

PD-ABY-701



FINAL PROJECT REPORT

ADMINISTRATIVE AND PROGRESS REPORT



Namibia Computer Assisted Teacher Training Project

May 2000 – March 2002

THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

Contract No. HNE-I-96-00018, Task Order 18

Implemented by the Academy for Educational Development (AED),
Global Communications and Learning Systems Project,
LearnLink

GLOSSARY OF TERMS

AED – Academy for Educational Development
BES II – Basic Education Support Project Phase II
BETD – Basic Education Teachers Diploma
CATT – Computer Assisted Teacher Training
EDDI – Education for Development and Democracy Initiative
EMIS – Education Management Information Systems
ETT – Education Technology Trainee
GRN – Government of the Republic of Namibia
ICT – Information and Communication Technology
IECT – Information, Education, and Communication Technology
INSET – In-Service Educators Training
ISC – Instructional Skills Certificate
IT – Information Technology
LAN – Local Area Network
MBESC – Ministry of Basic Education, Sport, and Culture
MHETEC – Ministry of Higher Education, Technology, and Employment Creation
MIT – Master Information Teacher
MMWG – NIED Multimedia Working Group
NGO – Non-governmental Organization
NIED – National Institute for Educational Development
OPIs – One Page Information Sheets
OPM – Office of the Prime Minister
PRESET – Pre-Service Educators Training
RETT – Regional Education Technology Team
SO – Strategic Objective
SOW – Statement of Work
TBCMs – Teachers Basic Competency Manuals
TOT – Training of Trainers
TRC – Teacher Resource Center
USAID – United States Agency for International Development
WAN – Wide Area Network

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EXECUTIVE SUMMARY

LearnLink / Namibia has had Successes in all Five Task Order Objective Areas:

In support of Task Order Objective Number 1 (*support the National Institute for Educational Development (NIED) and its designated staff in acquiring the necessary tools and skills to develop computer-assisted training courses for advisory teachers, inspectors, and others in the four education regions where USAID is assisting the MBESC*) the project:

- Assisted NIED in its decision to research, choose, and deploy a new network operating system that improved the performance of the Institute's computer network, eliminated some long-term costs associated with the previous system, and added new server capabilities such as listserv processing. This change is already well received by NIED, has eliminated certain long-term costs for both NIED and the project, and will greatly facilitate future project activities.
- Worked with NIED to develop and train a multimedia working group (MMWG). In consultation with the Director, NIED staff from the Resource Center, Professional Development, Curriculum Development, and Media Unit were identified and asked to serve on the working group. The group met formally from March until December 2001, received approximately 80 hours of formal training from the project, and produced online versions of the first year of the BETD INSET teacher training modules. Training topics included HTML, Internet communications tools, designing web-based training, teaching and learning in a multimedia environment, incorporating video into teaching/training materials, and video planning and production.
- Trained an additional seven NIED staff members in website design to help them provide more content on the ED'S Net and NIED websites.
- Assisted MMWG member and Oshindonga Education Officer to produce multiple ED'S Net web pages to support Oshindonga education. Oshindonga is one of the 13 official Namibian languages and one of the mother tongue languages for one of the largest ethnic groups in the country.
- Assisted MMWG member and NIED Resource Center technologist to develop the NIED Intranet.
- Formally and informally worked with the NIED Resource Center library assistant and MMWG member to assume the responsibilities of being the ED'S Net and NIED Home Page webmaster.
- Supported the NIED Resource Center library assistant by funding her to receive additional training in *Using and Managing Online Discussion Forums*, *Using the Internet as a Research Tool*, and *Information and Communication Technology (ICT): A Strategic Approach*. These courses will enhance Ms. Boshoff's abilities to serve as the NIED and ED'S Net webmaster, acting network administrator, and chair of the Ministry's Basic Information Science curriculum panel.
- Supported Regional Education Technology Team (RETT) members in developing One Page Information Sheets (OPIs) in multiple Namibian languages to assist them in their work in training education stakeholders in the regions.

In support of Task Order Objective Number 2 (*support NIED in the development of a communications network for the training of advisory teachers, inspectors, and others involved in the lower primary phase by linking them to NIED through the Internet and other key computer-assisted delivery mechanisms to be developed*) the project:

- Selected a consortium of vendors including UUNET and SchoolNet to procure, install, and connect the four computer laboratories that are currently being used as the core of the above-mentioned communications network.
- Successfully registered on NIED's behalf the domain *www.edsn.net.na* to serve as the address for the Educational Development and Support Network website.
- In cooperation with NIED, developed the Educational Development and Support Network website. By the end of the project, the website had approximately 50 professional development modules available in MS Word, PDF, and HTML formats and contained the materials for two separate HIV/AIDS education programs. The site also has capacity to support discussion boards, have remote users post resources, post questions, allow chat functions, and support a dynamic calendar.
- In February 2001, designed and delivered a three-day training on computer center management for the managers and likely future computer center employees (ETTs and other staff) at the NIED Ongwediva, Rundu, Tsumeb, and Katima Mulilo resource centers.
- In March 2001, designed and delivered a five-day training on computer operating system, maintenance, and troubleshooting for the likely future computer center employees at the NIED, Ongwediva, Rundu, Tsumeb, and Katima Mulilo resource centers.
- In May 2001, designed and delivered a five-day training on productivity tools and peripheral training for the three ETTs and staff from Ongwediva and Tsumeb TRCs.
- In September 2001, designed and delivered a five-day workshop for ETTs and TRC managers to discuss issues including sustainability and marketing, after-hours use, professional development of TRC and MBESC staff, ED'S Net, network and HTML training, and training in Microsoft Excel.
- In March 2002, arranged to have all ETTs visit at least one other TRC to share best practices and experiences in operating the TRC computer centers.
- Upgraded the NIED server (including CPUs, network card, RAM, and additional hard drives) to enable it to easily host both the NIED and ED'S Net websites and other future uses under development by NIED. While this server has since been replaced, it will likely be redeployed to another location or be used as NIED's archive computer.
- Assisted NIED in its decision to upgrade the old server (mentioned above) to a new and significantly more powerful new server that supports more software and functions.
- Provided informal training on the Internet and ED'S Net to groups holding training and workshops at NIED.
- Procured T Shirts and CD holders for RETT members to serve as marketing for ED'S Net.
- Assisted Ongwediva TRC staff member in locating and funding training to receive A+ computer certification.

In support of Task Order Objective Number 3 (*support the development of prototype curriculum-based teacher training materials for primary school*) the project:

- Retyped and developed HTML versions of NIED's *Teachers Basic Competency Manuals (TBCMs)* and posted them to ED'S Net. It is foreseen by the project that these prototype modules will be used to demonstrate the capabilities, strengths, and weaknesses of ICTs in the delivery of professional development training.

- Worked with NIED and BES II Management Advisor, Dr. Pfau, to produce online versions of the first three modules in the School Managers professional development series.
- Worked with the Ministry's HIV/AIDS committee and the Ministry of Local and Regional Affairs to provide the five module *Ombetja Yehinga* HIV/AIDS teacher training series on ED'S Net.
- Worked with the Ministry's HIV/AIDS committee to post all of the *My Future is My Choice* HIV/AIDS education program on ED'S Net.
- Worked with professional development unit at NIED to place on ED'S Net 18 General Education modules targeting junior secondary teachers on the ED'S Net website.
- Developed 40 *One Page Information Sheets (OPIs)* that provide basic information and instructions to assist users in beginning to use Internet Explorer, web-based e-mail, the Internet, ED'S Net, to evaluate information on the Internet, and to develop websites. The concept of developing OPIs has since been adopted by SchoolNet/Namibia in designing and developing its ICT training programs and training materials.
- Assisted RETT members in translating a limited number of the OPIs into various Namibian languages.

In support of Task Order Objective Number 4 (*support the expansion of an administrative framework at the level of the MBESC and NIED to include "Master Information Teachers," who champion the use of teaching/learning technologies*) the project:

- Worked with NIED and Regional Education Officers to propose the formation of Regional Education Tech Teams (RETTs) comprised of representatives from the Teacher Training Colleges, the Inspectorate, Advisory Services, Adult and Continuing Education, and Classroom Teachers.
- Held three meetings with RETTs from Rundu, Katima Mulilo, Ondangwa East, and Ondangwa West educational regions. During these meetings, team members developed group objectives and mission statements and were introduced to topics related to ED'S Net and the Internet, e-mail, instant messaging, chat, plus burning CDs, and using typing tutors and Windows 98, evaluating web-based resources, using Help features for Windows and Microsoft PowerPoint, and developing websites.
- Held closeout conference with RETTs in Windhoek that focused on developing skills in website creation, learning Microsoft PowerPoint, developing OPIs and other training materials, and developing and presenting mission statements and goals for the future. At the same time, the groups were also introduced to the concepts of Technology Champions and the model through which the project sought to develop them into Master Information Teachers. These team members, without explicit project support or encouragement, have gone on to formally and informally train hundreds of education professionals to begin using ICTs.
- With the assistance of two Peace Corps Volunteers and one teacher, located a vendor to provide the project a deeply discounted rate for computer reading software that will allow blind students at the Eluwa School for the Blind and Deaf to use computers and access the Internet at the Ongwediva TRC.

- Assisted NIED and its new WorldTeach Volunteer coordinator in developing an innovative program to work with Basic Information Science teachers to explore the integration of technology into cross-curricular research projects.
- Assisted NIED and its new WorldTeach Volunteer in exploring ideas for doing research on the use of technology in Namibians schools.

In support of Task Order Objective Number 5 (*contribute to discussions of national policies, strategies, and guidelines on the use of teaching/learning technologies in the basic education sector*) the project:

- Assisted NIED in developing and finalizing its *IT Users Policy*.
- Assisted NIED management in their deliberations to reconnect their semi-professional staff to e-mail and the NIED intranet to allow for more comprehensive use of e-mail and file sharing facilities.
- Wrote a policy proposal to encourage NIED to consider providing more of its publications online for free.
- Assisted NIED in developing an *Internet Publication Policy*. This policy is now being reviewed by the Office of the Prime Minister.
- Assisted NIED in developing and finalizing their *Electronic Archive Policy*.
- Helped NIED to develop a wireless networking policy that, among other issues, details the contractual relationship between the NIED Fund and NIED residents choosing to access the NIED wireless network. The *Wireless Connectivity Policy* is currently under review by NIED management.
- Assisted NIED management in its deliberations to purchase a wireless hub that will allow NIED residents to access the NIED network, e-mail, and the Internet from their homes. In exchange, residents will be asked to pay monthly fees to help support IT at NIED. The project estimates that this purchase could eventually provide the NIED fund with a monthly income well over N\$1,000. Funds for this purchase and the purchase of the new server are all being financed from income provided by projects paying into the NIED for connectivity.
- Developed a proposed draft addendum to the *TRC Network Manual* on computer center management.
- Assisted NIED in developing its policy for the use of the new NIED computer center including hours of operation, fees for use, and systems for reserving the center and for procuring supplies.
- Assisted NIED in developing an interim policy for non-NIED use of its new server.
- Assisted NIED in developing policies that begin to make the NIED network more financially sustainable by charging projects and organizations for access to the services provided by the NIED network and new NIED server.
- Assisted NIED staff in developing a new policy guideline to discourage the use of certain types of paper-based memos that can be more economically delivered via e-mail list groups.
- Using the newly created MBESC ICT listserv, frequently contributed to discussions covering different ICT topics relevant to the MBESC.
- Had resident advisor serve as one of NIED's representatives and a founding member of the E-Learning Development Group, an informal advisory committee representing the four primary distance learning institutes (University of Namibia, Polytechnic of Namibia,

Namibian College of Open Learning, and NIED.) In the last quarter, the advisory group discussed issues relating to its role and formation, discussed procurement of e-learning platforms, discussed coordination of activities and resources, and served as a forum to share ideas and discuss lessons learned.

