ICT in Secondary Education in the Pacific Region: Status, Trends and Prospects

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ACRONYMS

CDU	Curriculum Development Unit
CS	Computer Science
ELAs	Essential Learning Areas
EduNet	Education Network, set up for the schools by Ministry of Education and Telecom, Cook Islands
FIT	Fiji Institute of Technology
FNTC	Fiji National Training Council, now known as TPAF
ICT	Information and Communication Technologies
ISP	Internet Service Provider
IT	Information Technology
JICA	Japan International Cooperation Agency
MOE	Ministry of Education
NCEA	National Certificate of Educational Achievement
NGOs	Non-government organizations
PICs	Pacific Islands Countries
RMI	Republic of the Marshall Islands
TPAF	Training and Productivity Authority of Fiji, formerly known as FNTC
TVET	Technical and Vocational Education Training Section
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USP	The University of the South Pacific
UNV	United Nations Volunteer

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1.0 INTRODUCTION

ICT has the potential to enhance people's lives in the Pacific Islands Countries (PICs) in many ways. Day to day activities such as simple communication, health, education and economic activities are largely improved through affordable and stable digital network infrastructure. However, to benefit from ICTs, countries need to include ICT education and training in their national strategic plans, so that more people attain skills and expertise in the area of ICT. This would mean developing and supporting a pathway that ensures and encourages ICT education and use among children, beginning from primary through to secondary school, and on to tertiary level. As is the worldwide trend, ICT is being increasingly utilized in most modern sectors and people need to have at least basic ICT literacy to ensure that they can find employment and live worthwhile lives. Therefore, it is crucial that students are taught at least basic ICT literacy in schools.

To encourage regional collaboration and networking in the ICT education sector in the countries of the region, as well as with stakeholders, a regional workshop on ICT in education was organized by the University of the South Pacific in January 2005. This was attended by Ministry of Education representatives, particularly ICT Education and Curriculum Development Officers of six of the University-member countries, regional organizations, national educational institutions and representatives of the private sector.

The main objectives of the workshop were:

1. To share the results of the research titled "Evaluation of the Computer Science (CS) Curriculum in Fiji Secondary Schools" conducted under the JICA project.
2. To reflect on and review the current regional situation of ICT Education and explore opportunities to enhance the quality of ICT Education.
3. To establish some systematic approach at the regional level to ensure that educational goals in ICT are met in the best possible way.

Central to the findings of the research in Fiji were the demand from both students and teachers for up-to-date curriculum in ICT and computing, and the difficulties in achieving this due to lack of resources and other constraints. Many Pacific Islands Countries had identified similar constraints in the development, implementation and maintenance of ICT education in their countries. The workshop was deemed necessary to get regional countries' education sector managers and relevant stakeholders together to discuss ways and opportunities for the better delivery of ICT education to the secondary schools in Pacific Islands Countries.

The workshop program was developed to ensure that there was a high degree of discussion and sharing. Participants were given every encouragement and opportunity to participate actively in all the presentations and discussions, and they also assisted in putting together various reports and summaries.

The workshop was successful in a number of ways. From the participants' perspective, the workshop allowed them to focus on issues in the area of ICT education, identify the difficulties and constraints they each faced in introducing and sustaining the teaching of ICT courses, and to develop draft national ICT education policies. Participants were also given the opportunity to seek possible solutions to these constraints and problems. From the stakeholders' point of view, the workshop was very successful in that it provided a

forum that allowed wide discussion of a subject of increasing interest in the Pacific. It also ensured that the University was responding to one of the needs highlighted in the Pacific Plan. From the organizers' perspective, the workshop was a success in that it brought together people from the region that were able to articulate the needs, challenges and solutions in ICT education in their countries. The participants were also able to develop their own ICT-in-education action plans.

All these inputs have been brought together and included in this publication. The reports, presentations, status reports and policies on ICT education are valuable contributions to an education sector that is fast growing. As a body of data, it provides a strong basis for future discussions and development in ICT education. Stakeholders, teachers, lecturers and business people will need to keep abreast with developments in this area to ensure that it grows and the benefits are shared widely.

2.0 REPORT OF REGIONAL WORKSHOP ON ICT IN EDUCATION

25 – 29 January 2005 at Raffles Tradewinds Hotel – Suva Fiji

Introduction

Under the ICT Research component of the ICT Capacity Building Project, a Regional Workshop on ICT in Education was held at the Raffles Tradewinds Hotel, Suva, from 25 – 29 January, 2005.

The main objectives of the workshop were:

1. To share the results of the research titled "Evaluation of the Computer Science (CS) Curriculum in Fiji Secondary Schools" conducted under the JICA project
2. To reflect and review the current regional situation of ICT Education and explore opportunities to enhance the quality of ICT Education
3. To establish some systematic approach at the regional level to ensure that educational goals in ICT are met in the best possible way.

The workshop, which was opened by Acting Vice Chancellor, Prof. Rajesh Chandra, included a total of fifty-five (55) participants who attended various sessions of the 5-day programme. Participants included government representatives from USP member countries, Regional Organisations, USP staff, other educational institutions, and Funding Agencies. Regional participants were from Tonga (2), Marshall Islands (1), Kiribati (1), Tuvalu (1), Solomon Islands (1), Samoa (2), Niue (2) and Nauru (2). A list of all participants is attached.

Acting Vice Chancellor, Prof. Rajesh Chandra, opens Workshop.

Participants during the Workshop Opening.

Programme Plan

The programme was divided into 6 main sessions, which included presentations and group discussions. The whole programme was flexible to allow changes to be made during sessions upon the request of participants to the facilitators. This was found to be very useful as it allowed greater ownership of the workshop by the participants. A field trip to Tailevu North College was also organised to show participants a case of a rural

school that had successfully incorporated ICT education into its school system. A copy of the programme is attached as Annex 1 and list of all participants attached as Annex 2.

Country Reports

Regional participants were asked to prepare their Country Status Reports on ICT in Education prior to this workshop, which were then compiled to form a Regional Status Report on ICT in Education. The major constraints identified as common problems in all countries included:

1. Hardware facilities: Current infrastructure cannot meet demands; Maintenance; Isolation – poor supporting infrastructure.
2. Financing IT: High cost of internet, telephone and electricity; High costs of hardware; Lack of finance for curriculum development; Maintenance costs; Lack of finance for general ICT development in education; Economic crisis at national level.
3. HR in ICT: High turnover of ICT teachers; Lack of ICT experts and teachers.

Participants identified such key constraints further contributing to problems as:

1. Lack of a planned ICT curriculum
2. Inability to integrate ICT into curriculum
3. Lack of awareness and support for ICT development
4. The issue of universal accessibility for ICT in Pacific schools.

Dr. Sala Bakalevu, Ms. Maki Kato and Dr. Esther Williams discuss Country Status reports.

Action Plans: Summary of Key Commonalities

In assessing the key commonalities across the region, three major areas were focussed upon:

1. Curriculum development in ICT
2. Teacher education in ICT

3. Seeking support from donors, government and local communities on financing ICT education.

Conceptual Framework for Regional ICT Education

An emerging framework based on the collective thinking of participants emerged out of the workshop. Such a regional framework was seen as a guideline that would keep the region informed of international standards and changes in the field of ICT, and at the same time coordinate efforts to develop ICT in the Pacific.

The following main guiding principles for the Framework were identified:

Student learning is central
School ICT development – organisational holistic approach
ICT across the curriculum – relevant, dynamic
Community-based ICT development – needs, use – sustainability
Regional collaboration – sharing the Pacific experience.

Regional Country Status Report

All the participants have been given a two-week period to revise their Country Status Report that had been forwarded to the office prior to the Regional Workshop. Upon revision, all the reports will be compiled to form a Pacific Region Status Report on ICT in Education. This will be distributed to all key stakeholders.

Participants' Evaluation

Participants were asked to complete an evaluation form on the conference. Overall, participants agreed that the output matched their experience at the workshop in terms of:

Learning more about the standards of ICT in other Pacific countries
Learning how ICT can be implemented in education in Pacific Islands Countries
The importance of ICT development and finding some solutions to the issues raised.

A number of participants agreed that the most challenging thing in the workshop was learning the importance of ICT education and implementation in schools, developing the action plans and getting collaborative efforts from all countries through group discussions.

Comments on ways to improve the workshop included:

Improving the content by having more group discussions, site visits and presentations
Providing air transportation for participants from Nadi to Suva in place of road travel.

3.0 REGIONAL WORKSHOP ON ICT IN EDUCATION: A SUMMATION

By Dr. Seu'ula Johansson-Fua

In providing a summation of the important issues that were deliberated upon during the ICT regional workshop held in January 2005 in Fiji, this resume also intends to provide a platform upon which we may – through continued dialogue and collaboration – build regional ICT collaboration in education, including curriculum development that will benefit our island countries.

The participants set out to achieve the following outputs to align with the workshop objectives as identified in 2.0:

1. Creation of a structured outline towards recommendations relating to ICT Education at the country level
2. Compilation of the Regional ICT in Education Status Report
3. Formulation of draft action plans by the participating countries.

3.1 Commonalities arising out of Country Report

Participants were asked to bring to the workshop each country's status report on ICT Education development. It is evident from the status reports collected that while some countries, such as Niue and Cook Islands, have fairly integrated ICT Education, others, such as Nauru, Kiribati and RMI (Republic of the Marshall Islands), have yet to develop ICT curriculum for their schools. While some countries' achievements in the development of ICT education are to be commended, at this point we would like to focus on the constraints and challenges that Pacific Islands Countries are facing, to assist in identifying some possible solutions. Common constraints include hardware facilities, financing ICT and human resources in ICT. More in-depth discussion of this is presented in the previous paper, titled "Regional Perspective on Current Status and Trends of ICT application in Education".

3.2 Brief overview of papers presented during the workshop

During the workshop, several presentations were delivered and were well received by participants.

Dr. Salanieta Bakalevu's interesting paper on a 'Regional Perspective on Current status and Trends of ICT Applications in Education' is presented in full in this report. Dr. Bakalevu highlighted common constraints and plans proposed by various ministries of education in developing ICT Education in nine USP member countries. She also presented interesting and insightful comments on emerging trends in ICT Education, such as the growth in the use of the Distance Education mode and greater community involvement in ICT Education. Participants heard about some innovative trends in school and community integration, such as Niue's Learning Centres, the Solomon Islands People First Net and Fiji's Telecentre model. These trends in ICT Education were encouraging in providing regional educators with practical approaches to utilising ICT in their own countries.

During the workshop, participants were taken on a field trip to Tailevu North College. Many participants felt encouraged by the example set by this school. It reminded participants that community involvement, student initiative and dynamic leadership can push forward seemingly impossible dreams of ICT and make them a reality by using

existing resources. The examples of the Tailevu North College and the Niue Learning Centre reminded participants of not only the centrality of community support for education, but also the financial support that it could give to schools. Participants from Niue and Tonga described cases where they have drawn financial support from their communities in supporting ICT development in their various schools. Much could be learned from the experiences shared by these participants and greater involvement of the community in our schools is a good thing.

Dr. Muralidhar's presentation on 'Strategies and Modalities in Teacher Training' clarified to participants the difference between teaching ICT as a subject and integrating ICT across the curriculum. Nauru, Kiribati and Tuvalu requested general ICT training for their teachers and this illustrates the importance of ICT teacher education, in the overall plan for ICT development in Pacific schools. It is a very promising sign and participants were enthusiastic about further encouraging ICT training for teachers.

Utilizing a problem solving approach, participants in a concluding session identified key areas for most urgent assistance. Upon request from participants, workshop organisers invited the project manager from PRIDE (implemented by IOE at USP) to present to participants the various approaches for seeking funding from PRIDE. It was identified during this particular session that the PRIDE project could help member countries in developing their curriculum in ICT and ICT-related professional development for teachers.

Arising out of the many discussions, participants also requested for a forum or network that could provide updated information on key events in relation to education and ICT in the region. IOE was keen to implement this request by integrating it with their Network for Pacific Educators (NOPE) Project. All participants who were present during the ICT regional workshop and who have access to email have been added to this list. NOPE is operated by IOE and it should be up and running by the end of June 2005.

There were other papers presented during the workshop that were equally well received by participants. All the presentations in their complete form are accessible from the CD-ROM distributed with this report.

3.3 Action Plans: summary of key commonalities

During the workshop, participants were asked to put together action plans for ICT development in Education for their countries (available in their original form in the CD-ROM). This was drafted in light of the current status of ICT in their various countries and lessons learnt from the workshop. The following are common goals, outputs and activities that participants identified in their respective action plans. Most interesting in this summation was the strong collective voice of participants wanting greater regional collaboration in the development of ICT Education in the region.

Common goals identified were:

- Develop and implement ICT Policy in Education
- Develop, review and implement ICT curricula for all levels in education
- ICT across the curriculum is implemented and supported
- ICT leadership is taken by staff and administration
- Community and wider stakeholders' support in developing ICT.

Common targeted outputs were:

ICT policy in education is in place
ICT curriculum across all levels
Teacher education in ICT
Seeking government, community and stakeholder support for ICT educational development.

Some identified activities to reach targeted outputs were:

Ongoing curriculum review
Seeking of support from MOE and community
Implementation of teacher training programmes in ICT.

Regional collaboration identified included:

Donors such as ADB, PRIDE, PREL, JICA, etc.
Forum for ICT educators
ICT regional curriculum
Software suitable for the Pacific.

From these commonalities it can be concluded that there are three major areas that participants focused their attention on:

1. Curriculum development in ICT
2. Teacher education in ICT
3. Seeking support from donors, government and local communities for the financing of ICT education.

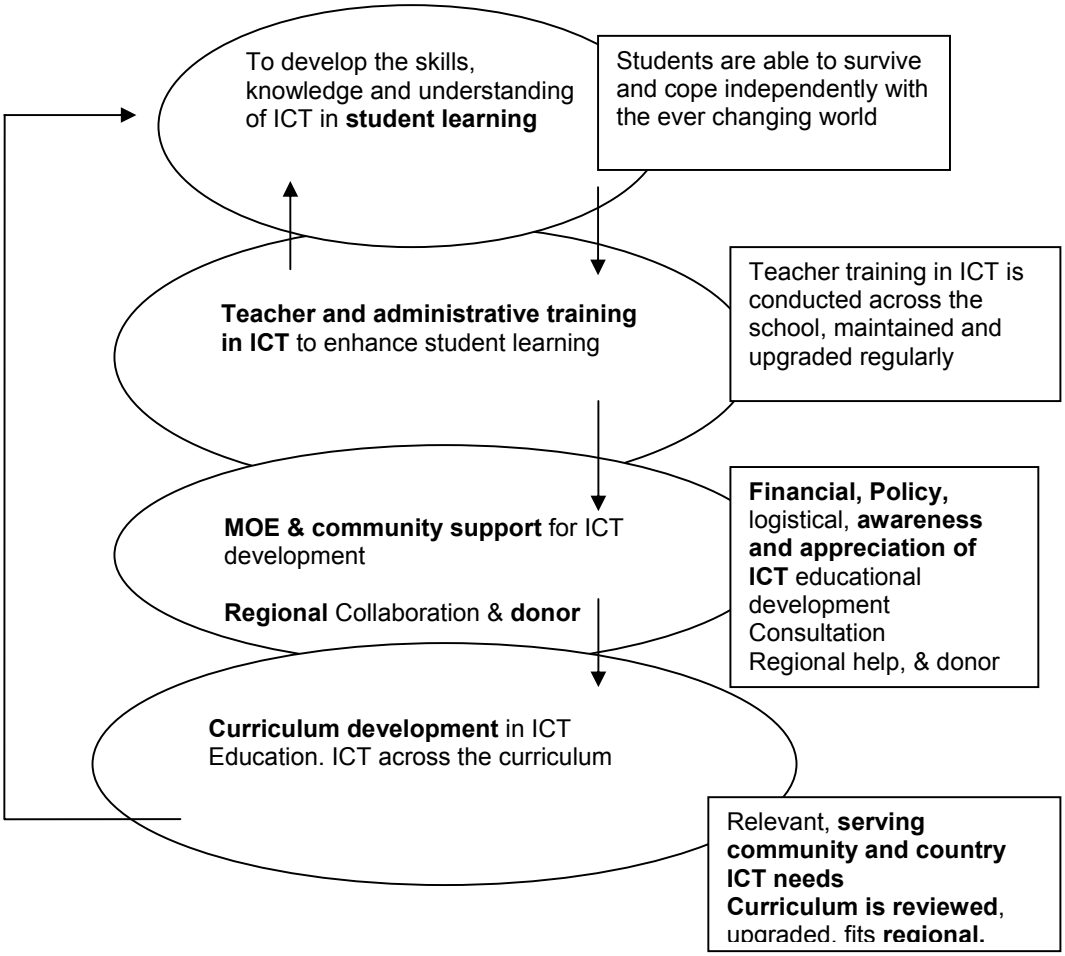
3.4 Conceptual Framework for Regional ICT Education

There was a strong consensus on the need for greater regional collaboration in the development of ICT Education in the region. As such, participants and the resource people in the workshop agreed that it would be timely to set up a framework for regional development in ICT Education. Such a framework will be a guideline for the ICT educators, and act as an information gateway for international standards and changes in the field of ICT, while at the same time coordinating regional efforts on ICT in the Pacific. This framework would comply with each country's strategic plans, as well as alignment with regional plans such as EFA (Education for All) and the new Pacific Plan.

A proposed framework as shown below emerged from the workshop based on participants' collective thinking. It is by no means a definitive framework, but a work-in-progress that will generate further discussions in years to come.

Some guiding principles for the theoretical framework are:

Student learning is central
School ICT development – organizational holistic approach
ICT across the curriculum – relevant, dynamic, accessible
Community-based ICT development – needs based, sustainable
Regional collaboration – sharing Pacific expertise.


To develop the skills, knowledge and understanding of ICT in **student learning**
Students are able to survive and cope independently with the ever changing world
Teacher and administrative training in ICT to enhance student learning
Teacher training in ICT is conducted across the school, maintained and upgraded regularly
MOE & community support for ICT development
Regional Collaboration & **donor**
Financial, Policy, logistical, **awareness and appreciation of ICT** educational development Consultation Regional help, & donor
Curriculum development in ICT Education. ICT across the curriculum
Relevant, **serving community and country ICT needs**
Curriculum is reviewed, upgraded, fits **regional.**

4.0 REGIONAL PERSPECTIVE ON CURRENT STATUS AND TRENDS OF ICT APPLICATIONS IN EDUCATION

Compiled from a paper presented by Dr. Salanieta Bakalevu
at the Regional Workshop on ICT in Education on 29 January 2005.

This paper is compiled from a Regional Overview of the Status of ICT in Education in the Pacific that was presented by Dr. Salanieta Bakalevu at the Workshop. Country reports that were prepared by the Workshop participants provided information for the overview of this paper. The paper is divided into two major sections; Current status and Developing trends. Level of access, implementation and costs, Ministry of Education or Department's capacity in terms of curriculum and personnel, constraints, future plans and recommendations were discussed under Current Status. No significant trends stood out clearly in the reports. It is suspected that this has much to do with ICT applications in education still being at the early stages. Nevertheless, an attempt was made to highlight traces of patterns. The following were identified: the use of old and new technologies, changing ways of using ICT in education, growth in distance education, school and community and government.

4.1 Current Status

4.1.1 Level of Access/Implementation and Costs

Overall, both old and new technologies are used in education in the region; some countries have access to the digital technologies that this workshop is specifically focusing on, particularly Cook Islands, Niue, Tonga, Samoa and Marshall Islands. The level of access in the countries is related to the level of practice in those countries, whether they are using technology as an administrative or learning tool, or as a learning area in the curriculum. Where practice is better defined and coordinated, there appears to be greater access. There is also evidence of growth and development, as apparent from column one of Table 1. Similarly, where practice is not as clearly defined there are fewer computers and there is an element of uncertainty about what the computers are for. This is to suggest that in countries where there is a curriculum or some standards for ICT education, then access, applications and developments seem better and there is more and better use of the technologies available. This is particularly evident with Niue and the Cook Islands, as they are using the New Zealand Technology Curriculum. Tonga also has an established standard and guideline for using ICT in education, with a longer history as well. Government schools in some countries appear to be well resourced, the first to be resourced, and they are better resourced than most others. Tertiary institutions are also well resourced and are being used for training and capacity building, and many benefit from the USPNet facilities. All countries stated that Internet is slow and the costs high. Telephone costs are also high. Countries like Niue have free access to Internet but the high telephone dial-up costs makes this impractical.

4.1.2 Ministry of Education Capacity: Curriculum and personnel

The countries were grouped into two. The first group are those that have or are using an ICT curriculum with set guidelines and standards. Group two countries had indicated that they have no standards or no guidelines for the use of ICT in education. Cook Islands, Niue and Tonga have their own ICT curriculum and assessment at secondary level, and they record high enrolments for the classes. The ICT lessons are timetabled. The countries also indicate that they have responsible teacher training providers that are producing trained personnel to deliver subjects in the schools. There is a variety of ICT

education providers, including commercial companies. The training produces teachers with ICT qualifications and others with some ICT components in their qualifications.

Group two countries generally do not have any ICT education standards in place. In these countries, there is a general lack of knowledge and lack of awareness amongst students and teachers. Generally these countries lack infrastructure and have sustainability problems in the overall education sector.

4.1.3 Constraints

Generally all nine countries reported some constraints. Many identified the high costs of telephone due to the monopoly held by telecom providers, isolation of islands, and the harsh environment that inhibits development of infrastructure. The development of infrastructure also involves high costs, which are mostly met by donor agencies and governments. Countries also identified the high costs of equipment and maintenance and few local personnel qualified to undertake maintenance as another major constraint. Lack of trained teachers and difficulty in retaining them is critical, as many teachers move to the private sector that pays better salaries. There is also general lack of awareness and reluctance to use technology, and politically, governments are slow in considering ICT plans and/or integrating ICT into education. It seems that governments are the late starters in ICT in most of the countries. Some have no national plans and policies for ICT, aside from ICT in education. In Solomon Islands the political turmoil also has some effect. Slow Internet systems and bandwidth problems were also identified.

4.1.4 Plans and Recommendations

Cook Islands and Niue plan to continue using the NZ curriculum at the secondary school level, as it is cheaper for them and also brings them more entitlement. They are also working to develop the primary school ICT curriculum. Tonga had its own CS curriculum and examination for Forms 3 to 5, but they use the PSSC curriculum in Form 6. Tonga is now planning to offer ICT at Form 7 as well. Other countries are planning to adopt ICT in education as a priority. Some countries stated they have plans to establish an ICT Unit in the Ministry/Dept of Education. All countries plan to improve infrastructure and facilities, negotiate lower coss for telecommunications for the education sector, and use different technologies to expand existing distance education possibilities.

4.2 Developing Trends

With no significant trends, this paper will simply mention examples and traces of developing trends.

4.2.1 Old and new technologies

The old technologies such as print and radio broadcast continue to be the mainstay for outreach of education in several of the reporting countries (Kiribati, Samoa, Solomon Islands, Tuvalu, Tonga, Fij). The new technologies are also being utilized to provide innovative ways of outreach such as PFnet in Solomon Islands and EduNet in Cook Islands. Overall, there is a strong sense of retaining the old with the new.

