ICT-Enabled Distance Education in Community Development in the Philippines

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The Philippines, an archipelago of 7,100 islands in Southeast Asia, faces new opportunities as it competes with the rest of the world in the information and communication technology (ICT) arena. New industries including call centers, foreign medical transcription services, and the hugely popular multiplayer online gaming systems require the rolling-out of a much needed ICT architectural backbone and support systems, and a readily available pool of ICT-trained workers. This article describes the development of the Maguinda Multipurpose Community Telecenter, a rural facility designed to provide this type of support; the experiences, successes, and lessons learned from a research and development project implemented at the site; and qualitative insights into the effects of the ICT intervention on the lives of the Maguinda residents. Emphasis is placed on the importance of community development principles in rural distance education implementation.

Introduction

The development of an information and communication technology (ICT)-skilled populace in Asia is an uphill battle in the face of the great problem of the "digital divide." ICT access and infrastructure are limited to the urban centers, and accessible only to those who can afford them. Far-flung communities are reachable only through rough roads, island villages, and farmlands, and are accessible only after hours of commuting on pump boats. These communities are left behind in the ICT revolution, seemingly stuck in the past and in the old ways. The benefits of the technological revolution have the potential to bridge this digital divide between the urban
and the rural dwellers. In order for this to be fully realized in developing countries, however, particularly in rural areas, various issues need to be addressed (Latchem & Walker, 2001). These include access to technologies, affordability and financing, inappropriate regulatory frameworks, and shortage of skills and knowledge to develop and implement ICT-based systems.

The Government of the Philippines has realized the need to address the problems of ICT implementation, and committed itself, in its IT action agenda (National Information Technology Council [NITC], 1997), to ensuring that every business, government agency, school, and home will have access to information technology by the turn of the 21st century, via community-based access at least. A 5-year pilot project supported by Canada’s International Development Research Centre (IDRC) through its Pan Asia Networking program has established four multipurpose community telecenters in the island of Mindanao, and helped in bringing ICT to the rural villages. The community telecenters contain resources including a public telephone office; a reading center or library; information about the barangay—the smallest political unit of a city or municipality (National Statistical Coordination Board, 2007); Internet access to information about agriculture, education, health, and livelihoods; and an Internet café. The goal of the project, beyond ensuring mere connectivity, is to spur content development at all levels, and to create an environment for two-way communication and interaction (Pan Asia Networking, 2006).

Water, Sanitation, and Hygiene in Distance Education

The United Nations Millennium Development Goals (MDG), adopted by the United Nations World Summit on Sustainable Development in Johannesburg in 2002, have firmly established water and sanitation issues on the global agenda, and have called for halving the proportion of people who lack safe water and sanitation by the year 2015 (United Nations Department of Economic and Social Affairs [UNDESA], 2004a, 2004b; United Nations Development Programme [UNDP], 2006). Past initiatives have been made by many local and international governments and organizations to address water, hygiene, and sanitation problems. Traditional avenues of communication and information dissemination such as radio, television, and print have been used, but in the Philippines their impact has tended to be temporary and superficial. Water, sanitation, and hygiene issues are pressing concerns for many rural communities, and there is useful content to be developed for use by the multipurpose community telecenters. Education on these topics is also an important entry point in providing health-related content as a medium for research on the effectiveness of distance education (DE). As a means to bridging the knowledge and information gap between the haves and have-nots, providing ICT hardware and Internet access is only the beginning, however. Communities need access to relevant and appropriate content that is localized to their situation through production of materials in the local language.
ICT and DE in Asia and the Philippines

To date, most telecenter activities in Asia have focused on computer training, agriculture, business services, and e-governance. Educational initiatives comprise approximately 22% of activities offered through telecenters (Whyte, 2000). In the Philippines, there have been no initiatives by the national government to provide ICT-enabled support for nonformal education. Efforts to use ICT in the public school system of the Philippines have generally been limited to basic education. These include in the study of Home Economics and Livelihood Education at the elementary level, and in Technology and Home Economics at the secondary level (Andrada, 2001). Topics are limited to the study and use of computers, although not with the actual use of ICT as tools for teaching other subjects, for example, Math, English, and Health and Hygiene Education.

