today as you prepared to come to class?</td>
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<tr>
<td></td>
<td>As you move forward to leverage the ICT skills that you’ve gained, what roadblocks or challenges do you face?</td>
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<tr>
<td>Attitudes / Beliefs about ICT</td>
<td>What were some of your initial beliefs about computers when you first came to class?</td>
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<td></td>
<td>How have these initial beliefs changed as a result of your experience in this course?</td>
</tr>
<tr>
<td>Value of the ICT training and access</td>
<td>In what ways did the training meet and/or fail to meet your expectations?</td>
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<td>How will you use your ICT skills to improve your quality of life?</td>
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<td>What aspects of the program would you change?</td>
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<td></td>
<td>What aspects of the program would you not change?</td>
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<tr>
<td>Definitions of the Digital Divide</td>
<td>In your own words, what is the digital divide?</td>
</tr>
<tr>
<td></td>
<td>Some people say that the divide has been bridged since we have provided people with computer and Internet access and training. Do you think so?</td>
</tr>
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\(^6\) [http://www.womenictenterprise.org](http://www.womenictenterprise.org)
The interviews were administered by the fourth author, a researcher located in a university in Kenya. All of the interviews were conducted in July of 2004, with each interview lasting for approximately 20-25 minutes. During the interviews, each woman was instructed to reply to the questions by anonymously writing her response in a booklet. The booklets were then sent to the co-authors in the US for data analysis. This interview process resulted in an average of 4 pages of hand-written responses for each interviewee (approximately 128 pages of interview texts). The interviews were highly structured with each woman receiving exactly the same questions in the same order. While there were no opportunities for follow up questions or clarification, the US researchers conducting the analysis did consult with their colleague in Kenya. Together they negotiated their understanding of terms and other unfamiliar cultural aspects. For instance, two US-based researchers did not understand the term “attachment” (an internship). The US researchers also found that all of the women discussed gender but only one woman explicitly talked about her race. This led the US researchers to inquire further about the demographics of the interviewees and racial / gender identity in Kenya. These discussions helped the US researchers to better understand the Kenyan context, which led to a more culturally sensitive analysis of the data.

**Data Analysis**

We employed well-established techniques for analyzing qualitative texts by finding illustrative themes which emerge across interviews (Glaser and Strauss, 1967; Miles and Huberman, 1994). Two US researchers began by independently reading and coding five interview texts. The coding utilized a grounded approach that was not
informed by a priori theory. Weekly meetings were held to discuss the interim analysis. The codes were synthesized and refined, and an additional batch of 5 interviews was selected for analysis informed by the codes. This process was continued for two months until all of the interviews were coded.

Next, the texts with similar codes were typed and grouped together for more focused analysis. We began clustering low-level codes into more abstract themes and finding relationships among the higher level themes. During this phase of focused coding, the entire research team met to share perceptions about the data and to build consensus on the analysis. It was important that we accurately captured the women’s perspectives, and provided a credible account of the research.

Findings

The findings presented in this section are organized around the 5 themes which guided the interview process – motivations for learning about ICT, challenges and barriers to learning about ICT, attitudes and beliefs about ICT, value of ICT training and access, and definitions of the digital divide. To protect the identity of informants, we fabricated the names used to identify each of the quotations. In what follows, we use these quotes to discuss each theme in turn.

Motivations for Learning about ICT

Nearly one-third (10 out of 32) of the women who participated in the ICT educational program at Strathmore University did so because they perceived the field as new and exciting. Some like Ndila were simply “participating since it seems like a very marketable course”. Others like Marjani were drawn from a “curiosity of IT which is a new field in Kenya and a very dynamic field which affects all aspects globally”.

[23]
Women also believed that there were substantial employment opportunities upon graduation because there were few ICT professionals competing for jobs. For instance, Dalila remarked that “IT is a fairly new industry in the country. Thus when Strathmore University designed the program, it was well respected in the country. The main motivation for me, as a woman, was due to the opportunities it would open for me in the future. By the time I was joining this program, there were very few IT positions in the country, but this is gradually changing.” There was also the perception that “not many people in Kenya have this sort of information [and] this is because currently in Kenya there lacks professionals in this field” (Issa). Not only were jobs seen as plentiful, they were also seen as well paying. Makena, for instance, believed that “IT programs have proved to be more well paying careers than other technical careers in the country. This is due to the wide usage of IT in various sectors such as banking firms. This provides a good basis for the women to work in a different sector while applying their IT knowledge”.

Thirteen of the women were motivated by the instrumental desire for career success. They wanted to be more competitive in the job market. Aza believed that “Women participate in the program in order to gain IT skills that they will be able to use in the outside world. IT tools are becoming a necessity in the business world and thus by taking this program, women will be able to gain more skills that are applicable in the job market.” Some women were more entrepreneurial and saw ICT as a way to start their own business. According to Arusi, “I want to be a business person in the future. I want to own my own business in Kenya so I need business and management skills. However, I also realize the role of IT in today’s society. I wanted to know how to link the
two – business and IT –and how I can use the two to develop my ideas of a business I hope to start”. In a similar fashion, Deka noted that “Since I have the basics of IT and my course provides a grounding I can build up on my own, I could start my own enterprise using this knowledge”. For women such as Zalika, business ownership was once a dream that now can potentially be achieved. “Given that I would like to learn IT so that I run my own IT firm in future. If I do not take this chance to learn IT, then my dream will not be accomplished”.