- Assisted NIED in developing proposed policies for the setting, collection, and accounting of fees collected at TRCs affiliated with the Namibian Open Learning Network (NOLNET).
- Assisted in the development of Regional Education Technology Teams that will discuss policy issues related to ICT use, training, and investment.
- Assisted SchoolNet/Namibia in their search for new board members from within the education community in hopes of creating stronger links between the Ministry's formal support and SchoolNet's more informal support to education.
- Provided significant assistance to NIED and USAID to help them develop a proposal for a nationwide website design competition aimed at secondary school learners. While the first year's focus is on youth, sexuality, and HIV/AIDS, the project and NIED envision that the competition, *InformED Website Competition*, may become a yearly competition with a focus on different issues of social importance such as the environment, civic participation, or tolerance.
- Provided significant assistance to NIED and USAID in organizing and hosting a three-day workshop to help plan and coordinate activities related to the *InformED Website Competition*. Further, the project has continued to provide IT and logistical support to this activity.
- Helped establish a partnership between SchoolNet, NIED, and USAID in the administration and management of the *InformED Website Competition*.
- Assisted NIED management in their decision to move the computer center from its former location to a location wholly contained within the Resource Center. This will allow NIED to better use the ETT working in the computer center for both computer center as well as resource center work. In the process, the ETT will acquire more training and will become a more valuable human resource for NIED.
- Assisted NIED in developing new signs for their Resource Center that will encourage users to visit and use the resource center rather than feel that the center is largely off-limits to them.
- Assisted NIED and the Ongwediva TRC in developing a policy for sharing connectivity costs at the OTRC.
- Assisted NIED, USAID, and BES II project in developing a proposal to initiate a laptop leasing program in cooperation with a local education and technology NGO.
- Assisted NIED management in deliberations to use past IT revenue in the NIED Fund to purchase a new, more robust SUN server for the NIED network. The backbone of the NIED network (both wired and wireless) is now wholly owned by the NIED Fund. The project also assisted NIED in obtaining a deeply discounted purchase price for this server. This server, amongst other things, has freed NIED from having to buy a more expensive, yet less useful backup server to provide virus-scanning functions, and also provides the potential for NIED to migrate to a less expensive thin-client solution when making future workstation purchases.
- Assisted NIED management in their deliberations to reconnect their semi-professional staff to e-mail and the NIED intranet to allow for more comprehensive use of e-mail and file sharing facilities.

- Developed lessons learned document entitled *Using Technology to Support Teacher Training at a Distance in Namibia* to help inform future decision making processes related to the uses of ICTs in the Ministry's in-service teacher training programs.
- Developed lessons learned document entitled *Policy Support for ICT in Education: Overcoming Barriers to Communication, Sharing, and Change* to help explain the project's approach to policy support.
- Assisted project counterpart, Alfred Ilukena, in deliberations to purchase computer equipment for at least 10 additional TRCs. This process took several months to complete, but, by the end of the quarter, Mr. Ilukena had received authority to purchase 42 workstations with specification similar to those purchased for the CATT supported computer centers.
- Assisted NIED in its deliberations to change Internet Service Providers and assisted them in making the transition from the old ISP to the newer one. As the new ISP is SchoolNet, NIED is saving approximately N\$1,000 per month while providing a new revenue stream to SchoolNet. This leased line is the first that SchoolNet has provided under its new ISP model.
- At the request of NIED, conducted a technology needs assessment at all four Teacher Training Colleges and presented the findings and recommendations to NIED.

ADMINISTRATION AND MANAGEMENT REPORT

A. Introduction

The first section of the report covers the administration of Task Order #18 from January 1, 2002 – March 31, 2002. This section is divided into hiring and staffing, deliverables, procurement, and outstanding issues.

B. Hiring & Staffing

AED / Namibia

Project staff in Namibia included the following:

- Long-Term Resident Advisor – Jeffrey Goveia
- Finance/Operations Manager – Elsie Klintenberg
- Technical Project Coordinator – Perien Boer
- Technical Training Coordinator – Todd Malone
- Rundu ETT – Gelasia Kauma
- Katima Mulilo ETT – Irene Ilukena
- Ongwediva ETT – Lineekela Nandjedi
- NIED ETT – Jeannette Sibungo

In addition to the above-mentioned project staff, the project also received significant support and contribution from Peace Corps Volunteer Tammy Hayano, WorldTeach Volunteer Heidi Soule, and Ongwediva TRC library assistant Dennis Mwandingi.

AED / Washington

The project was supported in Washington by the project manager Jeffrey Coupe, the monitoring and evaluation specialist Eduardo Contreras-Budge, and training specialist, Gini Wilderson. In addition, the project received budgetary support from Doug Boudreau.

Consultants

The project only made use of one non-AED consultant, Mr. Richard Reed. Mr. Reed assisted the project in designing and implementing an IT needs assessment for the teacher training colleges in Namibia.

C. Deliverables

Reporting Documents

CATT Project Planning Document

Proposed Timeline for Project LearnLink / Namibia

Terms of Reference for Project LearnLink Working Group

First Quarterly Report (June 2000 – September 2000)

Second Quarterly Report (October 2000 – December 2000)

Third Quarterly Report (October 2000 – December 2000)

Fourth Quarterly Report (April 2001 – June 2001)

Fifth Quarterly Report (July 2001 – September 2001)

Sixth Quarterly Report (October 2001 – December 2001)

Seventh Quarterly Report (January 2002 – March 2002)

Trip Report for visit made by A. Ilukena and J. Goveia to Washington, DC

Report on TRC Manager/Staff Training

Report of Baseline Computer Training for ETTs

Report on TRC Manager, Staff, and ETT Workshop

Three Reports on Meetings of Regional Tech Teams

RETT Conference Report

Lessons Learned Papers

CATT/LearnLink Final Report

Training

80 Hours of Multimedia Training Delivered to NIED Multimedia Working Group

TRC Manager/Staff Training

TRC Manager, Staff, and ETT Workshop

Baseline Computer Training for Education Technology Trainees (ETTs)

Computer Application and Peripheral Training for Education Technology Trainees (ETTs)
Computer Application and Peripheral Tool Training for ETTs
Three Meetings of Regional Education Technology Teams
Project Conference with Regional Education Technology Teams
Informal Training of Additional NIED Staff to Develop Online Materials
NIED Webmaster Trained to Assume Responsibilities as ED'S Net Webmaster
NIED Webmaster Funded to Attend Courses in Using and Managing Online Discussion Forums, Using the Internet as a Research Tool, and Information and Communication Technology (ICT): A Strategic Approach
Assisted Ongwediva TRC Staff Member in Locating and Funding Training to Receive A+ Computer Certification

Policy Documents

Addenda to TRC Manager's Guide Covering Management of Computer Laboratories
Report on Needs Assessment for Expanding IT and Internet into the Teacher Training Colleges
Policy Proposal: Arguments for Freely Sharing Intellectual Property via the Internet
NIED Online Publication Policy
NIED Electronic Archiving Policy
NIED IT Users Policy
Amendment to the NIED IT Policy: Wireless Access to NIED Network Prepared for NIED
Draft Addendum to TRC Network Manual for Computer Centers
Draft Cost-Sharing Policy for Internet Connectivity at TRCs
NIED Computer Center Policy
Interim Policy Guidelines for Use of NIED Server by non-NIED Organizations
Interim Policy Guidelines for Charging Fees for Access to NIED Network
Interim Policy Guidelines for Using E-mail for Internal Memos
Policy Proposal for Cost Sharing and Vouchers at NOLNet Centers
InformED Website Competition Guidelines
Proposal for the Development of Laptop Leasing Program
IT Planning Document for Namibian Teacher Training Colleges

Training Materials

All 20 TBCM Modules published online
Five Ombetja Yehinga HIV/AIDS Teacher Training Modules published online
My Future is My Choice, HIV/AIDS Materials published online
18 General Education Modules for STAMP 2000+ published online
Three BES II Continuous Professional Development Management Modules published online formats
Three BETD INSET Modules published online

40 One Page Information Sheets (OPIs) developed and published online
 InformedED Website Competition Web Pages published on ED'S Net
 CDs of ED'S Net and NIED websites produced

Other Deliverables

Successful Installation of Four Computer Centers
 ED'S Net T Shirts produced to help market the website
 ED'S Net CD holders produced for RETT Members
 RETT Technology Champions T Shirts produced as an incentive to RETT Members
 HIV/AIDS Mouse Pads produced for computer centers
 Developed Recovery CDs and Boot Disks to deploy to computer centers

D. Procurement

Items Procured in the Past Quarter

Quantity Procured	Description of Items Procured
4	Tires for Project Vehicle (Ford Station Wagon)
1	Left Rear Plastic Lens Cover for Project Vehicle
1	PC Keyboard
2	PC Mouse
1	Labtec AM-242 Desktop Microphone
1	17" Compaq Computer Monitor
1	Compaq DeskPro 667 MHz Pentium III Computer WorkStation including mouse, keyboard, 52X CD ROM, Floppy Drive, Sound Card, 56K Internal PCI Modem, 10/100 Ethernet Card, AGP Graphics Accelerator Card
1	Hewlett Packard CD-Writer
1	Logitech Ultralight Pro Data Projector
1	Pull Down Data Projector Screen
1	Sony Hi 8 Video CamCorder
2	MS Office 2000 Professional Edition Software Packages
8	Norton Systemworks 2000 V3.0 Software Packages
8	Sets of PC Speakers
7	Computer Headset and Microphone Combination Packages
7	17" Philips Computer Monitor
7	Compaq DeskPro 800 MHz Pentium III Computer WorkStations including mouse, keyboard, 52X CD ROM, Floppy Drive, Sound Card, 10/100 Ethernet Card, AGP Graphics Accelerator Card
30	Compaq Deskpro 800 MHz, Pentium III Workstations with 20 GB Hard Drives, 128 MB RAM, Sound Cards, 48X CD ROMS, Desk Microphones, Premium Sound Speakers, 10/100 Ethernet Cards, and Protects 100 Base-T Token Rings
30	Philips 15" Monitors
35	Microsoft Office2000 Professional Academic Edition Software Packages

30	Copies of Mavis Beacon Typing Tutor Software
4	Small Network Servers (Compaq Deskpro 800 MHz, Pentium III Workstations as specified above loaded with Linux OS Server Software)
1	Dell 800 MHz, Pentium III, Inspiron Laptop Computer
4	HP Colorado 14GB Internal Tape Drive
1	100 MB Zip Drive
5	250MB External ZIP Drive (USB)
5	HP LaserJet 1100 Printers
1	HP Scanner with Automatic Document Feeder and Slide Adapter
4	HP ScanJet Color Scanners with Slide Adapters and Automatic Document Feeders
1	Hewlett Packard PhotoSmart C200 Digital Camera
4	PHOTOPPC650 1152 x 864 Digital Cameras
4	CS-SC 120KN Air Conditioner Units
4	Intel InBusiness 16-Port Ethernet 10/100 Dual-Speed Hubs
4	HP CD-ReWriter Plus 8210e (USB with 4x write 4xrewrite 6xread)
5	Logitech QuickCam Teleconferencing Cameras
4	CS-SC 120KN Air Conditioner Units
4	Smart-UPS 420 VA, Line-Interactive, SmartBoost, with Smart Trim, data line protection to Protect Servers,
30	Back-UPS Multi Path 500VA Complete System Protection with Quick swap, deep brownout and surge protection
4	Computer Toolkits
34	Dustcovers for Computers
4	Server Cabinet, Connections, and Configuration for 4 Computer Laboratories
3	One-Year Agreements to Provide Leased-Line Connectivity to Computer Laboratories
35	Rolling, Adjustable Office Chairs
30	Computer Workstation Tables
5	Staff Desks with 3 Drawer Pedastals
5	Metal, Lockable 4-Drawer File Cabinets
5	Metal, Lockable Storage Cabinets
5	Whiteboards (1200x800mm)
4	Metal Door Cages
4	Burglar Bars for Windows (4 centers)
1	Staple Gun
1	Cross Cutting Saw
2	Copies of Dream Weaver
1	RJ 45 Crimping Tool
1	Network Card for NIED Server
2	133MB RAM Cards for NIED Server
2	450MHz Processor Cards for NIED Server
2	18GB Hard Drives for NIED Server
2	Copies of <i>Inspiration</i>
1	Orthopedic Office Chair
7	Uninterruptible Power Supply (UPS) Units
6	Copies of Microsoft Office XP
3	Sets of Burglar Bars for Doors Leading into NIED Resource Center/Computer Lab

1	Network Switch for Ongwediva TRC
1	Copy of JAWS Computer Reading Software for the Visually Impaired
1	Wooden Display Unit to Display Training Materials at the NIED Computer Center
8	Wooden Display Units to Display Training Materials at Resource Centers
8	Software Recovery CDs and Boot Disks for Computer Centers
200	ED'S Net T Shirts
30	RETT Technology Champions T Shirts
100	ED'S Net CD Holders
400	ED'S Net CDs

FINAL REPORT ON PROJECT ACTIVITIES AND ACHIEVEMENTS

E. Introduction

As this is the final report, the project is happy to report that it believes that it has substantially addressed all five task order objectives. Although the project in cooperation with its partners at NIED and within the regions have made significant progress over the life of the project, the project must admit that some work most likely has not reached a stage where the interventions may be considered consolidated or sustainable. With the project exiting, these tasks will now fall on the Ministry to assume and continue.

