Introduction

This case study examines the use of information and communication technologies (ICT) in Samoan schools and provides insights into the key issues faced by teachers in Samoa with regard to the integration of ICT into education.

Background

With the goal of providing developing member countries with better guidance in using ICT effectively in education, the Asian Development Bank (ADB) funded a 21-month regional technical assistance (RETA) project in Bangladesh, Nepal, Mongolia, and Samoa.

Implemented by RTI International, in partnership with iEARN-USA, the RETA researched approaches to using ICT in education which can bring about improvements in teaching and learning that are not only successful but also feasible and sustainable given the Asia-Pacific region’s development challenges.

The study commenced in April 2006, building on existing projects in each of the four participating countries. In Samoa the study focused on projects introducing e-Resources (electronic teaching and learning materials) to better reach remote and isolated areas of the country with up-to-date teaching materials. Specifically, the study built on the Samoa SchoolNet and Community Access Pilot, funded by ADB. The study was not an extension or follow-on for SchoolNet, which had involved five Samoan schools, but strengthened and complemented investments already done, while primarily aiming at studying the existing approaches and lessons learned.

The study in Samoa is timely in providing critical information about lessons learned and recommendations upon completion of the first ICT in education project conducted in the country, and in advance of a future initiative already planned under the ADB-funded Education Sector Project II. The study provides a systematic insight into early experiences from participating schools and includes consideration of key factors both, internal and external to the schools.

Under SchoolNet, five Samoan schools and communities had been provided with support in setting up a Community Learning Centre (CLC). On average, each CLC was equipped with 10 Internet-ready networked computers (thin client configuration), two PC servers, a video camera, a data projector, two printers, a fax-scanner, a photocopier, and uninterruptible power supply (UPS) devices for the servers.

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77 This summary case study was adapted by UNESCO, with permission, from the full research report: Ioana Chan Mow, Carmen Strigel, and Ruby Va’a, 2007, Provoking Change: Technology in Education Case Studies from Samoa. Samoa Country Report, RTI International, ADB TA6278-REG. Research Triangle Park.

78 RTI International is a trade name of Research Triangle Institute.

79 From here on also called “SchoolNet”.

80 A thin client setup features central servers on which all applications and data are hosted, while the individual (student) terminals, featuring a monitor, keyboard, and mouse, are directly connected to these servers for any significant data processing. This way, a Local Area Network (LAN) is created among the computers involved.
Three of the five schools had been connected via dial-up to the Internet and two of the schools, those in the capital city of Apia, via a wireless area network.

SchoolNet had also set up a portal and developed a number of e-Resources\(^1\) and collected links to electronic teaching and learning resources on the Internet, accessible via the SchoolNet portal.

Furthermore, SchoolNet had provided training to teachers who volunteered and were appointed by their principals as the key teacher counterpart for the project (“ICT Administrators”), and a few teachers at each school.

Training covered the following areas:
- Basic skills in computer and digital media.
- Using the computer as a teaching and learning tool.
- Development of resources and lesson materials for selected subjects.
- Managing CLCs at the school (business planning).

**Study of the Samoa SchoolNet project**

Given SchoolNet inputs and study objectives, the study involved conducting a number of activities, guided by a site assessment and need analysis, to strengthen what had already been done.

Activities included:
- A one-day strategic planning workshop for participating principals, ICT administrators, and Peace Corps Volunteers (PCV)\(^2\) based at the SchoolNet schools;
- A two-day strategic planning workshop for staff of the Curriculum Materials and Assessment Division (CMAD) at the Samoan Ministry of Education, Sports and Culture (MESC);
- A five-week (35 hours) ICT training programme for CMAD staff.
- Moderate equipment procurement for CMAD.

Six schools were selected to participate in the study, the five original SchoolNet schools and one additional school (an early ICT-adopter school in the country).

The study aimed to provide an account and reliable documentation of lessons learned, good practices and successful approaches on integration ICT into education, on the basis of the project under investigation.

Following the activities mentioned above, detailed case studies were conducted in each of the participating schools. The case studies required interviewing six principals, five “ICT Administrators”, 12 teachers, 24 students, and 11 parents in the study schools.

**Issues and approaches**

A number of common issues and approaches were identified from the case studies. These are presented below in terms of some key dimensions, such as: ICT environment, professional development, cost, and access.

