# **Forum**

# Female Empowerment and Development in Latin America: Use Versus Production of Information and Communications Technology

In 1992 the United Nations Development Programme (UNDP) first highlighted technology as a tool for human development, and the more recent Millennium Development Goals (MDGs) have recognized the important role that ICT can play in the fight against global poverty and as an effective tool to help achieve the MDGs (Information and Communication Technology for Development, UNDP). Furthermore, nearly all national governments have addressed technology in some fashion as a national imperative for sustainable development. Heeks (2008) has noted that the construction of the Internet and the MDGs gave rise to what he has called ICT4D 1.0, the first phase of a process to link ICTs with development goals by implementing technology as a tool for development, usually in the form of telecenters, and creating ICT access for the poor.

Women's empowerment is also thematic as a policy initiative to promote development. Gender is considered a cross-cutting theme of the MDGs, and the fifth goal calls for gender equality and the empowerment of women. ICTs, as stated by the 2003 World Summit on the Information Society in Geneva, are a key tool to promote this empowerment. The previous issue of this journal (Volume 4, Issue 2) presented several successful projects and research findings in the area of ICTs, women, and development. To follow up and expand on this important area of IT and development, this paper suggests two approaches, rather than one, for conceptualizing ICTs and the empowerment of women. In the first two sections of the paper we argue that a distinction can and should be made between women as users and as producers of ICTs. We follow this with a brief review of how this might apply to Latin America, providing policy and research suggestions for this region as well as other developing regions of the world.

# **Use Versus Production of ICTs**

There is a difference between the acquisition of technology for *use*, and the local innovation and *production* of technology. The acquisition of technology for use implies that users of the technology are dependent on the producers, whereas local production of technology suggests a more unilateral and independent adaptation and creation of a country's "own" technology, as well as the possibility to sell on the global market. Both are potentially significant for development, and innovation and local production most likely depend initially on the transfer and acquisition of technology, but differentiating between them can be important for theoretical

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and policy implications. Sein and Harindranath (2004) have called for a clearer conceptualization of ICTs and their role in national development. Noting that ICT is not a "monolithic black box," these authors distinguish among primary, secondary, or tertiary effects of ICTs on national development. The primary effect occurs when technology is adopted to replace more traditional ways of doing things, the secondary effect demonstrates an increase in activity enhanced by the new technology, and the tertiary effect is "the generation of new technology-related businesses and societal change." This third effect is not just the involvement of developing countries in the manufacturing of technology for foreign companies, but the diffusion of ICTs to fit the local context. which inherently involves adaptation and innovation. This implies the necessity for local expertise, innovation, and entrepreneurship, and thus an engagement in the production of ICTs and related industries. It also implies a more sustainable model of national development, diminishing reliance on foreign technology and knowledge, and perhaps eventually, foreign capital.

The distinction between users and producers at this level relates to the technological literacy and empowered engagement with technology by the individual. A user is one who can find and obtain information for particular tasks and purposes. A producer possesses a much wider range of skills and abilities, and hence a much wider range of opportunities and benefits: she is fluent in the uses of technology; comfortable using and designing technology and communication equipment, software, and can work well in virtual spaces. She is an active knowledge creator and designs information and knowledge systems, software, and hardware (Hafkin & Huyer, 2006).

Castells (1999) has argued that countries and regions that do not participate in the information economy will remain marginalized from a globalized capitalist economy based on information and knowledge as the means of production and engine of economic growth. Mansell and Wehn (1999) have stated that while many developing countries will not be able to engage in the production of technology for export, adopting and adapting ICTs will be critical for the construction of socially and culturally meaningful "knowledge societies." When the Tech-

