

# Content creation for ICT development projects: Integrating normative approaches and community demand

Raul Roman and Royal D. Colle  
*Cornell University, 338 Kennedy Hall, 14853 Ithaca, NY, USA*

**Abstract.** This paper discusses why concerns about the importance of content provision for ICT community development projects, such as tele-centers, must go beyond international initiatives such as the World Bank Development Gateway. The authors emphasize the importance of grassroots research, such as community needs assessments, for the generation of contextually appropriate content through ICT, including the role that local universities may play as facilitators in the identification and processing of this content. After providing a brief case study of a tele-center research project in India, the paper concludes that awareness raising about the value of information and the integration of information services within the local communication structures constitute a basic foundation for locally relevant content generation and use.

## 1. Introduction

Someone wrote recently that “even if the woman in the village has access to the Internet, she will not necessarily be able to use the information to improve her child’s health because trying to get information from the internet is like drinking from a firehose – you don’t even know what the source of the water is [13]. Information and communication technologies (ICTs) are not really about the computer, the Internet, and telephone lines. They are about information and communication. This makes the issue of content a very important priority as we try to use the new technologies for community development and alleviation of poverty.

The world is seeing a profusion of activity surrounding the assumption that information technologies are important instruments of development. From Mexico and Brazil to the governorates in Egypt and the villages of India, a wide range of organizations are promoting and supporting the creation of local entities that would make ICTs accessible on an affordable basis to everyone. While they have a variety of names and configurations, we focus particularly to multi-purpose community tele-centers where people share access to a variety of ICT and related services. Vigorous actors in championing and supporting these enterprises include United Nations agencies such as WHO, ITU, FAO, and UNESCO, bi-lateral donors such as USAID and IDRC, and national governments from Hungary and Malaysia to South Africa. In Latin America, non-governmental organizations are particularly active.

The relevance and sustainability of these tele-centers depend heavily on what they can offer to their communities, who still need to be convinced of the value and potential benefits of ICTs. This points directly to the kind and quality of information and communication resources available through tele-centers, especially on the worldwide web. According to a recent United Nations Development Program (UNDP)

document, numerous tele-center studies report non-use of services by the targeted local population due to the lack of understandable and relevant content [14].

Until early 2002, the main focus was on building or strengthening the digital readiness of developing nations to help people get connected. For example, the principal response to the “digital divide” has been to make available computers, telecommunications links, and Internet Service Providers where these facilities were thinly spread or absent completely. Now we are beginning to see increasing attention to the content and services that ICTs can deliver – digital communication (email), portals for health and development, and services identified as eCommerce, eGovernance, eBanking, eAgriculture, eHealth, eLearning and so on.

Some of that attention has been steered by the Digital Opportunities Task Force (DOT Force), a body created by the G8 nations at its annual summit in mid-2000. The job of the DOT Force was to come up with an action plan that would lead to all nations’ ability to participate in the ICT revolution. The result was the Genoa Plan of Action (named after the location of the 2001 G8 summit). Its nine Action Points included two specifically related to content issues. These were:

*Action Point 7* – Promote ICT for Health Care and in Support Against HIV/AIDS and Other Infectious and Communicable Diseases.

*Action Point 8* – National and International Effort to Support Local Content and Applications Creation.

Based primarily on our research on rural tele-centers in less developed countries, we first review an international and regional initiative to provide content for community development ICT projects. Secondly, we analyze the role that universities may play as facilitators of local content. We follow with a discussion of the importance of grassroots research for the design of contextually appropriate tele-center information services, providing a brief case study of a tele-center research project in India. Finally, we conclude with a basic set of guidelines and ideas that may be useful for policy makers and practitioners when thinking about the issue of content provision in tele-center projects.

Before proceeding with our analysis, it is important to clarify that by ‘content creation’ we broadly mean the processing and diffusion of information customized in any suitable format to fit the needs of a specific community. Understandably, the process of content creation –and the content itself– is not ‘value-free’, but this paper does not focus on the politics of representation or power issues involved in the creation and sharing of information (see [12] for a discussion on knowledge and power).

## **2. Content as an international development issue: The Gateway debate**

As we all know, there is much information available through the Internet. The UNDP estimates that about two million web pages are made available each day. But critical questions are being raised about the information these pages provide. Is the content relevant? Is it accessible? Is it understandable? Is it accurate? Is it biased? Is it affordable? Is it trustworthy? Is it like water in a firehose? We explore some of these questions as we examine efforts, including our own, to deal with major content issues.