F. Task Order Objective Number 1

Task Order Objective Number 1 asks the project to “*support the National Institute for Educational Development (NIED) and its designated staff in acquiring the necessary tools and skills to develop computer-assisted training courses for advisory teachers, inspectors, and others in the four education regions where USAID is assisting the MBESC.*”

Activities and Achievements

In its efforts to address this objective, the project worked with staff at NIED, worked with the education technology trainees working in the TRCs in the regions, and worked with the members of the Regional Education Technology Teams as well. The work the project did with NIED staff included a substantial amount of work with the NIED multimedia working group, a short training course held for an additional seven NIED staff members, and additional formal and informal support to two NIED staff members, Ms. Elbe Boshoff and Mr. Kashindi Ausiku. Below is a more detailed account of project activities and achievements.

NIED Agrees To Create Multimedia Working Group. In order to develop within NIED the capacity to create computer-mediated training materials, project staff and NIED management agreed that NIED should create a specific group within the Institute responsible for the design and creation of these materials. Since the group ideally would require and seek input from all of NIED’s professional divisions, this new group will include one staff member from the Professional Development Unit, one from the Curriculum Development Unit, one from the Languages Unit, one from the Media Unit, and one member from the NIED Resource Center.

NIED Multimedia Working Group Provided with Approximately 80 Hours of Multimedia Design Training. By the time the project's support to the multimedia working group ended in December 2001, the project had worked with the group on training topics including HTML, Internet communications tools, designing web-based training, teaching and learning in a multimedia environments, incorporating video into teaching/training materials, video planning and production, and DreamWeaver and Fireworks web authoring packages. By the end of December 2001, the projects' work with this group finally bore fruit when the team completed the production of the first year's BETD INSET teacher training modules for publication on ED'S Net.

Oshindonga Pages Developed by a MMWG Member for ED'S Net. Using the skills he learned from his work in the MMWG, the Oshindonga Education Officer chose to begin developing Oshindonga pages for the ED'S Net website. While the project has been encouraging education officers to do this, Mr. Ausiku is the first to undertake this work and has taken advantage of both the formal and informal training opportunities provided by the project to assist him in his efforts. The Oshindonga pages are available at <http://www.edsnet.na/Resources/Oshindonga.htm>. In the last NIED IT Committee Meeting, Mr. Ausiku promised to begin training additional NIED staff members in website design and production.

NIED Resource Center Developed to be Webmaster for NIED Home Page, NIED Intranet, and ED'S Net. One of the great project success stories is Ms. Elbe Boshoff, the NIED library assistant. Before Ms. Boshoff took over these responsibilities, foreign consultants and volunteers had done practically all of the web development at NIED. During a short project period, Ms. Boshoff completely redesigned the NIED website, developed a NIED Intranet, and as well had agreed and been trained to assume the responsibility for ED'S Net as webmaster. The project also has worked with her to assume more network management responsibilities plus working with her to provide basic troubleshooting support for NIED computer equipment.

Ms. Boshoff Funded to Attend Additional Training for her Role as NIED Webmaster and System Administrator. In addition to the formal and informal training the project provided to NIED and Ms. Boshoff, the project was requested by NIED to help fund the costs for Ms. Boshoff's training in South Africa for courses covering *Using and Managing Online Discussion Forums*, *Using the Internet as a Research Tool*, and *Information and Communication Technology (ICT): A Strategic Approach*. The project hopes that this additional training will provide Ms. Boshoff with additional skills, competencies, and confidence for her many roles within NIED.

Trained an Additional Seven NIED Staff Members in Website Design to Help Them Provide More Content on the ED'S Net And NIED Websites. In January 2002, the project discontinued its formal support to the NIED multimedia working group. Nevertheless, while it still had time, the project wanted to take an opportunity to train additional NIED staff to produce web-based materials to present via ED'S Net.

Worked with RETT Members in Developing Regional Websites. As part of its work with the Regional Education Technology Teams, the project assisted each team in developing a website for their region, their RETT, or for their regional education office. All four teams succeeded in developing a beginning design that was previewed at the National RETT Conference in March.

Supported RETT Members in Developing One Page Information Sheets (OPIs) in Multiple Namibian Languages. The initial OPIs were created by the project to help train the RETTs, but the RETTs reported that they also would like to be able to make these sheets so that they could train others on more programs and functions. Thus, at the National RETT Conference, several RETT members were provided guidance in making new OPIs. At the same time, they realized that the OPIs are easy to translate into other Namibian languages, as the amount of text on any OPI is minimal.

Obstacles Encountered

The project encountered several constraints impeding successful adoption of these new technologies in the Ministry's distance education programs. Most of the constraints are environmental characteristics that impede the expansion and use of ICTs in Namibia. Others are related to the project design. In general, the main constraints are lack of access to the technology; the Ministry's staffing structure, the costs of equipment and Internet access, limited bandwidth, the scarcity of IT skills, the project's short life, and the fact that the project was never explicitly linked to one of the Ministry's distance education programs.

Lack of Access: As mentioned previously, the first and most difficult is the lack of access to technology in the field. In particular, the lack of access to technology by the project's intended beneficiaries, lower primary school educators in Namibia's four northern education regions. Granted, the project was asked to set up computer centers at regional Teacher Resource Centers. Nevertheless, it is unfair to expect teachers who live at any considerable distance from these resource centers to frequently travel to access them. These sites were chosen to provide access to the greatest number of teachers in the field. Unfortunately, it is the more rural teachers who have the greatest need for support.

Staff Structures: While National Institute for Educational Development is undoubtedly the appropriate programmatic host for this type of activity; its staffing structure is insufficient for it to fully adopt the role of integrating technologies into the Ministry's distance education activities. The Institute has only one full-time professional staff member assigned to manage the development of the BETD INSET and another professional who has the role of coordinating the ISC program. Other professionals at NIED are similarly overtaxed as they are each individually responsible for overseeing portfolios such as mathematics for grades 1 through 12, the development of entire language curricula for each of the 13 national languages, and developing compensatory teaching activities for all grades and subjects. In addition to the limited number of professionals available to work on such projects, the Ministry to date has only two employees designated to support the Ministry's IT infrastructure and IT developments.

IT Costs: One of the primary causes for the lack of access to technology is the costs related to the procurement and maintenance of the hardware and software and the costs of connectivity. With approximately 92% of its budget reserved for salary and benefits, the Ministry has very little funding available to cover these costs. Furthermore, it must weigh these costs against the costs needed to reduce student-teacher ratios, build more schools, and provide more schools with basic services and infrastructure such as toilets, electricity, running water, telephone service, books, and libraries. Dial-up Internet connectivity currently costs approximately N\$18 per hour. This must be compared to the Ministry's budget for school telephone bills that currently stands at N\$50 per school per month. Assuming schools use dial-up connectivity, they will deplete their telephone allowance in less than three hours. Similarly, as Namibia imports the overwhelming majority of its hardware and software via countries such as South Africa and Zimbabwe, the costs frequently include taxes from multiple countries, high transport costs, and margins imposed by several middle men. Even after the equipment is bought and delivered, schools and educators must find ways to deal with the high costs of maintaining the equipment in hostile environments located at substantial distances from the closest sources of IT support.

Limited Bandwidth: While the costs of connectivity in Namibia are quite high relative to Namibian's ability to pay, the connectivity provided for these costs is limited. Although Namibia's IT infrastructure is impressive in that it has a nearly 100% fiber optic backbone, Namibia does not yet

have access to DSL technology. The standard leased-line connectivity agreement is for shared 64K Digicon service and comes at the cost of anywhere between N\$3,500 to N\$15,000 per month.¹ Thus, not only is the bandwidth limited, but it is also quite expensive. This makes dial-up solutions more appropriate for most users, but dial-up solutions further limit the bandwidth needed for more data-intensive functions such as streaming audio and video, video conferencing, and even uploading and downloading mid-sized documents such as teacher-training modules and assignments.

Scarcity of Technical Skills: Although Namibia has a decent number of trained IT professionals, the vast majority of them are located in Windhoek. This means that education professionals and schools located outside of Windhoek must frequently either pay for technicians to travel to do maintenance or make repairs on equipment or must pay to send their equipment into Windhoek incurring additional down time and costs. Further, as IT skills are scarce, the costs for procuring IT support are high and few organizations can find or afford onsite technical support.

Insufficient Time to Develop Programs: This has been the primary constraint for all of the project's activities. It is unrealistic to expect a Ministry unit to develop all the skills and understanding needed to convert programs from paper-based delivery mechanisms towards higher tech-delivery mechanisms, given a 22-month project timeframe that includes delays in hiring and contract negotiations. The project timeframe was adequate to assist NIED and the Ministry to begin developing basic skills and grasping some fundamental lessons such as those in this report, but it was insufficient to fully adapt one of their programs for electronic delivery. For this to occur, more time and more staffing would have been needed to rethink the courses, the strengths and weaknesses of the technology, and to train tutors and in-service teachers to participate. Even a pilot program with a limited number of teachers would have required significantly more time.

Project Not Explicitly Linked to One of the Distance Education Programs: Along with an insufficient timeframe another constraint came from the fact that the project was never attached to one of the Ministry's distance education programs. The project was not asked or explicitly expected to assist the Ministry in converting even one of its distance education courses for electronic delivery. Without such wording and given all of the other constraints, it was largely infeasible for the project to produce much more than it did, which was to help NIED with developing online adaptations of some of the distance education materials. While valuable at a basic level, this has not been sufficient to truly begin exploring some of the more promising tools that could be used in future distance education programs.

Lessons Learned

The project has learned many lessons in relation to how the Ministry's distance education programs may be supported by ICTs. These lessons may be divided into access issues, timing issues, human resource issues, cost issues, and issues of appropriate uses of technology.

Access Issues: The project's approach to addressing the access issue was to place computers in Regional Teachers Resource Centers. While this allowed the greatest amount of access to teachers, it falls woefully short of providing access to the majority of Namibia's educators. Expecting teachers to frequently travel long distances to use the computers is unreasonable. Teachers need easy access if they are expected to become comfortable with their use. TRCs in Namibia and elsewhere in Africa have proven to be good locations for short in-service training sessions but have never been used on a

¹ Leased-line costs are largely tied to the Rand to U.S. Dollar exchange rate. At the time this paper was written, the exchange rate was approximately 11.5 Rand to the Dollar.

daily basis by more than the most dedicated professionals located within a short distance from the centers. If the Ministry wants to seriously consider the expanded use of ICTs in its distance education programs, it must consider methods of ensuring that teachers have much easier access to the technology. Even if computers are provided at all TRCs, this will still be insufficient to meet the needs of a great percentage of the target teachers located in rural schools. In addition, the Ministry will have to find ways to contend with the costs for the hardware, software, maintenance, training and connectivity costs that will necessarily be incurred through such a massive expansion of access to these technologies. Even if the access is made available, the Ministry will have to consider how it can enable the target teachers to become comfortable with using the technology.

Timing Issues: One of the most obvious lessons learned is that introducing these technologies into such a critical component of the Ministry's work will take time. For these technologies to be fully adopted into these programs will require significant time and thought to determine how they may be effectively utilized. Time is needed to develop and convert content into electronic formats, to expand access to the technologies, to train the target groups in how to use the technologies and any advanced applications utilized within the courses, and to train mentors, facilitators and tutors. Also, time is needed to pilot test the materials and programs. Although it is true that online courses are becoming popular in other parts of the world, a quick analysis of their popularity will likely show that the programs' producers and participants already have access to the technology. In addition, they are likely to be already comfortable and familiar with its uses and can afford the costs associated with the technology. While it is possible that the Ministry and the target audience for the Ministry's distance education programs may one day fall into this category, even the most optimistic analysis must suggest that this will take considerable time.

Human Resource Issues: The human resource issues encountered by the project were many. While the project was able to show that it is not overly complicated to train Ministry professionals to develop simple online and CD-ROM based teacher-training materials, it learned that being able to train people was insufficient to encourage the development of CATT programs. In the future, if the Ministry wants to develop a distance education program that more fully incorporates the use of ICTs, it will need to devote a small team to the task of developing the program. Furthermore, the group must see this work as their primary responsibility. This team will need people with significant knowledge of the Ministry's professional development goals and philosophy, people who understand how technologies can be used to support these goals and remain consistent with the Ministry's reform philosophy, as well as people who are technologically competent. The project's approach of working with a group of professionals who all saw the project's work as a low priority produced few results. In addition, NIED's lack of any staff with a technology background has limited and will continue to limit the Institutes ability to use technology more creatively. It should also be noted that the Ministry's goals to expand access to ICTs will place a greater burden on the Ministry to hire or retain a growing number of IT technicians and specialist. It is questionable whether the Ministry can afford to assume these costs.