ICT-enabled DE in the Philippines is also in its early stages, being mainly limited to the formal education sector, particularly baccalaureate and postgraduate studies such as those offered by the University of the Philippines Open University (Suplido, Bonito, Escubio, & Mariano, 2003). A study conducted by the Southeast Asian Ministers for Education Organization on the effectiveness of nonformal education system (NFES) learning modules (APTR, 2002) has indicated that there is still a need for additional supplementary materials, for additional content with activities that are practical for the users, and for revisions to include more in-depth information and more thorough discussion of topics. While the NFES materials were designed for self-instruction, learning via these modules still requires considerable teacher–student interaction; so using the modules for DE purposes is unlikely to be effective at this stage. There is also a lack of content in certain local dialects. Most materials in the Maguinda MCT library are only in English and Tagalog (the basis of Filipino, the national language). New ICT-supported nonformal DE materials are therefore needed to address this problem. The study reported here has been designed to address these needs. By demonstrating the value of a community development approach to DE implementation in the Philippines, it is hoped that this article will encourage other Asian DE teams to follow a similar approach.

The Research Project

This study, carried out over 2004–2006, investigated the effectiveness of using digital and electronic media for effecting changes in the knowledge, attitudes, and practices of Filipino communities in relation to hygiene and sanitation. It was conducted by the Molave Development Foundation Inc. (MDFI), a nonprofit organization formed to promote health, education, and advocacy using ICTs for poverty reduction and the empowerment of people. The MDFI also acts as the Southeast Asia training and resource center for the Water, Sanitation and Hygiene for All (WASH) campaign, a global advocacy initiative of the Water Supply & Sanitation Collaborative Council. In 2004, the MDFI embarked on a project entitled Technology-Supported Distance Education and Training in Water, Hygiene and Sanitation (the Philippines) funded by
the IDRC. The project has provided technology transfer, livelihood and entrepreneurial skills training, social marketing, and development of modules and educational materials to enhance the delivery of WASH information through nonformal DE strategies. Technologies used to deliver the WASH Modules have included interactive video CDs, multimedia websites, remote videoconferencing, instructional programs, and short messaging services (SMS). The research was conducted in two study areas: one in an urban slum and one in a rural area. In both study areas, the intervention being studied is the WASH Modules, developed by the research team and delivered in digital format through DE media.

Research Objectives

This project aimed to identify issues, problems, opportunities, resources, and strategies for deploying DE technologies (tools, methods, and systems) to empower groups and organizations involved in nonformal education, specifically in training and teaching health, hygiene, and sanitation to distant Filipino communities. Its overall goals were to:

- determine how ICT-enabled DE can contribute to the improvement of the community members’ knowledge, attitudes, and behavior with respect to water, hygiene, and sanitation issues;
- enhance learning capacities through the use of ICT-enabled learning materials;
- address the issues of connectivity and lack of relevant content for use; and
- explore other opportunities whereby ICTs can play a role in developing community participation and ownership, as well as formulating strategies for operational and financial sustainability of the multipurpose community telecenters.

The Study Site

The community of Barangay Maguinda, situated in the outskirts of Butuan City, Mindanao, was established in the 1950s. Its inhabitants are mostly members of an organization previously known as the Caballeros de Rizal Agricultural Endeavor (CRAE), and currently as the Knights of Rizal Agricultural Endeavor Foundation, Incorporated (KRAEFI). Its Supreme Founder and National President, Datu Santiago B. Ecleo Sr., was the Barrio Captain who made the once field–forest ecosystem into a productive and progressive agricultural area (Barangay Connect, 2003). The hilly community, located 27 kilometers from Butuan City proper, has 20 puroks (small communities within the barangay) and six roads that connect farms to market and homes. Only one of these roads is developed, however. The others are either un- or under-developed, for example, the rough road that connects the community to the highway. The people of Maguinda are known for their peace-loving nature despite their multiple ethnic backgrounds. Because of the active participation of the residents and the presence of a strong community organization, officials and residents of Barangay Maguinda have a strong sense of commitment to
the different activities and projects initiated in their community, whether these projects are introduced by the government or by other organizations (Barangay Connect, 2003).