4.2.2 Changing ways of utilizing ICT in Education

Practices are changing as the schools are developing competencies for Word Processing as an administrative tool and email and telephony for communication. ICT integrated pedagogy is a new trend. In Marshall Islands, for instance, educational games in Maths and English are used to raise students' performance, in Tuvalu ICT software is

being used to raise literacy, in Cook Islands intranet is available for peer support, and in Tonga the use of the web for research and projects is encouraged.

4.2.3 Growth of Distance Education

As the Pacific islands are scattered over large areas of ocean and many small islands are isolated by geography, there is increasing scope to utilize distance education. USP's DFL (Distance and Flexible Learning) has been in operation since 1970 and the USPNet upgrade has vastly improved the capability and quality of these operations. AARNet connection will improve the system further, particularly for Fiji and its USP Centres. The Cook Islands EduNet uses Intranet technology to facilitate educational development. In Solomon Islands, PFNet has been hailed as a success and there are plans from the donor agencies to replicate similar projects in other Pacific countries. Solomon Islands also plan to revive SIDEN. In Fiji, radio broadcasts of its Schools Broadcast Unit have been in use for a long time to provide educational access to remote islands and villages.

4.2.4 School–Community Integration

A number of school–community projects have supported ICT education within these Pacific countries. Niue has established learning centres, Solomon Islands has the PFnet and Youth First Computer Centre. Samoa has a vision of ICT Centres to be developed within its schools. Fiji has plans for Telecentres. In most countries, the community, particularly the parents and teachers associations (PTAs) of schools are involved in fundraising for school computers. In some cases the old scholars with a technology background also assist schools in the maintenance of their IT equipment.

4.2.5 Government involvement.

There needs to be a greater commitment by the governments of all the Pacific Islands countries to take control and leadership in ICT development in Education. The governments are already indicating interest by developing ICT plans. They need to commit themselves in the development of relevant infrastructure, purchasing hardware, training personnel and negotiation of costs with corporations such as telecommunication companies that hold monopolies.

4.3 Sustainability of ICT in Education in Developing Countries

Sustainability of ICT in education in developing countries and particularly Pacific Islands Countries is a continuing concern. Sustainability is a major concern for educational projects and technology maintenance. Institutions with limited resources are constantly battling with how to maintain and replace technology.

Table 1: Summary of ICT applications in Education in nine USP member countries

COUNTRY	Access/ Implementation & Finance	MoE Capacity/Curriculum Teachers	Constraints	Future Plans/ Recommendations
COOK ISLANDS	a) Most government schools well resourced – Computers, email & internet. Costs very high – being negotiated with TCI; No. of computers per school varies –	a) Technology is a learning area in the Curr Framework b) Follow NZ Tech Curriculum & NZQA standards: 3 areas of learning are CS/ICT/IM for F1–F6, assessed at NCEA L1&L2; high enrolments; average 2hrs/week F1–4 and 4hrs/week F5&6;	1. Telecom monopoly 2. High costs (access, hardware/software, maintenance) 3. High cost for developing infrastructure 4. Harsh environment (unstable power supply) - contribute	a) Continue with NZ Tech Curriculum at 2°; - develop course outlines to suit students; - up to L3 in ICT component b) To develop Technology

	average about 5 per school; Software: mainly Word, Paint, Excel b) **EduNet:** (MoE/TCI) Intranet provides technology to facilitate distance education; c) Ministry: Internet; Ministry website dev. d) 3° providers: USP, MoH, WHO, NHRD – all have good access	Computer skills, Microsoft software, etc. c) Qualifications: some 1. teachers trained; most 2. ICT teachers have CS degree papers – male & female. d) Continuing in-service ICT training - all 2°, some 1°; e) Ministry: Assists teachers dev. teaching materials	to costs	Curriculum for L1-L6 (primary); c) EduNet to offer more intra-communication services; and skills & maintenance training
NIUE	a) Niue High School is well resourced in comparison with other countries in the similar situation: 20 students computers, 10 for students' Internet, separate for staff; digital cameras, video camera & recorders, stereos, scanner, flash disks, fax, DVD player with CDs/DVDs etc; b) Niue Primary School: Students' computers, staff computers; Internet at office; Digital camera, video camera &recorder, scanner, Copier etc c) WiFi was launched in 2003 - increased bandwidth; d) "Learning centres" in some villages - equipped with computers & internet;	a) Internet necessary to access NZQA materials; b) Niue High School: 2004: Information Technology (IT) as a subject IT is half year course for Form 1-3, emphasis on keyboard skills; 2hrs/week F4 option (IT or another) - IT in high demand! F5-7: IT and assessment at L1, L2, L3 of NCEA c) Niue Primary School ICT training from Y4 Training integrated into Technology program. d) Schools assisted to develop course outlines e) Internet Society of Niue (ISN) provides: ICT technical assistance & training Maintenance service; Assistance in set up of Learning Centres in villages f) Teachers trained in NZ; plus other training options	a) High turnover of qualified locals – move to private sector; b) System is slow; c) High costs of internet and electricity d) Problem using NZQA high security site; e) Restriction to use of wireless connection to internet is hindrance - could improve access in schools; f) Infrastructure cannot support demand	a) More and better (updated) equipment & resources; b) Train locals to replace expatriates; c) Accessible programs for 'slow learners"; d) More community access e) Continue with NZ curriculum: cheaper and more entitlements; f) Improve access in villages; g) Review policy about using wireless connection
SAMOA	a) Samoatel upgrade services - enhance connectivity to govt depts, NUS & Samoa Polytechnic; b) 166/205 are govt schools; 51 have Telephone,	a) There's national ICT Plan but No ICT education standards for schools; b) Use PSSC CS exam at Y13; recently designed their own CS curriculum for Y 12 & 13; c) 25% of govt 2° schools offer CS at Y9-Y13. d) Peace Corp volunteers teach	a) Lack of awareness b) Lack infrastructure – now outlined in Master Plan; c) Lack of expertise to implement National Plan and integrate ICT into school system effectively;	a) Use National ICT policies to develop ICT framework for school system b) Integrate ICT into Curriculum; c) Capacity building d) Ministry & Samoatel -

	computers & (internet?) connections c) 402 computers in 2°; 123 computers in 1° d) Internet only in schools on Upolu e) Computers mainly for word processing;	CS mostly - local teachers have limited knowledge, few taken courses e) Majority of students have no knowledge /access. f) MoE now has a IT Unit & an MIS Committee that advises and monitors development; g) 3° providers: NUS, Samoa Polytechnic, USP	d) High cost of hardware	provide tel connection & hardware to all schools; e) Vision for "ICT-Centres" within schools (open use)
TUVALU	a) TAESP supplied all 1° schools with phone-faxes, t/recorders & radio - for broadcasts; b) Computers in some 1° schools - purchased by parents, mainly for word processing; c) Motufoua Sec (govt school) has 4 computers for administration, digital camera for drama & magazine; phone-fax etc.	a) No ICT-related curriculum; but in Education & Training Sector Master Plan; b) Education Dept: staff have basic ICT knowledge; compiling 1° database c) Teachers: Most lack computer skills & knowledge; Two at Motufou are USP graduates with IS units; d) Training: 2 private schools on Funafuti train school leavers - graduates are absorbed into govt service.	a) Lack of finance: for training, curr. development, infrastructure etc b) Lack of resources & infrastructure; c) Lack of training & trained personnel	a) ICT curriculum a Ministry priority - final draft stage; b) ICT can improve literacy in 1° schools c) Capacity building vital; d) Need for maintenance service providers and training in this area
RMI	a) Most schools in Majuro & Ebeye; 2 in Jaluit & Wotje - have computer, internet; Computers & software used mainly for Maths, English & typing tutoring and Word-processing; Computers: student ratio is 1:14 b) Only schools in Majuro & Ebeye have internet - have telecommunications c) Internet cost: $10/month access; $3.60/hr usage. d) System is slow	a) MoE developing ICT network & database; b) No ICT Curriculum; looking at Guam's curriculum for Grades 7 & 8; c) PREL programme for CAI in numeracy & literacy d) Training priority is for teachers to teach in English; then training in other areas such as ICT; e) Expatriates are computer trainers f) Computer labs - "educational" game centres for students	a) Poor performance at 2° Raise proficiency in English & local languages priority; b) Equipment failure; c) Isolation/scatter of islands – infrastructure d) Lack of expertise & ICT trained teachers	1. ICT education urgent - Curriculum for grades 3-12 - Capacity building 2. Pilot project in ICT education planned; 3. Find infrastructure & resources; Maintenance & service centre 4. Demand from business community for trained people
NAURU	a) Telephone: One school connected; b) Internet: One school was connected c) Internet cost: $100/month for 50 hours dial up connections. (28Kps) - runs out early. Expensive d) 23 good computers in the 11 schools;	a) No ICT curriculum New curriculum planned: FOOTPATH - relies on ICT as tool to deliver learning, not a subject. b) No ministry staff has ICT training c) Most (90%) of teachers are women; teachers lack knowledge/skill of ICT; d) No training or institutional support for training	a) Lack of finance b) Lack of expertise & training c) Lack of awareness, reluctance to use ICT d) Poor infrastructure; e) Isolation	1. Island isolated; depleting phosphate 2. ICT is important path to the world; 3. Wireless connection system being considered - keen to learn about it at workshop

	e) Wireless connection system envisaged for internet connection	e) Lack of ICT experts - only technicians, mainly expatriates; d) Computer labs – used mainly for educational games		
TONGA	a) ICT education is well established 1997: ICT in CDTS 2002: TIHE developed as largest 3° ICT education provider b) All schools offering CS have infrastructure & access internet; c) Many schools have websites - monitored; d) Students use ICT for projects, research - with supervision; e) Internet café services in Nuku'alofa f) Radio: ubiquitous media; g) TV is less available h) NICT Society: innovative NGO, successful plans for developing & support of ICT; i) 2900 users (Dec 02); j) PTA an ex-students fundraise regularly for computers	a) Curriculum: F3-F5 follow MoE CS curr; F6 do PSSC curr; CS Curr has 7 Core Topics (Basic computer knowledge) and 3 Electives (more in-depth/app.) b) Schools: 25/35 2° schools offer CS and sit TS Cert (F5); 21/22 F6 offer CS Schools that don't offer have lack finance c) Basic Computing in other MoE programmes e.g. Accounting, Tourism & Hosp, teacher training; d) 3° providers: TIHE has 2yr Dip in IS and CS - USP format Tupou HS: 2yr diploma - NZ accredited; USP: 1st year courses; Unuaki o Tonga RI: ICT Diploma All on Tongatapu e) Training for teachers: TIHE has qualified staff Trained staff constantly leave for private sector; expatriate teachers useful; Training either school-based or with TIHE	a) Difficult to retain good ICT qualified staff in MoE; b) Donated PCs in schools constantly need upgrading – costly; c) Finance d) Lack of basic skills	1 To create and retain a sizeable ICT skilled workforce 2. More training for staff 3. Computer literacy for students; 4. To offer CS at Form 7 5. Considering a wireless connection system; 6. NICTT will support capacity building
SOLOMON ISLANDS	a) Lack of baseline data on ICT usage b) Few urban schools received donated equipment; rural schools lack infrastructure; c) NGO involvement: <u>Youth First Computer Centre</u>: Ten 1°, six 2°, 2 high schools and SICHE are located within vicinity. Services open to community; Has 10 computers; provides basic training, e-library, Internet <u>People First Network</u>: pioneering use of ICT in	a) No central ICT Strategy or Curriculum; lack of information of ICT use in schools; b) Urban: few schools developing own IT strategy, use donated PCs, use Internet c) Rural areas - no infrastructure d) Tertiary: SICHE has no computer lab; suffered during crisis & undergoing restructuring; USP Centre has USPNet facilities, will facilitate more ICT awareness; e) MoE/EU/NZ project: ESIR Programme (2004): 3 major ICT initiatives: Distance Learning Centre Project Education Management Information System, e-learning and distance	a) Ethnic tensions has devastated economy and development including ICT b) Economic crisis c) Isolation/scatter of villages	a) CDC pursuing reform of 1° & 2° curricula; studying overseas ICT curricula; b) Radio broadcast & VBC are viable; c) Distance Education to be strengthened: support for PfNet, revive SIDEN. d) ESIR program of EU/NZ/MoE/HRD. (40mill Euro) – Especially targeting distance education and development of community school-based learning centres.

	education. Growing ICT communication network for distance learning – builds rural and national capacity. Sasamunga DFL trial successful, to be replicated	education strategy f) Radio broadcast, SW radio, video are popular		
VANUATU	77 secondary schools	a) MoE has ICT policy standards - but not effected. b) 1 secondary school offers PSSC CS course c) Computers used mainly for admin purposes	a) Maintenance problem - lack of experts & costly b) Lack of capacity & support systems	
KIRIBATI	a) Computers & connections are costly; b) Computer labs: KGV, Moroni HS, USP and TTI - mainly for word-processing c) Limited Internet use in education -high costs d) 5 computers in national library have internet US$2.80/hr for computer use US$5.60/hr Internet access e) TSKL to provide computer & connections + internet to all 2° and 3° institutions – schools to pay for internet	a) Currently no framework for ICT in education; b) MoE supports some ICT activity with TSKL; c) ICT in education or as a subject not high priority; d) CT training provided by TTI and USP, also WHO	a) Accessibility problem b) Lack of infrastructure; c) High cost of telephone & internet access; d) Monopoly of TSKL	a) Successful radio broadcast: room to expand suggest independent radio station for education; b) Provide more PCs c) Financial sponsorship for training d) Develop National ICT Framework – urgent priority e) Provide ICT unit at MoE to support dev.

5.0 ICT IN EDUCATION COUNTRY STATUS REPORTS

5.1 COOK ISLANDS

By: Ms. Ina Herrmann – Ministry of Education (Cook Islands)

General Background

ICT as an element of education programmes was first introduced to the Cook Islands in 2001 through the development of a draft Technology curriculum within which ICT was included as an Area of Learning. This curriculum, though, has not been developed further, for a number of reasons including limitations of capacity and resources, and the requirements of the (2002) Curriculum Framework for the Cook Islands.

Teaching of ICT has, however, continued, particularly in secondary schools, and students sit assessments towards NCEA Level 1–2 through the New Zealand assessment programme.

Current constraints and Future Vision

Included under this head are a breakdown of what schools are offering, with discussion and recommendations. At present there are 6 secondary schools offering ICT studies, including 3 accredited ones in Rarotonga (Tereora, Titikaveka and Nukutere).

Overview of Status of Computer Studies in Accredited Secondary Schools

Table 2: Numbers of students involved at each level

Level/ School	**Tereora**	**Titikaveka**	**Nukutere**	**Araura**	**Mauke**	**Mangaia**
Form 1 – Year 7	0	8 per sem.	20	58	30	62
Form 2 – Year 8	0	17 per sem.	20	41	0	0
Form 3 – Year 9	22 per sem.	10 per sem.	40	17	0	0
Form 4 – Year 10	0	10	30	16	0	0
Lower 5 -Yr 11A	0	4	0	16	13	20
Upper 5/ SL1	40	12	24	10	2	0
Form 6/SL2	18	0	0	7	3	13
Total	**146**	**78**	**134**	**165**	**48**	**105**

Roll sizes approximate for semester courses.

Table 3: Hours of delivery per level

Level/ School	Tereora	Titikaveka	Nukutere	Araura	Mauke	Mangaia
Form 1 – Year 7	0	2	1	3	2	1.5
Form 2 – Year 8	0	2	1	3	2	1.5
Form 3 – Year 9	5	2	2 x 2	2	2	1.5
Form 4 – Year 10	0	3	2 x 2	2	2	1.5
Lower 5 -Yr 11A	0	3	0	3	5	1.5
Upper 5/ SL1	5 x 2	5	5 x 2	3	5 *	0
Form 6/SL2	5	0	0	4	5 *	3/ 4 for SL3
Total Teaching Hrs	**20 hrs**	**17 hrs**	**20 hrs**	**20 hrs**	**23 hrs**	**14.5 hrs**

Table 4: Courses being utilized

Level/ School	Tereora	Titikaveka	Nukutere	Araura	Mauke	Mangaia
Form 1 – Year 7	-	Basic computer management skills and WORD	Basic Skills	-	-	-
Form 2 – Year 8	-	Basic computer management skills and WORD	Intro to Design and Graphics	-	-	-
Form 3 – Year 9	Units based on design process and Technology Curriculum	Units based on design process and Technology Curriculum	Technology	-	-	-
Form 4 – Year 10	-	Year 10 ICT complete US 101	Technology	-	-	
Lower 5 - Yr 11A	-	6 Unit Stds Keyboarding Skills, Web page design and Graphics	-	4 x Unit Stds Keyboarding and Software	-	US 101, 102
Upper 5/ SL1	5 x Information Management Achievement Standards 2 Unit Stds	6 x Information Management Achievement Standards	IM Achievement Standards, but units written from Technology Curriculum	5 x Information Management Achievement Standards 1 Unit Std (Spreadsheets)	Correspondence School L1	-
Form 6/SL2	6 Unit Stds Mainly software applications plus LAN networks	-	-	5 Unit Standards Software Applications	Correspondence School L2	US towards NZ Certificate in Computing L2

Discussion

The three accredited Rarotonga schools spent time together last year looking at courses and developing junior school programmes leading towards NCEA Level 1. These units of work are based on the New Zealand Technology Curriculum. These units have been led by Rob Matheson, who has moved from Tereora College to Nukutere College.

Araura College have a slightly more skills-based programme in the junior school but still use some design process units in preparation for the Information Management Achievement Standards.

At Senior Level 2, schools are offering a mix of courses depending on the number and needs of students. These are unit standards–based courses inclusive of software applications and some basic web page design and networking units. All Level 2 courses would be accreditable to the New Zealand Certificate in Computing (Level 2). Students would, however, need to go through to a Senior Level 3 year to gain enough credits for this Certificate (currently only Mangaia provides this opportunity).

The courses offered at secondary school will need to be fairly dynamic over the next 5–10 years, as first, primary schools give greater access and opportunity to students for using the computer as a tool; and secondly, the Curriculum Statements for ELAs are completed and primary school students are involved in the design process through the Technology Curriculum. This awareness and development of younger students will mean that the secondary courses will need to adjust to the greater level of prior learning for their junior students.

Teachers of the three accredited schools on Rarotonga have expressed a preference for working with the Technology Curriculum. There is no reason why eventually, students could not do achievement standards through to Level 3 in Technology using the ICT area of learning. The Information Management standards do not go beyond Level 1.

Recommendations
It is recommended that:

- With appropriate advice and guidance (Qualifications Officer, Distance Education Officer, Curriculum Unit), secondary schools continue to develop programmes that suit the needs of their students and the capacity of their resources.

- Note be taken that the Technology Curriculum will eventually provide a framework around which teachers can develop units. Schools currently delivering courses at Level 6 and above could work within the framework of the New Zealand Technology Curriculum.

- The accredited schools on Rarotonga be encouraged to continue meeting and sharing ideas. This could be through the provision of space and resources for meetings.

- The Curriculum Unit identify teachers in charge and programmes being used in primary schools, so that secondary schools can be aware of the skills each student may already have acquired when they reach the secondary school.

Computer Education in Primary Schools
Presented here is a short report prepared following a meeting of interested parties. The review meeting was attended by representatives of Nikao, Arorangi, St Josephs, Avarua and Te Uki Ou schools.

Table 5: Summary of Current Standing:

School	No. of Computers	Grouping of Computers	Student Use	Software	Teacher responsibility
Avarua	11–15	In one place	Skills and presenting work from other ELAs	Word Paint	Teaching skills. Supervising formatting of work
St Josephs	6–10	All in one room	Word processing	Word Publisher	Teaching skills. Supervising formatting of work
Nikao	0–5	All in one room	Word processing	Word	Supervision only
Arorangi	0–5	All in one room	Separate lessons for Forms 1 and 2 Word processing	World Excel Publisher Paint	Teaching as separate subject for Forms 1 and 2.
Te Uki Ou	20+	All in one room.	Separate lessons as well as formatting class work	Word, Paint Some using Excel and Publisher	Separate classes for skills. Supervision of formatting.

In terms of Computer Education, the following issues are problematic for schools:
1. Maintenance of hardware and software
2. Teachers' own skill levels
3. Uncertainty about what to teach
4. Selection of software

5. The cost of consumables
6. Time allocation of available computers.

Other Points of Discussion

It is expected that the skill level of students leaving primary school will be dynamic for the next 5–10 years, as more and more schools use computers as part of their programmes and students gain skills at a younger age.

The debate about whether to keep computers together or split them between classrooms was very one-sided, with all schools selecting to have them together because of issues that have arisen in the past when they have been separated. Pedagogically, the ideal situation would be to have both systems. A 'lab' is the best set-up for teaching Computer Education and will certainly be the 'best fit' model for the intended Technology Curriculum. A small number of computers in each classroom, though, are best for students using curriculum-related software and word processing work from other ELAs. For schools not in a position to provide both arrangements, the Ministry would tend to support the former model, as it is believed that the equipment will be used more through teachers planning to integrate their use and booking time in the room for their whole class.

Recommendations

It is recommended that:

1. EduNet provides (through the Gazette) a guide for very simple things teachers can do for maintenance, e.g. file management, cleaning. The rationale for this is to maintain the equipment through regular service, rather than doing nothing until something breaks.
2. EduNet provides for schools a "who to call" list. This needs to cover the fact that new computers will be under guarantee and so the school needs to go to the supplier, as opposed to an older computer, when they will need to start by calling EduNet.

3. At a later date, consideration would be given to the possibility of running basic training on maintenance and repairs, for an identified teacher in each school.

4. CAU in consultation with both secondary and primary schools develop a list of identified skills relating to computing. Working towards achieving these by the end of Grade 6 would provide an objective for teachers and students. An additional list could be developed as an indication for Form 2, for those primary schools with Forms 1 and 2.

5. CAU would organise training for teachers in the different software programs used. Te Uki Ou will investigate the possibility of making their computer room available for these training sessions. It is hoped that facilitators can be found among MOE staff that already have skills in the area.

Curriculum

At the moment, courses are based on the New Zealand Technology curriculum and standards from the National Qualifications Framework in New Zealand. Technology is identified as an Essential Learning Area in the Cook Islands Curriculum Framework and Technology has been identified for further development in 2007/08. This will mean the development of a L1–6 (Grade 1 – Form 4) curriculum statement for the Cook Islands.

The use of New Zealand–based qualifications in the Cook Islands means that courses after Form 4 level are based on the New Zealand curriculum documents.

Career Development of Teachers
In the primary school sector, teachers involved in this area are self-trained and have followed their own interests. There are no teachers specifically trained in ICT at this level.

At the secondary level, the majority of people involved in ICT education have some university-level Computer Studies papers as part of their degree. In three cases Maths/Science teachers with an interest in the area have taken on responsibility for ICT. In two schools, the previous Typing teacher has upgraded through correspondence and in house-training courses, to be able to offer ICT. ICT teachers equally represent both genders.