Cost Issues: Any attempts to develop such programs must very seriously consider the cost and benefits related to such tools. The tools are expensive to develop, deploy, and use for both the Ministry and for the target audience. Unless it can be shown that these tools will significantly enhance the programs or significantly reduce other costs, then these interventions should not be made.

Issues of Appropriate Use of Technology: While the issues mentioned above are all very important, from the project's perspective, the issues related to the appropriate use of the technology are the most important. As mentioned previously, converting basic materials for online delivery is not a terribly difficult or necessarily even time-consuming task. This, though, is not the relevant question. The

questions the Ministry and promoters of the use of these technologies must address are those of how the technologies can effectively support the Ministry's reform efforts. If the Ministry does not believe that books are a sufficient *prerequisite* for education, then it should not believe that putting materials online are a sufficient *prerequisite* for teacher education.

If education is to be learner-centered, constructivist, and democratic, then the Ministry's teacher training programs must also be learner-centered, constructivist, and democratic. In addition, from the project's perspective, the teacher training programs must provide models and examples of the pedagogical approaches encouraged by the Ministry's reform efforts. While the technology can certainly be used to provide demonstrations of such practices, the project questions whether simple demonstrations are sufficient to encourage the reflective and critical perspectives needed to understand the theory and integrate it into a teachers daily practice. If teachers are to be expected to facilitate education, there needs to be a facilitative presence in the Ministry's teacher training programs. Unfortunately, the technology alone cannot provide this facilitative presence. Humans are needed. Of course, these humans are not necessarily required to be physically present, and this is where the technology can play a part in providing access to facilitators located at a distance.

The technology can also encourage communication between teachers and mentors and facilitate discussion between groups of teachers in training. From the project's perspective, it is along these lines that the Ministry should focus its interest on the adoption of technologies into its programs. In fact, it believes that the incorporation of some of these technologies could substantially improve the Ministry's current distance education programs. Nevertheless, these improvements will come at great costs in terms of expanding its IT human resources, expanding access to technologies and connectivity, and costs related to supporting and updating these technologies.

Recommendations

From the project's perspective, the way forward will require serious reflection on the part of the Ministry to explore what types of uses it foresees for deploying and incorporating ICTs in its current and future in-service and distance education programs. In this paper, the project has tried to show two paths. One path suggests that the technology can assist in enhancing the effectiveness of distance education. The other path suggests that technology may be used to remove Namibia's reliance on mentors and teacher trainers in favor of computerized teacher training systems that promise to greatly reduce the travel, print, and human resource costs associated with its current pre-service and in-service teacher training programs. In either case, the project recommends that no serious efforts be made towards a more significant adoption of these technologies until it can be shown that the six basic conditions mentioned previously are met. This, however, does not suggest that the Ministry and NIED should not continue to expand their IT capabilities, either in terms of human or physical resources. Below is a list of recommendations pointing a way forward that allows the Ministry to continue to experiment with education technologies in a way that will place it in a strong position to effectively integrate a greater number of technologies into its professional development programs.

Continue development of online materials to be delivered over the NIED and ED'S Net websites. This supports just-in-time learning and continuous professional development. It also builds NIED's capacity to integrate ICTs into its distance education programs in the future while providing an ever-expanding library of materials relevant to education in Namibia.

Continue support of programs and initiatives that encourage the adoption and spread of the Internet and ICTs within the education sector. One of the greatest immediate constraints to introducing greater use of ICTs within the education sector is lack of access; technology advocates must continue

to work to support efforts to expand access to hardware and software. Education professionals need frequent, if not daily access to this technology to make many of these distance education programs feasible. Recommended by the project to begin addressing the access issue, one innovative approach is the development of a laptop-leasing program for Namibia's educators. While the program as a revenue producing growth model would initially target mobile professionals such as advisory teachers and inspectors, it could later expand to include leasing lower priced or even refurbished equipment to classroom teachers. Until then, it is wise to continue support for equipping and connecting regional and circuit offices as well as TRCs. The TRC sites are particularly important as valuable training venues.

Become active advocates for lower prices for connectivity and bandwidth provided for education. Even if these technologies become more available to schools and education professionals in the field, only the more advantaged and private schools can afford the current costs of Internet connectivity. This is a reality of the digital divide in Namibia and across Africa. Despite Namibia's fine telecommunications infrastructure, most Namibians and the education system as a whole are incapable of affording anything more than token access. Similar to their work to refurbish discarded and donated technology in innovative ways so that it can be deployed to schools, SchoolNet/Namibia is working diligently to find solutions that will allow it to serve Internet connectivity at a reasonable price to the education sector. Nevertheless, the current costs for 24-hour per day leased line connectivity from SchoolNet is between N\$3,500 to N\$6,000 depending on the site. SchoolNet hopes that soon it will have a satellite and wireless solution available that will allow it to initially lower these costs to less than N\$2,000 per month and eventually allow it to serve schools for N\$200 to N\$1,000 per month. At the same time, it hopes that soon it also can provide individual educators access to the Internet for dramatically reduced rates. If these concepts materialize, great strides will have been taken that will allow greater integration of ICTs into the Ministry's distance education programs.

When the time is appropriate, redesign ISC and BETD INSET incorporating ICTs. With such limited access and familiarity with the technologies at all levels of the education system, the time is not right for full-scale introduction of ICTs into Namibia's distance education programs. Nevertheless, as educators significantly gain more access and greater familiarity with these technologies, the time may come where an expanded use of ICTs will be more appropriate and provide great value within the ISC or BETD INSET. At this time, it will make sense to redesign these programs to more fully utilize technology, particularly communication tools and video demonstrations. It should be noted here, though, that this will not be a simple process and will require substantial training and human resources to complete. Unfortunately, given the Ministry's current staffing structures, it is likely that NIED will need project assistance to complete this task.

Develop videos for modeling teaching practices. Although current bandwidth limitations in Namibia do not allow for video conferencing or effective streaming media, what is available are videos that model learner-centered education and constructivist practices. The BES II project has been experimenting with this work, and it promises to be very effective in allowing in-service professionals to view and discuss model practices. Once published, these videos can be easily converted to CD-ROM, DVD, and eventually web-based delivery. Like providing information via ED'S Net, this work will help develop capacity and materials for the eventual development of more comprehensive computer-assisted learning environments.

G. Task Order Objective Number 2

Task Order Objective Number 2 asks the project to "support NIED in the development of a communications network for the training of advisory teachers, inspectors, and others involved in the

lower primary phase by linking them to NIED through the Internet and other key computer-assisted delivery mechanisms to be developed.”

Activities and Achievements

The two primary inputs into this component of the project were the development of the computer centers at the NIED Resource Center and at the TRCs in Katima Mulilo, Rundu, and Ongwediva, plus the development of the ED'S Net website. In addition to these two major inputs, the project also trained NIED and TRC staff to run the centers and to update the website. More specific details on the project activities in support of objective are indicated below.

TRC Managers and Staff Trained in Computer Center Management. In February 2001, the project invited the Managers and proposed ETTs from NIED and the Rundu, Katima, Tsumeb, and Ongwediva resource centers to a training session on computer center management. Training session topics included center policies, introduction to computer equipment, managing TRC funds, generating revenue, budgeting, computer troubleshooting, lending procedures, training uses, and marketing.

ETT Candidates Given Training in Basic Operating Systems, Computer Maintenance and Troubleshooting, and Professionalism. Following the Computer Center Management training, NIED and project staff decided that the ETT candidates needed training in computer “basics” and fundamentals of professionalism to ensure that all had a baseline knowledge to prepare them for work in the computer centers. As such, in early March 2001, project staff presented a five-day training course on the above-mentioned topics. All four ETT candidates along with two additional TRC staff members representing Ongwediva and Tsumeb TRCs attended the training.

ETTs and TRC Staff from Ongwediva and Tsumeb Trained on Productivity Tools and Computer Peripherals. In May 2001, the project invited the ETTs for NIED, Rundu, Katima Mulilo along with staff from the Ongwediva and Tsumeb TRCs for training on Microsoft Word, Microsoft Excel, Internet Explorer, and Outlook Express. Along with this training, the group was also trained to use the peripherals in the computer centers including printers, Zip drives, CD rewriters, scanners, teleconferencing cameras, and digital cameras. Other topics included further center management tips and searching for educational websites.

ETTs and TRC Managers Meet to Discuss Center Sustainability and Use and are Trained in MS Excel, Network Administration, and Basic Web Design. In September 2001, the project invited the ETTs and TRC managers to NIED for a workshop, primarily focusing on the long term sustainability of the computer centers. During this time, the project also took advantage of having the ETTs together to provide them with additional training on Microsoft Excel (the TRC managers were also included in this portion of the training), network administration, and basic web design.

Upgraded the NIED Server. The upgrades included adding additional CPU cards, another network card, additional RAM, and additional hard drives to enable it to easily host both the NIED and ED'S Net websites and other future uses under development by NIED.

Registered the Domain www.edsn.net.na in NIED's Name, Procured Communications Software for ED'S Net, and Assisted NIED in Developing the Site. ED'S Net is now in a largely finished form with approximately 50 professional training modules covering basic teacher training topics, management training topics, and materials on HIV/AIDS. Other features of the site include interactive discussion boards and areas where professionals in the field can post resources. The site also includes all of the project's training materials and reports.

Obstacles Encountered

As with its work towards achieving the other objectives, the project suffered significant setbacks in timing. The main obstacles encountered in achieving Objective Two have been related to contractual delays and a lack of project time. For example, although in-country project staff had largely finalized an agreement in December 2000 to have UUNET and SchoolNet procure and install the equipment in the centers, due to contractual delays, the first center was not installed until April 2001. The project encountered similar time delays in developing the website. The primary difficulty stemmed from the time lost in hiring the assistant project coordinator—the person responsible for developing and training others on website development. The time between the project requested hiring Ms. Boer and the time it received approval was approximately 11 weeks. Other website development delays included the extremely long period of time it takes to register domain names in Namibia. The final obstacle to this work is the length of time it takes to develop online training materials. Website development consumed the majority of the project's assistant coordinator's time.

Lessons Learned

The lessons learned related to the website and particularly the computer centers fall into two categories. The first category relates to human resources to develop, operate, and maintain the equipment and the centers. The second category relates to the costs of procuring and maintaining the costs of the equipment, software, and connectivity.

Training Out-of-Work Youth to Operate Computer Centers Appears to be a Valuable Approach. In designing this project, NIED requested the project to attempt something different in relation to the people it hired to work in the computer centers. While other LearnLink projects had hired staff away from their host Ministry to work in the centers, NIED let the project know very early that it would not appreciate such an approach. From NIED's perspective, the Ministry had invested significant time and resources into training its teachers to teach. Taking teachers from classrooms, therefore, would be considered a loss of the Ministry's investment. Furthermore, NIED was also concerned about the project hiring highly qualified professionals at salaries that could not be assumed by the Ministry after the project ended. In response, NIED and the project decided to hire otherwise out-of-work youth to run the centers. As these youth had only a grade 12 education, the Ministry could more easily assume their salaries. Again from NIED's perspective, the project would be training and developing new human resource capacity rather than "poaching" already developed capacity. Although this approach has meant that the project has started more slowly, this approach seems to have worked in most cases. As the project staff working at the centers continue to gain both confidence and competence in their positions, they are likely to be hired by the government at salaries that are equivalent to secretaries and clerks rather than the salary of a teacher or head of department. They seem likely to continue in these positions rather than moving onto other project jobs or positions inside or outside the Ministry.

The Scarcity of Human Resources with IT Skills is a Problem. Although the project was able to develop a small group of people to manage the day-to-day operations of the centers, only one of the centers (Ongwediva) currently has a person with sufficient technical skills to do anything more than the most basic maintenance and troubleshooting. While tying significant technical expertise to these labs is not an efficient use of scarce technical skills, there is still great concern about how these centers and centers like them will receive intermediate and advanced technical support. It may make sense for the Ministry to hire a traveling IT expert based out of the regional offices to provide this support to various Ministry centers. Also, SchoolNet is working towards developing a help desk and ongoing support system. This system is still not working efficiently, and the centers have experienced relatively prolonged periods where individual machines and Internet connections have

been out of operation. This issue notwithstanding, the project has been lucky that it had the option of working with SchoolNet. The long-term sustainability of these labs is enhanced by their involvement.

The Long Term Financial Sustainability and Support for the Computer Centers is Questionable.