**Project Setup and Infrastructure**

The Maguinda Multipurpose Community Telecenter (MCT) was established in April 2000, through the joint effort of the following:

- government units of Butuan City and the province of Agusan del Norte;
- Department of Science & Technology Caraga Region (DOST-Caraga);
- Philippine Council for Health Research and Development;
- United Nations Educational, Scientific and Cultural Organization (UNESCO);
- Canada's IDRC; and
- officials and residents of Barangay Maguinda.

The vision of the Barangay MCT Project is to connect people and organizations for rural development purposes, empower the community, and alleviate poverty by means of ICT (Barangay Connect, 2003). At the end of the initial project in 2001, the community telecenter and its facilities were turned over to Barangay Maguinda. DOST continued to provide the center and its volunteers with technical assistance on request.

**Site Visit**

The MDFI research team visited Barangay Maguinda and the Maguinda MCT in April 2004, 3 years after its handover to the community, to assess its situation, and to find out if the existing facilities could accommodate the requirements of the WASH Modules. The team was pleasantly surprised to find the equipment (computers, network server, scanner, inkjet printer, etc.) in good working order. This can be attributed to the dedication and maintenance work provided by the Maguinda MCT volunteers, despite their financial difficulties. Unfortunately, the existing Internet dialup connection, running at 33 kbps, was not accessible during the visit and was reported to be intermittent. The telephone line used by the community also was not working. The Maguinda MCT, however, continued to serve the community members, particularly the farmers and students, by renting out the PCs to them at a minimal flat rate of about 10 pesos per hour. The equipment is being used for the typing of documents, contracts, and school projects.

**New Computers and Satellite Internet Access**

Although the Maguinda MCT already possessed computers, the project provided an additional eight new computers with better specifications, as well as new computer desks and chairs. A VSAT (very small aperture terminal) satellite Internet connection was installed in September 2004 to provide the Maguinda MCT with faster
Internet connectivity (asymmetric burstible up to 128 kbps downlink and 153.6 kbps uplink). The Maguinda community was glad to help in the installation of the satellite dish, and contributed the sand and cement used for the construction of its base. They also constructed a wire mesh fence surrounding the satellite base, to deter against theft and prevent the dish’s misalignment. The VSAT connection came bundled with cable TV channels. A DVD player and speaker system were added to the Maguinda MCT’s existing large-screen television. The Maguinda MCT has used these facilities for income-generating activities such as charging minimal admission fees to exclusive TV events (e.g., the Pacquiao–Morales boxing match).

The WASH Modules

The WASH Modules were originally produced in collaboration with the Teacher Community Coordinators of the Alternative Learning Services, City of Manila (formerly Non-Formal Education Services). The module contains six sub-modules on the following topics: personal hygiene; dengue fever; diarrhea; scabies; typhoid fever; and environmental hygiene. Information such as disease causation, symptoms, and prevention is discussed via multimedia elements such as voice, music, Flash-based animation, and video clips. These elements accompany the lessons, which are rendered in a conversational and lively style, in an effort to make the learning process more enjoyable, even for adults. A simple point-and-click system of navigation is employed using a mouse; and the material’s overall design aims to make it uncomplicated for first-time users, for those with no previous computer experience, or for those who cannot read or write much. From its original Filipino language version, the WASH Modules have been translated into English and Cebuano (the language used in Maguinda). Two new modules on “Hygiene and Health at Home and in the Farm” were also developed, aided by the content expertise of the Maguinda residents.