However, the majority of the women (23) were motivated to attend the ICT programs by gender equality. For instance, Badu reflected that “Since the initiation of gender equality, women have been able to overcome all sorts of challenges and exploit their potential to the fullest. As a result of this there has been more of women participation”. For them, ICT offered an opportunity for overcoming oppression and competing head on with men. Neema stated that “Gone are the days when there were specific jobs/careers for men and women. Women now want the challenge.” Similarly, Saada believed that “Women want to be able to compete equally in this profession that has been considered a man’s profession for a long time.” ICT represented a vehicle which would enable women to engage in a profession which has been historically perceived as a male domain. Chanya observed that “the reason for participating in this program is to broaden the job skill and not stick to the stereotype that certain jobs are for women. IT has impacted many areas and even women realize that there are job opportunities that come with this vast growth. They therefore want to be part of it.” Women want to break out of stereotypical roles and take advantage of perceived employment opportunities. For instance, Tamu remarked that “The simple reason why
women participate in this IT program is because men do the same thing. Equality is something that women have all been fighting for and have accomplished their goal. If a man can participate in IT, why shouldn't a woman do the same thing?”

Women also appeared to be strongly influenced by national polices and public discussion which promote gender equity. There was the belief held by women such as Adhiambo that “women have a better understanding of the technological world so that when we begin our career we will be able to successfully represent other women in our country”. The desire to represent Kenyan women was also salient in Eshe’s reflections on changing societal norms on parenting girls. “Due to the empowerment of women in recent years, more and more parents are becoming interested in the girl child and encouraging the girl child to become active in society. More and more women want to play an active role in their society and in the world, and this being the information age, women want to be involved in the ICT sector (not to be left behind their male counterpart).” There is a sense of societal change in the women’s discourse; challenges may exist, but gender relations are improving. For instance, Becca stated that “As a Black Kenyan woman, it is my decided opinion that women participate in IT programs due to the rising gender awareness in the country. It is as a result of the awareness that women can compete on an equal platform with men, and the Gender Equality Act that we have been empowered to participate in IT”. Badu also reflected on women’s increasing involvement and participation. “Since the initiation of gender equality, women have been able to overcome all sorts of challenges and exploit their potential to the fullest. As a result of this there has been more of women participation”.

Nazi also acknowledged the growing opportunities for women - “these days it’s not a matter of this is for women and this is for men.”

In summary, women’s participation in the program was motivated by two strategic factors. First, women sought to achieve gender parity and assume an active role in changing society. Second, women were motivated by more tangible economic and entrepreneurial aspirations for participating in the formal workforce. The responses were future oriented and predicted a variety of grave outcomes for those lacking knowledge of ICT.

**Value of ICT Training and Access**

All of the women who we interviewed held beliefs about the training which centered on very practical and production oriented uses of ICT. Theory was greatly devalued while practical experience was prized. Ndila lamented, “I expected a more practical course and more indepth coverage in areas such as programming, systems development, web design, etc.” The women desired a strong technical competency in a wide variety of skills. Anyango noted, “I expected to emerge as an IT expert with knowledge of the foundations and development of technology. I expected to be up-to-date on the technology trend and be able to manage information systems, develop them, code, implement, manage, and have ICT at my fingertips”.

The practical orientation extended beyond the notion of skills. Overall, a dozen women stated that they expected to easily gain employment upon completion of their training. Issa simply stated, “It will guarantee an instant job.” Most were more conservative like, Loiyan, who stated, “My expectations were to gain IT knowledge and skills that will prepare me for the job market and enable me to get a well paying and
fulfilling job.” Technical skills were seen as mandatory in the job market and in everyday life. Deka stated, “IT is becoming a basic need for people in their various careers and day to day life. Not having some knowledge of IT means difficulty in even accomplishing simple tasks such as using and ATM. Not having the basics of IT could close doors to jobs that are not essentially about IT”. Seventeen of the 32 women mentioned severe employment consequences for those without technical skills. Dalila notes:

“All employers are currently demanding that you have basic IT skills. And as many more people study IT, this demand is increasing and its no longer surprising to be asked to have additional networking skills even for us graduates (to be). Employers are asking for additional professional qualifications, e.g. Oracle, Cisco, etc. Thus currently it is actually a requirement to possess IT skills in any meaningful job that you apply for. So its either you learn IT or risk your future.