Although the project is ending soon, there are still great questions as to how financially sustainable these centers will be. All centers receive modest revenues from ad hoc use of the computers and Internet connections. In addition, all of the centers have received substantial use for training. Unfortunately, these revenue sources do not approach a level that will allow them to continue to support the leased lines. Although all of the centers have been in operation for over nine months, the most any center has collected in revenues is about N\$15,000. This would only support the Internet connection for three months. Furthermore, one of the largest producers of revenue is printing, and these charges were designed to ensure that the costs of paper and toner are recovered.

As mentioned earlier, the project is disappointed that the regions seemed to have failed to budget for the assumption of these costs. In fact, there was very little dialogue between the regions, NIED, and the project in relation to these costs and practically all of this dialogue was initiated by the project with little follow through from the regions. Despite this, the regional offices have been the primary users of the centers, particularly in terms of using the centers as venues for computer training. All three regional computer centers have been booked for months straight for the training of regional office staff. As the regions have not been charged for this use and this use cuts into time the centers can be used by paying customers, this has severely restricted revenue collection at the centers. That the centers are being used extensively for training is positive, but it serves to underscore the point that the centers' primary purpose is to serve the education community. As such, the education community must show greater willingness to support the centers. Still, as no region requested funds to support center connectivity in their latest budget requests, it is likely that some other source of funding will be needed to keep the centers running until the start of the next fiscal year in April 2003. If USAID chooses to continue supporting these lines, it should do so only with explicit agreement on the Ministry's part to assume these costs at some pre-determined date.

Multipurpose Resource Centers Take Time to Develop. The experiences of telecenters and multipurpose resource centers in other countries have suggested that it takes approximately two years for multipurpose resources to fully develop. The four centers developed by the project have only been in place for about ten months and, thus, still need time to develop further. Given this perspective, the difficulty the project has had in convincing the regions to assume responsibility for funding the staffing and connectivity at the centers is more understandable. The regions would have had to make budget requests in October 2001, only a few months after the centers had been installed. This was obviously too soon to expect the regions to understand the costs and benefits of the centers. In addition, there is still more work to be done in terms of developing cost-sharing arrangements at the centers as well as more time needed to develop policies and procedures that will encourage greater use of the centers. Nevertheless, the project is concerned that the push to make these centers self-supporting will negatively impact their primary function—serving educators. It is simply unreasonable to expect ad hoc use by non-Ministry clients to fully subsidize use by educators. Hopefully connectivity costs will fall with time and this issue will be less problematic. Most importantly, donors and projects must remember that these types of centers are being developed to address digital divide issues. If high fees are needed to make these centers sustainable, then it is fairly certain that the people who can afford these fees are not the historically disadvantaged audience that is typically considered to be on the wrong side of the digital divide. People should question whether developing cyber cafes should be the purpose of donor funding.

Developing Cost-Sharing Arrangements is Worthwhile and Can Reduce the Overall Budget Burden on the Ministry. Although it is not feasible for these centers to be fully sustainable at present, the project has had some success in encouraging cost-sharing arrangements that have reduced and hopefully will continue to reduce the burden on whichever group is responsible for the ongoing costs of these centers. These arrangements include charging fees for ad hoc use of the centers, charging projects and non-Ministry groups to connect to the local area networks providing connectivity to the centers, allowing Ministry professional living near the centers to connect to the networks from home using wireless technology, and charging non-Ministry groups using the centers for training. When the costs of the technologies and connectivity, these costs may at some point be sufficient to sustain the centers. For the time being, though, these arrangements will certainly help limit the costs needed to be assumed by the Ministry and should continue to be explored and developed.

Use of ED'S Net Appears to be High, But Its Impact Has Been Hard to Determine Due to Internet Outages and Holidays. Most of the feedback the project has received about the ED'S Net website has been positive. The project has a few anecdotes about how the information on the site has been used both within Namibia and within other countries. Given the long December and January holiday and a nearly one-month period in February and March where the NIED server and the NIED-based websites were offline, it has been difficult to gauge use. The recent problem with NIED connectivity also had the negative effect of preventing the project from providing training on the use of the site to groups visiting NIED and, even more important, from working with the RETTs to use and work with others to use the site. Unfortunately, it will likely take weeks if not months for people to regain confidence and interest in visiting the site now that it is back online. By the end of the project, ED'S Net had well over 1,100 visitors according to its strictest measurement and over 4,150 according to its more lenient measurement.

Interest in Use of the Centers is High. Contrary to some reports, the centers are used frequently and use continues to increase. From the first time the project reported registered users, the number has increased from 465 in June 2001 up to nearly 1,000 at the project's end. In addition, for months almost all of the centers have been booked every morning for group training. Some centers have also experimented with limited evening and weekend use as well with varying levels of success.

Recommendations

USAID should provide additional support to maintain leased-line connectivity at the centers for another year. This should only be done if the Ministry and the responsible individual Ministry units pledge to assume these costs in April 2003. This expanded time will allow the regions or NIED to make a budget request for next year. Hopefully, it will also give SchoolNet time to put in place more cost-cutting measures that will make leased-line solutions more affordable by the time the Ministry must assume these charges.

The centers should encourage projects to connect to their networks in exchange for a monthly fee. The Ongwediva Center has several projects connected to the center. Unfortunately, it allowed these projects to connect and never developed an agreement for them to assist with the connectivity costs. As such, these users are simply getting free connectivity and reducing the responsiveness of the lab computers. The project has worked extensively with the BETD INSET to encourage them to connect their administrative computers to the TRC networks at a fee and this arrangement should be made soon. For centers with other projects in place, this is an easy way to reduce the overall cost of connectivity charged to the Ministry.

The centers should explore deploying wireless technology to allow connectivity costs to be shared by Ministry personnel living nearby. This concept is currently being explored by NIED to support the staff living on campus. NIED hopes that by deploying a wireless hub it will be able to connect

several NIED residences to its network in exchange for monthly payments for this service. The project estimates that this service could provide NIED with roughly N\$1,000 per month covering approximately 25% NIED's monthly connectivity costs.

Become active advocates for lower prices for connectivity and bandwidth provided for education. Despite Namibia's fine telecommunications infrastructure, most Namibians and the education system as a whole are incapable of affording anything more than token access. Similar to their work to refurbish discarded and donated technology in innovative ways so that it can be deployed to schools, SchoolNet/Namibia is working diligently to find solutions that will allow it to serve Internet connectivity at a reasonable price to the education sector. Nevertheless, the current costs for 24-hour per day leased line connectivity from SchoolNet is between N\$3,500 to N\$6,000 depending on the site. SchoolNet hopes that it will soon have a satellite and wireless solution available soon that will allow it to initially lower these costs to less than N\$2,000 per month and eventually allow it to serve schools for between N\$200 and N\$1,000 per month. At the same time, it hopes that it can also provide individual educators access to the Internet for dramatically reduced rates as well. If these concepts materialize, the problem of sustaining these centers becomes less problematic.

H. Task Order Objective Number 3

Task Order Objective Number 3 asks the project to "*support the development of prototype curriculum-based teacher training materials for primary school.*" While Objective Number 2 addresses the issue of providing access to ICTs and the Internet, Objective Number 3 addresses the issue of beginning to provide content for Namibian educators to access via these technologies.

Activities and Achievements

The project addressed this objective in several ways—the first of which was through its support to the NIED multimedia working group. The second way was by converting and publishing online a variety of training materials as a way to model the strengths and weaknesses of the online and CD ROM based delivery mechanisms. Finally, the project also worked with the Regional Education Technology Teams to assist them in developing basic computer literacy materials. In all cases, these materials were published on the ED'S Net website. *These materials and activities are as follows.*

Twenty Teacher Basic Competencies Modules (TBCMs) Converted to HTML and Published Online. This was one of the first activities begun by the project and certainly the most time consuming. Nevertheless, the project believes that they are good examples of what can be done to convert paper-based training modules into online formats.

Three BES II Management Modules Converted to HTML and PDF and Published Online. This work is similar to the work done with the TBCMs and are intended to provide models relevant to inspectors, managers, and principals.

Five HIV/AIDS Education Modules Published Online in Microsoft Word. This work was done at the request of the Ministry's HIV/AIDS Committee. It provides an additional example of how information can be shared over the web. As the materials are provided in Microsoft Word, they are not interactive nor will they work on everyone's computers. Nevertheless, the modules were initially created in MS Word, which made possible a short time period for online publishing in this format. Again, this indicates another model for providing teacher-training content online.

Eighteen STAMP 2000+ General Education Modules published online in PDF Format. These modules were provided by Alfred Ilukena via his contacts with the SADC Ministries of Education and the Commonwealth of Learning. The modules cover various basic education topics. The project converted these modules into PDF format to demonstrate this web-publishing format. Again, the format is not interactive and has been described as “e-paper.” It has the advantage of using free software to read the files and is readable in most operating and web-browsing environments unlike MS Word, which is expensive and does not work on some operating systems.

Published the “My Future is My Choice” Program Materials Online. Once again, this was done at the request of the Ministry’s HIV/AIDS committee and provides more quality HIV/AIDS education content on ED’S Net.

In conjunction with the RETTs, developed a Series of IT Training Materials that currently includes 40 One-Page Information Sheets (OPIs) to Help Provide Basic Training and Guidance for Ministry Officials and Others. Current topics include accessing Discover Windows 98, accessing and using the Internet, accessing and using web-based e-mail, accessing a program to help users search the Internet and identify quality sources of information, using ED’S Net’s communication features, using Windows help features, and 20 pages on the basics of website development among others. At the RETT National Conference, the RETTs made several OPIs on their own and converted these into several Namibian languages.

Obstacles Encountered

Delays in hiring the assistant project coordinator delayed training materials development. This point is made several times in this report, but the project lost a significant amount of potential time to contractual delays—with the loss of Ms. Boer’s time being extremely costly given her skills in materials development and training.

The process of converting documents for online delivery can be time-consuming, but this process can be dramatically shortened IF the original documents are provided in electronic format, i.e., Word, Word Perfect, and other software. The conversion process is greatly facilitated by having the text provided in another electronic format. Many of these formats can be uploaded immediately or almost instantly converted to PDF format. Converting documents to HTML is a bit less time intensive, but MS Word facilitates a fairly easy conversion for source documents provided using the “style” settings. In the case of monographs, reports, and other “static” documents, online conversion is quite simple. Converting education materials for online usage is much more time-consuming as the producer *should* consider the strengths and weaknesses of the different online formats when producing the online materials. If HTML is chosen, the process can become quite lengthy in the event that any interactivity or many multiple pages or views are desired.

Lessons Learned

Developing the online materials is time consuming and the learning process, although not difficult, can be long. Everyone involved with the project would have liked to see more online materials produced during this time period. Due to the obstacles mentioned above, staff time dedicated to other project areas and needs, and the great amount of time required to do high quality web authoring, the project was not able to develop many online materials during this quarter. It is hoped that, with procurement largely over, project start-up activities complete, and more staff members coming on board, that the project will begin to enter its last quarter with much higher productivity.

NIED must develop a system for ensuring that it archives electronic copies of all its documents. A great amount of project time went into recovering text from the paper-based version of the TBCMs. The amount of time it takes to convert documents from other electronic formats into TBCM is time-consuming enough without having to totally retype the document in the first place. On average, it took approximately two full workdays to convert each TBCM after the format was developed and the TBCMs were retyped.

Recommendations

NIED should adopt some form of the proposed Electronic Archiving policy and adhere to the principles contained therein. In the short time the project has operated out of NIED, it has seen multiple occasions where significant NIED and project staff time was lost due to retyping documents that could not be found in electronic format. In response, the project worked with NIED to develop a draft Electronic Archiving policy. This policy still needs to be reviewed, modified, adopted, and implemented. Hopefully, with such a policy in place, much of this unnecessary work will disappear.

I. Task Order Objective Number 4

Task Order Objective Number 4 asks the project to “*support the expansion of an administrative framework at the level of the MBESC and NIED to include ‘Master Information Teachers,’ who champion the use of teaching/learning technologies.*” Early in the project, there was some confusion regarding the interpretation of this objective. Through consultation with USAID and the Ministry, it was determined that the intent of this objective was to have the project work with groups in the region. The aim is to develop technology champions who would creatively consider the possibilities of using technologies in the education sector and who would share their ideas and experiences with others.

When developing the program to develop champions, the project worked closely with Ministry counterparts to determine what was expected. These expectations included the following:

- The teams should be heterogeneous and include representatives from as many education stakeholder groups in the regions as possible.
- That the teams should be organized in a way that encourages communication between multiple stakeholder groups both within the Ministry of Basic Education and between the Ministries of Basic Education and Higher Education.
- The process should model learner-centered practices.
- The model should not be dependent upon or create a dependency for further training inputs.