Online Research Tool

For the WASH project, MDFI developed an online, web-based data and research management system: the WASH Research On-line Survey (ROS) system. It uses a PHP-based, open-source, server-side, HTML-embedded scripting language to create dynamic web pages. The ROS has enabled the research team to maintain an online database of the study population and to generate the research reports. It is used for data collection, encoding, and database management; and it aids in data analysis by converting figures into a standard delimiting format for statistical analysis programs such as Microsoft Excel, Stata, and SPSS. The ROS was designed with simplicity and user-friendliness in mind, which made it easier for Maguinda MCT volunteers to input data and to generate reports with a simple click of a button. The data, input in Maguinda, were sent in real time via the Internet to MDFI’s servers in Manila for storage and subsequent analysis.
Project Implementation and Results

Preimplementation Phase

During MDFI's first visit to Maguinda, a stakeholders' meeting was organized between MDFI, representatives of DOST-Caraga, Maguinda community leaders and members, and KRAEFI leaders. Various logistical hurdles had to be overcome. Unpredictable weather conditions delayed the team's visit to the site, and by the time they arrived DOST-Caraga was moving office. These problems created only minor delays, however, which did not seem to affect the overall outcomes of the research project. The Maguinda sessions were an opportunity for the research team to identify the linkages, opportunities, and responsibilities of the partner organizations. A baseline survey was conducted to establish the participants' sociodemographic characteristics; to gain insights into their attitudes, practices, and behaviors regarding water, hygiene, and sanitation issues; and to determine their current knowledge and skills of computer and Internet use. The results of the baseline survey indicated that:

(a) most of the participants surveyed have been living in Maguinda for more than 11 years;
(b) farming is their main source of income;
(c) most residents get their drinking water from a deep well or spring;
(d) most households have water-sealed latrines;
(e) most households dispose of their garbage by burning it;
(f) all residents wash their hands before eating; and
(g) half of them take a bath every day, while the other half take a bath every other day.

Gender differences were also noted in the survey results. Men appeared interested in accessing the computers and Internet to get agricultural information such as new farming techniques, product pricing, and weather, whereas women seemed more interested in accessing the Internet to communicate with loved ones in the city or abroad. Most of the participants were initially hesitant to use computers for fear of breaking them, but showed interest in taking lessons on how to use them properly.

Implementation Phase

A sample of 50 community members was selected to participate in the implementation phase of the research, using the following inclusion criteria: male or female, at least 12 years old; resident of Maguinda for at least 5 years; has not completed formal education and must not have been in formal education for at least 2 years; functionally literate; and willing to take part in the study. The demographic characteristics of the eventual sample were: age (22 years ± 6.1); male (56%) and female (44%); Roman Catholic (46%). The gender breakdown in the sample was: male (22 years ± 6.4) and female (22 years ± 5.9).
Before accessing the contents of the WASH Modules (online or on CD-ROM), the learners answered a 30-item true/false pretest questionnaire to ascertain their knowledge of water, hygiene, and sanitation issues; and a 42-item Likert-scale attitude survey to assess their baseline attitudes on these issues. They were then asked to use the computer-based WASH Modules for an estimated period of 1–2 weeks, as the project intervention. The ICT-based modules were downloaded from MDFI's central server in Manila, and were stored on the Maguinda MCT server, for access from the Maguinda MCT workstations. During this stage, the Maguinda MCT volunteers provided technical support and assisted the learners in the use of the PC and the modules. The volunteers also ensured, as much as possible, that information learned by the group would not leak out to other learners who had not yet seen the module. The sessions were frustrated by occasional technical problems (e.g., occasional losses of power and Internet connection); but despite these problems all of the participants were able to finish the modules, many of them staying extra hours into the evening.

After the learning session, the sample answered the pretest 30-item true/false as a posttest and the same 42-item Likert-scale survey used in the pretest, to assess any changes in their knowledge and attitudes following the digital media intervention. Table 1 presents the results on the true/false items, omitting the 13 items that were answered correctly on the pretest by most respondents (top quintile), and that showed shifts of only ±1 on the posttest. These items included the more obvious general knowledge statements such as “Boil your water to ensure that it is safe” and “Do not borrow clothes, towels and other personal articles from persons with skin diseases.” One true/false item was discarded owing to a computer error that prevented all of the participants’ responses from being recorded.

