Education through Wireless Rural Networking in Solomon Islands; The People First Network

David Leeming
People First Network
Rural Development Volunteers Association
P.O. Box 919, Honiara, Solomon Islands
www.peoplefirst.net.sb
leeming@pipolfastaem.gov.sb

Abstract

This paper describes an innovative approach to connectivity for remote, rural and underprivileged communities in Solomon Islands and how it has been applied to deliver education to remote island communities. The People First Network, or PFnet, was established by UNDP in 2001 but is now organised as an activity of the not-for-profit Rural Development Volunteers Association (RDVA). PFnet has piloted a model for sustainable community-owned rural access based on wireless networking in the HF band, with capacity building and facilitation of information sharing and rural networking for stakeholders in rural development and peace building. The paper focuses on the challenges the project faces in helping various groups within the rural communities to creatively overcome problems such as low bandwidth, extreme cost of Internet access, geographic and economic constraints and lack of political will and awareness. The paper then describes a case study in which the PFnet email system was used to deliver course modules of the University of the South Pacific to a group of students in a remote community. It demonstrates the utility of the technology and the immediate benefits to students and facilitators, and highlights some issues that need to be addressed if such a program were scaled up nationally. During the trials a program of research interviews was also conducted to provide data on e-readiness and impacts of the ICT.

Background

In a country such as Solomon Islands, which is recovering from ethnic conflict, good communications are a vital part of rebuilding peace. Furthermore, as 85% of the country's people live in isolated rural villages on undeveloped outer islands, it is essential to find ways to engage these disadvantaged poor in the new Information Society. The People First Network (PFnet) [1] is a project that aims to do just this.

PFnet, which has been running since it was established by UNDP in early 2001, aims to promote and facilitate equitable and sustainable rural development and peace building by enabling better information sharing and knowledge building among and across communities forming the Solomon Islands. The project has established a wireless email network based on sustainable community ownership and is now working with partners to develop applications in many sectors, including distance education, farmer's networking, grassroots news, business and market advisory, consultations on constitutional and policing reform, rights awareness and women's networking. Institutionally, the project is now an activity of the Rural Development Volunteers Association (RDVA) in partnership with the Ministry for Provincial Government and Constituency Development.

Those embracing ICT in the service of development can expect many benefits. In small-island developing states such as Solomon Islands, however, there are many constraints and challenges to be faced if ICT is to be introduced widely. Some of these challenges are "hard"; i.e. the geography, the regional telecommunications market, lack of infrastructure, etc. Others are "soft", in that they are related to lack of awareness, training and appropriate guidance and strategy for policy makers. These problems have been compounded by years of ethnic conflict and economic collapse, culminating in an Australian-led intervention in June 2003. This paper illustrates some of the constraints and challenges PFnet faces and highlights an application of the network in distance education.

Geographic constraints on technology

Solomon Islands has over a hundred inhabited islands spread over a huge area of the southwestern Pacific. 85%

percent of the population live in isolated rural villages, most of which have no power supplies or telephones. Most islands are mountainous and customary land ownership compounded by the effects of civil unrest make infrastructure vulnerable to vandalism, theft and closure due to compensation claims. The high cost of satellite access prescribes wireless technology as the only practical, affordable solution for rural communities. However, the distances and terrain make high-speed wireless connection (VHF, 802.11) of use in only certain areas close to urban centres. With these constraints in mind, PFnet has developed a solution utilising the HF (SW) band, with Pactor-3 modems and solar power.

Figure 1: Appropriate technology for sustainable rural networking in Solomon Islands
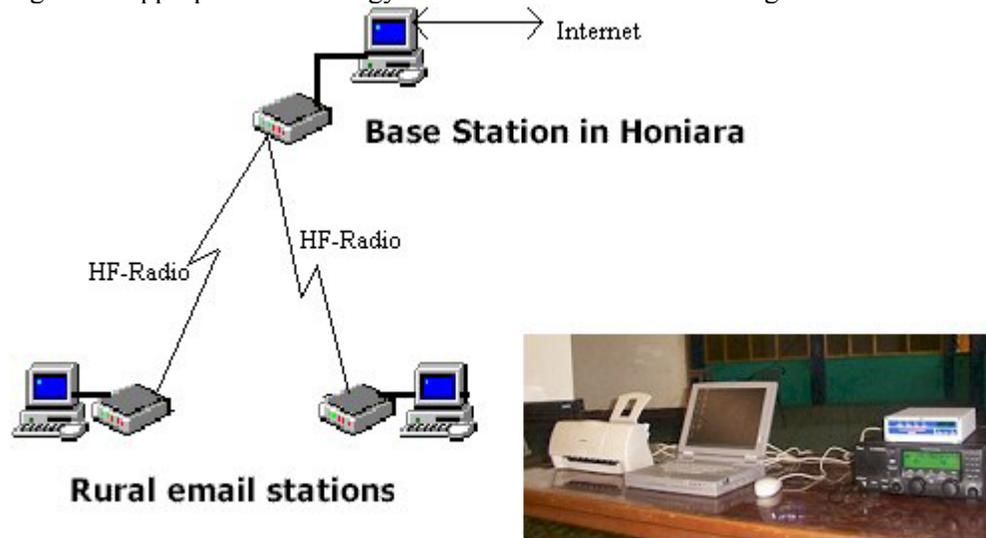
The downside is that all but the latest military-aviation HF systems are slow (2kbps), point-to-point and email only, with no full Internet capability. The low bandwidth is particularly vulnerable to denial caused by "spam" and virus activity. HF modems and software are still in the specialist market and are very expensive, especially commercial-grade systems.

It is necessary to creatively manage these limitations. To overcome the lack of full Internet access, web-for-mail systems such as TEK [2] have proved themselves. For sheer usability, TEK is an excellent system that has added a whole magnitude of utility to the PFnet rural access points. TEK runs in a browser, returns 10-15 results pages in a single compressed file, remembers requests and avoids repetition and builds up a local searchable archive. Examples of usage during a recent deployment included seaweed farmers who were able to receive appropriate market information and information concerning counterparts in neighbouring countries and a head teacher who obtained highly relevant information on the environmental impacts of logging in Papua New Guinea for class preparation. PFnet also plans to use TEK to reduce access costs where full Internet access is available but too expensive for groups such as students and young people.

ICT and National Development Strategy.

Ideally, the incorporation of ICT in policy making should be guided by a national ICT strategy if the benefits described by UNDP [3] and others are to be enjoyed. In Solomon Islands there is no such strategy in place, although the government has participated in the drafting of a regional plan [4]. Because of the crosscutting nature of PFnet, the project has particularly noticed the lack of focus and haphazard way in which ICT is utilised by the government and development partners alike. Lack of awareness of ICT and it's potential role in national development, together with lack of ICT skills seriously hinders the appropriation of these useful new technologies at policy-making levels. Coming and going of political personalities and public servants who may or may not be briefed on ICT4D issues has affected the level of support which the project expects from it's

government partners.