In-service training on the development and implementation of the new NCEA qualifications has been offered to all secondary ICT teachers. Primary school teachers on the main island have also received some in-service training. The Ministry of Education has recently received funding from UNESCO for an in-service ICT training course for teachers. This is starting with teachers in the northern group of islands, to allow opportunity for easier communication with them. This training will focus on teacher skills rather than ICT Education.

Accessibility
Through a range of internal funding and donor aid, the majority of government schools are well resourced in terms of hardware.

Recently, the last schools (in the northern group) became accessible by e-mail and have Internet facilities.

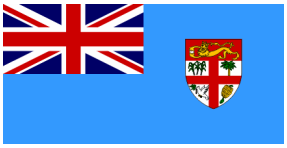
The high overheads for utilising these facilities, however, are still an issue. The Ministry of Education is currently negotiating with Telecom to find a package suitable for schools in terms of access and cost.

Implementation and Finance
The responsibility for this lies with the Ministry of Education. Some schools through their School Committees and Parent Teacher Associations have raised funds to purchase further hardware.

The cost of utilising the Internet within a school would be covered by their Operational Budget, which is based on the school roll size.

Capacity of Ministry in Charge of ICT education
There is currently no advisor available to support schools in ICT Education implementation, although there was an advisor in 2002. It is envisaged that Advisor(s) will be in place once the new curriculum statement is written.

There is a staff member responsible for Distance Education, who assists teachers with ICT issues for their own purposes. Staffs have Internet connections at their desks. A Ministry Website is being developed, which will include resources for both teachers and students.



5.2 FIJI ISLANDS

Compiled by Natasha Khan, largely from the Evaluation of Computer Science Curriculum in Fiji Secondary Schools Report and Ministry of Education resources. Other resources were also utilised and acknowledged for the preparation of this document.

General Background

According to Williams et al. (2004)[1] in 1993 the curriculum for computer science for secondary schools was first developed in Fiji, but it was implemented as a pilot programme in ten schools only in 1996. Following the success of the pilot programme, 74 schools implemented the curriculum in 2002 and in 2003 this increased to 86 schools. Since its inception in 1996, the curriculum has not been revised. In 2002, a team of researchers from USP conducted research titled "Evaluation of the Computer Science Curriculum in Fiji Secondary Schools" under JICA's ICT Capacity Building at USP Project funding. The study findings were as follows.

Of the 44 CS Teachers interviewed 98% wanted the present CS curriculum to be revised while 46% of the 217 students interviewed wanted the same. From the USP academics' professional viewpoint, the present CS curriculum had students struggling in programming courses due to lack of background in algorithmic thinking; problem solving and specific background knowledge such as Boolean logic.

In 2002, 86 (55%) of the 156 secondary schools in Fiji offered CS/IT education. Of these 86 schools, 35 (41%) have Internet access. Twenty (57%) of all 35 schools with Internet access are in the Central Division within the larger Suva–Nausori vicinity. Almost half of the Vitilevu schools teaching CS/IT have Internet access, particularly schools in the Suva–Nasinu–Nausori corridor. Overall, schools teaching CS/IT are concentrated in town areas like Suva, Nasinu, Nausori, Lautoka, Ba and Labasa. Many schools outside the town areas and in small islands do not benefit from Internet access as they do not have telephone connections.

There have been a few identified cases of schools utilizing ICT for other purposes as well as education. Nadi Muslim College has implemented a Smart School Plan which is utilized for administration of school operation; Value Added teaching, delivering the IT curriculum and other subjects using ICT; providing students and teachers with open access and school-wide connectivity.

Similarly, Tailevu North College[2] has integrated ICT curriculum with other courses such as Carpentry, Automotive Engineering, Secretarial and Catering, in cooperation with TVET, FIT and USP. Since 2005 all students enrolling for any vocational course

[1] E. Williams et al. (2004). Evaluation of Computer Science Curriculum in Fiji Secondary Schools. ICT Capacity Building at USP Project & The University of the South Pacific, Suva.
[2] I. Volau (2005). Leadership in developing innovative holistic TVET and Information Computer Technology, paper presented at the Regional Workshop on ICT in Education, 26 January 2005.

would have to take IT courses as well as learning at least the basics in email and Internet use.

Current constraints and Future vision

The above mentioned research identified many difficulties and challenges in the current CS/IT education, such as:

old curriculum
lack of appropriate PC laboratories and Internet access
limited financial and learning resources
uncertain sustainability situations for retaining CS Teachers
job insecurity of CS/IT teachers
limited opportunities for further education for CS/IT teachers
little networking among stakeholders.

Despite all the difficulties there are a number of schools that are successfully offering IT education in their schools. Three schools have been identified as such: Labasa College and Nadi Muslim College, identified in the research, and Tailevu North College, identified prior to the workshop as a best practice case. Some key factors identified for the success of these schools were:

leadership and support of school principal and management
dedicated CS/IT teachers
initiative coming from the institution followed by planning and action.

In the case of Nadi Muslim College, they were lucky to have a wealthy donor. However, we have to keep in mind that the school had planned for this project and then applied for funding for it. In the case of Labasa College the main factor of success was attributed to the management support. In Tailevu North College, the initiative of the principal and the support of the community were the driving factors for their success.

The research has suggested some recommendations for future plans. Some short-term (less than 3 years) recommendations were to revise the curriculum, build the capacity of the TVET section in the Ministry of Education, offer IT studies universally in all secondary schools, improve the IT teachers' job security issues and provide them with more relevant training, improve the equipment and infrastructure for IT studies provision and have more networking among stakeholders. For long term (less than 5 years) recommendations the study suggested that ICT should be utilized in education in all subjects and a national ICT standard should be developed.

Curriculum

According to the Ministry of Educations CS prescription (Annex 3) it aims to provide the student with opportunities to:

a) Become familiar with and understand the basic features of computers
b) Develop skills to use the computer creatively
c) Develop logic and problem-solving strategies in a variety of situations
d) Use the computer and commercial software as a tool in writing (word-processing), and number intensive calculations (spreadsheet)
e) Explore the social and economic implications of the computer

f) Become aware of the availability of the information that is electronically stored, updated and manipulated by computers, as well as the potential for the misuse of information about individuals
g) Evaluate their own attitudes and values as these relate to possible uses and abuses on computer technology in society
h) Become aware of different types of computer related careers and their basic educational requirements.

The CS curriculum targets Forms 5 and 6 students and is assessed through internal and external examinations. The study findings showed that 42% of all students presently undertaking CS considered IT knowledge useful when looking for work while 22% stated they planned to have a career in IT.

The TVET Section in the MOE has a committee for revising the curriculum; however, this has been inactive most of the time. The MOE has agreed to invite USP academics and other relevant stakeholders to this committee for the revision of the curriculum. The curriculum revision and implementation in Fiji generally takes more than a year.

Career development of teachers
A typical profile of an IT teacher in Fiji is that of an Indo-Fijian, in his/her middle 20s with less than 2 years' experience, working as a grant-in-aid teacher, having studied in Fiji and majoring in CS/IT. Barring any incentives to encourage them to continue teaching, they would take up more lucrative job offers in the private sector if these become available (Williams et al. 2004). The majority of the IT teachers do not study Education streams during their degrees, while the Ministry of Education requires teachers to have Education components in their qualifications to be granted civil servant positions. The study recommended to the MOE that IT teachers should be provided with better job security, inducement salary, and scholarship opportunities, opportunities for regular and relevant ICT training and teacher training, as well as inclusion of industry experience to enable them to deal with new equipment and maintenance.

Accessibility
The MOE prescription has set guidelines on both physical and human resources for the implementation and maintenance of computer studies programmes in schools. For instance, schools are required to have at least one PC per student for CS classes (Annex 3).

The research findings indicate 67% of the schools interviewed have met the PC ratio criteria. However, it was explained that at many times teachers divide CS students into theory and practical classes to allow all student access to PCs.

According to the research findings 55% (86) of all 156 secondary schools in Fiji offer CS/IT education. Of these 86 schools, 35 had access to Internet and 20 of these schools with Internet access were based in the Central Division.

The implementation and maintenance of CS curriculum in schools is generally expensive. During the Regional Workshop on ICT in Education a presentation by Kato and Maharaj (2005) based on various scenarios and conditions calculated the costs of combination options of equipping schools, using new and used equipment and proprietary and free and open source (FOSS) software. For more details on this please read the full presentation of this paper available from the attached CD-ROM.

Hardware options

Brand New Setup	= $47,045
Second hand Setup	= $35,755 (for Proprietary)
	= $23,755 (for FOSS)

Software options

FOSS	= $0.00
Proprietary Software	= $11,400

Connecting options

Brand New Thin Clients	= $35,565
Second Hand Thin Clients	= N/A

Implementation and Finance

All civil servant and grant–in-aid teachers are paid according to Public Service Commission salary scales. In recruiting, professional teacher's qualification, experience and subject areas are taken into consideration. From our interview responses, teachers' salaries range from $5,000.00 to $17,000.00.

The majority of schools in Fiji are managed by various NGOs, particularly religious NGOs. To implement a CS programme in their schools the school itself has to equip and maintain all relevant resources (apart from teachers). The MOE assists in provision of teachers' salary, course prescription and monitoring.

The Capacity of Ministry in charge of ICT education

The TVET section of the MOE, which is in charge of the CS programme, is manned by two staff, with limited finance and no access to Internet and PC. The lack of ICT utilization within this department makes it difficult for the staff to maintain constant touch with the schools offering the CS programme.

Community

Without the community's involvement the delivery of the CS programme in Fiji secondary schools would be very difficult. The majority of the schools fundraise and work with old scholars to equip and maintain the equipment for the CS curriculum programme.

5.3 KIRIBATI

Prepared by Ms Katalina Taloka, Acting Director of Education, Ministry of Education, Kiribati

Kiribati

Kiribati (pronounced Kiribas, localized from the English word 'Gilberts') is made up of 33 low lying flat coral islands (except for Banaba) with a total land area of 810 square kilometres scattered in a huge central Pacific ocean area of about 5.5 million square kilometres, making Kiribati the most scattered archipelago in the world with an east–west diameter equivalent to the Los Angeles – New York distance. It has a total population of 91,985 (2002) distributed over 22 inhabited islands. Its capital, Tarawa—which hosted one of the bloodiest battles of World War Two between the American marines and the Japanese Imperial forces, leaving many I-Kiribati dead—accommodates more than a third of the total population, resulting in overcrowding and the many associated health, social, economic and environmental problems. The biggest atoll in the world, Christmas Island, with the second largest population after Tarawa, provides the central administrative services for the Line and Phoenix Islands in the eastern part of Kiribati. It was once the site of a series of British personnel but also other nationalities including many I-Kiribati people. Its most easterly island, Millennium Island was world famous at the dawn of the new millennium for being the first island in the world to receive the first sunrise of the new millennium. Another easterly island, Fanning Island, is well known now as one of the Virgin destinations for world cruise tourists on the Norwegian Cruise Line.

Kiribati became politically independent in 1979 after being ruled by the British for 87 years. It has a 42-member unicameral law making body or legislature called the Maneaba Maungatabu, an independent judiciary and an executive headed by the Beretitenti (local word for President) and his 12 cabinet ministers including the Attorney General.

Kiribati's economy is based mainly on its large fishery resources from which Government derives substantial revenues from fishing access fees paid by distant water fishing nations, its earnings on its Revenue Equalisation Reserve Fund (RERF), remittances of over a thousand sailors working on foreign merchant and fishing vessels and to a lesser extent, on its copra and seaweed exports.

The Education System

The formal educational structure of Kiribati is made up of free and compulsory primary education from class 1 to class 6 for ages 6 to 11, a free junior secondary education from forms1–3 for ages 12 to 14, state subsidized senior secondary for forms 4 to 7 for ages 15 to 18, and vocational training and university education funded through government (local or foreign) scholarship awards made on merit and based on national manpower requirements.

The curriculum is centred on the basic subjects: English, Maths, Natural Science (including environmental studies, biology, and chemistry, physics and computing

science), Social Science (including History and Geography) and Cultural Studies (including Kiribati Language and traditional skills). It also includes such optional subjects as Accounting, Commerce, Home Economics and Industrial Arts. Cultural studies for Kiribati studies is essential for selection into junior secondary but not so for selection into Forms 6 and 7, as these are academically biased towards preparation for University education, in which the need for local language and skills is not critical.

ICT Education

ICT is not taught as a subject in schools. The closest to this are the disciplines of computer studies and computer sciences, which are offered as optional subjects in some of the schools, especially those that can afford to set up computer labs for the use of students. These include the KGV/EBS, the Moroni High School, the USP Centre and the TTI. But these are labs, and are hardly used for Internet purposes, partly because the cost of internet connectivity is high and partly because of the limited Internet connections available with Telecommunication Services Kiribati Limited (TSKL). The labs are used mainly to familiarize students with word processing and the other basic operations of a computer. Provision of ICT as a subject in schools may never become a reality as there are other more critical educational needs or deficiencies that must be given first priority in terms of attention and resources, before steps can be taken to develop the ICT as a subject to be taught in schools.

ICT as a tool for learning is a concept that the Ministry of Education Youth and Sports (MEYS) should promote and develop in collaboration with the other key players such as TSKL, Telecom Kiribati Limited (TKL), the media, the USP and the Ministry of Finance and Economic Development, the private sector and the relevant aid agencies. The National Library and the TSKL internet café provide Internet services for members of the public at a cost of $2.80 an hour and the USP Extension Centre operates a 24-hour Internet service only for enrolled students

ICT as a tool for decision making in the education field has been developed since 2002 by the MEYS in the form of KEMIS (Kiribati Education Management Information System), a system that stores data collected from schools from year to year and analyzes data to find trends and changes in the education system.

Current Constraints and Future Visions

These are three main constraints to the implementation of ICT education on a national scale. First is the technical capacity of TSKL to maintain a stable and reliable system. Second is the high cost of the services and the third is the capacity of the education system to accommodate another subject in an already overloaded school timetable. For the past few months the constant breakdown or faulty operations of the telecommunication link with the outside world has raised much doubt in the minds of telecom service users in Kiribati as to the reliability and effectiveness of the system. The very high cost charged on users has resulted in the low number of private Internet customers and the recent reduction of Internet connections the to government ministries and departments. On several occasions TSKL have had to withdraw services from some government ministries because of their unpaid accounts.

The future vision of ICT in Kiribati would have to depend on how such issues are addressed by the government, the ministries concerned and TSKL over the next few years. As long as the costs are higher than what the average person can afford, the ICT would remain a reality only for the few people who can afford it, schools because of the

initiative of some teachers who happen to be qualified in such fields, there is no standard curriculum for the subjects apart from those offered at the TTI and the USP Centre.

Career Development of Teachers
Because of the absence of a national curriculum on ICT, there is no organized plan on the training of ICT teachers or trainers apart from those students who take up their degree courses in computer science or other computer related courses and end up teaching in a school or a vocational institute such as the TTI.

Accessibility
As mentioned earlier, there is a problem of accessibility, mainly because of the high cost factor of the service, which is well above the financial capability of the schools or users.

Implementation and Finance
As mentioned above, the implementation of the ICT will depend on the financial capability of the educational authorities and schools to meet the cost of the service. More budgetary support would be needed coupled with a possible concessionary rate for the education use of the internet.

Capacity of Ministry in Charge of ICT Education
The ministry of Education, Youth and Sports (MEYS) would need to create a new section within its administrative structure to deal with the development of ICT education. This would require new staffing and additional financial and material resources. In the years ahead, ICT teachers would have to be trained, recruited and posted to schools with adequate resources. Without this, it would be very difficult, if not impossible, for the existing staff and resources to stretch themselves further to accommodate this initiative effectively in an already tightly packed curriculum and highly congested classroom time and space.

Community
The involvement of the community in the promotion of ICT education must be tapped early in the scene to ensure that they are supportive of the ICT initiative when the MEYS decides to implement it.

5.4 REPUBLIC OF MARSHALL ISLANDS

Prepared by Christopher Person, Information Technology Director, and Juanita Rilometo, Science Curriculum Specialist – Ministry of Education

General Background

As we are a new member to this organisation, this Country Status Report should help identify and understand the current situations we have pertaining to the Republic of the Marshall Islands (RMI). In addition, it is hoped that this report will give the reader(s) a feel for our commitment to ICT Education, our commitment to help obtain a plan, and finally our desire to implement such a plan to aid the development of the children of the Republic of the Marshall Islands.

The RMI is one of the few 'atoll nations' in the world, with which it shares what may be termed a unique set of characteristics and problems. It consists of over 20 atolls scattered in the central part of the vast Pacific Ocean located approximately halfway between Japan and Hawaii. The islands are dispersed over 1.9 million square kilometres of ocean, though the combined total land area is only 181 square kilometres. The recent census shows that the population is approximately 52,000 with two-thirds of the residents in the two district centres, Majuro (the capital) and Kwajalein, and the other one-third living in the 'outer islands'. Similar to most Small Island States, the Marshall Islands encounters constraints imposed by its small size, geographical distance from major international markets, natural disasters and limited resources. The country has set its aim toward achieving a self-sustaining economy by a combination of understanding the process of reconciling traditional ways with the aspects of foreign influence in order to obtain a modern democracy and a market economy.

The Ministry of Education (MOE) has been working towards developing and utilising ICT to improve its efficiency, effectiveness and transparency by addressing its networking and database collection capabilities. Currently, most of the MOE's body of data is scattered and stored in different divisions and programs. This includes information regarding projects and grant programs. The MOE is therefore beginning to develop and utilise database technology to centralise its data collection system. Detailed information on all schools is currently collected and logged in spreadsheets. In addition, the MOE is now searching for IT-related grants to purchase professional grade database software and hardware, and to seek technical assistance for IT development and training. Once the system has been purchased and installed, and the data currently being collected has been entered into the system, the MOE will be able to access data and relay it to relevant parties more efficiently. This ICT infrastructure will also ensure greater fiscal and educational performance accountability, and will be closely linked to the MOE's transference to performance-based budgeting.

With the assistance of the Community After-School Recreational Education (CARE) program and the Asian Development Bank (ADB), Majuro Middle School and all elementary schools on Majuro have access to the Internet and networking programs. Currently, most schools in Majuro and Ebeye have access to computers in the classroom. Two high schools on the outer islands, Jaluit and Wotje, also have access to

computer facilities. For the most part, the computers are utilized with educational software by the instructors to assist students learning math, English, typing and word processing. Because there is no curriculum developed for ICT in grades K–12, the schools' various computer facilities are used primarily as support for staff and other academic subjects. Any future development of ICT curriculum for the public schools will be designed, presented and implemented by the MOE. Below you will find course descriptions that the author set up and used when he worked at Marshall Islands High School in 1996. After he left to work in the private sector, these programs were discontinued. It is hoped that the ICT curriculum can eventually be restarted.

Current Constraints and Future Vision

In the RMI, the education of students and the resulting performance-based testing show that students in the upper secondary schools are performing more poorly than did past generations. The issue was first brought into the open when the college laid blame on the high schools for not producing adequately knowledgeable students. The high schools then blamed the elementary schools for the same problems. The Ministry of Education has decided to assign no blame, but to focus on fixing the problems. The ministry has decided that to focus on English in the K–5 grades would be the best way to help resolve the current situation we are in. If the students can become proficient in both English and Marshallese languages in the early years, the problems with reading and writing later in their education may be resolved. Implementation of this plan and development of its structure are currently taking place with the assistance of technical aid via the ADB.

Once students are proficient in the required areas, a firm curriculum of technology can then be introduced at a measured pace. We must make sure that there are funds for equipment, hardware, software, staffing and textbooks. Funding for the educational requirements is not being fully met so funds for other courses that have no curriculum are last on the priority list. However, the schools with computers are trying their best to incorporate their usage to aid the students in their learning.

The schools that do have labs use them primarily as a game centre for students. Many of the games are considered 'educational' and this keeps the students at school after hours and out of trouble. Most of the games in the Learning Centres are organised around typing, English and math. However, it is clear that much of the learning is a matter of making guesses until the child understands the goals of the game.

Currently the situation is not as adequate as would be possible. Because of our geographical location and the general isolation of many of the outer islands, ICT is not reaching them at a pace we would like. One of our major concerns is the fact that we have too many students and not enough teachers. Because of the lack of qualified teachers, we must rely on unqualified teachers to provide education to our children. This problem thus comes down to the lack of adequate funding for education, including technology education.

Our newest high school, Ebeye High School, would be an ideal place to implement a new curriculum. Because the school currently has only 9th grade, any program implemented could be a part of the foundation of studies as the school introduces 10th grade in 2005, 11th grade in 2006, and 12th grade in 2007. The year 2007 is also the year that the Teacher Quality Grant finishes, so for the next three years, this grant program could be used to assist in either training teachers to teach ICT curriculum or bringing in trainers to train people in the field.

Curriculum
Currently there is no curriculum for ICT in the RMI. However, the Ministry of Education has looked at Guam's curricula for 7th and 8th grades and feels they would work very well here. If we can get instructors from cancelled vocational programs into training, we should have the beginning of a cadre of ICT instructors ready to teach in the classrooms. In addition, under the National Vocational Training Institute (NVTI) sponsored by ADB, a curriculum for students unable to enter secondary school has been developed by the curriculum consultants from Pacific Resources for Education and Learning (PREL) of Hawaii. This primarily includes computer-assisted learning in numeracy and literacy. (The program is not attached in this report.)

Career Development of Teachers
Since we currently do not have a curriculum, the teachers of word processing or typing do not need to be highly skilled people to perform these tasks. However, once we get into a curriculum for the high school in which web site development, computer database management, and computer programming are possibly implemented, then we shall need highly educated technical people to carry out instruction.

Staff at the high schools teaches typing using the computers. They use the computers to assist with school newspapers and yearbooks. There is no computer literacy program per se where coursework extends to the components of computers, input devices, output devices, motherboards, hard drives, memory, etc. So, the equipment is used as a tool to help in other endeavours of the schools. In other words, computer use is a 'hands on' experience with no training in understanding how it 'works' and how its use may be extended.

At this time the focus of the Ministry of Education is on training new teachers and providing instruction to those in the primary schools. Their goal is to get the teachers to teach in English and follow the current curriculum. Once this policy is in place, followed, implemented and proven, then instruction in other areas, specifically Information Communication Technology, will see both potential and growth.

Accessibility
As mentioned, most of the schools in the city centres plus two of the outer islands high schools have computer labs, centres or facilities. Because these locations have electricity, the capabilities for ICT learning are possible. However, since only the city centres of Majuro and Ebeye have telecommunications, these are the only schools with both Internet capabilities and capacity. Because some of the schools in the capital that do have computer labs or computer centres are trying also to provide Internet access, the schools sometimes add an additional fee to cover the cost of Internet. Currently Internet costs $10/month for access and $3.60/hour for usage. Depending on the school, there is a ratio of approximately 1 computer for every 14 students. Because equipment failure is a large issue, most schools simply put unusable systems on the side and make requests for additional equipment. The 'shelf-life' of a typical computer is approximately 5–6 years. With heavy usage, constant power supply problems (interruptions and fluctuations) and environment issues (no rooms are air conditioned; for instance), the usage of a computer set diminishes. It is also essential to develop ICT technicians able to carry out repairs and maintenance, to try to extend the 'shelf-life' of the systems.