The attitude scale results, however, raised serious concerns about the reliability and validity of the attitude survey. Overall, they suggested a net shift of hygiene and sanitation attitudes towards negative and “don’t know” responses. On closer investigation in the subsequent focus group sessions, it became apparent that the Likert-scale task was confusing for many of the respondents, for example, in relation to the awkward double-negative task of disagreeing with negative statements. The attitude survey results are therefore omitted from this report, in favor of the clearer attitudinal evidence yielded by the subsequent focus groups.

Technical problems were experienced during the implementation phase as in the previous phase. The downloading of the modules was slow. Because the modules contain graphics coupled with accompanying audio and video, they required considerable download time. Frequent power interruptions in Maguinda affected the learning schedules. Power outages occurred two or three times a week, and some sessions had to be rescheduled to a later date. On several occasions the Internet was unavailable. Although the satellite Internet connection provided faster Internet access than dialup, weather conditions made it unstable. Sharing the Internet connection between computers also added to the slow access times. Three computers broke down, though they were quickly replaced by the supplier. Owing to these
Table 1. Levels of hygiene awareness before and after the WASH Modules

<table>
<thead>
<tr>
<th>True/false items&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Total correct responses</th>
<th>Number of persons with learning gains (+) or losses (−)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>(2) Dengue fever is caused by female daylight biting mosquitoes</td>
<td>45</td>
<td>49</td>
</tr>
<tr>
<td>(3) Do not go to places with abundant plant growth to prevent dengue fever</td>
<td>39</td>
<td>47</td>
</tr>
<tr>
<td>(6) Cleanliness can aid in the prevention of diseases</td>
<td>48</td>
<td>50</td>
</tr>
<tr>
<td>(9) The proper way of washing hands can be done by using water alone</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>(11) Germs and bacteria can enter dirty and bare feet</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>(12) Changing underwear once a week can cause diseases</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td>(13) “Pagtatae” is also diarrhea</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>(14) Diarrhea can only be caused by dirty, contaminated food</td>
<td>40</td>
<td>48</td>
</tr>
<tr>
<td>(15) Eating with dirty hands can cause diarrhea</td>
<td>36</td>
<td>45</td>
</tr>
<tr>
<td>(17) Patients having diarrhea should drink plenty of water</td>
<td>33</td>
<td>36</td>
</tr>
<tr>
<td>(19) One can keep the environment clean even with limited water supply</td>
<td>41</td>
<td>48</td>
</tr>
<tr>
<td>(20) Germs and bacteria can easily spread in clean environments</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td>(24) Eat nutritious food to prevent diseases</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>(25) Clear water is safe</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>(27) Nails should only be cut once a month</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>(28) Typhoid fever is contagious</td>
<td>34</td>
<td>39</td>
</tr>
</tbody>
</table>

<sup>a</sup>Unlisted items were those showing high prior knowledge; one item was discarded owing to computer error.

problems, some students were unable to complete their work, and had to repeat modules subsequently.

Postimplementation Phase

Similar technical problems occurred during the postimplementation phase, though they were resolved as previously. Two postimplementation focus group discussions, each lasting an hour, were conducted to probe the learners' changes in attitudes and behaviors after their introduction to the learning modules. The first group contained nine women and the second seven men. An external facilitator led the discussions,
gathering responses via questions based on the set objectives and in the vernacular dialect (Cebuano). To minimize interruptions, the focus group discussions were conducted at the back of the multipurpose community center, with the facilitator and participants in an informal circle so that participants were put at ease, and a good atmosphere for sharing was created. The following issues and concerns were discussed:

1. participants’ reactions to the WASH Modules;
2. issues or problems encountered in the process of learning WASH through ICT;
3. suggestions for improving the WASH Modules;
4. other subject areas needed in addition to WASH; and
5. changes in behavior, practices, and attitudes after the WASH Modules.

A summary of the discussion was prepared during the final stages of each session in order to check for agreements and last-minute clarifications and comments.