In order to address this, in February 2003 a workshop was held for stakeholders to identify, analyse and prioritise objectives on national issues related to ICT for Development (ICT4D). The workshop built consensus and was intended as the first step towards the development of a National ICT Strategy. Attendees included government workers including a Minister, members of NGOs, the private sector, donor agencies and civil society organisations. The workshop used Object Oriented Project Planning (OOPP) to build a "problem tree" by identifying all the reasons why ICT is not widely utilised in the service of development.

The associated "objectives tree" was then mapped and five major clusters identified, whose relationship is illustrated in Figure 2. The diagram shows that, if ICT is to be considered and used to best effect within government policies and development strategy, there is a need to first address the underlying issues. It does not mean that no policy development can incorporate ICT before these objectives are realized, but the impacts will be less and more isolated and haphazard in nature.

Figure 2: Priority ICT4D objectives clusters
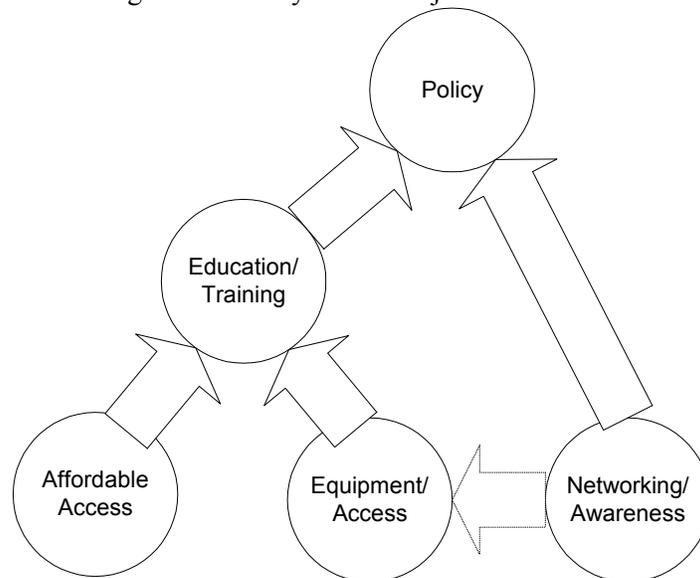
The final report of the workshop has been published [5] and is intended to provide guidance for policy makers. The workshop also resulted in a steering group, the *Solomon Islands ICT Working Group*, being formed to follow up the workshop. The Working Group is to be included in the regional *e-Pacifika* program [6], which is building the capacity of regional countries to develop ICT strategies.

ICT in education in Solomon Islands

The strategic objectives clusters in figure 2 clearly show how more ICT content and training is needed in education, from the standpoint of national development. This defines the focus of the rest of this paper.

Concerning the current situation vis-à-vis the penetration of ICT into education, as in many sectors in Solomon Islands there is a lack of baseline data. Such baseline data would enable better targeting and more effective ICT strategies in education. Research into the readiness of students, teachers and communities to embrace ICT is required.

A very few schools in urban areas have been building IT strategies and acquiring donated equipment. This seems to be more as a result of enlightened school management than official IT strategy. For instance Betikama

Adventist College claim they have an in-house IT strategy in place and have been successful in acquiring 10 donated secondhand computers. However, they have had problems implementing the strategy due to lack of support from technicians and inadequately prepared facilities. Observing the association between these problems and the lack of a central ICT strategy in education, the school recognizes the need for further ICT development at a secondary level and would welcome a move in that direction.

In rural areas the problems are compounded by lack of basic power and communications, poor transportation and shortages of all resource materials. However, this is where the need is greatest. The economic consequences of the ethnic conflict have had serious negative effects upon the ability of the Ministry of Education to continue financing overseas post secondary scholarships and SICHE at recent historical levels. The Ministry's priority is basic education and the magnitude of the problem precludes financing even that properly. The necessity of finding local solutions to post secondary training becomes important in this context. In addition distance education, properly resourced and organized, could assist in reversing the accelerating trend of an increasing number of school 'push-outs' and drop-outs throughout the educational system.

The situation in tertiary education is mixed. The Solomon Islands College of Education (SICHE) does not have a computer lab at present. SICHE has greatly suffered during the economic collapse following the ethnic conflict, and is now undergoing a review for restructuring under an EU-financed program. The University of the South Pacific (USP) already has a USP Centre in Solomon Islands, and there are plans to open a campus. USP have identified the need to promote and facilitate more ICT awareness and capacity building for students. The USP Centre is linked to the USP-net satellite system that offers a 64kbps Internet link, video conferencing and other facilities. It is a minimum requirement to have PC's available to students for the purposes of supporting them in: (a) research via Internet and through shared resources made available on USP-net; (b) communication via email, and (c) office computing so that students are able to present their results in a standardised and efficient manner.

Although at present there is very little or nothing at all on ICT in the school curricula, the Ministry of Education and especially the Curriculum Development Centre (CDC) is pursuing this. The CDC has embarked on a Curriculum Reform Program. Under this program CDC will be organising a series of workshops to review and develop the primary and secondary curricula. Concerning ICT, CDC are studying relevant curriculum documents from other developing countries to help them develop a national school ICT curriculum. A workshop is planned for 2004 on this topic.

The view is that Solomon Islands children should be exposed to ICT despite the financial constraints this country is facing. Although only very few schools in Honaira are using ICT facilities such as Internet cafes, there are other means to deliver content including broadcast and SW radio, video, etc. The absence of equipment from schools need not rule out all ICT teaching in schools.

There is some evidence that these moves are being driven by demand from teachers and students. Schools, even those that have no computers, are expressing a lot of interest in exposing their students to ICT. CDC believe that Government can be compelled to act on some of their aspirations (particularly to tap the benefits of ICT) if CDC can lead the way to introduce such an imitative by introducing ICT curriculum into the school system.

The Solomon Islands ICT Working Group has successfully obtained funding for a Youth Focal Point and Computer Resource Centre, which will be targeted especially at students who need access to computers and Internet to conduct research for assignments and to learn how to use the ICT. This project will be implemented by RDVA with the ICT Working Group acting as a "supervisory board".

Although this assessment is too superficial to accurately identify the priorities, it seems apparent that at least the following needs can be stated:

- Formal recognition of the gap in the education curriculum concerning ICT;
- Development of ICT content in the national curricula;
- An ICT strategy for education should be developed by the Ministry;
- More availability of computers to students at all levels;
- Baseline data on ICT penetration in education in Solomon Islands;
- A physical/virtual access point to facilitate development of ICT in education;
- More official IT support to schools;
- As rural ICT requirements differ from urban requirements, special attention is needed to connect rural schools to deliver services, provide equipment, IT support and electronic content such as can be distributed cost-effectively by CD-ROM.
- Special attention to the needs of senior students hoping to attend university.