nological Achievement Index (TAI) was first utilized by the United Nations Development Programme (UNDP) in 2001 in its Human Development Report (HDR), it was stated that "not all countries need to be at the leading edge of global technological development, but the capacity to innovate is relevant for all countries and represents the highest level of technological capacity . . . especially to adapt products and processes to local conditions" (HDR, 2001, p. 46). The Millennium Task Force on Science, Technology and Innovation has noted that while it is important for developing countries to gain innovative capacity, the challenge is not necessarily to ensure that developing countries will be in a position to take advantage of the newest technologies. New technologies will not benefit countries that lack the basic technological capabilities, infrastructure, or economic base to absorb them. Instead, the immediate issue for most developing countries in the use of science and technology to achieve the MDGs is the "efficient application" of existing technologies. This involves defining infrastructure services as foundations for technologies, placing universities at the center of local development, improving science education, and spurring entrepreneurial activities (Juma & Lee, 2005). Heeks (2008) has suggested that we are on the brink of ICT4D 2.0, which will incorporate this notion of local empowerment through production and innovation of ICTs.

# **Female Empowerment**

The innovation and adaptation necessary to incorporate foreign technology requires local involvement in the research, decision making, and development of ICTs. An analogy¹ can be made between developing countries and the empowerment of women through ICTs, whereby the participation in the research and development of technology, as well as the decision making on adaptation and implementation, suggests a potentially more significant level of empowerment than simply using the new technologies that are developed by multinational corporations. And, as Rosser notes, "globalization, technology, and multinational corporations have been, and remain, dominated by men" (Rosser, 2000, 62).

Although access to ICTs as tools and the promotion of women as users of technology are important

<sup>1.</sup> This analogy between developing countries and women's role in development was initially made by Reena Patel.

and can make real changes in women's lives, the sort of empowerment that leads to change in the power relations between genders is the decision making and creative engagement of women in the process of ICT design, development, and implementation.<sup>2</sup> Engaging women is vital, because they constitute half of the population, and because in many facets of society women hold the key to certain knowledge and processes. There is now a rich literature on women in development, dating back to the 1970s, demonstrating that the modernization process does not necessarily mean an improvement in the status of women, and in fact can produce negative results (Clark & Clark, 2004). Thus economic development as measured by per capita income and growth alone does not necessarily distribute the benefits throughout society. Clark and Clark (2004), based on this literature, have examined the relationship between economic development, the status of women, and quality of life, positively correlating the elevated status of women with an improved quality of life for societies. Amartya Sen's (1999) approach to "development as freedom" and the enlargement of people's capabilities and opportunities, which formed the basis of the UNDP's people-centered development approach, was also utilized in the 1995 construction of the Gender Empowerment Measurement (GEM) and the Gender-related Development Index (GDI). The dimensions used to calculate the GEM factor—women's income and decision-making power in the economic and political arenas—all focus on women's rise in socioeconomic status (HDR Indices). The dimension of decision making in the economic realm specifically measures women in "professional and technical positions."

Women must be involved in the activities that receive higher-value perception, higher rewards, and involve participatory decision making for their status to improve. In addition to increased participation in the political process and the information economy, more women need to enter into science, engineering, and related technology fields to participate in the research, design, development, innovation, and implementation of ICTs. The Gender Advisory Board of the United Nations Commission on Science and Technology for Development (GAB-UNCSTD) noted that the gender gaps in these fields have led to unequal technology development and transfer in

which men have benefited more than women, and women continue to be overlooked. According to the GAB-UNCSTD this is due to a lack of awareness of societal needs and how its work links to these needs, a lack of awareness of the potential of science and technology in social development, and a lack of understanding of how gender shapes the research agenda in science and technology (Gender Working Group, 1995). Recommendations to effectively incorporate gender concerns into science and technology for development include promoting increased representation of women in the scientific workforce, bringing professional women and female technology users into science and technology decision making on research priorities and implementation, ensuring science education is accessible to both girls and boys, supporting women in their daily science- and technology-related activities, and understanding the gendered risks and opportunities of science and technology for both women and men (Gender Working Group, 1995).