The focus was clearly on technical skills and competencies, with non-technical skills seen as complementary. When asked what aspect of the program would they not change, most women agreed with Selam’s response - “the business aspect of it, the management part.” Arusi also noted, “Through the mix of business/management and finance course with IT courses, I now see my dream coming true.” Women such as Chanya thought that the project assignments were useful. “I would not change the project assignments that are given be it individual or group. I think they are a helping tool to better learning for any student in IT.” The industry attachment was also highly regarded by the women such as Hasina who noted, “Industry attachment gives us chances of employment after completion of the course”. In this sense, both the projects and internships supported the practical, hands on orientation which motivated the women’s participation in the program.
Nearly every woman used terms like “expert”, “competence”, and “competitiveness”, which reflect the practical business orientation of the education that they are receiving. Dalila captures these themes in her response:

When I enrolled I hoped that by the time I would be graduating I would be a competent IT professional able to integrate my IT knowledge into a business environment. That I would be able to streamline an organization’s process effectively with IT so as to increase their competitive advantage. In short, I hoped that I could be an IT expert with sufficient business knowledge. I also expected to be more competitive than other students who are pursuing computer science as I would have all the knowledge that they had plus business knowledge thus I could be more marketable than them.

Lack of confidence was a concept that was invoked by several women to describe a relatively low level of self-efficacy. The lack of confidence tended to result from a negative experience during the industry attachment. Nazi shared her experiences:

It [the program] failed in that non availability of computer hence little exposure to the IT world, I didn’t learn a lot in response to attachment i.e. during attachment one realizes that they really don’t know, lectures not delivering that well enough i.e. student read to pass not understand. No confidence. It has met this expectation in that we know more than we did when we first came. I can handle few but not all problems with computers.

Dalila reiterated this view:

The training failed to meet those expectations as I am in my fourth year but I still don’t think I have the required technical skills that the market is demanding. My business unit was well taught but my IT classes lacked to impart the knowledge that I had hoped to acquire. I learned about networks, databases, websites but it was too theoretical. I cannot immediately apply this knowledge, something I proved when I went for my attachment. We are hired to be managers but nobody will employ us directly into management positions. We have to start as techies then climb the ladder. I feel we lack the technical skills.

Thus, while women placed high value on technical skill and business prowess, the translation of these competencies from the classroom to the workplace was difficult.
Class projects and lectures were helpful but didn’t provide sufficient practical skills. This resulted in a lack of confidence when women went out into the workforce.

**Challenges and Barriers to Learning about ICT**

The women mentioned a number of challenges and barriers which they believed limited their ability to translate their classroom learning into paid employment. Wanabui, for instance, suggested the lack of specialization and depth as potential barriers. “*The challenges we face is that we are equipped with skills of all areas of IT but not experts in those areas while other people in the filed form other universities specialized in an area of which they are good at and are employed for.*” Neema made a similar point when she noted, “*To a certain extent it did meet my expectations as it gave me an insight. But on the other hand, it is so wide that it only gave basics of the IT world which proved to be disastrous out in the field. We have very basic knowledge of some IT skills.*” Anyago added, “*Unfortunately, I think the training is too theoretical and application of it in an actual working environment is difficult*. Desta observed that the training failed to meet her expectations “*because it has been based more on theory than on practical or pragmatic situations. Thus I am not able to really relate what is actually happening in the real world with what I have actually learnt in class.*”

Perhaps most importantly, from the standpoint of empowerment, the women acknowledged several structural barriers that limited their ability to realize their goals. These barriers occurred at three levels: policy, societal and organizational. At the policy level, three women remarked that unclear government regulations resulted from policy-makers’ lack of appreciation for ICT. These unclear regulations were believed to stymie growth in the IT sector. For instance, Makena stated:
The government regulation of IT issues is not clear, therefore making it difficult for IT growth in Kenya. This makes it costly to apply IT knowledge in the field. The lack of appreciation of IT for policy makers creates a roadblock as the policies in place do not adequately give IT professionals a fair ground to work as bureaucracy is still in place. The IT roles are not defined in the ministries therefore ICT management in the country doesn’t give a good basis for policy makers to make decisions.

Aza also asserted, “The major challenge would be lack of technical skills due to the lack of practical training and also the government regulations on IT may limit the growth of IT in the market.”

Nearly every woman discussed issues related to the societal context. The most common response was that many people in Kenya still don’t understand IT. Zalika lamented, “The main challenges are that in Kenya, IT has not gained as much popularity as the Western countries. To educate the population first is one big roadblock”. Similarly, Fola observed, “A major challenge I face is lack of the IT awareness among other people. Most people who do not undertake the IT training have no idea what it’s all about. It is therefore hard on people in this field since not many people are conversant with it.” Costs were seen as a major roadblock. “Financial challenges as most of the IT skills require a lot of money.”(Kaya) There were also large personal costs of time and money associated with the rapid level of technology change. Saada’s experience is typical of the women interviewed. “I have to keep up with the ever changing technology through reading the latest journals, searching the web for new discoveries and also listening to any IT news be it on radio or television”.