In addition to these expectations, the project also wanted to avoid pitfalls that it had seen in other projects and in other forms of technology training. In particular, it wanted to focus on the call to develop technology champions. Therefore, to this list of expectations, the project added the following:

- The process should seek to encourage a model based on epidemiological spread but not encourage a formal cascade-training model.
- The process should not develop large modularized IT training manuals as, from the project’s perspective, these manuals are seldom used and do not model learner-centered practices.
- The process should help the learners overcome their basic fears of technology.

- The process must be able to work with groups with users ranging from beginning to moderately advanced.
- The process should truly seek to develop technology champions. From the project's perspective, technology champions...
 - Actively seek out new technologies to learn.
 - Learn through active experimentation.
 - Tend to seek help via networks of other champions.
 - Creatively consider how technologies can be used and actively experiment with these uses.
 - Share their ideas and uses with others.
 - Encourage others to use technologies in their jobs.

Activities and Achievements

In order to meet the project's and Ministry's expectations, the project worked with Ministry staff to develop a training process it calls OSSIAR. The OSSIAR training model was developed especially for this purpose and incorporates Namibian priority practices such as action research and reflective practice. In addition, the process is modeled after the process children use to learn new technology. OSSIAR, short for *Open, Shake, Share, Imagine, ACT!!!* and *...Reflect*, encourages active and reflective play. The facilitator is responsible for creating a fertile learning environment, for minimizing the element of fear, for getting participants started on exploring the technology, and for encouraging them to work with each other, to share information, to imagine how the tools may be used, and to reflect upon their learning experience.

Armed with this model, the Ministry and the project worked together to develop teams of professionals in each of the four partner regions to work on exploring the uses of technology for education in Namibia. Each Regional Education Technology Teams (RETTs) was encouraged to have members representing advisory services, inspectors, classrooms teachers, teacher training college faculty, student teachers, principals, and adult and continuous education. As such, the membership was heterogeneous, included members from both Ministries of Education, and represented most stakeholder groups in the regions.

The project's work with the RETTs included facilitating three meetings with each team. The first round of meetings took place in September and October 2001, the second round in October and November 2001, and the third round in February 2002. In addition to these three rounds of meetings, the project also held a National RETT Conference in Windhoek in March 2002. While the project did not formally train these professionals, the groups were encouraged to explore *Discover Windows 98*, *Mavis Beacon Typing Tutor*, *Microsoft PowerPoint*, *Internet Explorer*, *Internet Detective*, web-based e-mail, chat rooms, the use of the CD burner, teleconferencing camera, digital camera, website development, and the ED'S Net website among other activities. The materials developed for this work are called *One Page Information Sheets (OPIS)*, which are minimalist, one-page instruction sheets that are only intended to get a person started using a new piece of technology or software.

In general, the project has been very pleased with the outcomes of this component. Some team members have become quite active in their roles as technology champions and have, on their own, chosen to share their training experiences with relatively large numbers of colleagues. While this "cascade" effect has never been explicitly encouraged, it is heartening to see the training model reproduced...particularly in the case of it being reproduced by new users assisting other new users.

Although the spread of training is more organic or viral and difficult to monitor, every RETT has reported that its team members have gone on to train at least 100 others in each region. In one case, two members in Katima worked with each other to train almost 100 teacher training college student teachers on their own.

Obstacles Encountered

Team Members have been Unclear Concerning the Purpose of the Teams. As should have been expected, most team members were nominated by their Regional offices and were simply requested to attend the first meeting and had been given very little idea of what to expect. The first meeting began addressing this lack of clarity, but project staff also sought to put limits on structure as it hoped that the teams would take on their own character and address the technology needs and visions of their individual regions. To accomplish this aim, project staff introduced the team members to the wording of project objective #4 and helped explain the rationale behind creating the teams. During the National RETT Conference, project staff again addressed this issue and encouraged the teams to continue to develop their own rationale for being.

Team Members Have Extremely Different Levels of Familiarity with Technology. In some ways this can be seen as a staff strength. Nevertheless, it has required a very different approach to the project's work with the teams. As the theme of the first meeting was "overcoming fear," the team members were introduced to several tools (Windows 98, ED'S Net and basic Internet navigation, e-mail, and typing tutors) that allow users to learn many of the basic skills necessary to use the technology for different purposes. For those who were advanced users, these tools served as refreshers and as methods of improving their basic skills. For the new users, it allowed them to begin to use computers. As per the basic training model being used by the project (OSSIAR), the participants were asked to reflect upon their use of the different tools after a period of programmed "play" time.

Contacting Team Members to Organize Meetings was Difficult. The communication structures in the regions are still not very strong. At times, this made it difficult for the project to organize meetings. In regions where the ETT took on the role of calling meetings, the project had less difficulty. The usual case was that upon arriving at computer centers, team members had not been contacted by phone regarding meeting dates and times. The use of e-mailing reminders to team members proved insufficient as only a few members have daily access to their e-mail accounts.

Lack of Access to Computers has been Cited by Team Members as a Major Impediment to RETT Activities. Team members found difficulty in finding time to bring themselves and their target groups to the computer centers. This was due to the heavy workloads of team members and their target audiences. When these groups found time, they often found that the centers were booked for other training. It was interesting to see that it was lack of access to computers rather than a lack of interest or fear that kept team members from training others. The use of CD-ROMS and other computer centers have begun to be explored as ways of providing more access to more users in the regions.

The Time to Work with These Teams was too Short to Fully Test the Model. While initial results all seemed very positive, the project really only had about seven days to work with each group. The progress these teams made during this time was quite impressive. Still, during the National Conference, many team members expressed concern that the teams would not continue without continued project support and facilitation. The project also recognizes that it never had the opportunity to fully test the model. In particular, although it remained dedicated to the approach, the project never walked any team through the entire model process. The project estimates that it would have taken at least one more meeting to reach this stage.

Lessons Learned

This project component pertaining to method of training represents the most innovative and exciting portion of the project's work. Although it is probably too soon to decisively pronounce lessons learned from this experience, the following are a list of initial lessons learned or impressions gleaned from the process.

Approach Models' Constructivism and Learner-Centered Training. As this project was developed to support the Ministry's reform efforts, it was asked to develop a constructivist approach to its work with the RETTs. This approach appears to have been very effective for working with the teams. A more traditional approach is likely to have forced project staff to form multiple experience-based groups to more effectively meet the needs of the individual members. This would have made it difficult for the teams to work together on similar tasks and to discuss tools with each other, as some members would be doing very advanced work while others would be doing only basic tasks. Indeed, it would have been difficult to find a single application that would allow all members to train together. Nonetheless the project's approach encouraged the advanced users to review simple tools with the thought of how they could use them with new users. The new users essentially had the same task but were using these tools and skills for the first time. When the groups reconvened, though, the topic was how helpful the tool could be to assist users to gain confidence and largely "train themselves." This was a topic that all members in the group could discuss. Several, of course, had very recent experiences with this issue. The approach was effective in introducing new users to technology; also it has proven to be an effective demonstration of an extremely learner-centered process.

Approach Empowers New Users to Train New Users. The project's dissemination strategy is modeled more along the lines of viral spread rather than a very formal cascade-training model. Nevertheless, it appears that team members are willing to work with others at least informally on the tools they explored during the first meeting. This has included the newest technology users in the teams. The approach appears to have illustrated that a person does not need to be an expert to help a colleague or a client become familiar and comfortable with using the technology.

Approach Discourages Dependency on Experts. Of course, this was one of the objectives of the project's approach, and it seems to have worked. During the National RETT Conference, the RETT members and project staff had an intense discussion on this issue. The discussion brought to the surface many issues surrounding this topic. Although the members held different opinions, most seemed to understand that they learned the technology on their own. Oddly, there were mixed opinions on the necessity of the project's role in the process. It appeared that a small minority believed that the project's role was limited to designing the approach and facilitating the meetings. Others believed the project's role was more central to the process, although nobody could manage to put this role into words. Halfway through the discussion, one of the team members very explicitly thanked the project for designing a process that discouraged the team members from being dependent on further training. Others who appear to consider the project's approach as training, therefore see their experience with the project as project-led training. For example, after the discussion one team member told a project staff member that the teams had needed the project to get them started and that the teams would have never been created without the project. She also credited the project with developing within the teams a critical attitude towards training and technology. She was somewhat uncertain as to how the teams would proceed without further project assistance and was very concerned that the teams would stop meeting without continued project support. Nevertheless, when pressed as to whether the project had taught her how to use the technology, she said the project only introduced her to the tools, and she had learned the technology on her own.

The Project Appears to Put Learners on Steep Learning Curve. The project worked directly with each RETT only about eight days. Despite this short time, the team members learned to work with *Discover Windows 98, Mavis Beacon Typing Tutor, Microsoft PowerPoint, Internet Explorer, Internet Detective*, web-based e-mail, chat rooms, the use of the CD Burner, teleconferencing camera, digital camera, website development, and the ED'S Net website among other activities. As many training programs would spend more than this amount of time to introduce users to the basics of a PC or to walk them through the basic functions of a word processing program, the project believes its approach places learners on a fairly steep learning curve.

OPIs Simplicity is their Main Strength. The project's *One Page Information Sheets* were designed in response to the belief that people are loath to search through a large module or manual to find an answer to a simple question. Instead, the project theorized that a person would be much more willing to read through a very simple, one-page explanation of how to get started with a program or task. Other strengths include the fact that they are easy to make, that they are easy to share, that they cost very little to reproduce, and that they are easy to translate into other languages. Of course, all of these strengths are derivative of their simplicity. Finally, their simplicity also underlies another point; they are very constructivist in their design. They are not meant to tell people how or for what purposes the technologies should be used. They are designed to get somebody started in their exploration. Given the project's constructivist orientation, the project has resisted temptations to compile the OPIs into a manual or to order them in any particular way. It has also resisted making OPIs that explain how to make, order, or use other OPIs.

"Open Time" Appears to be a Strength of the Project's Approach. A significant early observation of the project's approach toward its work with the RETTs is that it provides the team members with time necessary to improve their IT skills—time to explore, discover, and play with the technology. As the project was asked to help develop technology champions, it has tried to develop an approach that encourages the habits and skills of such a professional. Among these habits is a propensity to explore and play with technology. The project's approach, thus, has provided time for the teams to do this. A very large portion of the "meeting" time was dedicated to allowing the RETT members to simply play with and explore the software and tools recommended by the project. After, the members were brought together to share their experiences and discuss the relevance of the tools and technology for educational purposes. Contrary to early concerns of some project staff members (including the resident advisor)...the RETT members did not "waste" this time, remained on task, and were active in later discussions. Perhaps most important, though, was that they did the overwhelming majority of the work themselves.

Time + Access = Exploration of Technology. The most important "thing" the project has provided to the RETTs is time and access to explore technology. This seems quite simple in hindsight. We only now realise how much interest is stifled by the difficulty in finding time and access to explore new technologies. Most people who work *with* technology rather than working *in* technology seem to have very little formal training *with* technology. Formal training is often the first thing provided by most ICT projects. Project leaders know about ICTs through their own exploration of the technologies. They have computers at their desks. Work is produced in digital format, and thus by trial and error problems are either solved or help/training is sought. In contrast, it is expected that projects' target colleagues learn the technology in a completely different way. Most, importantly, this project discovered that educators in Namibia learn technology exactly as educators anywhere in the world learn—people learn to use technology by having time and access to explore what ICTs can do.

Approach Appears to Lead Members to Consider Themselves to be Technology Champions. At the National RETT Conference, the RETT members were introduced to the project definition of

technology champions. Long before the presenter came to the point that the project's approach was designed to enhance RETT members' ability to become technology champions, team members began shaking their heads. When prompted, several team members said that they considered themselves to be technology champions or identified other audience members as technology champions. After this discussion, a few members asked project staff to make the group T-shirts that said that they were technology champions.

Contact People Are Necessary – For the teams to be able to meet on a regular basis, one member must be chosen to convene each meeting. As an exception to this rule, the Rundu team was able to meet regularly without the help of project staff. It was found that team members, knowing they can contact the ETT for information regarding future and past meetings, are more likely to do so. Allowing the teams to exchange ideas about how to hold more regular meetings is hoped to act as a vehicle for establishing more regular meetings with teams.

Recommendations

Continued Debate and Discussion on Mission Statements and Objectives of RETTs is needed. The RETTs continually explored what their role was in the regions. Though they agreed they did not always know exactly where they “fit” in the regional structures, they did agree about the importance of their work. They sought to clarify their goals and mission in bringing to the attention of the Ministry important experiences in their regions. They are beginning to discuss how to include the regional education officers more fully in their meetings and the process as a whole. This dialogue may begin simply as invitations to meetings and later as policy papers and recommendations. It is wonderful to see the teams go through the very obvious growing pains of a new group or organization.