# Female Empowerment, ICT Production, and Engineering in Latin America

Latin America has the highest level of socioeconomic inequality of any region in the world, and therefore it is especially important that women in this region benefit from globalization and the information economy in addition to becoming more empowered. The UNDP and the Inter-American Development Bank agree that development cannot progress in Latin America without addressing the root causes of the country's inequality (UNDP & IADB, 2004). This inequality is both ethnicity- and gender-based in most Latin American countries; indigenous populations, particularly indigenous women, are marginalized in this society. Reducing poverty, reducing economic disparity, and raising the status of women are all interrelated. The problem of development in Latin America must be viewed within the context of globalization and the ability of the region producing its own technology and innovation to compete in the global economy (Informe Nacional de Desarollo Humano, 2004). Likewise, if women are not involved in this process they will remain outside of it and dependent upon the creators

<sup>2.</sup> For a related approach to women's empowerment and ICTs, see Huyer (2006).

and owners of ICTs for access and application. Again, this does not mean that projects giving women, particularly poor and rural women, access to ICTs are not important—these projects can empower them with information, markets, and visibility. However, a sole emphasis on access runs the risk of ignoring the other important element of empowerment—participation in decision making and production. Likewise, Marsden (2008) argues that developing countries will become empowered when they themselves can redesign and create innovations with transferred technology to fit the needs of their own communities.

The importance of this element has been recognized by policy makers, and there have been multilateral and national efforts to integrate women into the realm of science and technology, which is the foundation for production of ICTs. The United Nations Division for the Advancement of Women (DAW) Expert Group Meeting in November 2002 on "Information and communication technologies and their impact on and use as an instrument for the advancement and empowerment of women" noted that women need to participate "in the decisions concerning the design, use and spreading of technological systems" (Bonder, 2002, p. 17; see also UNDAW, 2002). The UNESCO initiative Mujer, Ciencia y Tecnologia en America Latina seeks to encourage more women into technical and scientific professional careers and to "mainstream gender analysis into S&T policy-making and implementation" (Catedra) The United Nations Economic Commission for Latin America and the Caribbean assessment in 2005 of progress in the region toward achieving the MDGs included in the chapter on women's empowerment an emphasis on education, professional employment, and government participation (ECLAC, 2005). Mainstreaming gender issues (i.e., integrating gender perspectives and awareness in all aspects and at all levels of public policymaking) has been advocated in recent years by policy makers on women's issues from the United Nations to the European Union.

However, while surveying ECLAC's recommendations in 2000 for ICTs and development in Latin America, Bonder notes that there is no mention of gender, confirming that "ICT policies and the debates on gender issues seem to run along parallel roads" (Bonder, 2002, 15). Parallel policies indicate a lack of integration and mainstreaming, resulting in a marginalization of female empowerment issues. In her work with the UNESCO chair on Mujer, Ciencia y Tecnologia en America Latina in 2004 Bonder continues to highlight the lack of effective mainstreaming of gender issues into policies for ICT and development in the region and calls for research on how women participate "en su character de usuarias . . . y en especial cual es su papel actual in la produccion de CyT [ciencia y tecnologia]" (Bonder, 2004, 6).3 Again, there is the effort to distinguish between the use and production of scientific knowledge and technology.

Engineering disciplines form a key component of the capacity of the region to engage in production of technology, including ICTs, yet female participation grows more slowly in these disciplines than, according to one study, in any other area of technology or science at Latin American universities (Bonder, 2004). This fact was exemplified in the November 2005 Organization of American States (OAS) conference of engineering faculty and deans, government representatives, and private sector leaders in Lima, Peru, shortly after the 2005 Summit of the Americas. The main conference hall was overwhelmingly full of men; of the 234 participants, 33 were women, and of those 14 were from the United States. Thus only 19 were Latin American womenand this at a conference entitled *Engineering* for the Americas (EFTA), focused on enhancing engineering education for socioeconomic development in Latin America. Gender issues were not mainstreamed in this significant regional development initiative, sponsored by the OAS, Microsoft, National Instruments, and Hewlett Packard (Engineering for the Americas). The OAS, from its Office of Science and Technology, identifies as a priority area in a 2004–2005 year-end report the need to integrate gender issues into policies and programs for science and technology (Informe de Gestion, 2006). Yet, in the same report the Engineering for the Americas workshop was reviewed, again with no mention of gender issues in engineering.4

<sup>3.</sup> In English: "as users . . . and especially in their current role in the production of science and technology."