The World Bank took a major step in the content field, as it pursued its role as a “knowledge bank” by creating the Global Development Gateway. The Development Gateway initiative, which is directed by the Development Gateway Foundation, is a public-private partnership created in December 2001 and whose Board of Directors represents civil society and public and private donors. According to the World Bank, the Gateway is an interactive portal for information on sustainable development and poverty reduction, and its founders expect it to help fill the knowledge and communication needs of government officials and civic society organizations regarding a wide range of development topics. It is expected

to promote government quality and efficiency by providing information on best practices, networks for sharing solutions and experiences, and tools for analysis and problem-solving.

When it was first introduced, the Gateway stirred up substantial controversy because some perceived it as a “super-site” and a gatekeeper on development information, and some thought its management and control might not be impartial and beneficial to all [15]. In an article [8] distributed widely on the Internet, Michael Gurstein, a North American professor, suggested the possibility that, like other portals, the output has tended to reflect the interests, biases and limitations of its creators (official multi-national and government-like agencies and other elites) and that “raises the hackles and competitive juices of all those who don’t share those assumptions” (for example, grassroots type non-governmental organizations, development activists, and communities themselves). While Gurstein does not argue that it should be abandoned, he worries that the Gateway will crowd out, unfairly compete with, or result in the “defunding” of portals that reflect other “realities.”<sup>1</sup>

Another critic, Alex Wilks, Coordinator of the Bretton Woods Project in the USA, argues about the Gateway’s organization of its knowledge and resources:

The Gateway’s topic structure appears to reflect an aim to organise development-related information in a way that is convenient for people who see the world through official lenses, or perhaps a failure to understand that issues are constructed and perceived differently by different groups [16].

Wilks contends that many civil society organizations have decided not to cooperate with the Gateway, and, instead, to build “a plurality of spaces” to post, aggregate, and share information.

The World Bank has attempted to deal with some of these issues by creating a Country Gateway system. The Country Gateways are independently owned and operated by partners of the Development Gateway. They operate within a country and each gateway is designed to provide country-level information and resources, and promote local content development and knowledge sharing. They may be more interactive than the global gateway because of the emphasis on localization in their mandates. Gateway Foundation literature indicates that the Country Gateway will mobilize local content and engage local stakeholders including governments, the private sector, civil society and other communities of interest. In some cases, Country Gateways will provide eGovernment, eBusiness, and eLearning, and, overall, contribute to better connectivity and use of ICTs. The World Bank-managed infoDev program provides funding for planning of gateways (an average of US\$50,000, but up to US\$100,000) and for start up activity. In early 2003 there were 41 Country Gateways in different stages of development. Before they move into the implementation stage, they must be persuasive about their ability to survive by preparing a business plan.

### 3. Universities as local content facilitators

One of the difficult parts of the content portal and web page situation is the continuous effort and investment needed to maintain them. The amount of voluntary effort to sustain a dynamic web resource ensuring interesting and useful content is substantial, and it has been suggested that only those with a significant financial stake or who are paid can make it work [8]. To address this problem, we have

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<sup>1</sup>The International Institute for Communication and Development observes: “While new ICTs have increased the number and diversity of knowledge ‘producers’ and even helped to ‘democratise’ information flows, the dominance of a few sources and formats for the generation and presentation of content through new ICTs can erode older and locally adapted forms of knowledge that are essential to locally managed development and livelihoods.” See <http://www.iicd.org/news> [available February 15, 2002].

proposed that universities play a larger and more visible role in institutionalizing the generation and collection of development and local-oriented information resources [2].

The social role of the university historically has been to create, store and diffuse knowledge, a collection of activities that partially parallels some tele-center operations. Yet, few major programs link tele-centers to universities as an institutionalized source of information. Universities could play a significantly broader role in the world's efforts to employ ICTs for sustainable development and poverty reduction. For example, universities could:

(1) Conduct continual research on community information needs so that appropriate information resources can be developed. This could also supply a regional and local dimension to continual, long-term e-Readiness studies.<sup>2</sup>

(2) Convert its own research and "academic" knowledge into education, information, and training packages suitable for community use.

(3) Mobilize, interpret, integrate, and package information from external authoritative sources and tailor it to the needs of populations in surrounding regions.