Case study: Delivering education services to rural Solomon Islands by email

The People First Network with it's growing rural network was ideally positioned to pioneer local solutions in distance education. This fact was recognised by the University of South Pacific Centre of Honiara (USP Centre). Consequently, a project proposal was successfully submitted to the Pan Asia Networking R&D Grants scheme for 2002, administered by AMIC.

This project was implemented by the Rural Development Volunteers Association (RDVA) in partnership with USP Centre during June – October 2002, with PFnet facilitating the networking and providing technical assistance. The project aimed to utilize an existing rural Internet connection provided by PFnet to pilot a distance learning facility in one of Solomon Islands' rural Community High Schools. The site chosen for the project was the country's first rural community email facility, opened at Sasamungga, Choiseul, in October 2001, with the nearby Sasamungga Community High School.

The project entailed the application of a distance-learning program especially designed to integrate with the PFnet facilities. It also contained a research component that measured awareness of ICT in the community and studied the impacts of the email station. In doing so, the project provided invaluable baseline data for further expansion of PFnet to all rural areas of the country, and an example of an application serving the needs of one information stakeholder group (i.e. education users and providers).

Project objectives

The intended overall outcome of the project was to provide improved educational opportunities for rural people by exploiting new possibilities arising from ICTs, in particular the People First Network.

Specific objectives were to:
- Field test the utility of PFnet by using an existing community email facility to pilot a distance learning computer centre in a rural village school
- Provide baseline research data on the impacts of the distance learning centre and the general impacts of the email facility, to be used in the future expansion of PFnet.
- Build rural and national capacity in the use of ICTs especially in the education sector.

Strategy

A computing centre with two laptop computers was opened at the community school close to the email station. Power was made available from the school's own solar supply. 19 students were enrolled into the USP distance-learning program with funding facilitated by the local MP. Over a 2 week period, with backup supervision for a following 6 weeks, all 19 were trained to use the facility for basic office computing and to communicate with USP, sending assignments for marking, receiving counseling, tutorials and advice from the course tutors. For

this process, two RDVA volunteers (RDVs) were assigned to the training and supervision of students over the 2 months on site. The RDVs also conducted the research interviews. Out of the 19 students trained, 10 were selected to participate in the distance learning trials.

USP Centre was the provider and facilitator of the courses for the Distance Learning trials. The courses offered were (a) *Pre -tertiary English* and (b) *English*. The USP resource persons who participated included the (a) Course Facilitator, (b) Marker and (c) Technical Resource Person.

PFnet trained these three resource persons at USP Centre to use the PFnet email system, and overcome the limitations of it's low-bandwidth and lack of full Internet browsing capability (at the time, the TEK search engine mentioned above was not in use by PFnet). For instance, it was important to prepare materials before transmission by email, to optimize the file size and avoid transmission of unnecessary data. PFnet closely monitored the progress of the students, through reports from the RDV supervisors on site and monitoring reports. A system was agreed which specified a schedule for the communications between tutor, marker and each student. Each student was given an allocation for use of email.

Following is summary of the procedures followed to deliver the distance education services during the pilot:
- The RDV supervisors provided computer and email training for all the students and supervisory support
- Completed assignments were sent electronically to the Course Facilitator who passed them to the Tutor or Marker. In some cases the marker was in Suva, and as the pilot did not include Suva-based participants, some electronic documents were printed and sent by mail.
- Students contacted their tutor weekly by email to ensure continuity of student-tutor relationship. The supervisors record all the interactions and their turn-around times. This data was used to find out how effective and efficient this medium is in the delivery of distance education.
- Honiara based tutors prepared weekly tutorial guidelines and emailed them to students as a way of keeping the students on track with the time schedule for assignments, tests and exams.
- Supervisors provided assistance for students' queries and or doubts concerning usage of computers, course materials and assignments (i.e. counseling).
- Students emailed requests for reference materials, including research papers, etc., to USP Centre and Internet search requests to PFnet.
- All participants recorded their observations and data for subsequent evaluation.

Research Component

A random sample of 120 villagers was selected for a research interview program. Equal numbers of each age group and gender were included. There were two interview programs, namely a main interview and an exit interview. The main interview consisted of approximately 35 questions concerning experience and need for distance education, awareness of computers, email, IT training experience and needs, and the use of the PFnet email system with perceived benefits. The exit interview was applied to PFnet email station customers as they exited the facility, and recorded details of their use of the service. The exit interview results thus compliment the daily monitoring system in place at all PFnet stations, which records age, educational level and gender of the user and the destination and main reason for sending the email (the reports are transmitted to the PFnet base and imported into a statistics database.

Evaluation of the Distance Learning Trials

Evaluation of the pilot was through focus group meetings held by the RDVs with the students and other people involved on site following the completion of the USP course module. This was followed by an evaluation meeting held in Honiara with all project participants present. The conclusions and recommendations of the evaluation were then presented to an education stakeholders' meeting in Sept 2002, organized on behalf of the Ministry of Education.

Evaluation by the USP Course Facilitator

The task of the Course Facilitator is to dispatch reference and course materials both in printed form and in response to students' queries and Assignments. The facilitator receives assignments from students via email for recording purposes before passing it on to respective tutors/markers.

Positive observations:

- *Turn-around for assignments*
  Generally, assignments were always submitted before the due date without delays. With email, assignments took less than an hour to reach Suva for marking. The turn-around time has been greatly reduced compared to those assignments sent through post or mailbag.

Problem areas

- *Internet searching and requests for reference material*
  Requests for information from the Internet were usually referred to PFnet to be searched. In comparison, Honiara based students have the advantage as they can access these in the library or search the Internet themselves. The System for responding to students request for information needs improved coordination and definition.
- *Digitisation methods*
  Scanned assignments needed a lot of editing because the markers comments and corrections on the hardcopy caused distortion of sentences. Documents marked by pen prohibited the use of optical character recognition (OCR) software. Scanned documents also produced file sizes too great to transmit with the Pactor 2 modem installed at Sasamungga at the time. Therefore USP was limited to sending mainly text-based messages.

<div style="border:1px solid black; padding:10px;">

Recommendations made by the USP Centre Course Facilitator
1. Marking should be all-electronic to avoid the problem with scanning.
2. Some courses other than English should be offered.
3. A resource person should be nominated and trained to deal with students' information referrals.
4. Higher speed data connections are desirable.
5. Students and facilitators at the rural facilitator should be trained to use new tools to allow direct Internet searching, for example the TEK search engine now being deployed as a standard PFnet service.