ICT Coordinators at Ministry and Regional Level would be Helpful to Continue RETT Work. Several teams at the National RETT Conference suggested multilevel coordination. More than anything else, ICT coordinators would be useful for calling meetings and facilitating discussions. Having a person at the central ministry level would facilitate cross-regional discussions and encourage the formation of teams in the other education regions.

J. Task Order Objective Number 5

The project's activities and interventions have been multiple and broadly focused. Nevertheless, the project did use as a single unifying thread its desire to encourage constructivism as a paradigmatic theme running through all project activities. It also hoped that constructivism could be used as a way to manage project's activities and interact with project partners. As the project was based out of NIED, most of the policy support for the project was focused there. The project supported policy development in the TRC network, advisory services and the inspectors in the regions, the creation of Regional Education Technology Teams, SchoolNet/Namibia², and support to the Namibian Open Learning Network³ (NOLNet).

² SchoolNet/Namibia is a Namibian not-for-gain organization dedicated to providing Internet access and computer technology to educational facilities throughout Namibia.

³ NOLNet is a consortium of Namibia's four publicly-funded distance education groups, the University of Namibia, the Namibian College of Open Learning, the Polytechnic of Namibia, and the National Institute for Educational Development.

Policy Support for NIED

As mentioned above, the majority of the policy support provided by the project was focused on NIED. In many cases, this project support was encouraged and facilitated by project staff members voluntarily serving on the NIED IT Committee. In other cases, the support was requested explicitly by NIED management to assist its efforts to move forward some of its agenda items such as the establishment of Educator Development and Support Units in the regions and the development of policies in conjunction with NOLNet.

Formal Policy Support: Among the formal policies that the project assisted NIED in developing are the *NIED IT Users Policy*, the *NIED Internet Publication Policy*, the *NIED Electronic Archiving Policy*, the *NIED Computer Center Policy*, and the *NIED Wireless IT Policy*.⁴ In all of these cases, NIED staff explicitly approached the project for assistance. In the case of the *NIED IT Users Policy*, the policy had already been largely written when the project began, but the project assisted the NIED IT Committee in finalizing and editing the existing draft. In other cases, completely new policies were required. Of these policies, the two that most typify the project's policy perspective are the *Internet Publication Policy* and the *NIED Wireless IT Policy*. While both of these policies include rules that limit and guide use, their primary aims are to encourage sharing of resources. In the case of the Internet policy, the Institute is encouraged to share many of its currently paper-based resources online. For the *Wireless Policy*, the intent is to establish a set of rules that will allow the Institute to expand the Institute's Internet resources to on-campus housing in a way that allows staff members and their families to receive deeply discounted rates. The residents would be helping NIED pay for the cost of maintaining its network and connectivity. For these two initiatives, the project spent a great amount of time and effort in explaining and arguing in favor of these policies. For example, to help explain the Internet Policy the project produced for NIED management consideration a several page document to explain and defend the primary thrust of the policy...sharing resources.

Informal Policy Support: While the body of formal policy support provided to NIED is considerable, NIED management often cites the project's informal policy support as having been equally if not more important to the Institute. In particular, informal project support was appreciated and complimented the project's willingness to integrate its staff and activities into NIED structures. The project was located in NIED's Professional and Resource Development Unit, and the project went out of its way to ensure that it worked within this structure. It viewed the Unit's Chief, Alfred Ilukena as the project's primary director, and project staff were encouraged to participate in NIED activities, meetings, and committees as if they were NIED staff. While this approach frequently and undoubtedly pulled staff away from its most explicit project activities, it also allowed the staff to better understand NIED and Ministry issues, priorities, and needs. Most importantly, though, it insured that project staff members were present at the table when NIED wanted project support and input. In the project's quarterly reports, the project often stated that it would continue to provide informal policy support as needed and requested by project partners. At times the project received feedback referring to it as not serious about its policy support. On the contrary, the project was largely reporting on the method through which it developed policy-related activities. Imposing policies and policy ideas on NIED and the Ministry would have run counter to many of the constructivist beliefs of project staff and would have been received poorly by project partners. The project believed that by placing project staff at the right tables and by having them demonstrate their willingness to offer assistance encouraged NIED and other project partners to view the project as a resource and that the policy support provided would be seen as more relevant, timely, and effective.

⁴ Electronic copies of all of these documents are available on the Educational Development and Support Network (ED'S Net) website at <http://www.edsnets.net/EduTech/LearnLink/PolicyDocs.htm>.

Furthermore, this approach was more in keeping with the project task order's wording that specified "contribut(ing) to policy discussions."

ED'S Net: Informal policy support to NIED and NIED initiatives came in several forms. In some cases the input was as simple as working with the NIED resource center staff and NIED management to encourage them to remove the signs mentioned in the introduction. In other cases the support was more detailed, if still informal. One example of this was the decision taken on the part of the project and NIED management to develop the Educational Development and Support Network (ED'S Net) website. While many IT projects worldwide create websites, both NIED and project staff felt that a stand-alone project website had little value or potential for greater impact or sustainability. Instead, NIED requested that the project assist it in developing a website to support educators in the field in a way that would support many of the policy recommendations made through the Ministry's *10-Year Plan for Educator Support and Development*. In doing so, the project assisted in the development of a website that would serve project purposes but did so in collaboration with project partners. Also, it would support the Ministry's decentralization efforts by providing expanded access to resources and communication tools.

Support for the NIED Network and Cost Sharing: Other informal support for NIED came in the form of assisting NIED in developing mechanisms through which it could share costs associated with its computer network. Again, most of this support was informal and was offered largely through association with the NIED IT Committee. In fact, it was along these lines that the project encountered its first opportunities to assist NIED. When the project arrived at NIED in June 2000, it found a very well established local area network with leased-line connectivity that was provided for free by a local Internet service provider. While the project found that most of the infrastructure in place was good, NIED was having difficulty keeping the network running. With project support, NIED came to the conclusion that it needed to change its server's operating system. It was spending an unacceptable amount of money maintaining the server's operating system and was facing a large bill to update the licenses required to keep the system legal. The project-supported alternative was to opt for a more stable operating system without license requirements. Even though the cost of converting to this option was going to be less expensive than purchasing the licenses for the old system, NIED was still finding it difficult to secure Ministry funding for the conversion. In response, the NIED IT Committee with project support developed an informal policy that requested projects to pay a per workstation yearly fee in exchange for access to the NIED network, e-mail, and Internet connectivity. Not surprisingly, practically all projects supported the initiative and provided NIED with the funds that were needed to make the conversion and improve the system. Since then, NIED has continued to collect these funds which allow server upgrades, migration to a cheaper, new Internet service provider at the end of the contract, and consideration of the purchase of the wireless networking equipment.

Expanding Access to Staff: In encouraging use of the NIED Resource Center, project staff have also been advocating to expand access to NIED IT resources and NIED's semi-professional staff. During the time when NIED was concerned about keeping its server licenses up to date, NIED management made the decision to disconnect the majority of NIED's semi-professional staff of secretaries, clerks, and media personnel from the NIED network. This effectively has meant that NIED has continued to use a split system of communication for its staff. NIED professional staff now formally communicates with each other through e-mail. Unfortunately, NIED produces a large amount of paper-based interoffice correspondence because staff realizes that the paper-based method is needed to reach all staff members. More troubling from the project perspective is the concern that this policy decision was driven more to control access to resources rather than to cut costs. By means of subtle pressure applied during IT Committee Meetings, project staff contributed to NIED's management decision to reconnect the semi-professional staff members' computers. This action has

limited utility since members will only be given access to interoffice e-mail and the NIED Intranet. Still, some members of the IT Committee and NIED management are now more aware of how their decisions may be perceived.

Policy Support to Teacher Resource Centers and Regional Officials

Policy support to the region came primarily through the projects' work in establishing computer centers at Teacher Resource Centers (TRCs) in Ondangwa West, Rundu, and Katima Mulilo along with the computer center located in the NIED Resource Center. In addition, the project assisted the regions in developing Regional Education Technology Teams (RETTs) designed to assist regional officials to explore the uses of technologies for use by different stakeholder groups within the regional education establishment.

Support to TRCs: While project activities were confined to the support of four of Namibia's education regions (Katima, Rundu, Ondangwa East, and Ondangwa West), its intent was to assist these centers in developing policies and operating procedures that could be used as models for the entire TRC network throughout Namibia. Very early in the project's support to the three partner TRCs and the NIED Resource Center, the project encouraged project staff working in these centers and the TRC managers to cooperate in the development of policies that could be combined into a draft version of an addendum to the TRC Network Manual covering operation of computer centers. A large portion of the project's first meeting with these project partners was dedicated to a very interactive approach to policy development. While the project did come to the table with a draft version of the manual, this was normally only presented after the partners had been given time to develop policies of their own. In all cases, these policy recommendations were included in the final draft. The policies developed at this time included roles and responsibilities of regional and TRC staff, computer center rules and operating procedures, and recommendations for after-hours use and policy proposals to charge fees for use. This draft has since been shared with other TRC managers for review and consideration and will likely serve as a base for a future policy on computer center management at TRC and potentially NOLNet computer centers. As suggested by the project's task order, provision was made to pilot the use of these centers for multipurpose use by non-education partners on a fee-for-use basis. This approach has since received formal and informal support from the regional offices as well, but still needs final blessing by both the Ministry of Basic Education as well as from the Ministry of Inland Revenue.

Following NIED's model of charging fees for access to the NIED network, the project has also worked with NIED, the TRCs, and projects located within the TRCs to encourage the expansion of the networks at these sites. The best example of this is the Ongwediva TRC where the network has been expanded to serve over 40 workstations located in multiple offices throughout the TRC. As many of these workstations are operated by projects and groups charging fees for their services, the project has assisted the TRC by providing a draft policy for the TRC management to consider in drafting their final policy for charging fees for access to their network. The project, NIED, and the TRC management hope that these fees will significantly assist the TRC in paying for its monthly connectivity costs. NIED and the project have also worked extensively with one of the Ministry's distance education programs, the BETD/INSET, to help support connectivity at the TRCs where it has offices (this includes all three of the TRCs where the project has provided equipment and support). This program is able to help with these costs as it charges its clients fees for its courses.

A final policy innovation introduced by the project in the TRCs was the method it used to find and mentor project staff members to serve in the TRC computer centers. In early talks between NIED and project staff, NIED asked the project to be very careful in selecting project staff members to serve in the TRCs. Among the issues mentioned by NIED included concerns that the project would

hire teachers and professionals away from the Ministry, concerns that the project would pay these staff members salaries that would make it impossible for the Ministry to assume them when the project ended, and concerns that finding adequately trained people in the regions would be difficult if not impossible given the salaries that the Ministry could afford to assume. In response, the project and project partners pledged themselves to try a different approach. Rather than search for experienced staff to run these labs, the project accepted the responsibility of locating otherwise out-of-work youth and training them to serve as Education Technology Trainees (ETTs). While the primary benefit to the Ministry was that these staff members could be paid at levels that could easily be assumed by the Ministry. Perhaps more important, though, was that, if successful, the project would demonstrate to the Ministry that posts such as these did not require personnel with exotic education and technology credentials. Instead, the Minister could use these posts to hire any number of the many out-of-work youth clamoring for stable employment and the opportunity to learn IT skills. At project's end, it appears that most if not all of the ETTs have proven themselves capable of running the day-to-day operations of the computer centers and it is likely that most if not all of them will be hired by the Ministry to continue in these roles.

Policy Support via Regional Education Technology Teams: One of the project's primary inputs into the regions was its work in assisting to create Regional Education Technology Teams for the Katima Mulilo, Ondangwa East, Ondangwa West, and Rundu Educational Regions. This idea was born through discussions between project staff and NIED in April and May of 2001. The project's task order had tasked the project to "Support the expansion of the administrative framework at the level of the MBESC and NIED to include 'Master Information Teachers,' who champion the use of teaching/learning technologies." When project staff approached NIED with this concept, NIED explicitly told the project that they were much less interested in focusing on an administrative framework than it was on focusing on developing technology champions in the regions. Through intensive discussions several ideas were developed including the concept that the input should be made through regional "teams", that these teams should be heterogeneous and include stakeholders from all parts of the regional education establishment, that the "training" should explicitly encourage the development of "champions," that the training should model constructivist and learner-centered pedagogy, and that these champions should be encouraged to share their experiences with their counterparts and clients within the regions.