Discussion of Results

The data collected before and after exposure to the WASH Modules showed an improvement in knowledge in the 50-member sample. On 13 of the 30 true/false items, no changes in knowledge were observed, since the respondents were aware of these facts prior to taking the module. Overall, however, the group showed an increase in hygiene and sanitation knowledge, as reflected by correct pre-posttest shifts on 15/30 of the true/false items (50%). By contrast, a net knowledge loss was apparent on only two of the items. Specific knowledge of disease etiologies, such as diarrhea, dengue fever, and the fecal-oral route of disease causation, improved in the group. This is a good indication that the WASH intervention had a successful impact, since waterborne diseases such as dengue fever and diarrhea are common morbidities in the Maguinda area. The knowledge gained by the community is also valuable because it lessens folk beliefs and superstitions on how these conditions arise.

The problems with the attitude survey have taught the team significant lessons about future questionnaire design. The effects on attitude from the intervention were clarified by evidence from the focus group discussion; and since the focus groups contained actual participants from the WASH Modules, it may be assumed that those participants to elicited reactions generalizable to the ICT-based WASH Modules as a whole. Most of the focus group discussion participants expressed the view that the modules on water, sanitation, and hygiene had a positive effect on their knowledge and attitudes in terms of personal hygiene, eating habits, drinking water, and personal protection. Most participants wanted to share the knowledge acquired from the modules with their families and neighbors, and to encourage others to learn WASH through ICT. Most were also enthusiastic to learn more topics by the methods used in the WASH Modules. In general, the exercise gave them pride and a sense of accomplishment in having used computers and multimedia learning material, eagerness to learn more, and increased confidence in exploring computers and
the Internet further. These are simple farmers and housewives who would not otherwise have had the opportunity for exposure to these technologies.

Insofar as hygiene and sanitation issues are concerned, however, their attitudes appear harder to change than their knowledge. The module designers wished to convey that individuals must take responsibility for their health and hygiene rather than leaving it to the government or other groups; and many of the survey items related specifically to that message. There is a deeply rooted cultural belief among the poor people of the Philippines, however, that they are helpless in the face of health predicaments, and that these are less pressing and manageable than the need to find the next meal or to have a roof over their heads each night. There is even a prevailing attitude that hygiene and sanitation are luxuries to which poor people are not entitled. These complex sociocultural attitudes require in-depth analysis in relation to the WASH Modules’ evolving design.

The participants’ performance may also have been hindered by technical factors. The fact that the lessons were conducted online may have reduced the reliability of the results, since most of the students were using a computer for the first time during the implementation period, and may have had difficulty in following the course material. It helped that the Maguinda MCT volunteers were present during the implementation to assist the students with the use of the computers; and that the WASH Modules were user-friendly, featuring many graphics and narration in the local dialect, and were designed to ensure that even those who were not computer literate could use them with the mouse alone.

Other Activities

Writeshop

Part of the output of the research project was to develop new ICT-enabled learning modules. The research team organized a writer’s workshop or writeshop with the members of the research sample, and with other community members and leaders from Barangay Maguinda, to conceptualize and improve the content for the learning materials. The creative team responsible for the concept and content of the new modules was joined by the MDFI research team, Maguinda Barangay officials, representatives from DOST-Caraga, Maguinda MCT volunteers, and by farmers and mothers. The 2-day workshop was an opportunity for the creative team to learn about appropriate design elements, communication processes, and content. The activity sessions gave them the opportunity to discuss the community’s learning needs, issues, and obstacles. The participants were clear in their desire that the final product should be user-friendly, with relevant topics, and catering to specific needs.

After the writeshop sessions, the creative team developed two new modules: “Health and Hygiene at Home (for Mothers)” and “Hygiene and Safety in the Farm.”

As with the previous WASH Modules, these new learning modules contained multimedia elements including voice, music, Flash-based games and activities, and videos. The creation of these learning modules in direct collaboration with the
Maguinda community members themselves was an innovative process for all concerned, leading to the production of content that was tailor-made to the local community’s needs. MDFI merely facilitated the process, providing creative input and technical support.