</div>

Evaluation by the USP Tutor

The tutor's tasks included preparing a weekly tutorial guideline for students related to the course and to give general comments on course content and expectations. The tutor is also responsible for marking of assignments and giving feedback as well as reminding students of assignment due dates and tests. Of the 10 students participating, 2 were marked by a USP Centre based tutor and 8 by a tutor based in Suva.

Positive observations:

- *Success Rate of Students*
  The Sasamungga students marked by the Honiara tutor benefited from this mode of distance learning. They did not have difficulties in terms of answering assignment questions accurately. They were helped by the weekly tutorial guideline, which they received promptly. These allowed students to be on track with course requirements. The students doing the course were very successful in the two assignments during the pilot, with marks of 90% and 98%. In comparison, only 18% of students who studied in Honiara without use of ICT scored more than 85% in the two assignments.
- *Face-to-face vs. remote study using ICT*
  Students at the Centre who attend weekly tutorials face-to-face exhibit a lesser degree of self-reliance than the students using PFnet. The success rates, although limited in sample size, indicate that given this mode

of delivering education, students in remote areas might actually do better than those based in Honiara who do not use ICT. Use of ICT to carry out study and interact with the provider seems to be a significant success factor.

- *Student-Tutor relationship*
  This is enhanced by the use of ICT as it provides an avenue for queries and problems to be communicated and clarified, unlike in the past where students are left on their on without assistance.

Problem areas:

- *The Pilot did not include all USP resource persons*
  Most of the problems were associated with non-inclusion of Suva-based participants in the pilot. Thus, the students marked by Suva staff did not benefit as much as the others, and there was some confusion.
- *Sending tutorials as attachments*
  Over-large files caused problems with the slower modem type used at the time. More training was required in optimisation of documentation for low bandwidth.
- *Tutor lacked adequate tools*
  The Honiara-based tutor was not provided with a personal computer, and this limited her effectiveness in helping students.

Recommendations made by the USP Centre Tutor
1. Assign resource persons for Information Referral and Retrieval and use a standard request form so that students' requests for information are not delayed.
2. Agree to a protocol for sending/acknowledging email
3. Orientation for students and supervisors on the use of the email query system.
4. PFnet to train USP staff in specific areas relating to Distance Learning education

---

Evaluation by the participating Students and RDV Supervisors
The task of the supervisors was to oversee the activities in the field, which included providing computer training for the students, monitoring, reporting and the research interview program. The supervisors also assisted students with interpreting USP course materials and information needs, and recorded all student-tutor interactions for evaluation.

Positive observations:

- *General*
  On the whole, the positive benefits were as noted by the USP resource persons above. It is fast, easy and affordable to send and receive assignments, and query tutor on course related matters. All the students described it as a great experience.
- *Reduced isolation*
  Use of ICT vastly improved communications and quality of the student-tutor relationship for by rural-based students. Prior to this mode it was not possible to contact tutors and receive feedback; students only had access to their printed course materials and were largely left on their own to complete their courses without further assistance. With the use of PFnet this problem is solved. Students can communicate their problems with tutors, almost as if face-to-face.
- *Capacity building*
  The use of ICT during the pilot required students to learn new skills. After 3 months of the research trial all the students were confident in the use of computers and email. This will greatly help and motivate them in studying by distance in the future. It was also exciting as it help broaden their knowledge and skills in the use of ICTs for educational purposes.

Problems areas:

- *Sharing of limited facilities*
  The project could only afford two laptop computers for the 10 students in the pilot. Good cooperation and organisation was required.
- *Privacy*
  Shared use of facilities required more security than was available. For instance, students could easily access other students' files.
- *Maintenance of facilities*
  During the pilot, supervision and maintenance of the computer centre was supported. However, once the pilot was completed, participants who continued with their education missed this support.
- *Information requests*
  Eighty percent of students contacted their tutor for supplementary information on assignments to be searched on the Internet or from the main library. These searches were not always successful. Thus, students questioned the reliability of such an arrangement. The problems were associated with (a) lack of direct searching functionality and (b), the availability of requested material in electronic form. It was sometimes possible to locate the source of the material but it if not published online it was often unavailable in electronic form.
- *Lack of training*
  Students quickly became aware of their computer training needs and wished to use spread sheet and other software. Advanced office computing functions such as formatting for maths notation and so on, were not covered in the basic training course.
- *Lack of a library and electronic reference materials*
  This is the main disadvantage which students faced compared to their peers based in Honiara. Students lacked the means to access paper-based reference material quickly on demand. Completion of assignments invariably requires reference materials. If available in electronic form in USP centre, the formatting was often unsuited to low-bandwidth systems such as PFnet.

Recommendations made by the students and supervisors

1. Provide full Internet access or means to enable direct Internet searching for supplementary information related to assignments, supplemented with training and guidance notes on information searching strategies. (PFnet is now using *TEK* [2] for this purpose).
2. Train USP tutors to help students interpret their information requirements and advise on the best strategies for locating the material. This advisory status would be more efficient than having the students rely on the USP staff to actually do the searching.
3. The USP and USP Centre resource centres/libraries should designate and train staff to specifically assist distance-learning students with their reference material requirements and to assist searching the Internet. This is to avoid the problem of having to wait overlong for a response.
4. Remote learning computer centres should have their own email facilities rather than sharing a community facility. They also need small libraries for course-related reference books and papers.
5. Provide support for encryption tools so that students sharing computers can secure their documents. One such system demonstrated during the trial is the freeware *MaxCrypt*.
6. As the establishment of the distance learning facility has sparked widespread interest in the community, a standard facility would require more than two laptop computers as in the pilot
7. Make available other computer software and training to support speciality subjects such as maths. Students also need to be trained on the use of other programmes like Microsoft excel. This will help students where tables, graphs and charts are required in an assignment.
8. USP should provide distance learning by email as standard and build in the costs and agreements with participating communities, schools and ICT service providers.

General issues brought up by other Participants

The issue of whether or not such rural facilities would serve their purpose of facilitating distance education using PFnet was raised. The fear was that the facilities could be predominantly used for other purposes outside of facilitating education. However, the issue should be largely resolved through locating the centres in suitable premises such as community high schools and by requiring all partners to sign an agreement specifying terms of reference, roles and responsibilities.

Another issue raised by participants is the computer training of new distance learning students. The question was raised who would be responsible for training these students and providing technical assistance if the services are to be maintained and continued.