(4) Train students in the application of ICTs to development problems by assigning them as student interns at community tele-centers, having them collect indigenous case studies and "lessons learned" related to development initiatives, involving them in data collection and processing related to e-Readiness and information needs analysis studies, training them in the process of information packaging, and, maybe most importantly, training them to train others in the community.

(5) Design and execute ICT training programs for various community groups, especially those that are likely to be ignored by conventional ICT training.

(6) Through their participation as students in this program, prepare a new generation of professionals in various sectors to use and support the application of ICTs and tele-centers for community development and poverty alleviation programs.

(7) Orient university officials and faculty to the emerging 'ICT for development' field so they can be opinion-leaders in this area.

A small start is being made in India where the Tamil Nadu University of Veterinary and Animal Sciences (TANUVAS) –in collaboration with Cornell University, and supported by the International Development Research Centre of Canada—is revamping some of its extension centers to make them into support units for village information centers. While tele-center patrons in the villages can access web pages from far distant places, they will also have available information from the university's research labs, packaged to their needs by the TANUVAS ICT support unit. Elsewhere, working with the China Agricultural University, we have developed a similar plan whereby a group of agricultural universities in China would build their ICT and human resources capacity to collaborate with the China Country Gateway in carrying out the seven activities listed above. The universities would also collaborate in the development of township tele-centers which would serve the local communities and also be an 'ICT for development' laboratory for students, faculty, and local officials.

Some universities already have experience and commitments that are now relevant to community development information and training through ICTs and tele-centers. For example, universities have been involved in extension, a system designed to link researchers with potential users of their research. And since the days of correspondence courses, universities have used a variety of media for distance

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<sup>2</sup>E-Readiness is an assessment of a country's status regarding ICT infrastructure, the accessibility of ICT to the population, the suitability of the policy environment for ICT effectiveness, and a country's everyday use of ICT. A major challenge in the e-Readiness world is gathering reliable data at the local level and building appropriate programs there.

learning, especially focusing on formal education at secondary school and college levels. However, few universities have yet taken the step toward linking their knowledge resources to tele-centers and to the potential of ICT for development.

Progress was made in mid-2001 when several universities became involved in other Country Gateway activities. For example, universities in West Bank and Gaza, the Dominican Republic, Rwanda and Nicaragua are reported to be active in their countries' gateways.

#### **4. The role of grassroots research in generating locally relevant content**

Besides the World Bank, there are many other international organizations that are active in making available trustworthy and credible content for the digital age –such as the WHO and its Health InterNetwork portal to enable online access to high quality, relevant and timely health information. But beyond these international and regional macro projects, it is especially important to assess what is happening at the micro grassroots level. Even if these international efforts to provide high quality and trustworthy information finally make a difference (and their online resources are actively used by the intended beneficiaries), the tele-center staff and volunteers (and collaborative stakeholders such as universities, for example) still need to find, translate, interpret and evaluate the information available, and to market it as a community resource. One of the biggest challenges community tele-centers face is financial sustainability. Although there is debate about how sustainability should be approached [6,9] to survive, tele-centers must be substantially demand-driven whatever their sources of income. This translates to the need to have relevant and useful content. And one of the most important ways to meet this need is simply asking the community what information they consider useful, and relevant; grassroots research then becomes a key instrument in the content creation process. Note that in the previous list of possible roles of universities in tele-center development, research appears as the *first* point.

A case in South India shows one way the staff of a “village knowledge center” dealt with the challenge of providing relevant information services, based on previous participatory research. The M. S. Swaminathan Research Foundation (MSSRF) was convinced that the local people had the capacity to absorb the new communication technology, but the question was if people can get the information they need, in the way they want it?

The centers established by MSSRF demonstrated ingenuity, creativity and sensitivity in developing their information products. As part of their tele-center project in Pondicherry, the Foundation established a ‘value-addition’ center. This center collects and repackages information on diverse topics (such as agriculture market information and government schemes), and sends it to a network of tele-centers on a daily basis. This center is also in charge of identifying, evaluating and processing educational materials (for example, health information). One example of its applied research approach to content creation is the MSSRF tele-center in the fishing village of Verampatinam. There many local fishermen, most of them illiterate, expressed a need to have timely information on weather conditions in order to plan their fishing activities. To respond to this demand, the value addition center downloads the weather report from the US Navy web site, translates it to Tamil, the local language, and then sends it to the local tele-center as an audio file. These files are then played through several loudspeakers located in front of the center and across the nearby seashore [11].