Finally, at the organizational level, Zahara used the metaphor of a pioneer to describe their experience in labor market. “Since we are pioneers of this course, most organizations and companies out there really don’t understand what this course entails
and according to them they don’t know what positions we can hold in their companies.” Zahara further posited, “Most organizations in Kenya do not fully appreciate the value of good IT in managing business processes”. Eleven women echoed this pessimistic stance on employment opportunities based largely on companies lacking the wherewithal to take advantage of the skills that these women possessed. Adhiambo’s quote is fairly representative - “Not many companies in Kenya see the need for people who can mix IT with management of business, they are still expecting technical people, so my experiences are going to be hard to get.” Makena expressed similar sentiments. “IT popularity is growing at a slow rate and most organizations are at early stages of developing their IT department. Thus part of the knowledge gained in this training may not be useful as organizations may not be willing to invest fully in IT…” Eshe sensed that organizations have a limited understanding of the role that computers and technology professionals play in organizations. “People in this country do not know much of IT. When they see you are an IT person, they think that your job is to fix their computer whenever it crashes.” Dalilla also noted that “there is a discrepancy between what we are taught and what the market wants. Thus the main challenge is to define what I am capable of in the market and still be able to fulfill the market’s requirements of an IT professional”. Deka also expressed apprehension with “Taking IT where there has never been IT might be difficult. If I got hired in an organization that isn’t far advanced in IT, I could meet resistance.”

Three women mentioned employers’ lack of trust in graduates with little experience. Loiyan reflected on limited experience from the perspective of the employer. “People in the job market are not willing to take on students who lack
experience in IT. Not many people are willing to give students a chance to gain the experience needed to enhance their IT skills”. Ndila said, “People (employers and others) are not willing to trust IT graduates who have no experience and also being quite young is a challenge to me.” Deka talked about limited experience from the perspective of the job seeker. “I have some experience but this could be insufficient to compete with those who have been in the industry longer. Hence, finding a job has bright prospects but might prove challenging.”

Desta was one of two women who expressed concerns regarding gender discrimination. “As I move forward, the challenges that I foresee is that being female in a male dominated field, then it requires me to work hard and even have more qualifications.” Saada thought:

I am uncertain about whether or not I will get a job in the field I have studied in. This is because unemployment is a large problem in Kenya. There is a problem that because I am a woman, employers may not think that they should give me a job working in IT, so I may never fully get to use all that I have learned to do, work that I want to do.

In summary, women identified barriers related to practical technical skills, national IT policies and society’s overall lack of knowledge of and experience with ICT. Business organizations in Kenya were also seen as lacking the capacity to take advantage of the mix of business and technical skills possessed by the women. Organizations were also perceived as not hiring inexperienced employees and a small number of women raised concerns about gender discrimination.

**Attitudes and Beliefs about ICT**

Technology was seen as a fundamental imperative by nearly all of the women. Ndila and others believed that, “IT is the wave of the future, the worker heading towards
a completely digitized era. By not learning IT, one will be at a loss in the not too far
future since the majority if not all aspects of your life will have to collide with IT
applications.” Marjani expresses similar sentiments at both an individual and national
level. “IT affects most areas of our lives – communication, business, health – and is
therefore an area hard to ignore. Not learning IT means we will lag behind in developing
our country.” IT is also seen as the driver of social change because, as Bibi stated, “IT
is the driving force of the world and the current environment. In order to get a job and a
good job one needs to have IT knowledge”. The national implications of ICT are also
seen in Wanabui’s response “If you do not learn IT then the business world will be hard
to participate in due to the lack of understanding…And if the people do not learn IT, the
future of Kenya will be at stake as it is a developing country that needs to fully adopt IT
in all systems.” According to Becca, “those with IT knowledge will be the power-
brokers”.

Eleven of the 32 women discussed the idea of lagging behind and being
marginalized and oppressed if you lack computer skills. Desta warned, “If you don’t
learn IT then one will not be able to grasp various opportunities that it provides. Without
knowledge in IT, one is marginalized as the rest who are keen on IT are able to use
what they know to their advantage”. Similarly, Eshe cautioned, “If you do not take part in
IT then you get left behind. And the world is moving at a very fast pace because of IT
and one has to know IT so as not to get left behind”. Women, like Deka and Eshe,
perceived new forms of oppression and exploitation for those lacking IT knowledge and
skills. “Those who know about IT will oppress us who do not know by overcharging us
for services. For example, when cyber cafes started, they were charging 5 shillings
(about $.06 US dollars) per minute of service but [now] that people know the costs they charge 1 shilling per minute”. Arusi also believed that without IT skills, “It gets more costly to reach my goals since I’ll have to depend on others who know, have the info. This means that there is a risk of being taken advantage of because of my ignorance.” While some see new forms of oppression, others perceived new forms of freedom and opportunity. For instance, ICT may be beneficial “because it has enabled women to multitask i.e. work at home while still nursing their babies via the use of portable computers” (Fola). Nazi suggested that “IT makes life easier, faster and at times cheaper.” Makena contended, “The competitive edge that IT knowledge gives to job seekers makes it worthwhile for people to learn more about IT. The wide usage of IT in all sectors has made IT an essential tool to have in order to get work in most of these sectors.”