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\(^{1}\) Nine Learning Objects and 15 adaptations of electronic learning materials have been developed. In addition, SchoolNet organized an inventory of useful sites for teaching materials.

\(^{2}\) PCV are volunteers under the United States Peace Corps scheme.
Stakeholder Buy-In and Local Ownership

Schools were, overall, very enthusiastic about being part of an ICT initiative; principals, teachers, students, and parents alike. ICT administrators especially took on ownership of the initiative and were fully engaged, often at considerable expense of personal time. Principals were strongly supportive of the initiative and are eager to make it succeed. Some participating schools also mentioned strong and positive engagement by their school committees and high interest and demand for access by their communities. For a variety of reasons, however, the nature of which may need further investigation, some of the principals seem to have difficulties negotiating issues of cost recovery and management of the CLC with their school committees and communities, and finding the necessary buy-in and engagement from these actors.

ICT Environment and Infrastructure

As it is, the ICT environment of the participating schools is not conducive to the successful implementation of ICT initiatives. For example, the fluctuating power supply and frequent blackouts cause damage to the equipment. Poor or no telephone lines are barriers to Internet access. Irregular public transport makes it difficult for school staff and the community to access the CLC outside regular school hours. The general lack of Internet access or poor connectivity is a problem in all schools. According to study participants, other problems include insufficient numbers of PCs and lack of maintenance services. Some of the ICT equipment, such as the photocopy machines, proved to be very valuable for the schools, not only in terms of their own needs, but also as a tool for revenue generation. Other equipment, such as the video camera, does not yet seem to be fully made use of.

Professional Development and Training

According to staff interviewed at the participating schools, professional development and training is a priority and is urgently needed. Indeed, all schools raised the issue of the inadequate training received to date. Responses indicate that schools expect MESC to provide at least some further training, if teachers are to perform to expectations in managing and utilizing the CLC. Specifically, teachers require training in computer skills. Principals and the ICT Administrators require professional development in management, so as to assist them in their roles with regard to CLC management and administration.

The study participants indicated that, instead of one-shot training activities here and there, on-going and continuous professional development was needed. ICT administrators, especially, voiced a strong demand for more formalized, certificate-based training programmes that give them not only the skills, but also the recognition needed to fully take on their roles. Training that had been provided so far has allowed at least ICT administrators to achieve a foundational level of competence that can be expanded on. They in turn were able to start imparting some of their skills and support their colleagues (but still on a rather small scale and often in a more unstructured way). Schools with Peace Corps Volunteers with IT skills are fortunate and are making use of the volunteers for training their staff and teaching the computer studies classes. However, this strategy needs to be strengthened by a better matching and skill sharing with local school staff, to avoid capacity vacuums upon PCV departure.

Teaching and ICT

To date, the ICT facilities have been of most use as a place for basic computer skills training for teachers and students. Still, the majority of teachers at the participating schools have yet to be trained or given lessons in the basic usage of computers and other available ICT equipment. There are pockets of ICT integration practices happening at schools, such as geography or English classes being taught in the computer room and making use of the the projector for more effective visualization of maps and
graphs. Only some principals, ICT administrators, and teachers knew about the SchoolNet portal\[^{83}\] and the learning objects and e-Resources provided there. To most study participants, lack of awareness is a major barrier concerning this specific resource. Lack of appropriate Internet in general is considered the main barrier to teachers researching for materials on the Internet or communicating and collaborating with each other.

\[\text{Access}\]
Access was highlighted by all staff, students, and community members as being a problem. Although some schools have scheduled and planned periods for teachers and students to use the CLC, this does not meet the demand. Teachers, students, and parents want to use the facilities more frequently. Schools are forced to prioritize and restrict access for the most part because of an apparent lack of human resources to provide the support and oversight needed during those times. Where such capacity was available, after-hour transportation issues for ICT administrators and facility managers are aggravating the problem.

\[\text{Cost}\]
For the community, students, and individual teachers, affordability (cost) did not provide an obstacle to access. Many considered the fees and regulations quite appropriate and manageable. Cost is a big problem for the school, however. Strong concerns were expressed by all participating schools about the increased electricity bills, communication expenses, facilities and hardware maintenance, as well as allowances for the ICT Administrator. At the same time, parents seem to be willing to give extra funds for the sake of providing their children with access to this technology.

