

Women in Technology in Sub-Saharan Africa

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INTRODUCTION

International research has shown that in most countries, there are few women studying towards *information technology* (IT) careers (Galpin, 2002), and there is much research, particularly in the United States (U.S.), United Kingdom (UK) and Australia into why this is the case (Gürer & Camp, 2002). This article considers the situation in *sub-Saharan Africa* and focuses on women's involvement in the generation and creation of *information and communication technologies* (ICTs) in sub-Saharan Africa, as opposed to ICT use in sub-Saharan Africa, which is considered elsewhere in this volume. There are a number of aspects to the generation and creation of ICTs: how women are involved in this process as IT professionals and how they are educated for these careers, as well how technology can be used appropriately within the specific conditions of sub-Saharan Africa. ICTs will be considered in the broadest sense of the word, covering all electronic technologies, from computers and networking to radio and television.

Women's participation is important: The World Summit on the Information Society (WSIS) Gender Caucus (www.genderwsis.org) has identified women's involvement in the design and development of technology as well as technology management policy, as key principles for the information society. Marcelle (2001) emphasizes the necessity for African women to become involved in technological and scientific areas, including "computer science, software engineering, network design, network management and related disciplines" (Marcelle, 2001, para. 15) to create an information society appropriate for African women. The diversity of those involved in design leads to higher-quality and more appropriate technological solutions (Borg, 2002; Lazowska, 2002).

BACKGROUND

Sub-Saharan Africa has a population of 641 million, young (almost half under 15) and rural (35% urban). Significant problems are undernourishment, poverty and HIV/AIDS (United Nations Development Programme (UNDP), 2004). All the countries in sub-Saharan Africa are classified as developing countries. Some countries are relatively wealthy, such as Mauritius, South Africa, and Nigeria, but have large wealth disparities within their populations. Women in sub-Saharan Africa are expected to focus on the home, they have less access to education and health, and their contribution to family and community is not valued (Huyer, 1997).

Technology and Infrastructure

Per 1,000 people, there are only 15 landlines, 39 cellular subscribers and 10 Internet users (UNDP, 2004). There is less access to electricity in rural areas, so battery, solar-powered or wind-up radios are important.

The higher rate of cellular subscribers is due to liberalization of telecommunications policies and investment in infrastructure by private companies, but these advances benefit mostly those in urban areas. Mbarika, Jensen, and Meso (2002) identify the urban nature of Internet access, lack of telephone infrastructure, high cost of international links and a lack of technical staff as inhibitors of Internet growth in sub-Saharan Africa. However, growth is being stimulated by growing numbers of Internet cafes; a decrease in charges for access; increased mobile telephony, which releases landlines for Internet access; and deregulation of the Internet and telecommunications sector; as well as reduction of import duties on computer equipment (Mbarika et al., 2002).

Historically, African *non-governmental organizations (NGOs)* were pioneers in the use of communicating via computer networks in Africa, convinced of their importance in spite of skepticism from people outside Africa (Esterhuysen, 2002). WorkNet (which became SANGONeT) was founded in 1987 and played an important role in the resistance against apartheid in South Africa internationally. In the early 1990s, NGONET provided e-mail services in East Africa, and ESANet linked five universities in East Africa using *FidoNet*. By 1995, 12 sub-Saharan African countries had full Internet connectivity, and by 2000, all countries had permanent Internet connectivity and dial-up ISPs (Levey & Young, 2002).

IT Education

African women have low participation rates in science and technology education (Hafkin & Taggart, 2001). For undergraduate computer science (CS) students, the following rates of female participation occurred (Bunyi, 2004; Galpin, 2002; Hoffman-Barthes, Nair, & Malpede, 1999; Mariro, 1999; South African Qualifications Authority, 2004):

- Botswana, 10% (1998)
- Eritrea, less than 10% (2001)
- Nigerian polytechnics and some universities, around 30% (mid-1990s)
- University of Nairobi, Kenya, 11% (2001)
- Kenyatta University, Kenya, 14.3% (2002/2003)
- University of Makerere, Uganda, 27% (2000)
- Zimbabwean technical colleges, 41.7% (1996).
- South African universities, 31% (2001); technikons, 37% (2001).

In Tanzania, at the Universities of Dar-es-Salam, Sokoine, and Muhimbili in 1995-1996, only 3% of those receiving the Dip. Sci. Informatic qualification were female (Mariro, 1999).

Odedra-Straub (1995) highlights the lack of female lecturing staff at African universities, and that few universities offered CS degrees in the early 1990s. In Madagascar, 11.1% of CS education teachers were female (Mariro, 1999). In contrast, in South Africa in 2001, 46% of CS instruction staff in higher education institutions were female (South African Reference Group on Women in Science and

Technology, 2004), which is unexplainably higher than the percentage of female CS graduates.

An attempt to address the imbalance is the Cisco Networking Academy Program Gender Initiative (www.ciscolearning.org/Initiatives/Gender_Initiative.html) which, with NGOs and governments, provides opportunities for women to study networking. African countries involved include Rwanda, South Africa and Uganda. The Department of Women and Gender Studies at Makerere University, Uganda (www.makerere.ac.ug/womenstudies/ict.html) is an approved Cisco Academy and aims to increase the number of women working with ICTs and to change perceptions of computing as a male domain. To date, the majority of students have been female, and its courses cover basic computer skills, networking skills and the use of ICTs in education. Additionally, the Cisco networking qualification allows entry into the undergraduate CS and IT programs (Bantebya-Kyomuhendo, 2004). A similar program was run at the United Nations Economic Commission for Africa in Addis Ababa, which was exclusively for women and covered gender as well as technical issues (Hafkin, 2002).

IT Professionals

With low participation rates at the tertiary level, there is likely to be a low number of women working as IT professionals. There is little data available on this topic (Hafkin, 2003; Odedra-Straub, 1995). In South Africa, only 27% of IT employees were female, and they were more likely to be in sales and marketing, end-user computing, or education and training than in hardware, management or networking (South African Information Technology Industry Strategy, 2000). In sub-Saharan Africa, it seems that women are unlikely to be found in management or system analysis positions, as well as teachers or lecturers of computing courses, although they can be found as programmers and operators (Odedra-Straub, 1995). Similarly, in developing countries, women are more likely to be in low-level jobs relating to word-processing and data entry than in IT management or in jobs designing or maintaining computer systems and programs (Hafkin & Taggart, 2001). Worldwide, there are few women in senior management positions or on the boards of ICT companies, involved in policy, professional and regulatory organi-

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