**Meanings and Impacts of the Digital Divide**

The final group of questions focused on the women’s self-defined meanings of the digital divide. With this question, we were interested in seeing how the women connected issues of social inequality with ICT. It provided a way to hear them talk about their family members and peers who did not have an intimate relationship with technology. What was most salient from this discussion is that only one woman believed the problem had been solved. All the other women emphatically stated that the divide has not been bridged. Looking closer into their reasons for coming to this conclusion, we found that the divide still exists at the personal, national, and global levels.

Personally, the divide is seen as a gap in both access to technology artifacts as well as the know-how to make effective use of these artifacts. Nineteen of the women
adopted this standpoint and defined the divide as the big difference between “computer literate and computer illiterate people” (Issa), “those who have easy access to technology and those who don’t” (Selam), and “those who have some IT skills and those who don’t have” (Thairu). Each of these definitions is structured as binary oppositions, which is consistent with the simplified constructions found in much of the prevailing digital divide discourse (Kvasny, 2005; Kvasny and Payton, 2005).

This same dichotomy is used to structure the national and global levels. Women used language, such as the gap that exists between “third world nations and industrialized countries in terms of IT” (Hasina), and “developed nations and developing nations in terms of knowledge about IT and how it can be used to better living standards” (Nyamu).

At the national level, Aza expresses this dichotomy as “the way that some parts of the country that is the rural areas lack information technology tools while the urban centers have most IT tools”. It shows the ratio of how many people have access to technology against those who do not. This formulation of rural versus urban areas is consistent across the responses.

At the global level, the divide was defined by Ndila as “the difference between the level of technology in the more developed countries and that of the developing nations. Yes we at this learning institution have been provided that but all this is mainly concentrated in the major towns. The rural areas have been left far behind such that the average for the country is quite low compared to that of the developed nations. Thus we cannot say it has been bridged based on the numbers/statistics of the cities”.

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In addition to these dichotomies which are typically used in digital divide discourses, the women used terms which suggest a human rights perspective. For instance, Eshe suggested that “the digital divide is whereby you have in one region people know and get to have first hand experience of technology while in another area (in the same region) people do not even have a clue as to what technology is and how it can revolutionize their lives for the better”. This quote clearly brings out the inequities that exist among people who co-exist in close geographic proximity. Dalila noted, “A lot needs to be done because as of right now there are so many bright Kenyans who have had no access to any of these IT components. It will be a while before it can be completely bridged”. Implicit in all of these definitions is the assumption that greater ICT access and know-how will lead directly to improved living conditions.

Moving on to the question of why the divide has not been bridged, sixteen women noted that access alone fails to equal awareness of its potential for helping to shape societal change. Becca stated, “The digital divide is not merely about providing computers or software but having the necessary know-how to apply these software and hardware. Hence the digital divide can only be bridged if the people know and apply IT concepts to their lives”. Desta also believed that, “Having access to free computers, software and internet-based services does not necessarily mean that the gap has been bridged. There has to be understanding of this technology and using the technology to obtain benefits. Until there is access to these resources and its understanding even in remote places then the digital divide hasn’t been bridged.” This consideration of literacy, resources and spatial dimensions is essential because it denotes the way that the digital divide overlays existing systems of inequality (Payton, 2003).
In this final quote, we see a rather fatalistic narrative that speaks to the frustration of being situated in a nation which is always being measured according to Western criteria that is continually expanding. Selam laments, “It will be hard to catch up with the West. In fact, it will be impossible. This is because IT works in levels. You move from one level to the next. And since IT is always changing, by the time we move to another level, the industrialized countries will be yet at another level”. Marjani also noted, “The digital divide has not been bridged because the IT field is very dynamic and advances in IT are rapid. Some places in Kenya don’t have access to internet or telephones while other parts of the world there is e-government.”

Discussion

In this study, we examined women’s responses to an ICT education program as well as the extent to which this experience is empowering. In terms of responses, it is interesting to note that many of the responses offered insights which mirror the perspectives held by women in other parts of the world. For instance, ICT was seen as a male-dominated field which offered numerous, highly desirable and well paying careers. They believed that women could perform equally as well as men, and the only significant barrier would be their individual ability to acquire skills and knowledge. Women also believed that ICT and gender equity were inextricably linked to the broader development goals of the nation. The practical skills and instrumental value of ICT were highly prized, as were competencies in both business and technical skills.

What is different is that these global perspectives were arrived at from very different referent points. We note, for example, that the potential of a promising career in ICT stemmed from the perception among Kenyan women of the very scarce training
and employment opportunities available in that country. We also observed that the women portrayed themselves as active agents at several levels including their individual capacity to acquire technical skills, the capacity of women and girls to compete with males in the classroom and in the workforce, and the capacity of women to assist in the national development efforts. Thus, women were to play a central role not only in the development of individual career outcomes but also in the elevation the entire nation. We suspect that the current perceptions of ICT as a career with promise may be due to this sense of scarcity, as well as the discourses and policies on gender equity and development.