We have been fortunate that our ISP, the National Telecommunications Authority (NTA), has lowered the price considerably since 1997. NTA, as a shareholder-owned company, has brought in many services to the country. It does seem, however, that the rates we pay

(compared to what other entities pay) for the slow connections we do have mean that the budgeting for Internet use is severely strained. When a school attempts to put more than one computer on the dial-up line, the slow speed means that the Internet use time is longer, which in turn means a higher rate has to be paid.

The only data we could locate indicated that a price set for a new computer facility for 40 students was $60,000. This included 40 complete computer sets, 1 Raid server, 2 high speed laser printers, 2 colour printers, networking cables, 2–24 port switches, multimedia projector, software and other miscellaneous items. Fortunately, when looking at the simple Internet connections, we can now connect up to 30 systems using the NTA's broadband connection. Below is a summary of their connection costs:

Table 6: Summary of broadband connection costs

Speeds	Fixed Monthly Rate	Usage
128k	$2000.00	unlimited
256k	$3000.00	unlimited
512k	$5000.00	unlimited

Once schools' labs or centres are connected to the Internet, the capabilities of research, web site development, database development and management, and computer programming can then become a reality—once appropriately trained staffing is in place.

Implementation and Finance

The annual budget for this year, including subsidies to the private schools, is approximately nine million USD. About 63% of the budget is from the General Fund and 24% from the Compact of Free Association. Four per cent of this annual budget is capital improvement program funds. The Ministry of Education is currently connected via wireless access to the new accounting system of the Ministry of Finance (MOF). The transference of Ministry of Education personnel to the Public Service Commission (PSC) means that all hiring and firing of teachers is performed outside of the MOE. In the past, teachers hired via the PSC have not all been fully qualified. When teachers are hired without proper qualifications, this places a burden on the ministry to provide the proper training. Funding for all teachers is done on a budgetary basis that is monitored by the Ministry of Finance. If the MOE feels that it has found suitable candidates for teaching ICT, appropriate paperwork must then be submitted to the PSC and the funding be verified by the MOF. All of this takes time, during which the potential applicant may change his or her mind about working for government, or someone else may hire the person. The bottom line is that the Ministry of Education has to follow standard government practices when getting people on-board. Such a context can only complicate the already difficult implementation process for ICT or any other educational program.

The Capacity of the Ministry in charge of ICT Education

As was stated, current education in the Republic on ICT is limited and restricted to the secondary schools and the elementary schools' After-School Programs only. Computer teachers at the secondary school levels are usually expatriates. In the elementary schools' After-School Programs, computer teachers are either high school graduates or two-year college degree students with some education in computer science. Internet connectivity is not available for school usage at either level.

There is urgent need for ICT education in the Republic. In order to build the capacity for the Ministry to take charge of ICT education, priority areas that will or need to be addressed include:

Planning for implementation and management of curricula
Planning for how ICT is going to be established and maintained. This must be initiated by MOE
Assignment by MOE of a responsible and knowledgeable person to manage and oversee the program
As technology issues and concerns change, constant review and possibly revision of the entire program of ICT curriculum development from grades 3–12.

MOE and the designated person(s) will convene teachers and community members to inventory the nation's ICT needs, how ICT is going to be integrated into the school-wide curriculum, and career pathways for students exiting the program.

Based on the needs identified in this way, curriculum development/adaptation will commence with the selection of a pilot school or schools to lead the way with a trial run of the developed curriculum. At present, Ebeye High School is a most likely school for such piloting. It is newly established with some money set aside to set up and outfit a computer lab. Depending on the outcome of the pilot, ICT education will be expanded to other schools. Staff development is the most critical element. If the country is to integrate ICT into a more learner-centred style of teaching, careful selection of ICT teachers is going to be critical. At present, many young people are graduating from the College of the Marshall Islands (CMI) in computer science. In addition, there are young CARE Program people presently teaching basic computer skills in the Majuro elementary schools. With proper and appropriate training, they could be nurtured to become effective ICT teachers in the schools.

In the career development arena, if the country is to view ICT as a need, a career pathway in ICT has to be part of the ICT education. Students need to see that there is a future job market opened for them, available in the community. MOE will create links with the community, private sector organisations and other interested parties to establish future needs and 'assurances' for students exiting ICT education.

Resource allocations are always a concern when it comes to budgeting. As a charged agency, MOE will need to set aside resources (money) to equip the schools for ICT education. Proper hardware and software will need to be assessed, purchased and maintained. Resources for training and staff development will need to be set aside as well. Resources for Internet connectivity will need to be available for staff and students. Students who are too shy to seek help in classrooms will have to utilise the Internet to communicate with teachers as well as to seek out resources for learning on the Internet.

Community

Currently, the community involvement in schools for basic education is vested in the Parent Teachers Associations. However, there does not seem to be any current commitment from the community to make sure that Technology is implemented in the educational system. The business community and government do benefit from the students who eventually graduate from secondary school and acquire further training at the College of the Marshall Islands. In the long run, these students work for the community. In this aspect, the community does provide internship and practicum

experience for students in various areas. The business community requires that any person they employ has a basic computer understanding. It is with this in mind that we at the MOE provide (at the minimum) all high school students with keyboarding basics. From there, once the NVTI program fully integrates and implements its curriculum in the ICT area, students involved in the vocational area will be better equipped to enter the workforce.

5.5 REPUBLIC OF NAURU

Prepared by Mr. Jarden Kephas

General Background

Currently, Nauru has no curriculum in ICT. There are computers in some schools, but no teacher has received any training either in teaching ICT per se or in using ICT in the curriculum.

Current Constraints and Future Vision

Our ICT vision is that every student will be able to use ICT for learning, in a situation where every teacher uses the power of ICT to enhance the learning process. Our new curriculum, called Footpath, is a futures curriculum and relies heavily on ICT to deliver learning outcomes.

Our current constraints are severe: lack of money, lack of trained staff, lack of infrastructure, and a culture of reluctance to use ICT. These constraints in combination mean that the use of ICT is not common, and that the situation perpetuates itself. (Some of the major constraints are detailed in the section on Accessibility.)

Nauru is very isolated, and apart from some remaining phosphate, has no natural resources. However, we see ICT as an advantage because if we can develop skills in this area, it will allow our students to build and walk a footpath to the rest of the world.

Curriculum

Our new curriculum aims to provide Nauruan students with a skill that is useful, even indispensable, in our new world of communications, as well as being in demand globally. Our observations are that students, as well as parents and teachers, often overestimate the skills needed to obtain the benefits of ICT. We agree that ICT was complicated a few years ago, its accelerating development means that it is now becoming much more powerful and simpler for teachers and students to use.

Our new curriculum recognises this advantage and adopts the strategy of putting ICT in the background. In our curriculum ICT is used as a learning tool, not as a discrete subject. We think that those days are over. To be successful in the world of ICT, a student does not need to know how many layers of silicon go into making a floppy disk, the speed of a hard drive or the capacity of a graphics accelerator. The problem with students learning these things is that they become redundant or outdated so quickly that a school curriculum cannot keep up with the pace of change. Our new curriculum, based on New Basics and Rich Tasks, accommodates all new and emerging technology. We do not make our students learn about things that have already been superseded; we concentrate on new things.

Career Development of Teachers

Over 90% of our teachers are women. Unfortunately, it is true to say that all our teachers have no, or only very limited, exposure to the use of ICT in education.

The major issues are lack of opportunities to develop any skills in ICT, no institutionalised support for ICT, and no readily available literature on the subject. There are no courses in ICT offered on Nauru.

In the general population the number of ICT experts that can be called on for help in schools is extremely limited. Also, these experts are technicians; they are not experts in the use of ICT for teaching and general educational purposes. They may be able to 'fix' a computer, but they cannot recommend a suitable program, for example on reading.

Accessibility
Many constraints severely limit the degree to which ICT is accessible to the schools and people of Nauru.

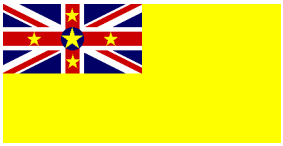
Power supply is often interrupted. It is also subject to frequent fluctuation, causing burn-outs in electronic circuits.
Telephones have copper wire connections, which often fail.
Because of failure to settle accounts or because of landowner disputes, only one school is currently connected to a telephone.
Most schools have roofs that leak in the rain.
The telecommunications employees are generally lacking in expertise in the field of computers or ICT.
In total, there are at present only 23 operational computers in our 11 schools. Another 27 computers are not functioning; the reason they are not working is not known, because no one has the expertise to tell us.
Only one school had Internet connection, but this was cut when the accounts were not paid. The cost is $100 per month for 50 hours of dial-up connection. The top speed of a connection is 28 Kps. The problem has been that the 50 hours are used up early in the month, the subscription runs out, and does not get paid until the start of the next month.

Our new curriculum envisages a wireless connection system. We heard that Suva now has a wireless broadband service for Internet connection. We have come to this present workshop to learn about the latest in ICT and we are interested in hearing about this at this workshop.

Nauru's geography would allow all schools to be connected by a wireless network. Our plan is to have a server at a central location with hubs to at least six other schools. Each school will be 'on line' to the central location. This will allow data on schools, such as enrolments, finance, absences and exam results, to be shared between the school and head office. The estimated cost is unknown. We have come to this workshop to hear from the experts on what it will cost. We want to know if a satellite connection will cost. That is why we are here.

Implementation and Finance
We look to PRIDE, FORUM and the sponsors of this Workshop to provide advice in this area.

Community
Our new curriculum involves the community heavily in education, but ICT is not common.



5.6 NIUE

Prepared by Mrs. Jeini Taoba-Mitimeti

General Background

Niue High School

From the mid-1980s Niue High School offered Typing as an option subject to the students of Forms 4, 5 and 6. In 1998 Typing was replaced by Text Information Management (TIM) as part of the change necessitated by changes to the New Zealand School Certificate syllabus.

At the same time, Computer Studies was also on offer at Niue High School. However, this was only at the Sixth Form Level. The choice to offer it only at that level was based on a number of reasons, the main one being the lack of resources and equipment available for teachers and students to use. Another contributing factor was the unavailability of suitably qualified personnel to teach both Text Information Management and Computer Studies.

In 2002 the New Zealand Qualifications Authority (NZQA) introduced the National Certificate of EA to replace the New Zealand School Certificate. The school continues to offer both Text Information Management and Computer Studies to the senior students. It must be noted that Text Information Management is offered up to the Form 5 level. It was for this reason that the school decided to make a further change and offer Information Technology as a subject in 2004. Text Information Management and Computer studies are no longer offered separately.

It is perhaps fitting to mention that the differences in the subjects offered at the school are as follows:

Table 7: Subject and description

SUBJECT	DESCRIPTION OF COURSE
Text Information Management	Covers the course outline usually covered in Typing, e.g. keyboard skills, use of various types of equipment to communicate information.
Computer Studies	Involves the various Computer functions, software use, etc.
Information Technology	Is the combination of both Text Information Management (TIM) and Computer Studies, but using a Technological approach?

The Equipment available for ICT at the Niue High School is as follows:

20 students' computers for ICT classes
for senior students, 10 computers that have Internet connection
for teachers, 4 computers that are also connected to the Internet
for the main office, 2 computers with Internet connection (1 with a CD burner)
1 computer for the Deputy Principal
2 digital cameras
1 video camera

2 video recorders
1 DVD player
1 TV Screen
Teachers' personal laptops
2 stereos
1 scanner
1 fax machine
1 external modem
internal modems for all computers that have Internet access
flash discs or pen drives
CDs and DVDs for students information
Floppy discs
Zip drives and external hard drives
2 black and white photocopiers

Both teachers and students have access to the Internet, as a result of special effort at the beginning of 2004 to improve Internet access for students and teachers.

There are only two schools in Niue and both are offering some form of ICT courses to the students. The course outlines used closely follow the New Zealand Technology curriculum document.

Currently we have the assistance provided by our New Zealand MSC consultants from the Dunedin College of Education, who are helping the teachers to improve programs, resources and methodology, not only in IT but also in other subject areas.

All other subject areas require the use of the computer with Internet connection in order to access information available through the net from the New Zealand Qualifications Authority. This includes access to Unit Standards and Achievement Standards as well as assessment exemplars for students' assessment activities.

Information Technology is offered as a half-year course to students of Years 7, 8 and 9 (Forms 1, 2 and 3). The students are introduced to the basic ways of using the computer but the emphasis is on keyboard skills. At the Year 10 (Form 4) level, students may opt to continue to take IT or choose to take up other subjects. Over the years it has always been a problem meeting the high demand from students who wish to continue taking the subject. Students in years 7, 8 and 9 are allocated two hours of IT per week for two terms. Each term is about 9 or 10 weeks.

Supporting services for the maintenance of our computers are always provided by the computer experts from the main office of the Department of Administrative Services. The Niue High School IT teacher assists in maintaining the equipment, but major faults are dealt with by our personnel from the Administrative Services, so that the IT teacher is not interrupted in his teaching.

Niue Primary School
While the necessary changes were happening to the courses on offer at the Niue High School, our young ones at the primary school level were also introduced to the computers at the Year 4 level. The program at Niue Primary is integrated into the Technology Program.

Niue Primary School has the following equipment:

1 digital camera
1 colour photocopier
1 black and white photocopier
1 computer for office use
Computers for students' use
Internet connection for the office computer
floppy discs
PIN drives
1 DVD player
1 Video camera
1 Video recorder
1 Scanner

ICT in the Community and Other Government Departments
The Internet Society of Niue (ISN), which is under the Department of Administrative Services, has been fully responsible for the provision of assistance in ICT in all government departments, private enterprises and community groups. It is manned by a UNV person and a couple of other workers with some IT qualifications.

The ISN has provided assistance in terms of fixing and maintaining computers and other ICT equipment, advice on the purchase of equipment and also the ordering of equipment. They have also conducted regular professional development programs when they have seen the need to run such programs.

Recently ISN has assisted in the setting up of learning centres in the villages. The learning centres are equipped with a couple of computers for the use of students, so that they may have access to computers if they do not have computers in their homes. Some of the computers in the learning centres have access to Internet, but this totally depends on the location of the village. Some of the villages outside of the main centre are unable to have Internet access because of the type of phone lines available to them.

Current Constraints
The major constraints experienced in the past years are as follows:

Availability of qualified personnel to teach at the secondary school level. Staff turnover is very high; on occasion we have had to use spouses of expatriates to teach and currently we have a UN volunteer teaching IT. We require a local person to be trained to teach in this area, to ensure consistency and sustainability in the development of the teaching and learning processes in the area of ICT.
Availability of adequate equipment and resources for teachers and students.
Internet access is very slow, so downloading of information from the net is rather time consuming.
The NZQA high-security site cannot be accessed through the net, so we cannot do our own entries and amendments on the net.
Internet access can be very expensive, especially when coupled with the high cost of electricity to run the air-conditioning for the computer rooms.
Accessibility to international lines is a problem in some villages due to the type of lines available for the people to use.

Currently it is government policy that no government department can utilise the wireless connection to Internet. This has proved to be a hindrance in the improvement of Internet access in the schools.

Future Plans and Vision

It is important to continue to improve the equipment for the teaching of ICT so that the teachers and students are able to access information easily and quickly. Other subject areas require the use of the same equipment in order to access information. It is important that more computers are purchased for both teachers and students.

Other resources required must be updated and maintained regularly so that we are able to access the most recent information and enjoy the use of it for a prolonged period of time.

One or two scholarships offered for the training of personnel to teach ICT could do away with the necessity to rely on expatriates, particularly locally recruited expatriate spouses, to teach the subject.

More attention could be given to the plight of our slow learners. A desirable course of action may be to design a program to suit them, so that they too may develop some basic skills for use in their future work place. There are also a lot of programs available for teachers, to support and extend their efforts to assist slow learners in their learning. Making these programs available to teachers and students would enhance teaching–learning processes.

Currently, only 4 computers are assigned for 25 teachers. More computers must be made available to the teachers, so that they can have access to a computer when they need it. Allocation of a proper computer room set aside for teachers' use would also improve the quality of their access; they presently share the small, overcrowded space that houses their 4 computers.

Computers must be replaced or upgraded at regular intervals to ensure minimum interference in the teaching and learning programs due to computers breaking down.

If more computers are available, it will be possible for teachers to use a computer program for record keeping and other essential school requirements, instead of the current time-consuming handwritten work involved in creating a paper record.

Continuation of professional development programs that will assist the teachers across the board is highly desirable, so that they too may be equipped with adequate knowledge and skills that will promote ICT in all subject areas.

Likewise, continuing to run professional development programs to assist people in the government departments as well as the private sector will further improve accessibility to information required for the work place and for the community at large.

Access to international phone lines in the villages must be improved so that students can easily access Internet in the villages and fully utilise the computers available in the learning centres.

Government policy in regard to the use of wireless Internet connection in the schools must be reviewed. The other alternative is to fast-track the request that has been lodged to the

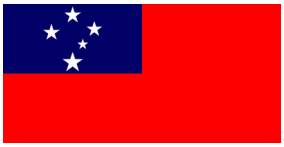
University of the South Pacific regarding the use of the USP satellite for Internet access to the Niue High School.

Curriculum

Both the primary school and the secondary school closely follow the New Zealand curriculum. The Technology Curriculum document is used in designing course outlines for the various levels in the two schools. The yearly Inspection visit from the New Zealand Qualifications Authority ensures that all the requirements are met at the secondary level. The consultancy services by MSC Consulting Group Limited rendered by the Dunedin College of Education to the Department of Education assist in the development of course outlines and the designing of appropriate assessment activities to meet the needs of our students. The MSC consultancy, which is financed by NZAID, has provided assistance in all subject areas in the last four years and has recently given direct help to the development of Technology as a subject area, while at the same time assistance is provided for the planning of further improvement in the general education system.

The current curriculum was introduced to Niue High School when the new NCEA was introduced in New Zealand schools in 2002. Prior to that, professional development programs were conducted for teachers and gradual changes were taking place in preparation for the switch over in 2002. It is the wish of the Niue government and its people that Niue continue to follow the New Zealand system, because of its economic dependency on New Zealand; it will be a lot cheaper to utilise the NZ system because of the other entitlements that the Niueans enjoy as New Zealand citizens.

The current course outlines on Information Technology and Technology used at the Year 11, 12 and 13 levels are attached.



5.7 SAMOA

Prepared by Ms. Doreen Roebeck-Tuala and Mrs. Rosemarie Esera, Ministry of Education, Sports and Culture, Samoa

General Background

Though there are many projects relating to ICT in Samoa, virtually no ICT standards have been developed specifically for schools. However, developments are in the pipeline to utilize the National ICT Strategic Plan as one of the roadmaps for the integration of ICT in schools.

The government has only limited expertise with which to be effective in formulating and implementing national ICT policies, and the education sector is without the resources and knowledge base to integrate ICT into schools. The Ministry of Education, Sports and Culture (MESC) has developed an ICT Master Plan 2004–2007, which builds on the achievements of the initial IT Master Plan 2000–2003 and the overall review of the past 3 years conducted by the MESC executive.

In April 2002 Cabinet directed the Ministry of Finance to form a National ICT Steering Committee. It was envisioned that this National ICT Steering Committee would be responsible for high-level policy, planning, development and co-ordination of ICT across all areas in government, the private sector and NGOs. To be consistent with the principles of transparency and accountability the government advised the committee to take a consultative approach in the preparation of this National ICT Policy. This would demonstrate the government's commitment to partnership with all stakeholders in the formulation of its policies and strategic directions. The National ICT Strategic Plan developed as a result of this directive was approved by Cabinet in September 2004.

The main features of the Plan are as follows:

> The national policy is to have four guiding principles, focusing respectively on human resources, infrastructure development, cooperation between stakeholders, and appropriate policy and regulation.
> Policies stated for each guiding principle are intended to set the rules by which specific strategies and actions will be designed to achieve the vision.
> The strategies for each policy, which comprise the national strategic plan, are thus intended as the general means by which the vision will be reached. They are medium-term strategies, but may be reviewed and changed every three to five years.
> Activities under each strategy in the plan are the specific means by which strategies are to be implemented. They should be monitored continually and modified annually if needed. Each activity has an identified actor or actors, and a proposed timeline or milestone.

In January 2003, a stock take was conducted to ascertain the number of computers in secondary schools and what computer programs were being used. Of 43 secondary schools, 15 were found to be offering computer studies at various levels, using Microsoft

Word and Excel. In March 2004 an increase of 20% in the number of computers was recorded, particularly amongst government secondary schools.

Current Constraints
In the rush to equip classrooms with computers, a fundamental fact is painfully apparent: that teacher must themselves be trained to use these machines before they can teach their usefulness.

As Information Technology is fast becoming one of the most important tools in today's schools—indeed, in today's world—the use and upkeep of the computers are very important if we are to maintain a high level of education in our schools.

The issue of an affordable, reliable and robust infrastructure is a major constraint, but unfortunately it is one over which the Ministry of Education (MoE) does not have ownership or control. Within the implementation of the National ICT Strategic Plan, however, the issue will be addressed for all sectors. Planning capacity for and delivery of educational services is becoming increasingly reliant upon information for improved management, and the ICT infrastructure upon which it exists.

Four factors seem to be crucial to the effective provision of computers in education:

1. the existence of clearly defined and understood outcomes
2. the professional development of teachers
3. the processes of provision
4. the model of provision.

Clearly defined goals for the provision of computers, including both the level and type of provision, constitute the foundation on which to make all other decisions related to the implementation of computers into education. Analysis of successful related case studies suggests there are three overarching outcomes to be considered:

1. the provision of access and training to the community as a whole, to promote lifelong learning and economic/vocational success

2. the provision of access and training to students and teachers, to provide both groups with the skills necessary to use ICT effectively

3. the integration of ICT into the curriculum, resulting in changes to teaching and learning, i.e. a shift to learning with and through technology.

While these goals are not mutually exclusive, it would not appear realistic to attempt to achieve them all simultaneously, and it is probably necessary to prioritise them with reference to the National ICT Strategic Plan. Fulfilling the third goal, of ICT integration, is much more challenging and requires more resources within any individual context.

It is important that the deployment of computers in both education and communities is carefully planned and structured. Many countries have employed haphazard processes based on a desire to get technology in to schools as quickly as possible. The result of this can be a weakening of outcomes, as the tendency is to spread resources too thinly across a diverse range of projects.

One of the key decisions to be made for Samoa is whether to develop a large number of contexts with limited resources, or to develop a small number of technology rich contexts. The desired outcomes are a key factor in determining the level and extent of provision. It would appear that while limited numbers of computers can be used effectively for the training of staff and students in ICT skills and for the improvement of administrative efficiency in schools, a much higher level of provision is needed if students are to have access to computers on a regular basis as part of teaching and learning.

Future Vision

Given the overarching vision statement of "Information and communication technologies for every Samoan", the ICT-centred model would seem to be the most effective in that it allows for both community and school access. We would suggest a phased implementation model, with centres being developed within schools. Schools would bid for the right to have ICT centres implemented in their school, on the basis of a number of criteria including their willingness and ability to provide for not only their immediate community in terms of training and access, but also to provide support and training for other schools in their geographic area. The ratio of auxiliary schools to lead schools is an important consideration. The ratio would depend primarily on the 'entry-level' skills of the cluster schools (their level of preparedness) and therefore the level of help they would require. Another potential issue is that if too many schools are accessing the same centre, the result may be a dilution of the effectiveness of the technology to the point where the lead school is unable to utilise it fully. Part of the bidding process could be the necessity to demonstrate the development of a co-operative agreement with a number of schools and community groups. In this way, while bidding is competitive it would also provide for collaboration and co-operation between and among schools and communities.