Integrating the media of ICT is being cleverly done also in Sri Lanka, where community radio provides broadcasts in which staff members search the web to answer questions phoned or delivered to the station. These, then, are broadcast to the whole community [7].

To help those designing and implementing ICT initiatives to better understand the various dimensions of the local content challenge, the International Institute for Communication and Development (IICD) undertook a project to identify and document how local organizations and communities in developing countries are using ICTs to create, adapt and exchange local content. From people and projects around the world, they collected examples, cases and insights to “unbundle” the notion of local content. This meant answering specific questions such as: What content is available and in what forms? What motivates owners to make content available to others and under what terms? The results of the study were to be reviewed in a workshop in March 2002 with a later final report that would illustrate innovative approaches, document experiences and lessons, identify opportunities and constraints, and explore the potential for replication and scaling up.

IICD is on the right track. We do need to collect information about existing initiatives in the field  $\text{eC}$  without committing “paralysis by analysis” – to help formulate content-generation strategies. Research is vital. This extends to participatory needs analysis which has been largely ignored in the tele-center movement [10]. Much of the effort to develop content is based on what officials and experts think certain populations need and want, often based on credible demographic and socio-economic data. We use the term “normative needs” to identify this expert-driven prescriptive practice. A needs-driven system must also consider what the consumer wants (what we call “expressed needs”, “felt needs”, or “demand”). In the South India TANUVAS project mentioned earlier, we mounted a participatory needs analysis study to help us make decisions about the content we should consider along with expert-driven assessments. In the next section, we describe our approach and briefly discuss initial analysis of part of the data collected.

## **5. Needs assessment as a first step: A case study from India**

During the summer of 2001, a TANUVAS-Cornell team, supported by staff from the Swaminathan Foundation, conducted an information and communication needs assessment study. This preliminary research was the focal point of the project planning and design process. With local young people as our research team, we collected qualitative and quantitative data through a survey questionnaire and focus groups of local women, men, and youth in the three villages where TANUVAS will establish tele-centers.

The focus of this comprehensive research effort was to draw a map of the communication and information patterns used in the village communities, including existing information resources and communication networks. The primary emphasis was put into identifying current village assets and opportunities, and then analyzing the potential for a proactive tele-center to solve actual information deficits and meet new demands.

Besides the strategic value of a needs assessment for project planning and implementation, this research initiative was arranged as an opportunity for the project team to begin establishing rapport with the villagers, and for the villagers to understand and become aware of the project and actively participate in the orientation of the tele-center activities right from the start.

While the data are still being analyzed, preliminary results of our focus group discussions show differences in information uses and patterns depending on gender, age and occupation. Agriculture is the main economic activity of the villages we studied. Farmers – men and women – revealed that they require information on new seeds and products, fertilizers, market prices, and other agriculture-related issues. However, women especially demand information about children’s education and health, while youth participants were mainly interested in employment opportunities.

Our research shows that information needs change depending on the time of the year. There are cyclical changes in information needs during the annual calendar because the village economic and

social life revolves around agricultural seasons and local religious and cultural traditions. This situation has implications for the content provision activities facilitated by a tele-center. For example, men and women express an interest in employment opportunities during the months when there is not much activity in their fields.

However, simply understanding the topics of interest and the right tempo of the content provision is not enough; it is essential to know the most appropriate channels and formats to disseminate that information. Our research suggests that the high rates of illiteracy and low levels of formal education in the villages studied make interpersonal communication and audiovisual materials most appropriate. And there is also the question of language. In the TANUVAS project, content should be provided in Tamil, the local language, also taking into account that many villagers are not able to write or read that language. Only a low percentage of the population speaks English (and this percentage is almost exclusively limited to the youth). These observations will lead to our testing a strategy for using intermediaries for reaching some of those who may never touch a keyboard or enter a tele-center [3,4].

## 6. Conclusions

### 6.1. Integrating normative needs and community demand

Any 'ICT for development' strategy is driven by certain technological determinism: ICT-based community development initiatives are a case of technology transfer [1], and usually the emphasis is on the potential of the technology, mainly computer networks, to provide information and communication opportunities to the rural poor. However, at the same time, precisely because of past experiences with technology transfer and research on diffusion of innovations – and also because these efforts try to find a place in the context of a post-modernization trend that underscores 'people-centered' development – there is an effort to foster participatory approaches to project design and implementation. There is an interest to encourage community ownership of the project, and promote a locally sensitive and relevant use of the technology – and this is mainly achieved by conducting participatory research and by involving community stakeholders in the design and operations of the tele-center. A tele-center is the product of an eclectic strategy for social change that mixes a prescriptive top-down technology transfer with a bottom-up community leadership to make the technology work for self-determined development goals. In other words, the development tool is normatively prescribed while the process of technology use is expected to be appropriated and guided by the active participation of community members.