Margolis and Fisher (2002) propose that female computer science majors seem to continue to underestimate their abilities. We see this same disturbing trend in our data. When the Kenyan women entered the workplace, they questioned their competence. This questioning seemed to emerge from their inability to actually leverage their classroom learning in a real organizational setting. They favored practical, hands-on knowledge and yearned to become experts who could tackle any computer-related problem. However, the training did not provide the specialized, highly technical skills which they perceived as most valued by employers. The women also held high expectations for the educational program, and these expectations were largely structured around practical production-oriented uses of ICT for employment, commerce, distance learning and entrepreneurship. They saw the value of applying both technical and managerial approaches to develop solutions to complex organizational problems. They sensed that those without ICT would be left behind and would be oppressed and marginalized. Skills provided by this program would allow them to escape this destiny.
This perspective is similar to assumptions which underlie the dominant digital divide discourses. From the women’s narratives, we found that the digital divide was generally viewed as a technological phenomenon. Women talked primarily about differences in skills, knowledge and access which occurred at the individual, regional and global levels. What also stood out in these narratives was the point that these differences were not random; the most economically, educationally and spatially disadvantaged people were also those most likely to experience the ill effects of the digital divide. Van Dijk and Hacker (2003) argued that new technology reinforces social inequalities because of the cumulative nature of IT skills and technological innovations. There is an unending need to retool and learn, and this places additional burdens on the most disadvantaged groups who already exist at the brink. Familiar recitations of dichotomies such as rural / urban and developed / developing countries in the formulations of the digital divide emerged from the Kenyan women’s collective voice.

Kvasny and Truex (2001) have noted how the objectification of the "have-nots" can be used to structure the social world and to encourage oppressed people to believe that social hierarchies are natural and inevitable. The digital divide discourse also reinforces racist attitudes by overlooking uses and adoption of ICT by people of color (Payton, 2003) and by citing people of color as continuously lagging behind others (Kvasny, Sawyer and Purao, 2004). This discourse contributes to a negative self-fulfilling prophecy for members of the groups that are cited as lagging (Hacker and Mason, 2003). Indeed, a few women in our study commented on the impossibility of developing countries ever catching up with the West.
The salience of this fatalistic digital divide discourse may be reinforced when the women gained the technical skills yet could not find desirable employment. As supported by Sen (1999), technical aptitude alone will not address the freedoms of women in the broader culture. Thus, ICT is not “the solution;” it is a skill-seeking, potential income earning alternative. In the absence of structural changes in rights for women— including inheritance and property, reproductive health, education, poverty alleviation, safety from violence in all forms - ICT will most likely do little to significantly impact women’s lives in a positive manner.

These findings suggest that there are continual needs for organizational, individual and national policy remedies. Moreover, the absence of these policies are not isolated to developing countries and, in fact, continue to plague women in highly industrialized nations, such as the US and Finland (Berki and Payton, 2005). Despite these global similarities (Kenya, US, Finland and other nations), policy implementation can undoubtedly result in different outcomes for women in IT workforce participation. For instance, if organizations cannot absorb these newly trained graduates into the workforce, then several questions come to the fore. Do companies have a real need for technology workers, or is this need being imposed by well meaning corporations and international aid organizations? How does the overproduction of technology workers serve to highlight an implicit assumption of an infinitely elastic market for people with computer skills? Indeed, we found several women who stated that technical skills would “guarantee” employment. How does the gender and empowerment agenda habituate 4th World nations and their politicians, educators and citizens to accept as normative the general ideology, practices and perspectives of ICT as a progressive discourse?
How does this technological rationality lead women to establish unreasonable beliefs about technology and empowerment?

When thinking about empowerment, concepts, such as autonomy, self-determination and emancipation come to the fore, and lead us to think about empowerment as a good thing that would help create a more humane and socially just world. Empowerment can be seen as operating between the strategic and practical levels (Molyneux, 1985). Practical gender interests are enacted when women are trying to meet the needs that are assigned to them by virtue of their gender. Such needs include feeding their children, trying to secure better health care and gaining concessions from employers, governments and other powerful people to enable them to live up to their ideas of what good wives and mothers should be. Very few women in our study talked about their stereotypical gender roles, and this is perhaps because we interviewed young college students who have yet to assume the roles of mother and/or wife. Only one woman talked about the ability to use ICT to multitask between childrearing and work outside of the home.

Strategic empowerment occurred when women attempted to challenge these stereotypical roles and associated responsibilities. For example, the women often talked about equality as being “something that women have all been fighting for”, and “if a man can participate in IT why shouldn’t a woman do the same thing?” ICT was seen as beneficial to women because “it will enable us as women to compete fully with men in jobs”. Taken from these responses, it seems that women are being empowered from a strategic level as they see themselves as autonomous, emancipated individuals fully aware of their rights. ICT is generally seen in very material, instrumental ways which
directly affect their participation in the formal workforce and the modernization of their country. This is positive because strategic gender concerns are seen as more empowering than practical gender interests (Giffin, 1998).