<sup>4.</sup> More recently, steps are being taken to address this issue in the initiative through addressing diversity of representation and participation of women in science, technology, and engineering. According to one of the coordinators, EFTA

Rather than indicating failure on the part of the organizations, this example demonstrates the difficulty involved in mainstreaming gender issues into development policy, as these "issues" mirror the social structure and existing gender relations (Moser & Moser, 2005). According to UNESCO, female enrollment in engineering disciplines in 2002-2003 was less than one third of total student enrollment, and in some cases it was lower than that. For example, in El Salvador there were 368 women out of 1,412 students enrolled in engineering, and in Argentina 1,916 women out of 6,265 (UNESCO). There was also an indication of slower growth among female students: male engineering students in Mexico grew from 37,716 in 1998 to 50,812 by 2003, whereas women grew from 9,945 in 1998 to only 16,462 in 2003. These numbers do not reflect what happens in the workplace after graduation; the numbers are sure to decrease due to gender discrimination, unemployment, and the fulfillment of traditional female roles in the family (Bonder, 2004). These traditional roles affect the courses students follow at universities. The "hard sciences," especially engineering, still have a tendency to be viewed as masculine, while education, social sciences and humanities, and certain areas of medicine are considered feminine (ECLAC, 2005).

Other international initiatives have continued to address the issue of entrenched gender roles and how to overcome these specifically in the area of science and technology. One such initiative to mainstream the gender dimension into policy in the region was a collaboration of the Office of Science and Technology of the Organization of American States, the Inter-American Commission of Women (CIM), and GAB-UNCSTD. The intent was to generate a series of recommendations as part of a larger "Project for Hemispheric Cooperation and Scientific and Technological Policy Development"—the main objective of this project was to generate science and technology policies and strategies for the Americas in the areas defined by the Inter-American Committee in Science and Technology (COMCYT). The recommendations developed in this process were presented in November 2004 to the First Meeting of Ministers and High Authorities in Science and Technology in Lima, Peru, as part of the preparatory process for the IV Summit of the Americas in September 2005.

Five workshops were organized, including one on Gender and Science and Technology.<sup>5</sup> In all, more than 100 experts from 16 member states participated, including the UNESCO chair on Women in Science and Technology in Latin America; national science and technology offices from Uganda, Chile, Costa Rica, and Panama; and key women in science organizations and research institutes from the region. The resulting document from this workshop, Recommendations for Integrating a Gender Perspective in Science and Technology Policies and Programs in the Americas, identified seven central strategies for moving forward in the region. The first of these was institutional strengthening, the mainstreaming of gender in science and technology policies and programs supported by appropriate budget allocations, so women and men can achieve equal representation and advancement in science, technology, engineering, and innovation in academia and industry. Following this was integration of the gender perspective in the creation, acquisition, utilization, and dissemination of knowledge, gender equity in access to and quality of education and training, and the necessity to take steps toward a genderequitable science and technology workforce. Finally there was an emphasis on the importance of science and technology and building a knowledge society for social development, but with the caveat that this would require gender equity in which women and men are equal partners in the design and production of the knowledge society. The way forward was to promote awareness of gender in this endeavor and in all policies related to it. Also stressed was the importance of supporting further research on gender, science, and development before policy actions can be recommended (Abreu, 2006; OAS 2004).