Fees were an issue that was raised. In light of the current financial problems facing the country this is one of the main obstacles for rural people wanting to access distance Education. In the pilot the problem was solved by the generous donation of course fees by the MP. If the service is to be made national, costs would need to be passed on to the students in absorbed in the course fees. Therefore there is a need for a scholarship program, or the provision of subsidies.

Difficulties in identifying, locating and accessing supporting material emerged as a major issue for all the participants. When relevant scientific papers were tracked down, it often required contact with the source's author, and quite often the material was only available in paper form. It would have helped the students and tutors greatly to have access to an online catalogue of relevant scientific and academic research material with content made available in a standard electronic format with options for low-bandwidth users. An archiving system based on CD-ROM with a way of updating the contents periodically online would provide a great service in such applications. The author has not verified if such systems and standards already exist

Evaluation by Education Stakeholders

Following on from the internal evaluation, a workshop on distance education was held on the 24th September 2002 to present and discuss findings and results to all the stakeholders [7]. The workshop was organised on behalf of the Ministry of Education and training and most stakeholders and donors were represented including the USP Centre, SICHE Distance Education Centre, CDC, the Solomon Islands Association of Rural Training Centres, the Ministries of Education and the Sasamungga Community High School. Aid resource organisations whom attended included the High Commissions of Britain, New Zealand and Australia, the Embassies of R.O.C. and Japan, the Resident Delegate of the E.U. and the E.U. Micro-projects Programme, and Oxfam Solomon islands. The Ministry of Transport, Communication and Works were represented as the lead ministry for ICT policy and strategy.

The workshop had two objectives and two anticipated outcomes:
1. To demonstrate the utility and suitability of some ICT as a platform for distance education in the Solomons.
2. To facilitate a discussion between all indigenous and donor stakeholders on the potential of distance education in a time of economic and educational crisis. The anticipated outcome of this exercise was agreement on a mechanism to encourage and develop co-ordination of distance education initiatives.

During the Workshop it was noted that the ethnic tension and economic crisis had serious negative effects upon the ability of the Ministry of Education to continue financing overseas post-secondary scholarships and SICHE at historical levels, especially as the Ministry's priority is basic education. The necessity of finding local solutions to post secondary training becomes important in this context. In addition, distance education, if properly resourced and organized, could assist in reversing the accelerating trend of an increasing number of school ' push-outs' and dropouts throughout the educational system

The workshop's summary noted that the developing PFnet network has been achieving national dimensions and wide support, that its usefulness for rural connectivity has been proven and that many of the PFnet access points are also institutional; i.e. educational (Community High Schools and a Rural Teacher's College), agricultural and Fisheries stations. The summary concluded that PFnet's umbrella organisation the Rural Development Volunteers Association (RDVA) is proving to be very efficient in providing local technical and support personnel.

The Workshop noted that a distance education initiative called Solomon Islands Distance Education Network (SIDEN) was started before the tension, involving co-operation between SICHE and USP Centre; but was abandoned in 1999. It was agreed that this idea should be revived using the PFnet technology as a base. For the present, resources would have to come from donors.

It was judged that the distance trial at Sasamungga was judged successful and could be replicated on a national scale provided that sufficient financial and material resources were made available. Given current budget constraints such resources could only come from the donor community. Certain technical limitations of the equipment such as the lack of direct access to internet will have to be addressed eventually but is anticipated this will be solved as more advanced technology becomes accessible and affordable. It was noted that the turnaround time between student's work and tutor response was cut to days rather than up to six weeks with the former correspondence model. Distance education based upon PFNet Rural Learning Centres should also encompass other media such as video and radio.

The Workshop recommended that a *National Coordinating Committee for Distance Education* be established by the Ministry of Education. This would encompass all stakeholders and co-ordinate the development of a national program for distance education incorporating the needs of school leavers and push-outs, post secondary students, in service training on a multi sectoral basis and collaboration with overseas institutions.

The workshop led to PFnet making the following proposals to the Stabex99 Program Management Unit, who are managing EU funds allocated the Ministry of Education:
- To establish Rural Learning Centres in key community high schools in each province. These would build on the model used at Sasamungga in the trials and would involve a small LAN with radio email access, a library, an attached supervisor/trainer and audio and video facilities, with solar power;
- To build capacity for communications and networking by the provincial education authorities;
- To create an online presence for the Ministry of Education linked to database management systems and the rural communications network;
- To refurbish the Ministry's databases and linkage to online management systems, with capacity building;
- To establish a sponsorship scheme for distance education and overseas tertiary education in ICT subjects;
- To promote use of ICT in schools through providing computers, competitions and collaborative learning.

One year after these proposals were made, the situation in the country has improved following an Australian-led intervention that has stabilized the government finances and improved law and order. Under these conditions blocked EU funds allocated to education may be released later this year.

Research Interview Results

The purpose of the research interviews was to collect data on the impacts of ICTs on a representative rural community and their readiness to embrace ICTs for educational purposes. The sample size was 120 people covering all groups. The sample was randomly selected from the five main villages that make up Sasamungga Community. The data also gives a snapshot of the degree to which rural islanders have had access to distance education and exposure to ICT in one form or another. At the time the sample was taken, the PFnet email station at Sasamungga had been in operation for eight months.

The sample
The design was to have an even distribution of ages and gender across the sample. The sample is spread across all education levels from Primary to tertiary. Gender wise the education of male and female is similar, although this was not by design.

	Female	Male	Total
All Ages	64	56	120
< 20	16	11	27
20-29	22	22	44
30-39	10	9	19
40-49	11	13	24
50+	5	1	6

Table 1. Gender and Age groups

	Female	Male	Total
Primary	25	22	47
Jr. Secondary	16	16	32
Sr. Secondary	13	7	20
College	9	9	18
University	1	2	3

Table 2. Education and Gender

Exposure to Distance Education
From the sample, 11% had studied by Distance Education prior to the implementation of the research project, of which 31% were women (table 3). This indicates that women still have access to distance education in the rural areas despite their traditional roles. The most popular provider for distance learning is USP.

For those who have studied by distance education, the subject studied were Education, English, Geography and Maths with one person doing Computing (table 4). Some respondents explained that these subjects are sometimes particularly chosen on the basis of availability of reference materials to ensure successful completion.

Sixty eight percent of respondents want to study further (table 5). This clearly indicates that people in this rural community are showing great interest to doing further studies to improve themselves. Distance Learning was seen as a bridge to attaining higher education and eventually to jobs. Many have realized the importance of English in getting employment. Many school-dropouts want to get back into formal education. The country's education system produced a lot of school leavers and push-outs. Lack of continuing education provision for this group culminated in many not getting further formal education. Therefore, many see distance learning as an opportunity to further their education and qualification. Interestingly two chiefs want to better their education to help them in their leadership roles. Village leaders have come to realize the importance of good leadership in their communities and education is seen as the vehicle for attaining such qualities.