A third and more pessimistic understanding of empowerment outside of the practical/strategic dichotomy is the understanding of women’s empowerment as a zero-sum game in which gains to women are inevitably losses to men. This last understanding is a potential obstacle to the participation of women in the IT workforce. This zero-sum conceptualization of empowerment did not materialize in our data. Women saw themselves as peers who are able to compete with men in a male-dominated profession. They wanted to help in the development of their country and never spoke advancing women at the expense of men.

However, as we move beyond the space of the individual responses, we must consider how women will act on these feelings of empowerment. Technology alone cannot act as a direct cause of women’s empowerment. Therefore, we do not support the argument that ICT will change women’s lives in a profound and positive way. Instead, we find that strategic empowerment can only occur in the context of broader social change, and even Western, technologically advanced nations continue to grapple with the roles of women in IT issues (Berki and Payton, 2005).

Moreover, in developed nations where access to ICT training and opportunities appear plentiful, women tend to op-out of IT careers after a short period in the workforce participation and/or after reaching a plateau – given the increased demands associated with family, organizational barriers and/or career balance. This is in light of the escalating presence of tele-work or telecommuting which creates the organizational-
imposed or self-imposed need to be connected to the e-world. Despite these findings from the Western world (CIO Magazine, 2000; Black, et al., 2004; Berki and Payton, 2005), our data suggest that Kenyan women welcome (at minimum) training and educational opportunities. The practical empowerment issues and challenges associated with family, work-life balance and 24 x 7 career demands seem to be issues that Kenyan women will contend with as consequences of ICT. We suggest that these consequences can have different outcomes than those which occur in the Western world – as family dynamics and national infrastructure vary in SSA countries. Hence, while we observed similar global perspectives and report them in the findings, these local conditions can result in diverse outcomes.

At a national level, even when women enter into IT careers, issues of pay equality persist and impede the degree of workforce participation. As noted in Berki and Payton (2005), Elisabeth Rehn, Minister for Equality Affairs in Finland, who gave a welcoming address at the Women, Work and Computerization: Understanding and Overcoming Bias in Work and Education 1991 Conference said: "There was quite a lot of hope that new technology could break down the gender division in the labor market and narrow the wage gap between women and men, especially when we learned in the middle of 80's that more than half of those using new technology in their work are women. However, it seems that the rapid technological change has so far had the opposite impact in promoting equality in these essential aspects." (Rehn, 1991). Attendees of this conference represented Europe, the USA, Australia, Asia and Africa. Beyond compensation equality, work-life balance for women complicates career choice,
parenting, 24 x 7 expectations and access associated with IT jobs and dual-career families’ situations.

In sum, the work of Arun, et al. (2004) suggests that advances in the IT workforce for women in developing countries rest on livelihood assets. Among these are social, human, natural, physical and financial capitals. The absence or presence of these capitals influences the creation of and access to transformation structures and processes (e.g., policy, societal and organizational aspects) among women, in general, and SSA women, in particular – given that gender influences livelihood.

Conclusion

In this paper, we examined the extent to which broader IT educational opportunities are being converted into women’s empowerment and opportunities to participate in the IT work sector. Through interviews with 32 female students enrolled in Strathmore University in Kenya, we illustrated that women were highly optimistic, embracing ICT as a practical mechanism for achieving entry into the male dominated, technology workforce. However, their narratives also displayed the complexities inherent in these ICT educational efforts. Women desired cultural change, on the one hand, that provided them with educational and employment opportunities equal to those enjoyed by men. ICT access and training was seen as imperative for their individual career success as well as the development of the entire nation. On the other hand, women sought radical change such as entrepreneurship, a society that was knowledgeable and comfortable with technology-based services and products, and employers with greater business and technical acumen. However, they perceive significant structural barriers, such as public policies that failed to facilitate the
development of the ICT sector, the unwillingness of employers to hire inexperienced workers and women, and ICT professionals with skills that exceeded the capacity of organizations to take advantage of this skilled workforce. They also viewed the technology profession as male oriented. Our findings largely reiterate the gendered perspectives found in similar studies conducted in other countries, but they also provide insights into the localized causes into what appear as global perspectives.