We would further suggest that while lead schools are infused with a high level of infrastructure and training, other schools with which they have agreements should simultaneously be provided with seed funding to establish a basic level of provision, allowing for the training of staff and access by selected groups of students. These schools could then bid for a higher level of funding in subsequent rounds. Approval could be based on the extent to which they have shown themselves able and willing to use ICT to meet set outcomes effectively.

Infrastructure at the pilot schools could include:

- Portable computers that teachers could use on a loan basis (the number dependent on overall funding but a ratio of 1:3 could be effective). Where teachers show a willingness to utilise technology fully, they could become eligible for a subsidised computer for their personal use
- Sufficient computers within laboratories to allow class use – perhaps including one 'set' of portable computers for transportation to classes. Where whole classes are using computers, the most realistic ratio appears to be 1:2, suggesting around 20 computers in a laboratory. The school-wide ratio is generally around 1:20 or 1:30
- Data projectors to allow for classroom use. The cost of these has dropped considerably and they allow teachers to present to classes multimedia material such as simulations off the Internet and PowerPoint. Teachers would require either a portable computer in their room or be able to book one along with the data projector

Internet connectivity at a reasonable rate

Scanners, digital cameras, printers. The ratio of printers is important, as also is their location. A major decision is student access and the related costs of printing, such as paper and toner cartridges. A printer should certainly be available in key staff work areas that have computers or in a central location such as the library. Similarly, there probably should be a printer in any laboratory

Professional development in both pedagogy and ICT skills. This should be made available for all staff, and be given by approved providers who demonstrate a high level of skill and knowledge in pedagogy and in the facilitation of change in complex environments.

Infrastructure at the auxiliary schools could include:

Pods of computers (2 – 5) in central locations such as the library, with a printer

Computers for staff use only – perhaps several portable loan-out computers, which can be booked for use outside of school hours

Wherever possible, Internet access – as part of the collaborative process, schools could then link not only to the outside world but also to their lead school, and share resources through an Intranet. This would allow for the development of a professional community

The lead schools would undertake staff training as part of the agreement with the national funding body.

Curriculum

In Samoa, six of the 25 government secondary schools are currently offering computer studies at Years 9, 10, 12 and 13. For a number of years now, Samoan students have sat the PSSC computer studies examination. Samoa recently designed and developed a Computer Studies curriculum for Years 12 and 13, which will be implemented in 2005 at selected secondary schools. Impediments to achieving this, however, are critical. 1) The majority of Samoan children have yet even to see a computer at their school. 2) One major concern is how this curriculum can best be delivered if teachers are not properly equipped to manage and teach the subject. Despite Peace Corps volunteers stepping in to help in most government schools, volunteering will soon be phased out. Thus it is imperative to have qualified and confident Samoan teachers to teach computer studies. 3) At present, computers in most schools are used for administrative purposes, but as teachers become more comfortable with this technology, their use for other levels and purposes will need to be reviewed.

Radio broadcasts are still produced by the Ministry to support the delivery of the curriculum in primary schools. AusAID's recently completed Primary Education and Materials Project donated to each primary school a CD player and CDs containing additional materials to support the curriculum. New equipment to produce these educational CDs was also provided to the Ministry of Education, Sports and Culture Broadcasting Unit.

The development of computer curricula is a positive move forward but it needs to be accompanied by the provision of facilities in schools, more trained teachers and greater availability of maintenance service providers.

Career development

The provision of professional development for staff is a key ingredient in the successful implementation of ICT. However, it is often either overlooked or understated in initial budgeting, when funds allocated are insufficient for the level of professional development necessary for significant benefits to occur.

The timing and content of any professional development is crucial. A commonly used phrase is "just in time not just in case", which suggests that training should be provided when it is needed rather than before equipment is available or some time after it has been provided. Two essential aspects of effective professional development are the ability to practice and the relevance of the professional development to teacher practice. Where courses are held too early, before computers are provided, both these aspects are likely to be undermined.

The content of any courses should be determined by the objectives for computer provision. If the immediate objective is simply to provide students and staff with ICT skills, the professional development offered can be focused on skills-based training alone. However, this level of provision may be short sighted if there is a long-term goal of ICT integration and change in practice. In this instance it is essential to provide not only skills based training but also pedagogical training, in how to integrate ICT successfully not only into the classroom but also in different pedagogical practices related to student centred learning. In fact, where schools have been successful in integrating ICT across the curriculum and in achieving school-wide change, the processes for change were put in place before the integration of computers, and staff were receptive to what technology could offer. Such pedagogically oriented professional development needs to operate in conjunction with skills based training.

A research paper was prepared for the MESC to examine the level of understanding in the use of computers, especially as these tools were to be placed in the new schools as part of the resources necessary to support the new curricula. The results speak for themselves:

The majority of the teachers surveyed have either limited or no basic knowledge of computers at all, but would very much like to learn about them.

The most popular computer program of which teachers have introductory knowledge is the MS Excel program. MS Word accounted for only 4 teachers, MS Access for 3. Two teachers have knowledge of other programs, while the majority do not know any of the programs.

Only 10 out of the 67 teachers surveyed have taken a course(s) in computers, at the introductory stage. Most of these courses were in Excel or spreadsheet. Other courses like e-mail and Internet were also introduced**.**

The majority of those who did not take courses showed they also do not have basic knowledge in the use of the tool.

Most of the 67 teacher's surveyed fall into the age group of 31+ years, and most of them are females.

The teachers surveyed were teaching either in primary schools or in the secondary schools.

Although the results from the study are not spectacular, it has confirmed the suspicion that a significant proportion of teachers in the classrooms are neither equipped to use today's technology (computers) nor aware of its importance in teaching and learning in the 21st century.

Accessibility

Since 2002, the telecommunication sector has undergone major changes under a new management body, Samoatel. Improvements include an increase in the number of telephone connections, and the laying of fibre optic lines to enhance connectivity for government departments, the National University of Samoa (NUS) and Samoa Polytechnic.

Telecom Samoa Cellular provides wireless communication. The prepaid mobile telephone is their latest development and has proven to be very popular. This new technology is now available in Savaii.

Until 2002, most government schools had only limited access to telephones and consequently, severely limited access to the Internet. However, the MESC and Samoatel are working together in a joint project funded by the Government to provide a telephone connection and hardware to every school. As of December 2004, we have 51 schools already connected.

A few schools have acquired computer labs through which students have Internet access, but these are only on the main island of Upolu.

Table 8: School statistics as of March 2004

Controlling Authority	**Secondary Schools (no.)**		**Primary Schools (no.)**	
	Computers	Telephones	Computers	Telephones
Baptist	1	2	0	1
Catholic	46	7	27	9
Government	92	13	57	38
LDS	117	13	12	6
Methodist	27	4	1	1
SDA	34	5	8	2
Private	27	3	15	9
CCCS	46	7	0	0
Peace Chapel	0	0	3	2
Total	**390**	**54**	**123**	**68**

Implementation and Finance

The MESC continues to be responsible for policy advice to the Minister of Education, Sports and Culture and ultimately to Government. The partnership of the MESC and the Government schools has remained the same. Village based schools are built and maintained by the school committees, with staffing, stationery and delivery of education managed through the Ministry.

Computers and accessories are still very costly in Samoa. Not only are institutions unable to afford teaching facilities, but also ownership of computers is limited to those who can afford them. For most, having a computer is not a priority when compared to the other more pressing and basic needs of a family. In addition, labour costs are high.

The Capacity of Ministry in charge of ICT education
There is currently a Management Information Systems (MIS) Committee chaired by the Principal Information Technology Officer, and a staffed IT Unit of three (3) to ensure that the MESC executive are informed of the information management and technological developments issues that will have an impact upon the MESC. Also the development of the MESC Helpdesk has made it possible to collect and analyse data to assist the Executive Committee in its decision making on ICT related issues. One of the major achievements of the IT Unit has been the development of the ICT Master Plan, and its refinement and implementation is now a major responsibility for them.

Community
Community involvement in the provision of ICT education is low in Samoa. It is an area that has been flagged and will be investigated in the upcoming donor-aided projects.

Good school–community relationships have been shown to improve educational outcomes, and programmes offering community access to school based facilities can improve this relationship. A limitation of this model may well be that the high number of potential users may mean restricted access in terms of time on the computer, thus limiting the potential of integration across the curriculum while increasing the number of people trained in ICT skills.

5.8 SOLOMON ISLANDS

Prepared by Mr. David Leeming – PFNet Technical Advisor for Solomon Islands Ministry of Education

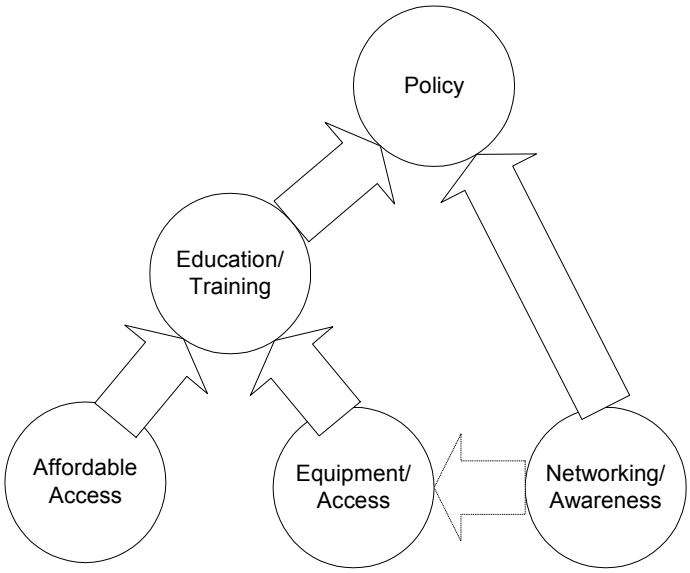
General background

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, which enjoyed technical assistance from UNDP, 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 relationships are illustrated in Figure 1. This diagram shows that if ICT is to be considered and used to best effect within government policies and development strategy, there is a need first to address the underlying issues. It does not mean that no policy development can incorporate ICT before these objectives are realised, but the impacts will be less and more isolated and haphazard in nature.

Figure 1 clearly shows the central role that ICT education and training have in the development of Solomon Islands.

Figure 1: Priority ICT4D objectives clusters



The final report of the workshop has been published[3] and is intended to provide guidance for policy makers. The workshop also resulted in the formation of a steering group, the Solomon Islands ICT Working Group,[4] to follow up the workshop. Strengthening of this process and the working group was included in the regional e-Pacifika[5] program, which is building the capacity of regional countries to develop ICT strategies.

As of December 2004, a draft Cabinet paper is being presented through the Ministry of Communication, Aviation and Meteorology, seeking endorsement for the ICT working group. This process has already been accepted in the government's medium-term development strategy, the National Economic Recovery, Reform and Development Plan (NERRDP) published in October 2003 following several years of ethnic conflict.

In section A4, Revitalising the Productive Sector and Rebuilding Supporting Infrastructure, the plan earmarks the following priority objectives for section 6, Communication, Aviation and Meteorology:

(a) Developing and implementing a national Information and Communication Technology (ICT) strategy in all sectors and in rural and urban areas, particularly in the following sectors and areas: health, education, agriculture, women, youth and children, land, commerce, trade and marketing, and banking and financial services

(b) Supporting the provision of affordable rural access to ICT, including the continued development of rural communications through the expansion of the People First Network (PFNet)

(c) Considering the adoption of the Solomon Islands ICT Working Group as government's advisory body on ICT matters.

Thus, the government has already committed itself to national ICT strategy development, including specifically its development in the education sector.

Usage of ICT in the education system

Baseline data

In Solomon Islands there is a lack of baseline data on ICT usage. Such baseline data would enable better targeting and more effective ICT strategies in education.

A few schools in urban areas have been building IT strategies and acquiring donated equipment. This seems to be as a result more of enlightened school management than of official IT strategy. For instance Betikama Adventist College lays claim to having an in-house IT strategy in place and to having been successful in acquiring 10 donated second-hand computers. However, they have had problems implementing the strategy due to inadequately prepared facilities and lack of support in the form of technicians. Observing the association between these problems and the lack of a central ICT

[3] E. Stork, D. Leeming and R. Biliki. (2003), *Solomon 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

[4] www.peoplefirst.net.sb/general/pfnet_stats.htm#WG

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

strategy in education, the school recognises 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 the levels seen in the recent historical past (before the disturbances). The Ministry's priority is basic education, but the magnitude of the problems 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 organised, 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 Higher Education (SICHE) does not have a computer lab at present. SICHE has suffered greatly 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 has 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, which offers a 64kbps Internet link, video conferencing and other facilities. It is a minimum requirement to have PCs 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.

Curriculum

Although at present there is very little or nothing at all on ICT in the school curricula, the Ministry of Education through its 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 is studying relevant curriculum documents from other developing countries to help them develop a national school ICT curriculum. A workshop is planned on this topic.

The view of CDC is that Solomon Islands children should be exposed to ICT despite the financial constraints this country is facing. Although only very few schools in Honiara are using ICT facilities such as Internet cafés, 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 an ICT curriculum into the school system.

NGO-sector involvement in ICT for education

Youth First Computer Centre

With funding from the Global Knowledge Partnership (GKP), the Rural Development Volunteers Association (RDVA) has established the Youth First Computer Centre, which is targeted especially at students who need access to computers and the Internet to conduct research for assignments and to learn how to use the ICT.

The Youth First Computer Centre is providing basic computer training, electronic library, secretarial services and Internet access. Ten (10) primary schools, six (6) community high schools, two (2) national high schools and the Solomon Islands College of Higher Education are within the vicinity. The Centre has also extended its services to the public and school push-outs.

The Coordinator reports to the chairman of the association and will be expected to be an active member of the Solomon Islands ICT Working Group (see above), which acts as an advisory body. In this way multi-stakeholder interests will be coordinated with respect to national development priorities, allowing the greatest potential for synergies to result from collaboration, and through cross-fertilisation of ideas and best solutions.

Until July 2004, the centre has been providing near full capacity with four main schools providing regular batches of students for training. However, less than 5% of students in Honiara have attended training in the centre. This is due to the lack of capacity (the centre has only 10 computers but is expecting ten extra donated computers soon). Should the facilities increase, the attendance will increase as well.

People First Network

The People First Network (PFnet) project, itself also a project of RDVA in partnership with the Department of Provincial Government and Constituency Development, has also been pioneering the use of ICT in education. With its growing rural network, PFnet was ideally positioned to pioneer local solutions in distance education. This fact was recognised by the University of the 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 the Asia Media Information Centre.

This project[6] was implemented by RDVA in partnership with the USP Centre during June–October 2002, with PFnet facilitating the networking and providing technical assistance. The project aimed to utilise 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.

[6] Final report to the AMIC 12th Annual Conference, 6–7 Nov 2003, can be downloaded from www.peoplefirst.net.sb/downloads/amic.zip

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.

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. Nineteen 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 counselling, tutorials and advice from the course tutors. For this process, two RDVA volunteers (RDVs) were assigned over the 2 months to the training and supervision of students 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.

Finally, all participants evaluated the project and the evaluation was presented to a stakeholders' workshop organised by the STABEX 99 Program Management Unit on behalf of the Ministry of Education and Training.[7] Most stakeholders and donors were represented including the USP Centre, SICHE Distance Education Centre, CDC, the Solomon Islands Association of Rural Training Centres, the Ministry of Education and the Sasamungga Community High School. Aid resource organisations who attended included the High Commissions of Britain, New Zealand and Australia, the Embassies of ROC and Japan, the Resident Delegate of the EU and the EU Micro-projects Programme, and Oxfam Solomon Islands. The Ministry of Transport, Communication and Works was represented as the lead ministry for ICT policy and strategy.

The workshop had two objectives and two anticipated outcomes:

To demonstrate the utility and suitability of some ICT as a platform for distance education in the Solomons
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.

[7] The distance learning project and workshop web page can be viewed at www.peoplefirst.net.sb/general/distance_learning.htm

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 organised, could assist in reversing the accelerating rise in numbers of school 'push-outs' and drop-outs 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 teachers' college), and 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 the 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.

The distance trial at Sasamungga was judged successful and it was decided that it could be replicated on a national scale. This has resulted in a major EU-funded project, the Distance Learning Centres Project, which started in December 2004 (see below).

The workshop also noted that technical limitations of the equipment, such as the lack of direct access to Internet, have to be addressed. It was noted that the turnaround time between student's work and tutor response was cut to days, rather than up to six weeks as was common 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 the Ministry of Education and Human Resource Development (MEHRD) establish a National Coordinating Committee for Distance 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.

One year after these proposals were made, the situation in the country has improved following an Australian-led intervention that has stabilised the government finances and improved law and order.

Ministry of Education and Human Resource Development

The Ministry of Education and Human Resource Development (MEHRD), together with the EU and New Zealand, is implementing an Education Sector Investment and Reform Programme (ESIRP) from 2004. This is being developed and managed by MEHRD with substantial financial and technical input from the development partners. A total of SBD

330 million (40 million Euro) has been committed for the first three-year planning cycle of ESIRP.

At the heart of the ESIRP is the recognition that following the years of ethnic tension, the education sector needs to decentralise and develop local and rural solutions.

Under ESIRP, there are several initiatives involving ICT. The most significant are:

the Distance Learning Centres Project (DLCP)
the Education Management Information System (EMIS)
development of an e-learning strategy.

1. The Distance Learning Centres Project (DLCP)[8]
As is described above, in 2002 the People First Network (PFnet) pioneered the use of ICT for distance education in the Solomons. These trials were evaluated by stakeholders and led to the recommendation that they should be scaled up to national level under a coherent distance learning strategy.

The MEHRD has included this recommendation in the ESIRP EU component as an initially two-year pilot project, the Distance Learning Centres Project (DLCP), which started on 14 December 2004. The DLCP will establish community school–based distance learning centres in each province using expertise on sustainable community networking and technology from PFnet, with additional technical input from Solomon Telekom.

The DLCP will develop a strategy leading to sustainable management of the centres within three years. At the heart of the strategy will be partnerships at all levels, based on (but not limited to) the model successfully tested by the existing PFnet email network. Also integral to the strategy will be a policy of opening the centres for general community networking purposes with linkages to rural health service delivery and support, commerce, finance, legal services, gender development, reduction of vulnerability to natural disasters and other improvements in rural access, many of which have already been pioneered by PFnet.

The rural learning centres will be sited in high population areas not served by existing communications infrastructure and will consist of:

A satellite terminal (VSAT) providing at each location broadband of least 33kbps CIR bursting upwards. This will be expected to increase with time and linkage to new applications
A local area network with six laptop computers
HF radio communications
Prepaid (card) telephone using Voice Over IP (VOIP)
A physical and CD-ROM library
Solar power supply also supplying light to the school staff houses and classrooms
Permanently attached supervisor/trainer and facilitator.

[8] Contact: David Leeming, Project Manager, Tel: +677 26358/76396 Email: leeming@pipolfastaem.gov.sb
www.peoplefirst.net.sb/general/pfnet_esirp_briefing.htm

The DLCP will also strengthen one existing PFnet email station in each province with the addition of more public-access computers and printers, and training of the operators as trainers. The innovative RANET system using digital radio receivers and satellite broadcasts by the Worldspace Foundation will provide means of downloading (one-way web-casting) large amounts of data with no satellite connection fees.

The centres will offer formal (managed) and non-formal (self-managed) access to distance learning resources, open learning networks and general Internet access and communications. Teachers will be trained to maintain the centres and utilise them, both for their own development and to assist their students. The centres will provide IT training for school, distance and vocational students. They will also function as library services and community telecentres through which social and economic development programmes can be accessed and facilitated.

The DLCP will assist providers to develop local content and will provide portal and online library frameworks to bring together these resources with relevant and useful content from other sources and knowledge centres such as the Commonwealth of Learning (COL), UNESCO and others. Open Networks will be researched and promoted to the students.

The project will explore many techniques that have been pioneered successfully elsewhere. This includes webcasting, use of MP3 players to deliver audio (lectures, etc.) and other innovations.

The project expects almost immediate utilisation by providers such as USP, who have already developed online distance learning materials and procedures. A number of USP services have already been identified and put forward by various departments for the delivery of courses and support services targeted at both students and teachers.

The capacity of other providers will be built through workshops and training, using technical resources and advisory services of knowledge centres such as COL. This will extend to both course delivery and generation of local content.

Participating providers will include:

USP
SICHE
School of Education
Association of Rural Training Centres
School of Nursing
Other schools (Marine, Legal, etc.) can also extend their services to the rural centres).

The impacts of the learning centres are not likely to be confined to the education sector. In the context of national development, the project will bring in a whole new platform for service delivery and citizen participation. The impacts will be in a wide context, through enabling service delivery, opening channels of communication, improving monitoring and collection of rural data, participatory governance and access to the emerging ‘Information Society’.

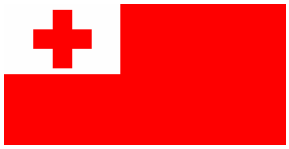
Some examples of the potential benefits are given below:

The beginning of a new, powerful commercial grade rural communications platform
Lands administration accessible from the provinces
Access to credit and secure payment systems
Rural access to legal services and rights awareness
Remote training for rural health workers
Remote diagnostics and online specialist medical support
Access to global markets and information
Empowerment of rural resource owners against exploitation
Generation of employment opportunities
Better promotion of tourism.

Risks will be considered and means of militating against them will be built in to the development of the MEHRD's distance learning strategy. For instance, a system of accreditation of online courses supported by the centres could be introduced. Controls can also be put in place at the network level, preventing inappropriate use. Policies will be developed based on best practice elsewhere and local considerations, including community opinion.

EMIS
With funding from NZAID through the ESIRP, an Educational Management Information System is being developed with technical assistance from UNIQUEST.

E - Learning and distance education strategy
MEHRD will develop a Strategy and Policy for Distance Education in the Solomons that will encompass the Solomon Islands College of Higher Education, USP Honiara Extension Centre, and all formal and informal learning networks using appropriate and cost effective technology. Under this strategy, the DLCP will work with providers in the formal and informal sectors to build capacity for the delivery and utilisation of distance learning resources and the development of local content.



5.9 TONGA

Prepared by Ms. Alisi Kato'anga – Ministry of Education (2005)

TERTIARY EDUCATION

General Background

The Kingdom of Tonga has fostered ICT education for a number of years. The Ministry of Education created the Community Development and Training Centre (CDTC) in the 1970s. As an ICT programme developed with the growth of the field, it was incorporated within the CDTC in 1997. In 2002, a new facility was built to encourage the further expansion of the program. At this time the Tonga Institute of Higher Education was created to unify tertiary education programmes within the country. It is in this current incarnation where the majority of tertiary ICT education is provided to students. The Tonga Institute of Higher Education offers a two-year Diploma programme in Information Systems and Computer Science.