Twenty seven percent of the sample does not want to study further (table 6). These are mostly women (66%). The reason may be that women's traditional roles are seen as barriers. Also, fees were seen as a barrier especially for family people. Such people do yet perceive the new opportunities that may arise from the ICTs. Many see old age as a reason not to continue further studies.

The most popular subjects that people want to study (table 7) are English and Education. The range of subjects selected reflects the nature of peoples needs to attain further education to improve and or maintain themselves. English is particularly popular due to its emphasis on providing a foundation for attaining jobs.

Studied by distance	13 (11%) of whom 4 (31%) were women
- via USP	5
- via SICHE	2
- via Pacific Bible Studies	2
- overseas technical college	1

Table 3. People who have studied by distance

Subjects studied by distance learning:
- Education
- English, Geography, Maths
- Electrical, Computing
- At least 4 (30%) did not complete

Table 4. Subjects studied by distance

68% want to study further:
- To obtain a vocational qualification
- To obtain a qualification
- To help with running a business
- To get a job
- To continue after dropping out of school
- To help bolster leadership roles
- To improve English
- Just interested in learning
- To acquire qualifications for teaching
- To get a degree
- To benefit family

Table 5. Respondents who wanted to study further

27% don't want to study further:
- Mostly (66%) women
- Family and/or work prevents
- I am a mother so no time
- Not educated enough
- Financial constraints
- Too old
- Not interested

Table 6. Respondents who do not want to study further

In order of popularity, subjects people want to study are:
- English
- Education/teaching
- Science
- Vocational skills
- Maths
- Leadership skills
- Others: music, secretarial, health

Table 7. Subjects' people want to study by Distance Education.

Exposure To Information Technology

With regards to respondents with computing experience more than 10% had used computers (table 8). Most of these had only primary or junior secondary education. It shows that access to Information Technology (IT) may not be the privilege of an elite and at the same time it shows that many people are ready for IT in the rural areas.

Word-processing seems to be the common usage (table 9) with 50% of those with computing experience stating this. Others (28%) mainly use computers for games and the remainder used other programs. Only two people were experienced (table 10) in computing. One is the email station operator and the other states that he is "out of practice". Most of the rest have some experience of typing or word processing while some just use it for games. Skill levels are very low.

The obvious reason why 88% have no IT training (table 11) is predominantly due to lack of access to computers. At the same time many assume it as only appropriate for urban centres. This implies that the technology is yet to penetrate many rural settings in the Solomon Islands. Coupled with this, non-availability of training is another factor. 3 out of 120 indicated fear of the technology.

When asked what their IT needs were (table 12), 51% of respondents stated basic training and 18% indicated that access to a computing facility would enable them to use computers. Two people identified including computing in the school syllabus to provide an avenue for more people to gain awareness, have access and to use the technology. Several suggested having a computing facility at the school. Predominantly the most stated type of training desired, with more than 50% of respondents, was on word processing with 21% wanting training on how to use email (table 13).

14 of the sample (12%) had used computers
- 43% were women
- 64% junior education only
- Experience gained during employment, training courses or introduction by peers, mostly in town

Table 8. People with computing experience

Of the people who had used computers, uses included:
- Word processing (50%)
- Games (28%)
- Email and Internet (21%)
- Spreadsheets (15%)
- Archiving (15%)
- Presentation, PowerPoint (7%)

Table 9. Type of computing experience

Skill levels of the people who had used computers, :
- Skilled (PFnet Operator) (7%)
- Some experience (28%)
- Little experience (35%)
- Just introduced to it (28%)

Table 10. Level of computing experience

88% have no IT training, because:
- No access to computers
- Don't know how to use them
- Not well educated
- When young, there were no computers
- Afraid that people's brains will atrophy if they rely on computers

Table 11. Reasons why others have no IT training

What people identified as their ICT needs:
- Basic Training (51% of responses)
- Access, a computing facility (18%)
- Computing as school subject (2%)

Table 12. What respondents identified as needed to address their information and communications needs

People want training in:
- Word processing (52% of responses)
- Email (21%)
- Basic computing (8%)
- Internet (6%)
- Spread sheets (6%)
- Other: Introduction to hardware, archiving, games, digital photographs)

Table 13. Computer skills for which people want training

Awareness, Usage and Benefits of the Email Facility

Forty six percent of responses described email as a way of sending and receiving messages (table 14). Two people mentioned that it was used for communication with rural areas/out in the provinces. Some described it as similar to fax but much faster and cheaper. Responses "don't know" sometimes means that the person cannot express the answer and have more bearing on the interview design than the intended query. Overall it shows a high a high level of awareness of email and it's uses. However this is not representative of rural areas in general, as the sample was taken after 8 months of the PFnet email station operation at Sasamungga.

Many people become aware of email at the community when the PFnet email station was established in 2001 (table 15). However, 68% made no response of when they become aware of email, possibly again due to failings in the interview design.

Sixty four percent of respondents had someone in the family who used the PFnet email station (table 16). Thirty eight percent of this random sample (which included all age groups) uses the email station themselves. This demonstrates the significant degree to which the community in Sasamungga have utilized the PFnet email

station.

Usage by gender is fairly balanced (table 17). Usage by education level is fairly even, people of all educational levels use the station, but proportionally to the sample size for that group (in brackets), fewer people with primary and secondary use it. Nearly all the tertiary educated people use it. Usage is fairly evenly spread across the age groups (table 18). Looking at the sample size in brackets, it is clear that older people have relatively more confidence in using the email because they have more reason to use it. Proportionately, older women use it less than older men, but women often ask their husbands to do their communicating.

The graph of usage frequency (table 19) indicates there may be occasional and regular users. Occasional users have used the station an average of 5 times while regular users use the station on average once a week. The main reason people do not use PFnet email (table 20) is that they perceive no need to do so, or only have people to contact in areas without access. Only 9% of the 74 respondents who did not use the email station did not know how to do so. This demonstrates that the email technology and the community management of it are accessible to most people. The monitoring data from all the networked email stations shows that most users (about 70-80%) are male. However, the interviews reveal that in fact many women ask their husbands or other family members to send their messages for them.

One of the main reasons people stated that they send email messages is family correspondence (table 21). This is mainly contacting family in the capital Honiara, the nearest provincial centres and other places of access including PFnet stations. They also contact family especially students overseas (some rural people have managed to communicate with long lost relatives within hours of email station opening, after years of no contact). Secondly, another reason for use is education. This is mainly for arranging school fees for themselves and family members. Teachers use it to contact the Ministry of education and other professional institutions. The Distance learning students use it to communicate with tutors and sending assignments. Thirdly, they use it for business purposes ordering cargoes from suppliers as most village storeowners make orders by email. Furthermore, they use it for health reasons such as ordering medical supplies and contacting Ministry of Education.