The results of the gender workshop were also

now designs programs and projects to incorporate gender equity and inclusion at the university level and is targeting women students in its activities to increase the appeal of engineering as a career through a variety of partnership and collaboration strategies in the region (Marcek, personal communication, March 26, 2007).

<sup>5.</sup> The work on gender was also carried out within the implementation process of the Inter-American Program on the Promotion of Women's Human Rights and Gender Equity and Equality (IAP), which was adopted at the XXX General Assembly of the OAS, and which promotes the full and equal participation of women in all aspects of economic, social, political, and cultural development.

presented at the Civil Society Roundtable on Science, a consultation held immediately before the Summit of the Americas in September 2005, which solicited civil society input into the Summit documents. The lobbying by science civil society representatives produced a much stronger presence of science and technology issues in the Summit document, as well as recognition of the importance of women's use of and education in science and technology. The Summit Plan of Action specifically includes references to improving the quality of science education, including science, technology, and innovation in national action plans, and recognizing the role of science and technology in sustainable national development. It also includes a commitment to ensure equal opportunities for all to employment, remuneration, and access to education and training in addition to calling for "special attention to gender-differentiated needs."

Although they were less comprehensive and detailed than many participants hoped for, the inclusion of these gender-related recommendations in the Summit documents nevertheless represent a step forward. More recent activities include a National Committee on Gender and Science and Technology in Brazil, established by the Gender Advisory Board and coordinated by Alice Abreu, leader of the OAS science and technology process leading up to the Summit. The UNESCO chair on Women in Science and Technology in Latin America remains active, as do several other national and regional organizations and networks, and joint planning is underway among these organizations to develop a hemispheric initiative as a follow-up to the Summit. However, overall, implementation of the gender recommendations—and commitment within the region—is inconsistent. According to a recent OAS Office of Education, Science, and Technology report, "the region's national programs for scientific and technological development have not addressed the full participation of women in the creation, acquisition, utilization, and dissemination of scientific and technological knowledge, nor their equal access to and use of scientific and technological innovations (OAS, 2007)." This is an issue which will require continued attention and advocacy. One positive step in this regard is the intention of the Fifth Regular

Meeting of COMCYT in June 2007 to dedicate a session to address concrete actions to mainstream gender in science and technology and improve the participation of women in this field, among other matters.<sup>6</sup>

### Conclusion

Research and policy initiatives should consider this dual conceptualization of ICT use and production to better assess outcomes for national development. This inclusion of ICT use and production becomes particularly important with respect to female empowerment, because there are many layers in the nature of this empowerment. These various layers can be important for national development and the welfare of women, however it is at the level of empowerment—where women are involved with the creation and diffusion of ICTs—that their status visà-vis men might change and where they are likely to affect how ICT development and use occur. The recommendations for policy, research, and programming made at the OAS-CIM-GAB Gender and Science and Technology Expert Meeting apply equally to the ICT context, particularly with respect to promoting gender equality in the creation, acquisition, utilization, and dissemination of knowledge, as well as through the call to build a knowledge society in which women and men are equal partners in design and production.

Specifically, research efforts in this area might focus on the intersection between the mainstreaming of gender issues and production and control of ICTs in the region. This research could include, for example, gathering and analyzing more information on the degree and level of women's participation in engineering and other disciplines, the position of women in foreign and local technology firms, and women's roles and representation in policy making in the area of technology and development. Further, in the area of policy research, persistent monitoring of gender-based initiatives and their intersection with, or marginalization from, ICT development in Latin America is needed to assess progress at this level of female empowerment. It could also be fruitful to examine the relationship between users and producers of technology: Could becoming a user of technological tools lead to further education and

<sup>6.</sup> COMCYT is a regional network of national authorities of science and technology, including national councils of science and technology and ministries in the field.

development as a contributor to the production of technology? Finally, there is a need to enlighten and engage policy makers to understand the importance of women's empowerment in the use and production of ICTs as a stepping stone toward national economic and social development.

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