The Tonga Institute of Higher Education (TIHE) is a part of the Ministry of Education, which has provided and obtained ample funding in the past, resulting in the largest deployment of ICT education within Tonga. Other schools also provide tertiary level ICT programmes, although with slightly different focuses. Tupou High School, a Wesleyan school, offers a two-year Diploma program that is accredited with New Zealand schools. The University of the South Pacific (USP) also has a Centre in Tonga where they offer first-year courses in ICT, before students relocate to Fiji to complete their studies. Recently, the Unuaki o Tonga Royal Institute opened which also offers a Diploma programme in ICT. These programs are all located on Tongatapu and are not available on outer islands.

Many other programmes that the Ministry of Education (MOE) offers use ICT within their own programmes. The Accounting programme offers a number of courses in computerised accounting. Additionally, Agriculture, Tourism and Hospitality, and Teacher Training schools each require students to take basic computing courses in order to familiarise them with basic tasks. The Ministry of Education, and thus the government of Tonga, is primarily responsible for all education in Tonga. They also provide funds to the other private ICT programmes.

Current Constraints and Future Vision

There are a number of problems limiting full scale ICT tertiary education in Tonga. Obviously, funding is problematic as computer purchasing and maintenance can be costly, limiting both the number of possible groups attempting to provide education and the expansion of current organisations. Another problem is the lack of foundation skills needed to pursue higher level abstraction studies often needed in ICT, for example programming. The number of students who are academically prepared to pursue advanced ICT education is limited due to the small size of the Tongan population as well as the number of students who leave Tonga after completing secondary level education.

The TIHE, long the premier tertiary institute for studies, remains the best practice school for ICT. A significant amount of funding has been directed towards infrastructure and it now has the largest network of computers in the nation. The student population, which has steadily grown, reflects not only the interest in ICT education amongst eligible students, but also the respect they have for the Institute as well as the Ministry of Education. The strong commitment towards providing quality staffing has also ensured that courses are properly developed and deployed to students.

Tonga and the MOE recognise the importance of ICT in all aspects of work and school, meaning the maintenance and growth of ICT education is paramount amongst many concerns affecting education in the Pacific. At the secondary level, creating computer literacy skills for all students is a priority, without prejudice to the offering of advanced study for those choosing it. At the tertiary level, ICT education will continue to focus on developing computer science skills that can be employed in businesses in order to utilise ICT to reduce costs and improve service. The goal then is to create a large enough ICT workforce so that all businesses and organisations will find it within their means to use ICT solutions to develop and grow.

Curriculum

The following curriculum will focus on that of the MOE's programme in ICT. Other institutions have their own means of obtaining curriculum, mainly that of importing it from overseas schools.

The TIHE's Information Technology programme has two tracks, Information Systems (IS) and Computer Science (CS). Both were modelled on programmes offered by USP, but have been further developed to reflect local needs as well as keep up to date with changing trends within technology. IS was created to address the need for skilled managerial positions, capable of making informed decisions regarding ICT as well as recognising and implementing possibilities by utilising ICT solutions. CSI is focused on creating students capable of critical thinking so that they can develop information systems able to be deployed in a professional environment. Another goal of both programmes is to create students capable of setting up, maintaining and upgrading computer hardware, software and networks.

The curriculum for the TIHE is revised on a yearly basis to reflect new changes as well as to re-evaluate the worth of different segments. The full-time and part-time tutors within the programme will discuss these changes, as well as soliciting the input of professionals within the field of ICT in Tonga in order to garner feedback on the qualities they desire in future employees. The syllabus of courses is attached at the end of this document.

Career Development of Teachers

The primary concern presently is the retention and recruitment of skilled ICT professionals as tutors. There is a dearth of qualified ICT staffing in Tonga, thus the brightest and best often will move out of education and into the private sector. TIHE has been able to stem the flow by utilising recent graduates on bond with the MOE due to scholarships and overseas volunteers. TIHE has also regularly employed the top ICT professionals in Tonga as part-time tutors. Table 9 indicates current staffing statistics.

Table 9: IT Staff Demographics

Full-Time Staff	6
Part-Time Staff	7
Male	12
Female	1
Bachelor Degree	10
Masters Degree	2

Accessibility
Infrastructure: Electricity and Internet are both very expensive and consistent provision of both requires dedicated organisation.

Equipment: At TIHE

Computers: 93 working Windows XP workstations
Students (2004): 226
Ratio: about 2 students per computer
Internet: 128 kbps ($600 TOP/month). Internet rates are half for educational institutes.
Estimated Cost to setup Internet: 32 kbps – $150–200 TOP/month + 200–500 set-up fee + additional hardware costs (firewall, switches, server)

Implementation and Finance
The Ministry of Education is responsible for paying the salaries of full- and part-time tutors.

Community
There is little community involvement in tertiary ICT education. Donor organisations, as well as stakeholders and the MOE, have provided the majority of all funding for capital costs as well as continuing costs like electricity, staff wages and maintenance.

Table 10: Student Demographics

Year	Total Enrolment	Male	Female	Pass Percentage	# Dropouts	# Certificate Program	# Diploma Program
2002	108	49	59	81%	18 (16.67%)	59	39
2003	185	74	111	42%	21 (11.35%)	126	59
2004	226	95	131	66%	86 (38.05%)	140	86

Source: Information taken from the Ministry of Education Annual Report and the TIHE

SECONDARY SCHOOLS

General Background
Computer Studies was offered in the early 1990s as an option subject started at the Form 3 level in the secondary schools. Only a few secondary schools could afford computers to offer the computer studies at that time. Now there are 35 Secondary Schools in Tonga and 25 of them offer Computer Studies and sit the Tonga School Certificate at Form 5. There are 22 secondary schools with Form 6 level, 21 of which offer computer studies at this level.

Current Constraints and Future Vision
The best practice secondary school for computer studies for Pacific Senior Secondary Certificate (PSSC) in Tonga is Beulah College. Beulah College is one of first secondary schools to offer Computer Studies at the Tonga School Certificate (TSC) examination. In 2003, they had 100% passes at the PSSC. But for TSC, Tonga High School is the best practice school for computer studies, as they had 98.3% pass with the highest percentage of Grade 1 (16%). Beulah College is always advantaged in that they always have a smaller number of candidates taking computer studies than Tonga High School.

Constraints
Computers in most schools in Tonga were donated by some funding agencies and Aid programmes. Those computers were not new; they were upgraded ones. So those computers need to be continually upgraded. Funding is one of the problematic constraints, as we need funds for the continuing maintenance and upgrading of those computers.

Ten secondary schools do not offer computer studies, mostly because they do not have funds to buy computers for their schools. Three of those ten schools are in remote areas and they use solar electricity, which is unreliable.

Local teachers who are teaching computer studies need in-service training or some sort of training to upgrade their skills and knowledge. Schools that have expatriates as computer teachers are very fortunate because these people help in the upgrading, looking after and maintenance of their computers.

Vision
The Vision for the future is for the secondary schools to offer computer studies at the Form 7 level. Tonga High School will, it is hoped, be able to do so this year, 2005.

Curriculum
Most of the secondary schools in Tonga continued to follow the syllabus for computer studies, Forms 3–5, prescribed by the Ministry of Education through the Curriculum Development Unit (CDU), while Form 6 follows the syllabus prescribed by the South Pacific Board for Educational Assessment (SPBEA) towards the PSSC Examinations at the end of the year.

The course prescription for TSC is divided into core topics supplemented by elective topics. The Core Topics are:

General Computer Knowledge
Hardware
Software
Operating systems
Word Processing
Spreadsheets
Databases.

The Elective Topics are:

Desktop Publishing on a Personal Computer
Using Personal Computers to Make Computer Presentations
Networking.

Career Development of teachers
No data were available when this report was being prepared, especially with respect to the question of career development of teachers. The schools are on holidays and the Ministry of Education does not have data on this.

Training of teachers is mainly school-based, unless a school seeks assistance with training from the TIHE or the SPBEA. Schools in Tonga are in great need of computer studies training for teachers, to upgrade their skills and knowledge and to improve the students' grades in the exams.

ACCESSIBILITY

Infrastructure
Schools that offer computer studies do have electricity and telephone and they have access to the Internet too. The using of the Internet in Tonga is supported by the Tonga Communication Corporation. Each school has its own computer programme to control the websites that their school may use for both teachers and students. It is closely monitored and supervised by the head of the computer department, with the help of the computer teachers.

Computers are available to the students for their projects/research etc. or for personal use, provided that some of the computer teachers are willing or free to supervisor them during the interval, lunch break and after school.

Schools' orders from overseas are tax-free but each school has to follow the Government's policies and regulations. The Ministry of Education carries out this task on behalf of the Government.

Here is an example of the estimated costs of one of the computer rooms funded by the Tonga High School Parent Teachers Association (PTA). The PTA provided 24 computers for the room at a cost per computer of approximately $1400, added to which was the cost of the setting up of the Internet.

Implementation and Finance
Mission (Church) and private schools are responsible for the salaries of their staff members but the MOE is responsible for paying the salaries of the staff members of the government schools.

The PTA and the ex-students associations of every school in Tonga strongly support the schools financially. These two types of association usually raise large amounts of funds to help finance the school programmes, including their computer programmes and even the Internet payment.

The Capacity of THE Ministry in charge ICT education
Through the CDU the MOE is responsible for providing the national curriculum for the computer studies (syllabus) for the schools to use. CDU also provides the prescription for the Form 5 computer studies for the Tonga School Certificate Examination.

Community
As noted, PTAs and the ex-students are very much involved in supporting each school's programmes. It is very common to some PTAs of some schools to organise village

concerts to raise funds to help support the school programmes. In that way the community at large is involved in such activities. One of the expatriates as a principal of one of the schools said that he was not familiar with such fund raising efforts. His school collected more than T$30,000 from village concerts. He felt uncomfortable for collecting this amount from the community but he understood it was a Tongan way of doing things.

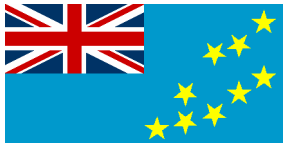
Student Demographics

Data for the results of the Tonga School Certificate and the Pacific Senior Secondary Certificate are still being compiled at the time of writing this report.

Table 11: Secondary Schools in Tonga

√ - Doing computer Studies, No – indicates schools that do not offer computer studies

No.	Name of the School	TSC	PSSC/Comp
1.	‘Apifo‘ou College	√	√√
2.	Beulah College	√	√√
3.	Chanel High School	√	--1
4.	‘Eua High School	√	√-2
5.	Ha‘apai High School	√	√√
6.	Hofangahau College	1	--3
7.	Lavengamalie College	√	√√
8.	Liahona High School	√	√√
9.	Mailefihi/Siu‘ilikutapu College	√	√√
10.	Liahona High School	√	√√
11.	Mailefihi/Siu‘ilikutapu College	√	√√
12.	Mo‘unga‘olive College	2	--4
13.	Niuafo‘ou High School*	3	--5
14.	Niuatoputapu High School*	4	--6
15.	Ocean of Light International School	√	--7
16.	Queen Salote College	√	√√
17.	Sainehā High School	√	√√
18.	St Andrew’s High School	√	√√
19.	St. Joseph Business College * sit only 3 subjects	5	--8
20.	St Joseph Community College	√	--9
21.	Tailulu College (Tt)	√	√√
22.	Tailulu College (Hp)	6	--10
23.	Tailulu College (Vv)	7	-- 11
24.	Takuilau College	√	√√
25.	Taufa’ahau/Pilolevu College	√	√√
26.	Tonga College	√	√√
27.	Tonga High School	√	√√
28.	Tupou College	√	√√
29.	Tupou High School – Nukunuku Campus	-8	--12
30.	Tupou High School – Tapunisiliva Campus	√	--13
31.	Tupou High School – Vaololoa Campus	√	--14
32.	Tupou High School – Fasi Campus	--	√√
33.	Tupouto‘a College*	-10	--15
34.	Vava‘u High School	√	√√
	35 Secondary schools	25 schools - TSC computer Studies	
	20 PSSC – secondary schools		
	* secondary school in a remote area		



5.10 TUVALU

Prepared by Mrs. Valisi Tovia, Ministry of Education

Introduction

Tuvalu has not yet developed an ICT curriculum for all school levels. However, development of an ICT curriculum is one of the priorities endorsed for inclusion in the Education and Training Sector Master Plan (ETSMP) to which the Ministry of Education (MOE) is putting in finishing touches for Cabinet's endorsement prior the donors meeting tentatively scheduled for March this year (2005). The Ministry of Education and Sports initiated the development of an ICT curriculum for Tuvalu schools in recognition of the significance of ICT in the modern world. The young generation of Tuvalu must be ICT oriented and 'computer literate', and leaders in today's digital economy. The Ministry of Education believes that ICT can act as a medium to bring the outside world into the classroom, through photos, animation or video clips, thereby immersing pupils in real life contexts. This will in turn model their perception on a more concrete and up to date understanding of the real world 'out there', thus enabling them to visualise concepts in a more constructive approach.

Background

According to the definition given by UNESCO in 2003–04, ICT in terms of telecommunications that should co-exist in primary and secondary schools covers several forms: phones, faxes, radio, tape recorders, computers and videos. Schools are using these facilities only as supporting resources, for enriching the teaching and learning of the main subjects in the school curriculum, like the teaching of English as a Foreign Language (TEFL). For instance, as there is no School Broadcasting Unit in the Ministry of Education, the Tuvalu Australia Education Support Project (TAESP) supplied all primary schools with a tape recorder and radio. The main purpose of this is for teachers to record whatever lessons they presented to their classes in their respective schools, and send back the recorded lessons to the Education Department on Funafuti to be broadcast on the national school broadcasting programme every week. This process reflects the sharing of teaching methodologies, likewise allowing a wider range of pupils to learn through this sharing process. Furthermore, the TAESP has also supplied all primary schools with phone-facsimile equipment, thus assisting with communicating with Funafuti and the outside world. A few of the primary schools also have computers, which were provided by parents. These are used only for the schools' administration, but not for computing lessons.

The Ministry of Education provided a few computers for the only government secondary school, Motufoua, again for the school administration and for teachers to use in lesson preparation, but not for teaching computing as a subject. Motufoua Secondary School has a digital camera and its main use is for the production of the school magazine. The provision of that equipment [digital camera] to Motufoua School allows teachers to have 'hands on' experience in its use. But in turn, some of the knowledge acquired will flow on to the students, who may through guidance from the teachers become familiar with film making processes in structuring their scripts for drama or concerts, and especially for

magazine items. Thus they may learn techniques as simple as the development of a storyboard with annotations. Students work collaboratively to create scenes. They move the characters within the scenes, and the story line evolves as they discuss changes to their original story.

ICT can also be used as a resource to enrich and extend design and technology teaching and learning.

The ministry aims to plan the ICT curriculum strategically, considering when, where and why the use of ICT might be appropriate.

Current constraints and future vision

The severe financial constraint is the deciding factor that discourages the development of an ICT curriculum in schools, as the Ministry of Education is well aware that the ICT curriculum is not only the development of the curriculum, but also the improvement of infrastructure and provision of materials. Lack of capacity building in ICT is in itself another constraint, which needs to be tackled in terms of special training.

The Ministry of Education encourages the development of ICT since it assists pupils' learning in design and technology by:

enhancing their capability to explore, develop, communicate and present their ideas
providing a range of information sources to support their development knowledge
providing tools, equipment and components for designing, such as modelling
encouraging design awareness using technology.

The Ministry of Education notes the important role ICT can play in improving the level of literacy in primary schools. On-screen grid software can be a powerful tool in supporting pupils whose literacy skills are poor. Whole words, pictures and even sounds can be assembled on the grid and the students select them using a mouse or switch, to create a message. The software program 'Clicker', which has a wide range of prepared grids, can help students begin to overcome some of the problems that cause low literacy skills: poor spelling, lack of vocabulary acquisition skills and poor writing skills. As a consequence of these problems, they have difficulties in recording their work and expressing themselves. In such a situation, the Clicker program enables them to record and communicate independently, using prepared grids of words and pictures with colour-coded cells that are created to assist them access specific areas of the curriculum. They can also listen to the words in the grid before choosing them. The same software Clicker can read the students' work back to them. These students work largely independently and their teacher updates the grids when needed. Using the software Clicker program would support the Motufoua Secondary School students with poor literacy skills, enabling them to complete prepared survey forms, questionnaires and other cloze passages in other subject curricula like English, Mathematics, Science, etc. They could select key words and phrases from different grids to enter text into the prepared document.

On the other hand, through ICT education, teachers' teaching aids and references for effective lesson presentation will be well supported, as accessibility of teachers to webbed-resources will be improved.

Curriculum
As already mentioned, the development of the ICT curriculum is not yet in place. However, the ICT curriculum development is a priority in the ETSMP, which is now in the stage of being finalised.

Career development of teachers
In 1998 the Education Department conducted a computing workshop for all primary school headteachers and assistant headteachers. The main purpose of this workshop was to introduce the basic computing concepts to the teachers in order to enable them to use the computers, which were used only for administration tasks. Due to the digital divide, some of these computers were in use for a very short period of time.

Most teachers at Motufoua Secondary School are graduates from the USP, and a couple of them had acquired some degree of literacy in computing. These teachers will be of assistance with realising the intention to introduce an ICT curriculum to the schools soon. Likewise, the students' results from the school are analysed and presented in statistical format, and it is intended that those who have acquired the skills will be able to share them with others, so that the computers may be utilised more widely, to lessen the burden.

Accessibility
The development of the database for the Tuvalu primary school system commenced during the year 2002 following approval of this TAESP activity in 2001. Prior to the installation of the database, TAESP prepared a questionnaire that builds on the structure of the database. Pilot questionnaires were sent out to all primary schools in Tuvalu for completion, and returned to the Education Department for compilation and inputting into the database for further analysis and development. The effective and efficient inputting of responses has been hindered by the infrequent transportation links, and the geographical dispersion of the outer islands. The questionnaire now in use is basic, covering only the major items necessary to gain an overview of the primary system, excluding the examination results. We have therefore developed the database from these, and the result is also basic, simple and user friendly, but of the expected high quality. Throughout the development of the database, we were fortunate in the calibre of the experienced consultants who have worked with Basic Education Management and Teacher Upgrading Project (BEMTUP) in Fiji and relied on their previous contacts with Griffith University.

The first visit of the adviser for a period of two weeks was in April 2003. His time was taken up by reviewing the installation of the new equipment, the database and the initial training of the relevant staff in data entry and use of database. That coincided with the arrival of the first set of data from schools for the academic year 2002. To complete the training adequately, it was suggested that the adviser extend his visit and a period of ten days was proposed for later in 2003 in order to consolidate what had been done in April 2003. A further visit for ten days in 2004 was also suggested, to coincide with the collection of data and data-entry in Tuvalu. The second visit in 2003 was to carry out further training on the appropriate use of the database, interrogation of the database, report writing, and any revisions to the questionnaire for the 2004 data collection exercise. The third visit of ten days in April 2004 was to follow the collection of 2003 data, and concentrated on data entry only, and further training in the use of and interrogation of the database. It was noted that the 2004 visit was the first where local staff actually have the opportunity to carry out their own data entry and interrogations.

Implementation and Finance
All the activities conducted by the TAESP during the primary schools data collection and entry were funded by AusAID. An A$12,000 grant was set aside for the development of the questionnaire and database, and a further grant of A$12,845 was set aside specifically for in-country installation and training on data entry and use of the database. It was the view of both Government and AusAID that the proposed system should not complicate things: it should be simple and easy to install. The training component should also be easy and straightforward. It was the general consensus that there are different views between gathering of data from schools and inputting them, which was to be a relatively simple matter. No matter what size your system is, once you have set a database with a series of inputs, and identify what is required, it does not matter whether you have ten schools or 100 schools; the work on the custom database and the training will be the same. This was fully appreciated at the time of costing these activities.

The Capacity of the Ministry in charge ICT education
As yet there are no staff members in the Ministry of Education with special qualifications in ICT education. It is not unjust to say that at this point in time, the Education Department's human resources have only very basic and limited ICT skills. Thus it is the intention to up-skill them.

The five positions that are being filled include:

Director of Education (DOE)
Senior Education Officer, Assessment and Examination (SEOAE)
Senior Education Officer, Curriculum (SEOC)
School Supervisor (SS)
Early Childhood Education Officer (ECEO).

The DOE administers the Department and issues policy directions; the SEOAE handles assessment and examinations, and maintains the database. The SEOC administers curriculum in all subjects (Primary and Secondary schools). The ECEO handles pre-school education.

Community
There are two private schools on Funafuti with ICT programmes. They are the MKH Typing School and Motulalo Internet Café. These schools train school leavers in word processing and other computing skills. Through these computing lessons participants can acquire the necessary skills, and are able to find employment at clerical or junior levels in either government departments or private organisations.

Conclusion
In conclusion, the long-term objective of the Ministry of Education and Sports is to develop ICT as a curriculum course to be taught in classes at both primary and secondary level. The effective implementation of this vision depends on the ease with which funds can be availed from both government and donor partners.

5.11 VANUATU

Prepared by Mr. John Niroa, Ministry of Education

Ministry of Education

The Vanuatu Ministry of Education (MoE) supports and has in its policy the introduction of ICT into schools. The Ministry, however, has not done anything substantial to realise this.

Schools

There are around 10,000 students in secondary schools and 40,000 in primary schools. They are scattered through out the archipelago of 83 inhabited islands. Out of a total of 77 secondary schools (government, government assisted and private) only one offers the PSSC (Pacific Senior Secondary Certificate) computing studies course. This is possible only through the school's own initiative, not as a matter of government policy.

Most of the other secondary schools (about 50) have computers that are mainly for administration purposes. There is no systematic uniform data program in use; each school uses what it has available. In secondary schools, there is a French assistance program funded by the French government that has put a database into French speaking schools. It is hoped that this program will also be introduced to English speaking secondary schools as from this year, 2005.

Regarding ICT use, any development that goes on in any of the schools up to now has been purely the initiative of the school administration. They are left to fend for themselves in financing, personnel and facility resourcing.

Difficulties/challenges

1. It is difficult for schools to house ICT equipment in good conditions. There are no proper facilities to keep them in good conditions, for example no air conditioning, despite the hot humid climate, and often no thoroughly dry rooms. Such poor conditions mean that the equipment itself rapidly declines into a bad condition!

2. Once any of this equipment breaks down, most of the schools have no easy access to technicians to have it fixed. It is an expensive exercise to air freight these out-of-service items to Vila or brings a technician out to the outlying schools to get them fixed. Once they are out of order, the school normally does not have another to be used as a 'reserve' until repairs can be attended to. Maintenance is a constant problem.

3. There is a lack of human resources in this area. The school that is providing the PSSC computing course depends on teaching provided by a Peace Corps Volunteer. No local teachers are currently available to render these services in other schools.