The usage data in table 21 can be compared with the combined data from daily reports sent by the rural email station operators top PFnet headquarters every working day. These cumulative statistics are presented on the project's statistics web page [8] and updated monthly.

When asked what were the main perceived benefits of the email facility to the interviewee, the main response was that it provides them with affordable and efficient communications (table 22). Many people observed indirect benefits to themselves in that it helps the essential services such as health, helping the hospital make orders for drugs and other supplies. People saw the PFnet as more than communications as some pointed out that it provides information and news, as well as communications.

Respondents stated that the email station has benefited the whole community in a range of ways (table 23). It enables community to be better informed, through access to current news and information. It supports the local economy by reducing costs and the need to travel to town. It supports health services by making it easier to order supplies, drugs and make emergency calls, therefore it improves health security. It empowers the community by giving them a way to better provide input into public debates and to influence decision makers.

It should be noted that table 23 shows a list of rephrased summaries of 100 or more responses, with all the benefits identified by the interviewees themselves.

Responses to the question "What is email?"
- A way of sending/receiving messages (46% of responses)
- Communication tool (13%)
- Messaging using a computer (13%)
- Don't know (28%)

Table 14. Awareness of Email in the Community

People became aware of email technology, when:
- When PFnet established the email station 8 months previously (25%)
- In Honiara before PFnet came (5%)
- Overseas (1%)
- During the (this) pilot project (1%)
- No response (68%)

. Table 15. When and where people become aware of email

	Total
Several members of family	32 (27%)
The Interviewees only	14 (12%)
Other family members	30 (25%)
No-one in family	44 (37%)

Table 16. Number of people using the PFnet email station

Education Level	Female	Male	Total
Primary	5	8	13 (sample size = 47)
Jr. Secondary	4	7	11 (32)
Sr. Secondary	2	2	4 (20)
College	9	6	15 (18)
University	1	2	3 (3)

Table 17. Profile of users: Number of email station users by education level and gender

Age Group	Female	Male	Total
< 20	2	2	4 (sample size = 27)
20-29	9	5	14 (44)
30-39	3	7	10 (19)
40-49	5	10	15 (24)
50+	2	1	3 (6)

Table 18. Number of email station users by age group and gender

How often do people use PFNet Email

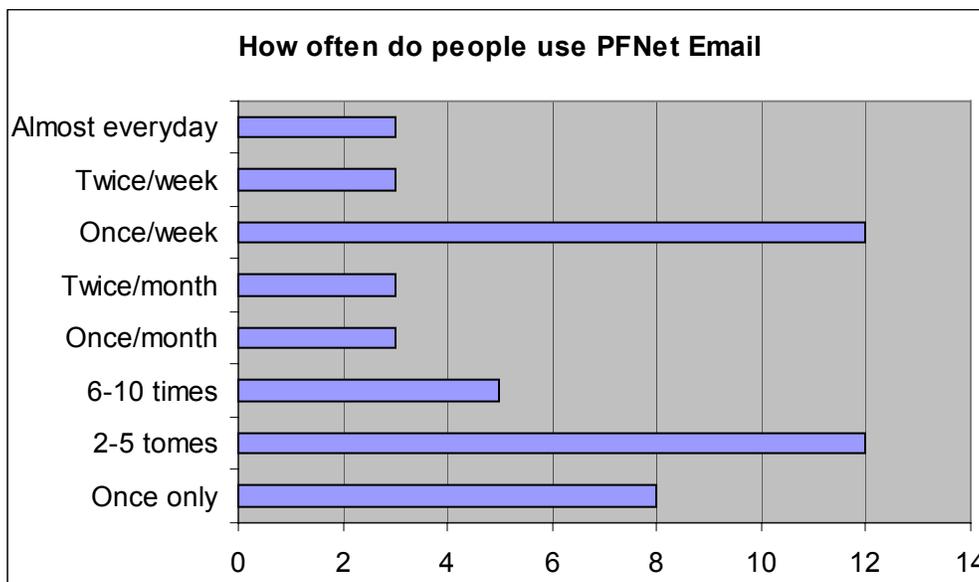| Category	Value
Almost everyday	3
Twice/week	3
Once/week	12
Twice/month	3
Once/month	3
6-10 times	5
2-5 tomes	12
Once only	8

Table 19. How often people use PFnet email

Some people do not use the PFnet facility because:
- No need/no-one to contact (61%)
- No message to send (14%)
- Do not understand how to (9%)
- People I want to email don't have access (4%)
- Husband sends them (4%)
- Other family member sends them (1%)
- Not confidential (Operator types) (1%)
- Need training to self type (1%)
- Use other means (radio / sat phone) (1%)

Table 20. Reasons people do not use PFnet email

Main uses of the email communications:
- Family correspondence (47%)
- Education (25%)
- Business (9%)
- Health (6%)
- Development (5%)
- Church (3%)
- Other (5%)

Table 21. Main reasons people send email messages

How people say the rural ICT helps them:
- I can send messages quickly (63%)
- I can send messages cheaply (51%)
- I can send messages quickly and cheaply (39%)
- Easy to pursue business dealings, make orders and contact suppliers, and locate new suppliers (11%)
- Gives me access to education services
- Helps me (school Principal) in school admin
- Gives me health security as it helps the hospital (17%)
- Helps me coordinate my development project
- Helps me to send urgent messages and in emergencies

Table 22. Perceived impacts of PFnet on individuals: How people say PFnet benefits them

How people say PFnet benefits the whole community:
- Benefits to the whole community
- Fast and affordable communications
- Community is better informed
- Supports local businesses by improving efficiency
- Improves access to education and quality of education
- Supports local economy
- Supports health and medical services
- Religious groups can better coordinate activities
- Gives community a voice to lobby decision makers

Table 23. Perceived impacts of PFnet on the community.

Update on Usage of the Sasamungga email station

The research project was carried out in the period June to October 2002. Since that time, the email station usage has continued to grow. PFnet records daily usage data for emails sent from the community email account and other facilities.

The usage figures in table 25 clearly show the peak caused by the additional usage during the distance learning trials. However, the trend is upwards, with usage roughly 25% up on levels immediately before the trials. The revenue is also increasing on average, with a monthly level of over $600 (USD 80). This is twice the target level set by PFnet , and demonstrates increasing demand and appropriation of facility by the community.