Sustainability Planning

MDFI also organized an action planning session in January 2005, to develop sustainability plans for the Maguinda MCT after the project and equipment would be turned over to the community. This was another innovative process, and a proactive initiative by MDFI. By involving the Maguinda community in the planning process, a shared sense of responsibility and ownership for the sustainability of the project was generated. Through MDFI’s strategic planning framework, the Barangay Maguinda officials and Maguinda MCT volunteers arrived at specific targets in order to fulfill their vision to be the model barangay telecenter in the Philippines in terms of knowledge generation, sustainability, cost-effectiveness, and community empowerment. The primary goal, as agreed by the community leaders, is to achieve sustainability of the Maguinda Maguinda MCT for at least 5 years (2006–10), by generating adequate financial, community, and human resources to sustain its operations. It is hoped that the Maguinda MCT’s financial viability will be sustained through increased usage of Maguinda MCT facilities by the community, and by income-generating strategies, subsidies, donations, and collections. The community has also focused on increasing the skills and capacities of the project’s stakeholders, by training key leaders on effective planning and management, and by increasing the number of advocacy initiatives undertaken by the community. The planning team is also seeking to facilitate new activities and funding through partnerships, coalition building, and networking with other organizations.

The People’s Overall Reactions

For the Maguinda community members who became part of this research, the learning process through the use of the ICT-enabled module was enjoyable and involving. The inclusion of multimedia elements allowed for a more engaging learning experience. The community saw the potential of using computers and the Internet in learning not only about hygiene and sanitation but also other topics that can contribute to the improvement of their work, education, and lives. They now see computers as tools for empowerment and advocacy, which can bring employment opportunities in an increasingly IT-driven economy. The community has learned to see beyond the borders of the barangay, as the Maguinda MCT has opened the world up to them. Perhaps the most striking contribution of the project for the community and the people of Maguinda has been the way in which it has improved the lives of the people in terms of community empowerment. The success of the Maguinda MCT is a good example of a working and effective partnership between project proponents, stakeholders, and beneficiaries. The project has also helped to
develop the capacity of the community, and to open many new opportunities for self-improvement by the community members.

A good example of this is the case of Danny, a Maguinda MCT volunteer who handles the telecenter's day-to-day management. He was responsible for encouraging his co-barangay members to visit the center to participate in the research project. Danny has passion and dedication for the task at hand, and he did not see his lack of a college degree as any hindrance to learning about computers and using ICT to improve his life. Although he still earns his living through farming, the computer and Internet knowledge he has acquired through the project is allowing him to consider other avenues for a better living. He believes the experience has given him a more positive and optimistic view on life, and he is willing to share his knowledge with the community. Danny's experience and learning through the project can be summarized in his own words:

I used to be shy and afraid of talking to people. Regardless of my limited education, Molave trained me and now I lead the Maguinda MCT volunteers in teaching our community members how to use and learn from the WASH ICT Module. I also learned how to use the computer and I can even teach others how to use it.

Final Outcomes

Friendships were renewed, experiences and lessons shared, and successful project outcomes were celebrated during a partners' synthesis meeting organized in September 2005. This was attended by representatives of the various stakeholder groups in the project, from both the urban and rural study sites. Representatives of Barangay Maguinda, Maguinda MCT, and the Maguinda National High School showcased their accomplishments, and briefed the project team on their plans for the sustainability of the MCT after the project completion. The success of the Maguinda MCT was featured in Manila Bulletin, one of the country's leading broadsheets, following interviews conducted during the synthesis meeting (Limpin, 2005). The article highlighted the accomplishments and experiences of the research project, as well as the activities, experiences, and learning of Maguinda's community leaders, volunteers, and residents.