If we apply this eclectic model to the process of content creation, we observe that while communities define their communication and information needs (through participatory needs assessment, monitoring and evaluation), the local tele-center staff, in collaboration with other project stakeholders (such as universities, as in the case of the TANUVAS project), have an active role in the identification, retrieval, processing, and diffusion of content. The information services provided by the tele-center will expectedly respond to the local community expressed needs (what we are calling 'demand'), but it is clear that some decisions on content will be based on what the 'experts' paternalistically think the community needs (that is, 'normative needs'). Therefore, there is a forceful integration of normative needs and community demand in the management of content for tele-center development.

#### *Content: important but sometimes not enough*

We started out by asserting that it was the information and communication part of ICT that was really important in development. Nonetheless, social change usually entails more than information and

communication. There is the reality of what is possible to change given environmental conditions and physical resources. A recent report accentuates this point:

ICTs can deliver potentially valuable information to end-users like market prices to poor rural farmers and medical advice to rural healthcare workers. However, market information is useless if there are no roads to transport goods, and medical advice is meaningless if there is no money to purchase medicines. As evidence from research on Botswana SMEs [small and medium enterprises] confirms, information is important, but it is only one part in a chain of resources (infrastructure, skills, money) required for the end-user to have the capacity to act [13].

As we test a new IT system for women's self-help groups in rural Tamil Nadu (in collaboration with TANUVAS and the University of Madras) during the next few years, we will seek the help of both experts and the women themselves to guide the development of the micro-finance and entrepreneurship material to be made available in that action research. And equally important, we will build the *facilities* that will help women process, package, and maintain quality control of their micro-enterprises' products.

#### *Awareness raising about the value of information and the role of tele-centers*

It is important to emphasize that an effective endeavor to create locally relevant content is strongly connected to creating awareness about the information services (and potential opportunities) a tele-center may provide. A tele-center is a new resource in the community, and therefore it is (at least initially) a demand-creating challenge. In this respect, Hornik states that "demand problems call first for investment in motivation and in mechanisms (like group meetings and multiple channels) that ease and reinforce participation" [5]. From past experience in development communication projects, it is clear that people most in need of a specific information or communication service may not necessarily respond to simple service availability. Applying a 'field of dreams approach' ("build it and they will come", or "provide the content and they will use it") is naive. It can also be dangerous: our focus group research reveals how village elders and leaders act as a main source of information and communication, and if a tele-center ignores this tradition, it may bring power clashes and conflicts that hamper any ICT-enabled development initiative. This indicates the importance of raising awareness about the role of the tele-center, while also exploring every opportunity to sensibly integrate the tele-center into the existing local communication structure.

At the same time, it is important to underline that the potential of tele-centers is not limited to the provision of locally relevant versions of information from outside: emphasis must be put on the opportunities of tele-centers to stimulate the processing and diffusion of indigenous knowledge. That way a tele-center can become a reference center with a mission to preserve and disseminate local cultural traditions and practices.

In any case, contextually appropriate content and awareness raising about the existence and value of tele-center information services are necessary but probably not sufficient conditions for effective tele-center use. Our study shows social and economic divides that may hinder equal access to the information services provided, no matter how useful or relevant the content is or how information-seeking oriented the potential users are. For example, in our work with women's self-help groups, we will need to deal with issues of self-efficacy (the women's self-assessment of their ability to take action) and the women's perceptions of how significant people in their environments support or resist what the women try to do.

### *The role of research in the generation of locally relevant tele-center services*

A tele-center is intended to become a flexible information and communication resource. In the context of our discussion, we put an emphasis on flexibility because the information needs and priorities of the villagers are not static, and a needs assessment should not be a 'one-shot' strategy, but a first step in an ongoing learning process. Continuous monitoring of community needs and uses is a basic strategy to make tele-centers and their ICTs locally relevant and demand-driven [10].