While the project's work with the RETTs was largely a training activity, it had two significant policy consequences. The first was the method through which the project sought to train these teams of future champions. Rather than creating and modeling a training method that sought to transfer skills to the team members, the project, with NIED assistance, developed a training model that sought to empower the team members to learn about the technology on their own, develop ideas for how the technology may be used, and share their newly acquired skills and ideas with others. In the process, the project also hoped to demonstrate to the Ministry and others that formal, expensive, and extensive IT training was unnecessary and potentially even counterproductive. In pedagogical terms, the approach was designed to be more exploratory or experiential rather than based on transmitting knowledge from an "expert" to trainees. Assuming the model was successful, these new members would be able to see, understand, and serve as advocates for a training policy that would be less reliant on experts and training funds.⁵

The second policy consequence was that the training model rests largely upon the question, "Why technology?" In other words, for what ends should the technology be used. Rather than training the RETT members on specific productivity tools and explicitly telling them how to use the tools, the approach used was to very briefly show the members how to start using a new tool; then allow them

⁵ For a more detailed explanation of this approach, please see *CATT/LearnLink Lessons Learned Series: Paper 3*.

to explore the tool and decide for themselves if and how it could be useful in their work. In doing so, the project hoped to develop within the team members a critical and creative attitude towards technology; an attitude that does not presuppose that the technology is educationally valuable or appropriate, but one that does encourage the professionals to consider how it might be useful. From the project's perspective this is a more healthy perspective to bring to policy decisions regarding procurement of education technology.⁶

Support to SchoolNet/Namibia

The project's relationship with SchoolNet/Namibia has grown throughout the life of the project. Project staff met with SchoolNet during the first two weeks that the project was in the country. At that time, the project was conducting an environmental scan of stakeholders in the fields of education, technology, and education technology in Namibia, and SchoolNet was a great source of information. Later, when the project was seeking a vendor to procure and install the computer centers in the TRCs, SchoolNet teamed up with a couple of private sector groups and won the tender. This was the first tender of this scale that SchoolNet had sought and won, and it provided SchoolNet an opportunity to prove that its teams of volunteers were capable of working with high-quality equipment and leased-line connectivity. In the end, all partners benefited greatly from the project taking a responsible risk and backing SchoolNet's low tender.

Since then, project staff and SchoolNet have established "an informal relationship that has allowed both groups to advise, assist, and learn from each other. The project has required SchoolNet's greater technical expertise to help it solve technical problems and make better technical decisions. It has also continued to use SchoolNet as a primary provider of hardware and software. SchoolNet, on the other hand, has been able to take advantage of the project being located within the Ministry to help build more explicit ties with Ministry partners. In addition, both groups have worked together to discuss and develop training models and training policies. Finally, the project has assisted SchoolNet in fostering several concepts for raising revenue to support SchoolNet's activities. The project has always seen the success of SchoolNet as necessary for the long-term success of project inputs. SchoolNet's work in developing low-cost solutions for providing equipment, connectivity, and ongoing technical support to schools is essential for any of the project's activities to have any long-term benefits to the education sector.

Most recently, the project played a significant role in strengthening formal and informal ties between NIED and SchoolNet. The project assisted SchoolNet in identifying project counterpart, Alfred Ilukena, as a strong candidate to serve as an alternate to the NIED Director's seat on the SchoolNet Board. It assisted both NIED and SchoolNet in reaching an agreement for SchoolNet to become NIED's Internet service provided, which benefits NIED by lowering the costs of its connectivity by approximately 20% and benefits SchoolNet by providing it with another revenue stream. More recently, the project has also supported both NIED and SchoolNet in conversations regarding the identification and selection of appropriate educational software and educational content. From the project's perspective, this partnership between NIED and SchoolNet is essential as NIED needs SchoolNet's technical expertise to serve the Institute's and the schools' technical needs while SchoolNet needs NIED's educational and pedagogical expertise to help SchoolNet ensure that the technology it brings to schools will be used for educationally appropriate and enhancing purposes.

⁶ At times the project has referred to this perspective as e(y) or "e as a function of why". The point being that educators should critically evaluate why and how technology could or should be used. In doing so, the technology will hopefully be more appropriate and can be more effectively deployed.

Support for NIED's Role in the Namibian Open Learning Network

The Namibian Open Learning Network (NOLNet) is a consortium comprised of the four publicly-funded distance education groups within Namibia, the University of Namibia (UNAM), the Polytechnic of Namibia, the Namibian College of Open Learning (NAMCOL), and NIED. Through NOLNet, these four groups have agreed to work together to "...establish a network of open learning centers throughout the country at which certain facilities will be shared and services offered on a collaborative bases..."⁷

The project's policy support to NOLNet has come through two primary avenues. The first avenue has been in the project's membership on NOLNet's E-Learning Development Group, which was developed as an advisory group and venue for the NOLNet partners to discuss and explore issues related to ICT support for distance education.

The second and most important avenue was the project's support to NIED in developing its policy perspectives related to its collaboration with the other NOLNet partners. The project certainly supports NOLNet and supports the open communication and sharing encouraged by the NOLNet partnership. Nevertheless, much of the project's support to NIED came in the form of helping NIED develop a proposal that would protect NIED's investments in the TRCs. Although seemingly contradictory to many of the project's aims to encourage resource sharing, it realized that policies need to be developed that encourage cost sharing in a way that would continue to encourage the NOLNet partners to share resources and continue to provide access to each other's stakeholders. NIED twice came to the project to ask for assistance in this regard. The first time was to ask the project's support in evaluating a fee structure developed by NOLNet. Given the project's experience in developing and maintaining computer centers, the project encouraged NIED to have NOLNet raise several prices, as they did not allow for cost recovery. The second time NIED requested assistance was in relation to developing a proposal for cost sharing practices among the partner groups. The standing proposal at the time was that all NOLNet client groups could simply use any NOLNet center free of charge. From both NIED's and the project's perspective, this proposal will very likely result in individual centers choosing to opt out of the agreement as soon as they feel that the other client groups are overusing or abusing their privileges at the centers. The project instead assisted NIED in formulating a proposal to develop a voucher system where all the distance education clients would be given a limited number of vouchers that would be redeemable at any NOLNet center. Each center would be responsible for collecting the vouchers and submitting them to NOLNet to be reimbursed at a set rate for the usage. Through this system, the centers would be reimbursed proportionately from the NOLNet partner organizations according to the use each center received by each organization's clients. Hopefully, such a system would encourage the individual center managers to view the use by the other client groups as a benefit to their centers rather than as a problem.

Obstacles Encountered

The constraints impeding the project's policy support efforts were many. In general, though, they can be broken down into three main areas: donor-related contractual constraints, constraints related to a lack of experience with the new technologies, constraints related to existing policies, and thinking that opposes the changes supported by the project.

⁷ NOLNET, "Developing the Namibian Open Learning Network : A Report on Progress in Implementing this Initiative". March 22, 2000.

Contractual Constraints: Undoubtedly among the greatest constraints impeding all of the project's objectives have been insufficient timing and staffing. The project was originally only guaranteed a 16-month life. Although this was later extended to 22 months, it still constitutes a very brief amount of time to achieve and sustain the project's goals. The time constraints were further exacerbated by substantial time delays experienced in hiring project personnel. In almost every case, the project was forced to wait weeks and, in some cases, months before having hiring requests approved. In one case, the project was simply forced to give up hope in ever hiring a senior network manager. Throughout the project, staffing was thin. This was less problematic for the policy objectives as the project's resident advisor was the primary project member responsible for the project's policy support and was employed by the project from its beginning to its end. Nevertheless, his time and attention was frequently diverted by the need to compensate for minimal staffing in other areas.

Further and even more influential, is the simple reality that effectively encouraging changes in perception, policies, and standard operating procedures requires consistent support for extended periods of time. In cases where these actors have years of experience with other systems and practically no experience with the new perspectives or new technologies, these tasks are even more difficult and more time consuming. For example, it has been very difficult for the project to encourage change at the Teacher Resource Centers, as they will have only had nine months of experience with the new technologies when the project closes. Experience with developing computer centers in other developing countries has suggested that it takes a minimum of two years to effectively establish a multipurpose resource center. As such, the project's formal support will have ended less than halfway through this learning process.

Human Resource Constraints: One difficulty project staff frequently encountered was that many of the stakeholders with which the project needed to interact were quite novice in terms of their experience with technology. While this was to be expected, it presented many problems to the project in the sense that it is difficult to develop meaningful dialogue with inexperienced professionals. The lack of experience had two primary causes, the first is that many of the educational partners with which the project worked have other interests and priorities that they considered more important and frequently more pressing than the issues surrounding the introduction of technology in the education sector. The second cause is related to a lack of access and thus a lack of experience with the technology. Developing and discussing policies in relation to ICTs is very difficult for policymakers who are technologically inexperienced. In many cases, project partners asked the project to allow the Ministry to have more time with the technology before pushing the development of policy. While this is a very reasonable approach, it certainly limits the amount of support that can be provided over a short period of time.

Policy Environment Constraints: In many ways, the environment for developing policy in Namibia is quite fertile. As a relatively young country, policy development is a frequent and necessary activity within the Government of Namibia. Nevertheless, Namibia's *apartheid* experience has left many barriers to the introduction of policies that encourage expanded communication and the sharing of resources. Some of these barriers are attitudinal such as the knee-jerk tendency to develop policies that restrict access to library resources and a certain mistrust of the intentions of groups who seek to use Ministry resources. Others are derived from existing policies such as one that makes it difficult to charge fees for use of Ministry resources, others that make it difficult for different Ministries or even inter-Ministry groups to split costs of providing resources and facilities, and one that mandates that revenues received by governmental units should be remanded to the local receiver of revenue to be returned to the central government. These policies, therefore, discourage Ministry managers from opening their centers after hours, from sharing their resources with the public, with other Ministries and other Ministry units, and from actively encouraging use of resources.

Although not an obstacle *per se*, the project is concerned about a perception that it is not successfully working towards meeting this objective. From the project perspective it is working quite diligently towards achieving this objective and has made certain that it has placed staff on committees that allow it to have input into Ministry policies related to IT and education. It also has worked to be involved in most major discussions of IT and education taking place within the Ministry. If there is more expected of the project in this regard, the project is certainly willing to invest more time into these efforts, but it feels that the Ministry and its bodies should take the lead in making this request. To date, it has addressed every specific request given to it by the Ministry and project partners and is only constrained by the time needed for these groups to respond to requests by the project to comment on the project's work and/or draft proposals.

Lessons Learned

The Project's Constructivist Approach and Demonstrated Willingness to Provide both Formal and Informal Policy Support Appears to Have been Received Positively. While Ministry partners are the only valid source for validating this statement, feedback received by the project staff has been overwhelmingly positive.

The Location of the Project Significantly Affects Where and How a Project can be Effective in its Policy Support. At times, project staff felt that the project was expected to support policy reforms at much higher levels within the Ministry and even within Government. Given that the project was hosted by NIED and had a deputy director as its primary counterpart, the project had few avenues to support policy at higher levels. As mentioned previously, the project provided policy support whenever specifically invited to do so by Ministry counterparts. These requests most frequently came from NIED, as NIED was the group within the Ministry that was most aware of the project's activities and capabilities. In the future, if USAID or other donor groups would like to provide policy support at higher levels, it should seek to link their support to Ministry headquarters or to the Office of the Prime Ministry.

Effective Policy Support Requires Time to be Effective. Policies seldom come in one-size fits all packaging. For policy to be effective, understandable, and sustainable they should be developed for the context within which they will be followed and should seek to incorporate the various views of the stakeholder groups who will be affected by them. Adopting policies from other countries and attempting to apply them to Namibia has not been a popular approach. Ministry counterparts have been most appreciative of policy support that has sought multiple stakeholder opinions, have been provided in draft form, and have been modified to account for feedback. This process is time consuming but will hopefully lead to policies that are better understood and therefore are more likely to be appreciated and followed.

Recommendations

The RETTs should be used more frequently as sources of information and guidance on policy development. This will provide them with more guidance and will allow their approach to learning and developing uses of new technologies to guide the Ministry in developing its policies.

ICT policies should seek to encourage rather than discourage the use of technologies. A frequent mistake made when developing ICT user policies is to use the policies to restrict unwanted use. Unfortunately, these policies may discourage use in general. People exploring the uses of technology have done a great amount of creative work. If policies discourage such exploration on the basis that it looks like "play" rather than "work," then these creative uses will not be developed or will develop more slowly.

Education partners should seek to support policies that allow technologies and connectivity to be provided at lower costs to the education sector. These policies include encouraging competition in the telecom sector, opening up the use of satellite and wireless connectivity options for education use, encouraging the development of an e-rate, and general support to SchoolNet initiatives among others. In general, while the costs of these technologies and connectivity remain as high as they currently are, the use of these technologies in the education sector will remain very limited and the many advances promised by their introduction will have a poor chance of materializing.