Recommendations and Conclusions

To run a research project dealing with educational ICT does not merely involve subject knowledge and expertise. It also has to take into account the factors that could directly or indirectly affect the procedures, processes, and outcomes of the project. In the conduct of the current project, the following lessons were learned:

1. Technical and student support are vital aspects of running ICT-based learning systems
An ICT-enabled DE system should not be designed to replace person-to-person interaction or hands-on assistance. Technical problems and learning concerns will
arise from time to time, and provision must be made for technical support (online, phone-assisted, or personal) so that users and learners will know where to go and who to ask for help, to ensure that usage and learning will not be hampered. This is particularly important in poor areas of the Philippines of the type studied in this project, where there is low functional literacy, and where people still are finding it difficult to learn completely independently. In addition, many computers in the poor areas are old, refurbished units donated from other countries. Up-to-date technical support is needed to ensure that these units run efficiently.

2. The technology used should be designed and customized according to the learner's needs and skills
Content developers must be sensitive to the social and cultural diversities of the users and learners. This does not merely entail translating available content into the local language, but also requires the production of learning content with which the learners have a basic familiarity. Content must be sensitive to the idiosyncrasies and nuances of the country’s many cultural groups and regions. For example, in its discussion of intestinal diseases, the WASH Modules avoided references to, and images of, pigs or pork, as the material was to be used in the south, home to a sizable Muslim minority. The lack of basic computer skills and low functional literacy of people in communities were also considered in the modules’ design. For this reason, interaction between the student and the material was achieved almost completely by using a mouse.

3. Technology has limitations
The most efficient implementation of an ICT-enabled learning system is accomplished using the most direct approach and the simplest technologies. While multimedia-rich learning modules can be effective tools for delivering lessons and messages, technical issues such as limited bandwidth, intermittent Internet connections, power interruptions, and corrupted system files can cause delays. System backups, and alternative processes and access technologies should be planned and made readily available. With communities dispersed across 7,100 islands in the country, and with little or no advanced telecommunications infrastructure in many areas, best-laid plans can falter and appropriate technologies must be sought (Government of the Philippines, 2007)

4. An ICT-based learning module will be more effective if combined with teacher–student interaction and other learning resources (“blended” learning)
Due to technology limitations and sociocultural realities in the country, it is not yet possible to rely on an ICT-enabled learning system that operates with minimal human intervention and interaction. For now, learning through ICT-enabled modules should be balanced with teacher assistance, activities, and interaction. This is especially necessary when students require additional information and help with
topics that are not clear, and with problems that the system could not anticipate; for example, in the nonformal education setting, where motivation for self-learning may be harder to elicit than with learners who take DE courses to gain formal qualifications. A completely online, multimedia educational package is still not viable in the Philippines, and ICT-based content still has to be used in conjunction with traditional learning resources.

5. Design and produce learning materials that are user-friendly and enjoyable to use for both learners and teachers

The project was successful because of the introduction of processes facilitated with the barangay and the Maguinda MCT. The community as a whole, and not just the Maguinda MCT volunteers and learners, became an integral part of community-based participatory research. They were deeply involved as active participants in the research, and not just as passive recipients of grants or guinea pigs who had no say in the process and were not going to be informed of its outcomes.

This study has shown that, while the Philippines has only begun to use ICT-enabled DE, it is off to a promising start. Increased efforts in scaling up this type of project should now be made and supported by more nongovernmental organizations, funding agencies, private organizations, and government entities. There is a vast potential for replication of these kinds of initiatives with other communities that have similar and even greater needs. Decision makers, policy formulators, and development organizations can play a large part in this process, by identifying policies and assistance to provide opportunities for improved telecommunications infrastructure, an affordable and efficient ICT backbone and services, and technical support. The success of the Maguinda MCT can now be replicated around the country in setting up, managing, and sustaining other telecenters. Indeed, the model used in the Maguinda project is already being examined by the Government of the Philippines ICT Commission, which is currently setting up “Community e-Centres” in all municipalities of the country (Commission on Information and Communications Technology [CICT], 2006). The Commission has been keen to examine the lessons of the study, especially with respect to community participation and localized content development.

If individuals and communities are empowered by the information technology revolution, they will grow beyond being mere recipients of assistance, and can contribute directly to the nation’s economic lifeblood. They will have a larger worldview and will no longer be limited to the confines of their homes, work, and communities. An empowered community can work towards self-sufficiency, efficient governance, and economic prosperity.

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