However, research still needs to show if and how proposing a mechanism that constantly adapts, updates, and disseminates locally relevant information is realistic (and by realistic we mean a financially and socially sustainable mechanism providing information that is affordable, useful and usable, and trusted by the villagers). Our discussion on the opportunity for universities to provide and adapt relevant and contextually appropriate content may be an important and visionary response to some of these concerns around the world.

### References

- [1] P. Benjamin and M. Dahms, Socialize the Modem of Production: The Role of Telecenters in Development, *Tele-center Evaluation: A Global Perspective*, Ricardo Gómez and Patrick Hunt, eds, IDRC, Canada, 1999, <http://www.idrc.ca/telecentre>
- [2] R.D. Colle and R. Roman, Challenges for the Tele-center Movement in 2002, in: *Tele-centers and ICT for Development: Critical Perspectives and Visions for the Future*, R.D. Colle and R. Roman, eds, special theme issue of *The Journal of Development Communication* 12(2) (in press).
- [3] R.D. Colle and R. Roman, *The Tele-centre Movement: Using ICTs for Social Change*, paper presented at the Nineteenth Annual Intercultural Communication Conference, University of Miami, February, 23, 2002.
- [4] R. Heeks, i-Development Not e-Development: Special Issue on ICTs and Development, *Journal of International Development* 14(1) (2002), 11.
- [5] R. Hornik, *Development Communication: Information, Agriculture and Nutrition in the Third World*, Longman, New York, 1988.
- [6] A. Gumucio-Dagrón, Prometheus Riding a Cadillac? Tele-centers as the Promised Flame of Knowledge, in: *Tele-centers and ICT for Development: Critical Perspectives and Visions for the Future*, R.D. Colle and R. Roman, eds, special theme issue of *The Journal of Development Communication* 12(2) (in press).
- [7] A. Gumucio-Dagrón, *Making Waves, Stories of Participatory Communication for Social Change*, Rockefeller Foundation, New York, 2001.
- [8] M. Gurstein, Commentary: The Global Development Gateway and the Central Dilemma of E-Commerce, The Communication Initiative, 17 December 2001. [www.comminit.com/commentary/sld-3600.html](http://www.comminit.com/commentary/sld-3600.html)
- [9] F. J. Proenza, Tele-center Sustainability: Myths and Opportunities, in: *Tele-centers and ICT for Development: Critical Perspectives and Visions for the Future*, R.D. Colle and R. Roman, eds, special theme issue of *The Journal of Development Communication* 12(2) (in press).
- [10] R. Roman and C. Blattman, Research for Tele-center Development: Challenges and Opportunities, in: *Tele-centers and ICT for Development: Critical Perspectives and Visions for the Future*, R.D. Colle and R. Roman, eds, special theme issue of *The Journal of Development Communication* 12(2) (in press).
- [11] R. Roman and R.D. Colle, Digital Divide or Digital Bridge? Exploring Threats and Opportunities to Participation in Tele-center Initiatives, *TechKnowLogia*, (May/June, 2001), 56–59. <http://www.TechKnowLogia.org>
- [12] S. Schech, Wired for Change: The Links Between ICTs and Development Discourses, *Journal of International Development* 14(1) (2002), 13–23.
- [13] T. Tan-Torres Edejer, Disseminating Health Information in Developing Countries: the Role of the Internet, *British Medical Journal* 321 (30 September, 2000), 797–800.
- [14] United Nations Development Program (Evaluation Office), Information and Communication Technology for Development: Synthesis of Lessons Learned, *Essentials* (5, September 2001), [http://www.undp.org/eo/documents/essentials\\_5.PDF](http://www.undp.org/eo/documents/essentials_5.PDF)
- [15] M. Van Der Velden, Knowledge Facts, Knowledge Fiction: The Role of ICTs in Knowledge Management for Development, *Journal of International Development* 14(1) (2002), 25–37.
- [16] Alex Wilks, Development through the Looking Glass: the Knowledge Bank in Cyber-space, paper presented at the 6th Oxford Conference on Education and Development, Knowledge Values and Policy, September 2001.

#### About the authors

*Raul Roman* is a Ph.D. candidate in Communication at Cornell University. His research focuses on the application of information and communication strategies for rural development. He currently coordinates the evaluation of a telecenter project in South India.

*Roy Colle* has combined a 37-year professorship at Cornell University with development work in Asia, Africa, and Latin America. He has served as a consultant for WHO, FAO, the UN and other international organizations, and is currently involved in information technology projects in China, India and Mexico.