4. There is no supporting system in place at the moment to assist schools in any of these identified problem areas.

APPENDICES

ANNEX 1: Regional Workshop on ICT in Education Programme

OVERVIEW (Facilitator – Dr. Esther Williams) **Tuesday 25th January**

9-9.10am	Welcome and Introduction Dr. Esther Williams – Pro Vice Chancellor (USP)
Official opening	
9.10-9.20am	Professor Rajesh Chandra – Deputy Vice Chancellor (USP)
9.20-9.30am	Mr. Tadashi Ikeshiro – JICA Resident Representative
9.30-9.45am	Overview of the ICT Capacity Building @ USP Project Ms. Maki Kato – Coordinator ICT Capacity Building @ USP Project
9.45-10am	Participant/Staff Introduction
10-10.45am	**Refreshments**

Session 1: Current Status of Pacific ICT in Education (Facilitator – Ms. Maki Kato)

10.45-11.30am	Findings of Evaluation of CS Curriculum in Fiji Schools Research Dr. Esther Williams – Pro Vice Chancellor (USP)
11.30am-12.15pm	Current status and general trends of the Pacific ICT in education Dr. Salanieta Bakalevu – Instructional Designer (USP)
12.15-1.30pm	Group Discussion
1.30-2.30pm	**Lunch**

Session 2: Universal Access (Facilitator – Dr. Esther Williams)

2.30-3.30pm	Hardware, Software and Connectivity issues Mr. Kisione Finau – Director, Information Technology Services (USP)
3.30-4pm	**Refreshments**
4-5pm	Group discussion

CURRICULUM DEVELOPMENT **Wednesday 26th January**

Session 3: Curriculum Development (Facilitator – Mr. Prakash Narayan)

9-9.45am	Integration of technology in schools – the Smart School approach Mr. Abdul Shafeel – Teacher, International Secondary School
9.45-10.30am	The NIIT at School – Model and Curriculum Mr. Yashwant Gaunder – National Institute for Information Technology
10.30-10.45am	**Refreshments**
10.45-11.30am	Information Systems Curriculum Structure Dr. Jito Vanualailai – Mathematics & Computing Department (USP) Computer Science Curriculum Structure Mr. Prakash Narayan – Mathematics & Computing Department (USP) A USP/JICA e-learning course and what is computing? Mr. Atish Chand – Mathematics & Computing Department (USP) 11.30am-12.30pm Group Discussion
12.30-1pm	**Lunch**
1-5pm	Field Trip to Tailevu North High School Mr. Iosefo Volau – Principal Tailevu North College

TEACHER'S CAREER DEVELOPMENT **Thursday 27th January**

Session 4: Teacher Training Opportunities (Facilitator – Dr. Salanieta Bakalevu)

9-9.45am	Preparing Teachers for ICT in Education

	Dr. Muralidhar – Education & Psychology Department (USP)
9.45-10.30am	Teachers Career Development Opportunities in Fiji Mr. Josefa Natau – Director TVET
10.30-10.45am	**Refreshments**
10.45-11.30am	Building Information in the Curriculum Ms. Victoria York – Librarian (USP)
11.30-1pm	Group Discussion
1-2pm	**Lunch**

Session 5: **Finance and Implementation** (Facilitator – Dr. Salanieta Bakalevu)

2-2.45pm	Fiji Telecentre Movement Ms. Fani Vosaniveibuli – Telecom Fiji
2.45-3.30pm	Cost Estimation of ICT education: Laboratory and Networking Ms. Maki Kato & Mr. Maharaj – ICT Capacity Building @USP
3.30-4pm	**Refreshments**
4-4.30pm	The PRIDE Project at USP Dr. Mahendra Singh

DISCUSSION **Friday 28th January**

Session 6: **Policy Formation** *(Facilitator – Dr. Esther Williams)*

9-4pm	Presentation of Action Plans
6pm onwards	COCKTAIL

WRAP UP (Facilitator – Dr. Fua) **Saturday 29th January**

9-11am	Initiative creation
12-2pm	**Evaluation**

ANNEX 2: Regional Workshop on ICT in Education Participants

FULL NAME	OCCUPATION	COMPANY
1. Luisa Kaumaitotoya	Academic Head	APTECH
2. Primita Singh	Technical Coordinating Officer	APTECH
3. Padric Harm	Activity Manager	AusAID
4. Stacy Tennant	Second Secretary	AusAID
5. Salabogi Mavoa	MIS	FIT
6. Monika Driu-Fong	Human Resource Policy Officer	Forum Sec.
7. John Budden	Economic Infrastructure Adviser	Forum Sec.
8. Alex Konrote	Research Associate	JICA
9. Satoshi Wakasugi	Asst. Resident Rep.	JICA
10. Franco Bordie	Curriculum Officer	Min.Education Solomon Is.
11. Jarden Kephas		Min. Education Nauru
12. Floria Detabene	Principal	Min. Education Nauru
13. Rosemarie Esera	Principal IT Officer	Min. Education Samoa
15. Doreen Tuala	Asst. CEO	Min. Education Samoa
14. Apisai Mahe	Education Officer	Tonga
16. Joe Nainima	Programme Manager	Min. of Education – Fiji
17. Josefa Natau	Director	Min. of Education – Fiji
18. Vilimone Dranivesi	Snr. Education Officer	Min. of Education – Fiji
19. Alisi Katoanga	Snr. Education Officer	Min. of Education Tonga
20. Valisi A Tovia	Snr. Education Officer CDU	Min. of Education Tuvalu
21. Christopher Person	Director IT	Min. of Edu. Marshall
22. Pritesh Chandra	Server Administrator	NIIT
23. Romika Prasad	Asst.Accnt.	NIIT
24. Yashwant Gaunder	CEO NIIT	NIIT
25. James Poihega	Teacher	Niue Education Dept.
26. Jeini Taoba-Mitimeti	School Teacher	Niue Education Dept.
27. Sumeet Chand	Academic Coordinator	NZPTC
28. Meeta Khatri	Lecturer – IT	NZPTC
30. Hermant Prasad	Snr. Training Officer	TPAF - Fiji
31. Ana Taufuelungaki	Director, IOE	USP- PRIDE Project
32. Atish Chand	Lecturer - MACS	USP- Maths & CS Dept
33. S. Muralidhar	Assoc. Professor	USP- Edu. & Psychology
34. Jito Vanualailai	Head of Maths/Computer Sc. Dept	USP- Maths & CS Dept.
35. Linda Austin	Resource coordinator,	USP – Media Centre
36. Victoria York	Librarian	USP - Library
37. Esther Williams	Pro Vice Chanceller	USP- VC Office
38. Rajesh Chandra	Acting Vice Chancellor	USP – VC Office
39. Prakash Narayan	Lecturer - MACS	USP – Maths & CS Dept
40. Maki Kato	Coordinator	USP/ICT Project
41. Hiroshi Kuriowa	Chief Advisor	USP/ICT Project
42. Kisione Finau	Director	USP/ITS
43. Seu'ula Johansson-Fua	Fellow in Leadership & Research	USP/Pride project
44. Sereana Tagivakatini	Fellow	USP/Pride project
45. Mahendra Singh	Project Manager	USP/Pride project
46. Ateca Williams	College Director	USQICF
47. Iosefo Volau	Principal	Tailevu North College

ANNEX 3: Computer Studies Prescription - Ministry of Education, Science & Technology Fiji School

Rationale

In this age of Technology, the computer has the potential of opening a wealth of information for all people. As society becomes increasingly centered on the creation and flow of information, the computer becomes increasingly essential as the primary tool for managing this information. It is essential for the education community to be knowledgeable about the computer, its uses and limitations. The business world is rapidly incorporating the computer in all aspects of its operations. The students leaving Fiji schools will need to be informed about computers whether they will be seeking employment of continuing into tertiary studies.

This prescription assumes that, whether at home or in previous schooling, the students will have had limited opportunities with computers. The course is built to be flexible and provide a wide range of individual and group activities. Computer studies will emphasize the computer as a tool to be used in personal development as well as the world of work.

Aims

The aims of this prescription are to provide the student with opportunities to:

(a) Become familiar with and understand the basic features of computers.
(b) Develop skills to use the computer creatively.
(c) Develop logic and problem-solving strategies in a variety of situations.
(d) Use the computer and commercial software as a tool in writing (word-processing), and number intensive calculations (spreadsheet)
(e) Explore the social and economic implications of the computer
(f) Become aware of the availability of the information that is electronically stored, updated and manipulated by computers, as well as the potential for the misuse of information about individuals.
(g) Evaluate their own attitudes and values as these relate to possible uses and abuses on computer technology in society.
(h) Become aware of different types of computer related careers and their basic educational requirements.

General Learning Objectives

The learning objectives of the prescription are to develop and assess the students' ability to:

(a) Set up a personal computer and its peripherals.
(b) Effectively use the basic features of a word processor.
(c) Use a database to process data and information.
(d) Use graphs for effective and graphics presentation.
(e) Choose the most appropriate application tool or language to solve a given problem.
(f) Solve problems by designing and creating simple computer application models e.g. a simple spreadsheet.
(g) Recognize the major hardware and software components of a computer system
(h) Explain the functions of the basic hardware and software components of a computer system.
(i) Define and use correct computer vocabulary when communicating about computers.
(j) Show and understanding of the nature, functions and use of common software programmes.
(k) Discuss the positive and negative impact of computers on society and suggest ways in which the negative impact maybe minimized and the positive impact maximized.
(l) Discuss the future of computers.
(m) Appreciate the role of computer technology in schools, home, business and society in general.
(n) Value the computer as a tool for enhancing learning and efficiency in the education setting.
(o) Become aware of the advantages and limitations of computer technology.
(p) Appreciate the trends and developments in computer and information technology.
(q) Draw simply flow charts to help solve problems.
(r) Demonstrate knowledge of a computer language by writing, debugging and running simple programs to solve specific problems.
(s) Appreciate the value of hardware and software and the importance of maintaining them in a suitable manger.
(t) Be wary of the dangers of incorrect use of handling computers and their peripherals.

Course Content
[Note: The T and P extensions designate Theory and Practical units respectively. The prescription assumes at least 200 minutes (or 5 40-minute periods) of instruction each week divided between theory and practical. Units 1 though 3 to be taught the first year. The second year concentrating on Units 4 through 6.]

Form Five and Six

Unit 1- T: Structure and Functions of a Computer.
Aim:
To enable the student to understand the basic parts of the computer, their use and care.

Content:
1T.1 Major functions and parts - Input, Output, Storage, Central Processing Unit, Memory, Floppy Disk Drive, Hard Disk Drive, Monitor, Keyboard, Mouse, Printer.
1T.2 Types of Computers - Micros, Minis, Mainframe, Super Computers
1T.3 Operating Systems - Purpose, DOS.
1T.4 Application Software - Word Processing, Spreadsheet, Business, Games, Typing, Tutors, Inventory.
1T.5 Limitations of Computers

Unit 1-P Using the Computer
Aim:
To help the student become proficient in using the computer.

Content:
1P.1 Guidelines for care of the computer - Proper working environment, care of floppy disks, cleaning disk drive, use of printer.
1P.2 Keyboard Skills - Use of keyboard tutor program to increase keyboard skills.

Unit 2T: History of Computers
Aim:
To provide the student with information on the development of computers from the earliest days until today. To enable the student to understand that innovations (inventions)and development of new technologies came about in response to the needs of society.

Content:
2T.1 History and Development of Information Processing, computer hardware, computer software, information systems, data, data entry, data bases, data processing, output.
2T.2 Applications of computers in various fields e.g. education, medicine, law and law enforcement, economics, airlines, government, insurance, art and music.
2T.3 Latest trends in Computer Usage

Unit 2P: Word Processing
Aim:
Students should have the ability to produce letters and reports using a word processor. Students should be able to input text using a keyboard at a sufficient rate.

Content:
2P.1 Keyboard skills development using appropriate software
2P.2 Retrieving and saving a document
2P.3 Creating a document
2P.4 Printing a document
2P.5 Document editing - Display existing document, Moving the cursor, Strike over (type over) text, Insert text, Delete text, Move text, Copy text
2P.6 Advanced word processing skills - Centre text, Underline text, Bold text, Indent text, Search and replace text, Use a spelling checker, Use fonts and graphics
Remarks: This unit may be used to create documents for other subjects' e.g. English, History etc.

Unit 3T: Computers and Information Processing

Aim:

To assist the student to recognize how the computer can manage, store and retrieve vast amounts of information.

Content:

3T.1 Information - Definition, Use in Business, Banks, Libraries, government
3T.2 Information Retrieval -File, Records, Field, Database
3T.3 Managing Information -Fields, Records, Sorting, Searching, Boolean Logic

Unit 3P: Information Processing

Aim:

To provide opportunities for the student to actively engage in information processing.

Content:

3P.1 Using an existing database -Searching records, sorting records, print formats, printing requested information.
3P.2 Creating a database - Develop a simple database (i.e., library books, video rentals, student records, school inventory.

Unit 4T: Programming

Aim:

To familiarize the student with the tools and techniques of programming. To introduce the student to the BASIC programming language.

Content:

4T.1 Languages -Machine Language, Compiled Language, Interpreted Language, LOGO, BASIC.
4T.2 Program planning - Problem specification, decomposition and algorithm designs
4T.3 Programming Language – BASIC, commands: DELETE, EDIT, FILES, LIST, LLIST LOAD,"RENUM, RUN, SAVE" SYSTEM, BASIC keywords: CLS, END, FOR….NEXT, GOSUB….RETURN, GOTO, READ, DATA, IF, INPUT, LET, PRINT,REM.
4T.4 Data types -Numeric, alphabetic and alphanumeric
4T.5 Arithmetic operators - Addition, subtraction, multiplication, division, exponentiation, order of operation.

Unit 4P: Programming

Aim:

To enable the students to write simple structured programs in BASIC. To develop debugging skills in the student.

Content:

4P.1 Writing simple structured programs in BASIC, entering the program into the computer, saving the program, loading the program.
4P.2 Subroutines and parameters - FOR……NEXT,GOSUB…..RETURN,
4P.3 Predicting output -Output and its layout (format).
4P.4 Debugging and correcting syntax errors, finding and correcting errors in program logic.

Unit 5T: Computers in Society

Aim:

To study the present and potential uses and significance of computers in society. Be able to discuss the psychological, organizational, ethical and legal issues arising from the introduction of computers.

Content:

5T.1 Computerization of Society
5T.2 Privacy of information
5T.3 Computer-based crime, hacking
5T.4 Computer security
5T.5 The computer virus

Unit 5P: Spreadsheet
Aim:
The student will understand the purpose of the spreadsheet and its application in a variety of tasks. The student will create and use simple spread sheets.

Content:
5P.1 Entering information - Enter text in a cell, Enter a number in a cell, Enter a formula in a cell, Adjust column width, Insert columns or rows, Save and retrieve a worksheet
5P.2 Using information - Make a copy of a range of cells, Move a range of cells in a work sheet, Sort a range of cells, Format a range of cells, Print a work sheet
5P.3 Creating graphs - Create and view a graph, Save a graph for later printing, Print a graph
5P.4 Data query - Select specific information, Modify selection criteria

Unit 6T: Computers and Careers
Aim:
To investigate the use of computers in fields apart from computing. To introduce the students to the concepts of networking and data communications. To investigate the work of computing professionals.

Content:
6T.1 Computers in Other Fields - Research using CD-ROM, Music with MIDI, Writing/Composition, Foreign Languages, Art, Computer Simulation, Mathematics, Robotics, Artificial Intelligence, Drafting using CAM/CAD, machining using Numerical Control.
6T.2 Data Communication and Networks
6T.3 Management Information Systems (MIS)
6T.4 Jobs in Computing - MIS Manager, Operations Manager, Programmers, Analyst, Librarian, Data Entry Operations, Salesman, Technician, trainer/Educator etc.
6T.5 Career path of computing professionals.

Unit 6P: Intermediate Concepts and Optional Applications
Aim:
To expose the students to computer applications. To familiarize the student with commonly used DOS commands.

Content:
6P.1 DOS commands
DIR, FORMAT, CHKDSK, COPY, RNAME, ERASE, DISK COPY, DATE, TIME, CLS, MKDIR, CHDIR, RMDIR, TYPE, PRINT, MORE, REPAIR, RESTORE, VER, PROMPT, AUTOEXEC.BAT, CONFIG.SYS.
6P.2 Education Software
6P.3 Desktop publishing, Graphics, Graphics User Interface (GUI)

EVALUATION
A. INTERNAL ASSESSMENT
a.1 The practical assessment will weighed 30% of the total score. The teacher will maintain a file of the student's assignments on the Practical Units during the two year course of study. Word processing and spread sheet will each be 10% of the score. Programming and other applications will each be 5% of the practical score.

B. EXTERNAL EXAMINIATION
b.1 There will be a three hours written examination at the end of the two year course of study.
b.2 The written examination will account for 70% of the total score. The examination will include questions that will test the specific objectives. Questions will be derived from the following categories.
Multiple choices, Short paragraphs, determining the outputs of computer programs, Debugging simple computer programs and Structured programming.

b.3 Each of the units within the prescription will be examined and the maximum marks attributable to each will not normally exceed:

Unit	1T	Structure and Function	8 marks
	1P	Using the Computer	10 marks
	2T	History of Computers	5 marks

2P	Word Processing	10 marks
3T	Computers and Information	5 marks
3P	Information and Processing	10 marks
4T	Programming Methods	5 marks
4P	Writing Programs	10 marks
5 T	Computers in Society	7 marks
5P	Spreadsheets	10 marks
6T	Computers and Careers	10 marks
6P	Intermediate Concepts	10 marks
	WEIGHED TOTAL	**70%**

POSSIBLE SUBJECT COMBINATION INCLUDING COMPUTER STUDIES

Science Track
Two of the three sciences [Biology, Chemistry, Physics] English, Maths, Computer Studies

Business Track
English, Maths, Accounting, Economics, Computer Studies
Arts Track -English, Maths (optional), History, Geography, Computer Studies
General/Vocational Track - English, Maths (optional), Clothing/Textiles, Food/Nutrition, Wood Technology, Engineering and Computer Studies

Implementation Guidelines
Computer education is a relatively expensive exercise which demands careful planning at the outset. It requires good management of both physical and human resources to ensure the implementation and maintenance of a meaningful and beneficial computing Programme. This is even more important in the light of the numerous constraints currently faced by schools and their managements.

The purpose of the following guidelines is to inform all concerned of the many facets of computer education. Plans for school programmes must take into account the changing nature of computer technology. This means that allowances must be made to suit the demands of changing circumstances. Lastly, if a school is to properly manage, organize, and budget for computer education, it is essential that those making decisions in these areas have some awareness of the needs, scope, rationale, and issues of mounting an examinable computer studies course.

1.0 Hardware

1.1 Minimum Configuration
The recommended minimum configuration for computer hardware is as follows:
386SX processor, 25 MHz, 4 MB-memory, 40 MB-memory, 3.5” 1.44 MB floppy drive, Color VGA screen, MSDOS 5.0 and Mouse
This minimum configuration will be assessed on a regular basis in relation to the current situation.

1.2 Purchase
When buying on their own, schools are advised to consult the Computer Education Centre (CEC) if they are not certain about how and what to purchase. Normally, vendors will install computers at the site.

1.3 Support and Repair
While it is not possible for the CEC to provide support services for hardware, schools will depend on outside vendors for support. Schools are therefore advised to be assured of hardware support by vendors that they purchase from.

Replacement Policy
Computer equipment is different from most other hardware in the speed at which it becomes obsolete. By its nature, there is little value in teaching computing with outdated systems. For these reasons, it is important that schools consider and adopt a policy that will ensure that replacement of computers on a regular basis.
After five years at the very outside, maintenance costs will be unreasonable high in relation to the cost of the computers. Thus computer replacement will be required, and funding for this should be built into any budget of future programme costs. Old computers could be sold at auction to recoup some of the cost.

1.5 Power Supply

Equipment providing adequate power protection should be installed with the computer hardware to insure good quality electrical power thus protecting the computers from premature failures. This probably means that in most areas served by FEA, a simple filter that removes electrical spikes will be sufficient. Where power is supplied by a generator, full voltage stabilization will be necessary. Uninterruptible power supplies which provide continued operation in the event of a power failure are not recommended. The additional expense of this equipment cannot be justified.

2.0 Software

2.1 Purchase

The CEC will assist by purchasing shareware and freeware which can be distributed freely to schools. It will also evaluate software and recommend them to schools. Schools are encouraged to purchase software on their own. The purchase of any prescribed software will be a school's responsibility unless otherwise stated by the ministry.

2.2 Licensing

Buying software usually means purchasing the license (or right) to use the software on one computer. Schools are advised that all software used should be properly purchased and licensed. This enables the provision of manuals and additional copies of software.

3.0 Computer Room

A separate and well equipped computer room will facilitate student learning, classroom organisation, and proper care for the computers. A room for storage is essential and a white board is recommended to prevent dust. Air conditioning helps in maintaining the life of the machines. Should needing help on the layout or set up of a computer room may seek help for CEC.

4.0 Ratio of Students per Machine

The maximum number of students per machine in a computer class is two (2). This ratio is necessary to insure that students have sufficient time to interact with the computer.

5.0 Time Allocation

5.1 A minimum of five (5) 40 minute periods per week

5.2 The recommended minimum time allocation for each unit is as follows:

Unit		
1T	Structure and Function	3 weeks
1P	Using the Computer	5 weeks
2T	History of Computers	2 weeks
2P	Word Processing	11 weeks
3T	Computers and Information	3 weeks
3P	Information Processing	7 weeks
4T	Programming Methods	2 weeks
4P	Writing Programs	7 weeks
5T	Computers in Society	2 weeks
5P	Spreadsheets	11 weeks
6T	Computers and Careers	3 weeks
6P	Intermediate Concepts	6 weeks
	Total	**62 weeks**

ANNEX 4: Description of Computer Literacy I Course: Republic of the Marshall Islands

The aim of this one-year course is to provide the students intensive studies of the basics of three applications:

The first is the **word processing** application; which is a program that turns the computer into a "smart typewriter" by entering words into a file just by typing them on the keyboard, after which special word processor commands make it a simple task to scroll through the text, search for a word or phrase, and make changes in what has been written. For most students the hardest part of writing is making changes. Without a computer that means having to erase or scratch out words and then pencil in new words. After a few changes the paper looks messy. One may have to rewrite or retype the whole paper several times; thereby making it easy to become discouraged and give up when even more changes are needed. The program makes any changes anywhere needed by simply using a few keystrokes. When satisfied with the results, a printout of the new version may be obtained.

Another application, **database**, is a program which helps get useful information from a large collection of data. Familiar databases are address books, the card catalog in a library, an almanac, or a collection of baseball statistics. Using a database means searching for whatever is desired. Without the computer, the data is usually organised for only one kind of search. When a database is in a computer system, searching is easy. With a single command data can be reorganised to suit needs.

The last aim is to have the students understand the **spreadsheet** application; which is an application that deals with files containing collections of numbers. This program gives special tools for working with numbers in a table. These tools make it easy to add a column of numbers, calculate an average, or multiply two numbers. A computer spreadsheet does the same things a student would do with a paper, pencil and calculator, but it does these things in seconds and without errors.