While the women in our study showed very positive attitudes towards gaining an IT education, despite expressed challenges, more research is needed in this area. Given that we concentrated our study on an urban IT-based university, our findings cannot be generalized to the rural parts of Kenya which constitutes over 70% of the country’s population. Our study, like most studies that portray a positive view of ICTs in sub-Saharan Africa, tells the story of the urban African “elites.” Future studies should concentrate these rural “forgotten” parts of Kenya and other developing nations. This will not only extend the debate on the disenfranchisement of certain groups from access to ICTs, but also the disenfranchisement of given regions, such as these rural areas. Taken together, these studies would present a more comprehensive and viable platform for sustainable ICT growth. Lastly, researchers may use this work to inform subsequent studies of ICT, African women and empowerment. The meanings and values ascribed to ICT, strategies for appropriating ICT and barriers to IT-related careers must be understood from and contextualized in the situated knowledge of people who are subjugated in relation to the dominant view of the Western majority. These oppositional ways of knowing and experiencing ICT can contribute to socially just remedies for alleviating the digital divide and gender inequality.

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Appendix A

Sub-Saharan African countries are located south of the Sahara Desert in Africa. In the map below (Figure 1), Sub-Saharan Africa consists of all those countries south of the Tropic of Cancer (latitude 23½° N).

Figure 1. Map of Africa
Sub-Saharan Africa is south of the Tropic of Cancer (23½° N)
### Appendix B

**MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY**

**Student Enrolment by Gender in Universities, 1999/2000 - 2003/2004**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Public Universities</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nairobi</td>
<td>8,419</td>
<td>3,523</td>
<td>8,383</td>
<td>3,341</td>
<td>10,638</td>
</tr>
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<td>Kenyatta</td>
<td>4,188</td>
<td>3,008</td>
<td>4,510</td>
<td>3,019</td>
<td>10,638</td>
</tr>
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<td>Moi</td>
<td>3,483</td>
<td>2,312</td>
<td>4,753</td>
<td>1,960</td>
<td>5,469</td>
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<td>Egerton</td>
<td>7,131</td>
<td>2,842</td>
<td>5,998</td>
<td>1,968</td>
<td>6,816</td>
</tr>
<tr>
<td>Jomo Kenyatta (JKUAT)</td>
<td>2,511</td>
<td>626</td>
<td>2,992</td>
<td>1,288</td>
<td>2,565</td>
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<td>Maseno</td>
<td>2,338</td>
<td>1,385</td>
<td>2,595</td>
<td>1,538</td>
<td>2,531</td>
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<tr>
<td><strong>Total</strong></td>
<td>28,070</td>
<td>13,696</td>
<td>29,232</td>
<td>13,114</td>
<td>38,856</td>
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<tr>
<td><strong>Private Universities</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Unaccredited</td>
<td>777</td>
<td>340</td>
<td>876</td>
<td>472</td>
<td>949</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,963</td>
<td>4,162</td>
<td>3,968</td>
<td>4,521</td>
<td>4,071</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>32,033</td>
<td>17,858</td>
<td>33,200</td>
<td>17,636</td>
<td>42,727</td>
</tr>
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<td><strong>GRAND TOTAL</strong></td>
<td>49,981</td>
<td>50,836</td>
<td>63,214</td>
<td>68,721</td>
<td>67,596</td>
</tr>
</tbody>
</table>

* Provisional

Enrolment data includes parallel programmes of the respective universities

Source: Ministry of Education, Science and Technology

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### Appendix C

**MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY**

**Student Enrolment by Gender in Technical Institutions, 1999 - 2003**

<table>
<thead>
<tr>
<th>INSTITUTION</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>National Polytechnics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya Polytechnic</td>
<td>2,720</td>
<td>1,730</td>
<td>2,979</td>
<td>1,228</td>
<td>4,523</td>
</tr>
<tr>
<td>Mombasa Polytechnic</td>
<td>1,784</td>
<td>1,141</td>
<td>1,943</td>
<td>801</td>
<td>3,567</td>
</tr>
<tr>
<td>Kisumu Polytechnic</td>
<td>689</td>
<td>441</td>
<td>646</td>
<td>266</td>
<td>755</td>
</tr>
<tr>
<td>Eldoret Polytechnic</td>
<td>664</td>
<td>425</td>
<td>833</td>
<td>343</td>
<td>647</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,858</td>
<td>3,745</td>
<td>6,400</td>
<td>2,639</td>
<td>9,522</td>
</tr>
<tr>
<td><strong>Other TTIs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Training Institutes</td>
<td>5,942</td>
<td>3,799</td>
<td>4,900</td>
<td>3,280</td>
<td>5,295</td>
</tr>
<tr>
<td>Institutes of Technology</td>
<td>4,875</td>
<td>2,040</td>
<td>4,380</td>
<td>2,895</td>
<td>4,674</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10,817</td>
<td>5,839</td>
<td>9,340</td>
<td>6,175</td>
<td>9,969</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>16,675</td>
<td>9,584</td>
<td>15,740</td>
<td>8,814</td>
<td>10,401</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>29,259</td>
<td>24,554</td>
<td>30,555</td>
<td>33,655</td>
<td>32,718</td>
</tr>
</tbody>
</table>

* Provisional

Source: Ministry of Education, Science and Technology
Works Cited


Kvasny, L. forthcoming. Let the sisters speak: Understanding the information technology from the standpoint of the ‘Other’, *Data Base Advances in Information Systems*.