Monthly email usage (sent and received)
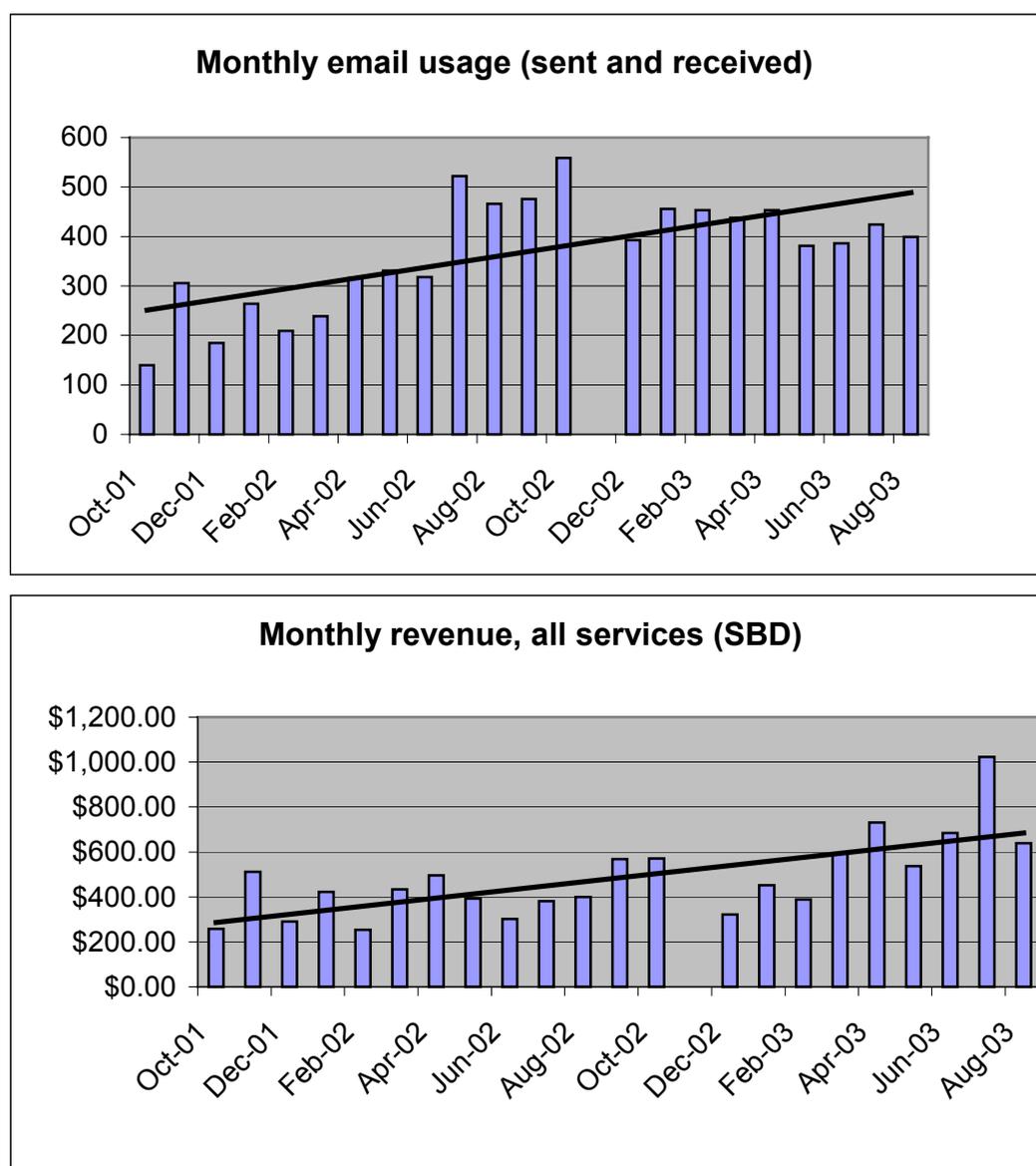

Monthly revenue, all services (SBD)

Table 25: Usage statistics for Sasamungga email station since it was established in Oct 2001.

Current research program

USP (Suva) is currently leading a F$40K project [11] which takes the described research a step further. Funded by JICA and implemented in partnership with RDVA and UNDP Fiji, the project will conduct similar but more in depth research into the impacts of the PFnet email system. The project will study five PFnet email stations with varying characteristics and usage levels, and will also identify the factors that affect the uptake of services and appropriation by the community. The results of this project will be available in early 2004.

The justification for this research is therefore very clear. Now that the PFnet project has facilitated the development of an ICT network in the Solomon Islands, there is a need to examine in detail how the PFNet email stations impact on sustainable rural development for poor Solomon Islanders. With the results of this research both the existing PFnet system and proposed expansion in the Solomon Islands, and replications elsewhere in the region, will be better placed to operate an ICT system that fosters genuine and sustainable rural development. Furthermore, Pacific Island governments have expressed that equal access and deployment of tele-centers is one of the regional ICT priorities. As such this paper will be a valuable document for all governments and stakeholders seeking to develop policy to improve the livelihoods of people in rural and remote areas in Pacific Island countries.

References

[1] People First Network web pages, brochure and PowerPoint presentation,
www.peoplefirst.net.sb
www.peoplefirst.net.sb/downloads/PFnet_Brochure.pdf
www.peoplefirst.net.sb/downloads/PFnet-Primer.zip

[2] TEK search engine, Massachusetts Institute of Technology, http://tek.sourceforge.net

[3] UNDP, *Digital Opportunity Initiative*, www.opt-init.org

[4] Pacific Forum Secretariat, *Pacific Islands ICT Policy and Plan*
http://www.forumsec.org.fj/division/DEPD/infra/infrastructure.htm

[5] Stork, E., Leeming, D. and Biliki, R., (2003), *Solomons Islands ICT Strategy Workshop Report*, Electronic Journal on Information Systems in Developing Countries, Vol 12, Apr 2003 http://www.is.cityu.edu.hk/research/ejisdc/vol12/v12p5.pdf and www.peoplefirst.net.sb/general/pfnet_stats.htm#WG

[6] UNDP Multi-Country Office in Fiji, *e-Pacifika*, http://www.undp.org.fj/RAS-99-064.htm

[7] People First Network web pages, *Distance Learning Project and Workshop*,
http://www.peoplefirst.net.sb/General/Distance_Learning.htm

[8] People First Network web pages, *Statistics Page*,
http://www.peoplefirst.net.sb/General/PFnet_Stats.htm

[9] Contact Dr. Anand Chand, University of the South Pacific, Suva, Fiji, chand_a@usp.ac.fj

Education in the Solomon Islands is governed by an Education Act and is patterned after the British system. The law, however, does not make education compulsory at least in the primary level, which is the main reason why only 60% of school-age children have access to the six-year elementary or primary education, the first level of the three-tier system of education in the country. The second level is the seven-year secondary school which consists of the government's provincial, national and community secondary schools and several privately-run high schools. Successful completion of the second