TEXT AND MATERIAL USED IN COMPUTER LITERACY 1

1. Appleworks Word Processing: A hands-on guide by: Computer Literacy Press
2. Appleworks Database: A hands-on guide by: Computer Literacy Press
3. Appleworks Spreadsheet: A hands-on guide by: Computer Literacy Press
4. Supplementary material

COMPUTER LITERACY I COURSE OBJECTIVES

General Program Objectives

1. To provide the student with the initiative to explore computer literacy in their community and in their world,
2. To aid the student in acquiring skills and the ability to communicate with others in understanding the computer's roles in everyday living.
3. To assist the students to be able to recognise their computer literacy resources which they already possess, so that they will be able to strengthen these skills and at the same time recognise their weaknesses and work on them.
4. To present to the students the distinction between truly understanding the functions of a computer and just operating a computer.
5. To assist the students in understanding the difference between computer applications and integrated computer applications.
6. To serve as the pre-requisites for acquiring more advanced computer skills and to prepare the student to handle more complex content of the study of Computer Literacy II.

Skill (Specific) Objectives

1. The student will become fluent in the functions and usage of the keyboard and keyboarding activities.
2. The student will be able to recognise the hardware that makes up a computer system.
3. The student will be able to understand the difference between software types for a computer system.
4. The student will be able to start-up and shut down the computer correctly.
5. The student will be able to formulate their need in choosing an application for necessary work.
6. The student will be able to distinguish between the applications used.

7. The student will learn to use the appropriate commands to access special functions provided by the program.
8. The student will feel comfortable starting up a new program and following the directions to complete it.
9. The student will be able to ask specific/crucial questions in the understanding of computer applications.
10. The student will be able to provide printouts on paper of any application they choose and material in which is chosen.
11. The student will be able to manipulate the computer commands to change printouts or computer screen.
12. The student will be able to control the output of their data using any of the three applications.

Methods of Computer Literacy 1 Course

1. Opening of class activity.
2. Preparation of computer literacy terminology and application terminology selection.
3. Discussion of terminology and visual aids plus hands-on training.
4. Continued activities with the use of terminology including oral, written and visual aids.
5. Homework/assignments/class work/ (individualised).

Contents of Computer Literacy 1 Course

1. Keyboarding/Typing
2. Computer Hardware
3. Computer Software
4. Following Directions
5. Computer Programs
6. Word Processing Application
7. Database Application
8. Spreadsheet Application
9. Computer Aided Instruction Software
10. Computer Graphics Programs
11. Computer Educational Games
12. Computer Arcade Games

Evaluation of Students in Computer Literacy 1 Course

1. Completion of written assignments
2. Class work
3. Application quizzes
4. Application tests
5. Literacy quizzes/tests
6. Weekly Laboratories
7. Special quarterly projects
8. Class involvement

Grading System for Computer Literacy 1 Course

1. 10% HOMEWORK
2. 15% QUIZ
3. 20% CLASS PARTICIPATION
4. 25% TEST
5. 30% FINAL EXAMINATION

Grade Distribution for Computer Literacy 1 Course

A: 90 – 100%
B: 80 – 89%
C: 70 – 79%
D: 60 – 69%
F Below 60%

ANNEX 5: Description of Computer Literacy II Course: Republic of the Marshall Islands

The aim of this course is to provide the students intensive studies of the basics of BASIC computer programming, in addition to continued computer literacy. Computer programming is the study of technical and logical aspects of computer software and its relation to the systems that will be used. Programming is a tool that is both beneficial to the students in their other course work while in high school, but it also its applicable to events in everyday life.

Computer programming is writing instructions for your computer. The entire set of instructions you give to a computer to make it do something is the **program**. A computer language is similar to the language that people speak. It has a vocabulary and syntax—word order and spelling are very important. The programming language used is called BASIC. BASIC is an acronym for **B**eginners' **A**ll-purpose **S**ymbolic **I**nstruction **C**ode. The computer reads the BASIC instructions typed on the keyboard, and then it does exactly what it is told. It is easier to learn BASIC than a human language because BASIC has far fewer words, and its grammar is usually straightforward.

When students learn to program, they discover that a computer is not really magical (although it certainly seems that way at times); it is just following the instructions that are given to it. When students program a computer, they make it do what they want it to do—thereby creating their own magic. Students learn a lot about how a computer works as they learn to program it. That gives them a better understanding of what their computer can do. Finally, students might find that programming is something that really intrigues them and stimulates their own creativity in ways they never thought about. They may eventually decide to become a professional programmer.

PREREQUISITE COMPUTER Literacy 1

Text and Material Used in Computer Literacy 2

1. Computer Literacy – with an introduction to BASIC programming. Harcourt Brace Jovanovich, 1986.
2. Learning BASIC for the IBM Computer system, David A. Lien, 1988.
3. Basic BASIC – Computer Programming in BASIC Language, James S. Coan. 1978.
4. Supplementary material

COMPUTER LITERACY 2 COURSE OBJECTIVES

General Program Objectives

1. To provide the students with the initiative to explore computer programming in their community and in their world through seeing how software functions.
2. To aid the students in acquiring skills and the ability to communicate with others in understanding computer programming roles in everyday living.
3. To assist the students to be able to recognise the computer programming resources they already possess, so that they will be able to strengthen these skills of logic and at the same time recognise their weaknesses and work on them.
4. To present to the students the distinction between truly understanding the functions of computer software and just operating computer software.
5. To assist the students in understanding the differences between other computer languages.
6. To serve as the prerequisites for acquiring more advanced computer skills and to prepare the student to handle more complex content of the study of computer languages in college.

Skill (Specific) Objectives

1. The student will become fluent in the functions and usage of graphics programming and text programming.
2. The student will be able to distinguish different types of computer programs used in software, including a history of programming.
3. The student will be able to understand the difference between software types for a computer system.
4. The student will be able to write programs that can be used for simple home computing.
5. The student will be able to formulate their need in choosing the correct programming language they wish to study in the future.
6. The student will be able to learn about special features of the particular type of computer they are using.
7. The student will be able to see, through deductive reasoning, how to extend their knowledge

without the help of functions not yet covered in a core lesson.

8. The student will be able to present competently a relatively short program that students can enter into a computer and run. These programs will show what the computer can do; though the writing of such a program may be beyond the capabilities of other students, thereby giving more advanced students more difficult tasks in which to work.

Methods of Computer Literacy 2 Course

1. Opening of Class Activity.
2. Preparation of computer programming terminology and application terminology selection.
3. Discussion of terminology and visual aids plus hands-on training.
4. Continued activities with the use of terminology, including oral, written, and visual aids.
5. Homework/assignments/class work/ (individualised).

Contents of Computer Literacy 2 Course

1. Following Directions
2. Graphics Programming
3. Text Programming

Evaluation of Students in Computer Literacy 2 Course

1. Completion of written assignments
2. Class work
3. Programming quizzes/tests
4. Weekly Laboratories
5. Special quarterly projects
6. Class involvement

Grading System for Computer Literacy 2 Course

1. 10% Homework
2. 15% Quiz
3. 20% Class participation
4. 25% Test
5. 30% Final examination

Grade Distribution for Computer Literacy 2 Course

A: 90 – 100%
B: 80 – 89%
C: 70 – 79%
D: 60 69%
F Below 60%

ANNEX 6: Niue Information Technology Course Description

Year: **13 or Form 7**
Qualification: **NCEA Level 3**
Prerequisite: A minimum of 12 Credits or better in Level 2.

Course Description
Computer studies learning advanced skills in Word, Spreadsheet, Database, File Management and Web site design. Working on one-off technology solutions based on a client issue.

Achievement Standards	Title	I/E	Credit Value
90624	Develop and implement a one-off solution to address a client issue. Computer Based Training Solutions. SDL, Project planning, selecting packages for CBT	I	6
US 2785	Create a computer spreadsheet to provide a solution for organization use.	I	5
US 2787	Produce a computer flat file database to provide solutions for organization use.	I	5
90617	Develop a conceptual design to address a client issue in information and communication technology.	I	6
90685	Demonstrate advanced skills in information and communication technology/	I	3
Total: 25			

For Further Information:
HOD Information Technology

Technology

Year: **3 or Form 7**
Qualification: **NCEA Level 3**
Prerequisite: NIL

Course Description
This Technology course is divided into five modules. Each of these modules is based upon one Achievement Standard. Three of these Achievement Standards are internally assessed and the remaining two are externally assessed. Each Achievement standard carries a specified number of credits towards the National Certificate.

Achievement Standards	Title	I/E	Credit Value
3.1	Develop and model a conceptual design to address a client issue.	I	6
3.2	Develop and implement a one-off solution to address a client issue.	I	6
3.6	Demonstrate understanding of technological knowledge in Materials technology.	E	3
3.7	Demonstrate Advanced Skill in Materials Technology.	I	3
Total: 18			

For Further Information:
HOD Graphics and Technology

ANNEX 7: Structure for Certificate and Diploma Programs in Tonga

Programme Structure
The Certificates for Information Systems and Computer Science each requires 6 courses to be completed. The Diploma requires the six courses from the Certificate program as well as six additional courses.

Certificate in Information Systems

Semester 1

IT 131	Mathematics for Science
IT 141	Information Systems
IT 161	Professional Communications

Semester 2

IT 133	Introductory Statistics
IT 142	Introduction to Programming: Visual Basic .Net
IT 162	IT Research Project

Diploma in Information Systems

Semester 1

IT 233	Applied Statistics (PR IT133)
IT 244	Database Management Systems (PR IT141)
IT 256	Advanced Programming: Visual Basic .Net (PR IT142)

Semester 2

IT 235	Discrete Mathematics (PR IT131)
IT 245	Management Information Systems (PR IT141)
IT 262	Principles of Management (PR IT161, IT 162)

Certificate in Computer Science

Semester 1

IT 131	Mathematics for Science
IT 141	Information Systems
IT 151	Introduction to Programming: Java

SEMESTER 2

IT 133	Introductory Statistics
IT 142	Introduction to Programming: Visual Basic .Net
IT 152	Data Structures and Algorithms (PR IT151)

Diploma in Computer Science

Semester 1

IT 244	Database Management Systems (PR IT141)
IT 253	Computer Organisation (PR IT152)
IT 256	Advanced Programming: Visual Basic .Net (PR IT142)

Semester 2

IT 235	Discrete Mathematics (PR IT131)
IT 254	Design and Analysis of Algorithms (PR IT152)
IT 255	Special Topics

PR = Pre-Requisite

Course Syllabus Descriptions and Relevant Materials
All courses are required to meet for at least four hours a week for a fifteen-week semester.

Assessment methods vary with teacher. Most courses consist of a Mid-term and Final test/exam, as well as internal assessments such as quizzes, homework assignments and projects.

Certificate Level Courses

IT131 – Mathematics for Science (CS and IS)
Aim
To ensure that students are able to accomplish problem solving using different mathematical equations and techniques.

Course Content

Mathematics
To know what problem solving is, and to know how to use and to be able to attend to word problems using simple applications.

Algebra
To know how to calculate solution(s) to a system of linear equations, determinants, matrix, algebra, inverse matrices, solutions via matrix inversion, method of least squares with applications to data analysis.

Calculus
To be able to understand functions, graphs, limits, rates of change, derivatives, technique of differentiation, first and second derivative tests, applied extreme problems, related rates, linear approximations, exponential, logarithmic, trigonometric and inverse trigonometric functions, indefinite and definite integrals, and method and applications of integration.

Textbooks
Lipschutz, 2003, Schaum's Outline of Linear Algebra
Ayres, 2003, Schaum's Outline of Calculus

IT133 – Introductory Statistics (CS and IS)
Aim
This course is designed to introduce students to basic statistics using simple ideas in probability and statistical data calculations and equations.

Content
Rounding off numbers, use of calculator, metric units, descriptive statistics, organizing data, and use of graphs, charts, histograms and frequency distributions.
Measures of central tendency; the mean, median and mode; cumulative frequency tables, graphs and percentiles, standard deviation and variance.
Introductory probability and probability rules.
Distribution of random variables.
Probability distributions
Sampling theory and estimation parameters.
Tests of hypothesis.
Regression and correlation.

Textbook
Lipschutz, Seymour. 1998. Introduction to Probability and Statistics.

IT141 – Information Systems (CS and IS)
Aim
To provide Certificate-level students with an introduction to the field of computers and information technology.

Content
An overview of computer systems and the field of information technology including introductory work with Microsoft Office applications. Other topics will include hardware, software, file management, the Internet, networking, HTML, information systems theory, databases and Microsoft Access, programming and additional topics that will cover the rapidly evolving field in computer science.

Textbook(s)
Parsons, Oja. 2001. Computer Concepts, 5th Ed.

IT142 – Introduction to Programming: Visual Basic.NET (CS and IS)
Aim
To enable students to create professional grade software applications using the Visual Basic.Net programming language.

Content
This course introduces students to the fundamental concepts of program design using the Visual Basic.Net programming language. It emphasizes the design process, producing elegant, well-documented and easily maintainable programs. Elements of object-oriented programming are introduced.

Students will design, code, test, debug, and document Visual Basic.Net programs. The course will also address program design and program style.

Textbook(s)
Barwell, Fred., et al. Professional VB. Net 2nd Ed. Indianapolis: Wiley Publishing, 2003.

IT151 – Introduction to Programming: Java (CS)
Aim
Students will be able to create software applications using the Java programming language and object oriented techniques.

Content
This course introduces students to the fundamental concepts of program design using the Java programming language. It emphasizes the design process, producing elegant, well-documented and easily maintainable programs. Elements of object-oriented programming are introduced.

Students will design, code, test, debug, and document Java programs. The course will also address program design and program style.

Topics will include Data, Selection Structures, Loops, Object Orientation, Error Handling, User Interfaces and the Software Development Process.

Textbook(s)
Riley, David D. The Object of Java. Boston: Pearson Education, Inc., 2002.
Smiley, John. Learn to Program with Java. Berkeley: McGraw-Hill, 2002.
Zukowski, John. Mastering Java 2. New Delhi: BPB Publications, 2000.

IT152 – Data Structures and Algorithms (CS)
Pre-requisite: 151 — Introduction to Programming: Java

Aim
To provide students with a solid understanding of data structures and the algorithms that is used in relation to them.

Content
This course introduces data structures and algorithms as used in computer programming. Topics include arrays, sorting, stacks, queues, linked lists, iteration, recursion, binary trees and hash tables, as well as when to use each data structure. Algorithms used to manipulate the data within data structures are also examined.

Textbook
Lafore, Robert. Data Structures and Algorithms in Java 2nd Ed. USA: Sams Publishing, 2003.

IT161 – Professional Communications (IS)
Aim
This course is designed to develop the students' ability to communicate positively and effectively both orally and in written form in their working environment.

Content
Content includes, definition of terms, theory of communication, qualities of good communication, oral communication (general, telephone technique, non-verbal communication), Written communication (letter writing, orders, instructions, notices, report writing, memos, messages), Meetings (Agenda, Procedure, and Minutes)

Textbook(s)
Beisler, F, Hermini, S and Pinner, D, 1987, Communication skills, Pitman Publishing

IT162 – Information Technology Research Project (IS)
Aim
This course is intended for students to gain key skills in basic research that will enable them to conduct basic research tasks in the workforce. The nature of the course is also designed in such a way that students wishing to pursue further study will be able to carry out basic research in academia.

Content
This course is to provide students with basic knowledge in the following areas of research:

Theoretical background to qualitative and quantitative research perspective
Research problems
Designing research questions and hypotheses
Sampling procedures
Proposal writing
Research tools
Field work
Data analysis
Writing a research report

Diploma Level Courses

IT233 – Applied Statistics (IS)
Pre-Requisite IT 133 — Introductory Statistics

Aim
The course is designed to train students to effectively use commonly employed methods of statistical analysis and to give them an insight into the mathematical and statistical reasoning behind these methods

Content
Combinations and permutations, conditional probability, important discrete distributions: geometric, Pascal, hypergeometric, binomial, multinomial; sampling distributions; estimation, confidence intervals; significance tests involving means, proportions and variances; simple linear regression and its tests; analysis of variance; one and two factor designs; basics of Bayesian inference Non-parametic methods.

Textbook(s)
Hines, William. W., Probability and Statistics in Engineering and Management Science (3rd Ed)
Spiegel, Murray. Schaum's Outline of Probability and Statistics. 2000.

IT235 – Discrete Mathematics (CS and IS)
Pre-Requisite IT 131 — Mathematics for Science

Aim
Discrete mathematics has many applications including mathematics, computer science, physics, chemistry and economics; however, the applications covered will focus on computer science and mathematics.

Content
Topic 1 The Foundation – Logic, Sets and Functions, Propositional Equivalences, Predicates and Quantifiers, Set Operations, Sequence and Summations
Topic 2 The Fundamentals – Algorithms, the Integers and Matrices, Algorithms, Complexity of Algorithms, Integers and Division, Application of A˙Umber theory, Matrices
Topic 3 Counting
The basics of Counting, the pigeonhole Principle, permutation and combination, Discrete probability,

Probability theory, Generalise.
Topic 4 Advanced Counting Techniques
Recurrence Relations, Divide-and-Conquer Relations, Generating Functions, Inclusive-Exclusive, Application of Inclusion-Exclusive.
Topic 5 Graphs
Introduction to graphs, Graph terminology, Representing graphs and graph Isomorphisrn. Connectivity, Euler and Hamilton paths, planar graphs, graph Colouring.
Topic 6 Trees and Modeling Computation
Trees and Sorting, Spanning and Minimum Spanning trees, language and Grammars, Finite-State Machines with and without Output

Textbook
Lipschutz. 1998. Schaum's Discrete Mathematics.

IT244 – Database Management Systems (CS and IS)
Pre-requisites 141 — Information Systems; 142 — Introduction to Programming: Visual Basic .Net

Aim
To prepare students to use real world database systems as well as possess the underlying theory.

Content
Introduction to Database Systems
Entity – Relationship Data Model
Relational Data Model
Other Data Models
Relational Algebra
Database Language SQL
Constraints and Triggers
System Aspects of SQL

Textbook(s)
A First Course in Database Systems. Jeffrey Ullman, Jennifer Widom (Second Ed.)

IT245 – Management Information Systems (IS)
Pre-requisite 141 — Information Systems

Aim
This course is designed to familiarize students with the management of concepts and practical side of information systems.

Content
This will cover a range of topics such as the foundation concepts of IS plus their fundamental behaviors and technical concepts. It will allow students to become familiar with up-to-date trends in technology in the form of hardware, software, networks and data communication, application of IS to operations, management and strategic advance of business, the developing of IS solutions to solve business problems, decision making, ad-hoc resources and strategies.

Textbook(s)
O'Brien J. O., Management Information Systems 4th Ed.

IT253 – Computer Organisation (CS)
Pre-Requisite IT 152 — Data Structures and Algorithms

Aim
Knowledge of computer organization is necessary for people who design programs or need in-depth knowledge of computer systems. This course aims to provide a basic understanding of computer organization and its analysis. It provides a general foundation for further specialized study.

Content
Data Representation (binary, hexadecimal, floating point, ASCII)
Memory and Bit Operations (stack, heap, pointers, memory addressing, bit operations)

Logic (Boolean logic, De Morgan's Laws, Truth Table, Gates)
Computer Arithmetic (building gates to make adders)
Processor Data path and Control (in-depth look at single-cycle processor design)
Instruction Set Architectures and MIPS (different ISA's, instruction formatting, MIPS assembly programming)
Memory (caches, RAM, memory hierarchy, replacement policy, code improvement)
Virtual Memory (TLBs, page tables, memory spaces)
Input/Output (keyboards, mouse, buses, hard disks)

Textbook(s)
Patterson, David. Computer Organization and Design. (2nd Ed.) 1998.

IT254 – Design and Analysis of Algorithms (CS)
Pre-Requisite IT 152 — Data Structures and Algorithms

Aim
The aim of Algorithm Analysis and Design is to study classical algorithms for solving real world problems in terms of programmatic technique as well as asymptotic analysis. Critical thinking skills are developed through using different techniques to solve new problems.

OBJECTIVES
This course compares naïve ways of solving problems with some more innovative solutions and compares the amount of time one can save by using a different algorithm to solve a problem. The analysis part is focused on analysing how much time an algorithm will take to solve the problem, and serves as a tool for comparing algorithms. This course is also designed to be applicable to real life problems, i.e. dividing a large problem into smaller problems that are solvable (Divide and Conquer algorithm), so that the student can use the subject matter to help them solve non-computer related problems as well.

Content
Introduction – Growth of functions, Summations, Recurrences
Sorting – Bubble Sorting, Heap Sorting, Quicksort, Sorting in Linear Time
Data Structures – Hash Tables, Binary Search Trees, Red-Black Trees
Advanced Design Techniques – Greedy Algorithms, Huffman Codes, Amortised Analysis
Graph Algorithms – Elementary Graph Algorithms, Representation of Graphs, Breadth first, Depth First, Single Source Shortest Path, Dijkstra
Matrix Operations – Properties of Matrices, Strassen's algorithm, Solving systems of linear equations
NP Completeness – Polynomial v. NP time, NP Completeness
Cryptography – Symmetric Encryption, Public Key Encryption

TEXTBOOKS
Cormen T.H., 1998, Introduction to Algorithms, The MIT Press
Goodrich, Michael, 2001. Algorithm Design John Wiley & Sons.

IT255 – Special Topics (CS)
Aim
To enable CS students to be aware of cutting edge resources in the rapidly evolving field of Information Communication Technologies. Courses will grow to fit Tonga's changing needs. Current Course Offering: Network Administration and the Linux Operating System

Content
Network Administration and Linux
Introduction to Linux
Working with Linux
Installation and Installing Programs
Graphical Linux
Filesystems
The Root User
TCP/IP and Networking
Apache and Webserving
PHP

DNS and DHCP
Email
Security Concerns
Windows Server Administration

Textbook(s)

Running Linux, 4th Ed. Matt Welsh, Lar Kaufmann. O'Reilly. 2002
Mastering Windows Server 2003. Minasi. 2003
Programming PHP. O'Reilly and Associates.

IT256 – Advanced Programming: Visual Basic.NET (CS and IS)

Pre-Requisite IT 142 — Introduction to Programming: Visual Basic .Net

Aim

By undertaking this course, it is hoped that that students will develop a basic understanding of Object Oriented Programming, and further develop their programming skills and knowledge in Visual Basic.

Content

This course will provide students the opportunity to develop their programming skills by understanding Object Oriented Programming fundamentals, using basics of Visual Basic Programming forms, controls, and menus; managing projects, create user friendly interface, develop multiple-document interface (MDI) applications, Process drives, folders and files, use ADO Data control and other basic VB standard controls, understanding SQL and its various commands – select, delete, insert and update. They will also use SQL in developing Visual Basic application, develop applications using Microsoft Office products, handle errors and distribute applications.

Textbook(s)

Barwell, Fred., et al. Professional VB.Net 2nd Ed. Indianapolis: Wiley Publishing, 2003.

IT262 – Principles of Management (IS)

Aim

To prepare students to make effective managerial decisions by being versed in a variety of productive and relevant organisational management techniques.

Content

Introduction to business management
The business environment
Employee–employer relations
The impact of change on business organisations
Overview of principles of management
Business planning
Problem solving in organisations
Leading and motivating people in organisations
Controlling prformance

Textbooks

Work Environment (NOS119) TAFE National Accounting Training, Outer Eastern College of TAFE
Bartol, K., D.C. Martin, M.H. Tein and G.W. Mathews (1995) Management: A Pacific Rim Focus, Roseville, McGraw-Hill