\[\text{Sustainability}\]
It is recognized that local staff must be appointed and trained for long term sustainability. Three schools that “lost” their PCVs are examples of the gap arising if there is no one to continue. The issue of sustainability of the facilities also includes issues of hardware and equipment: the repair and replacement of damaged or worn out equipment is an area that needs to be included in management plans and budgets. However, schools have not yet fully managed to engage in planning for long term funding strategies.

\[\text{Policies and Strategies}\]
There are still major gaps in schools’ plans to provide access and capacity not only for the community, but also for their students and teachers. Principals are asking for more support in developing policies, strategies, and appropriate management models. The activities conducted in areas of policies and strategic planning under SchoolNet and this study provided an important platform for stakeholders to share their views, exchange ideas, and gain experience in developing such models. However, more support in this area had been requested.

\[\text{Community Access and Awareness}\]
As indicated above, community access has yet to be implemented in most of the participating schools. Barriers identified include the lack of a qualified trainer to provide classes after school hours and the absence of a longer-term strategic plan to extend the service. Furthermore, some schools are prioritizing access for staff and students over access for the community, while at the same time struggling with issues of cost and earning revenue to sustain services for the school, which the latter would provide. In some schools, however, information exchange with parents and communities has not yet been sufficient in terms of generating awareness about the initiatives taking place. The awareness programmes, especially

\[^{83}\] The portal address is: www.samoaschoolnet.edu.ws
a television advertisement that had been developed to disseminate information on the SchoolNet pilot project, have been successful in raising awareness among communities and played an important role in generating interest and demand.

» **Education System Support and Engagement**

A key challenge, according to the participating schools, is the lack of involvement and support they receive from MESC. School representatives also seem to not be entirely clear on roles and responsibilities and to whom to turn to when help and support is needed.

» **Private Sector Involvement**

According to the participating schools, vendors selected under the SchoolNet pilot project have been very diligent in following up on their maintenance and support responsibilities. Some have even gone beyond that, for example, by providing a school with some additional computers. Apart from these examples, schools did not mention any collaboration with the private sector.

**Discussion of findings**

This section discusses some of the issues identified during the case studies.

**A. Education Development Objectives**

While many projects aim to use ICT to improve the “quality of education”, the concept of “education quality” and definitions thereof are multi-fold and complex. It is recommended to go beyond terms such as “education quality”, and identify more specific goals so as to help to clarify project objectives and to better align monitoring and evaluation. It is important, however, to ensure that the specific targets are appropriate in terms of the overall aim of the project and that the targets are achievable within the given time frame, budget and other constraining factors.

The Samoa SchoolNet pilot project aimed to enhance “…the environment for poverty reduction in rural areas of Samoa by improving access to basic services through improved communications”. 84

At the same time, some of the SchoolNet project targets (indicators) included:

- “50% increase in teachers completing in-service training”
- “decline in teacher resignations by 50%”
- “improved student outcomes by 2%”
- “pilot school student grade point average improving by 5%” 85

An examination of the overall goal and the specific targets indicates that, as in many similar projects and initiatives:

(a) There is incoherent alignment between the aim of the project and the indicators by which its progress and impact were to be evaluated.

(b) The project assumes a role for ICT that ICT as such can not fulfill – that of a magic bullet to improve education outcomes.

(c) Comparing the indicators with the nature of the activities conducted, questions arise as to how those indicators could have been achieved at all.

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Finally, even if the project objective, activities, and monitoring indicators had been aligned more appropriately, it is highly questionable how any of the above-mentioned monitoring targets could have been achieved at all within the original timeframe of an 11-month project.

There is no doubt that the SchoolNet pilot has achieved some of its objectives and aims, most notably:

- raising awareness about ICT
- engaging a number of schools to explore the technologies' potential for education
- piloting a connectivity and computer lab configuration model that seems to be appropriate given both country context and school environments.

However, the computer lab configuration model drives a very specific way ICT is being used at schools, and its impact therefore may not be measurable via any of the “targets” (indicators) listed above.

As the case studies from participating schools in Samoa show, and international experience confirmed, computer labs such as the CLCs can play an important role in providing access to ICT for students, teachers, and the community. However, in practice, computer labs mostly serve the teaching of computer studies classes, with the aim to develop students’ computer skills.

If the aim of a project is indeed to increase students’ computer skills (e.g. to equip them for the demands of a competitive employment market with skills that most likely will play a role), then activities should focus on providing the infrastructure required to teach the computer studies classes, as well as build the skills of computer studies teachers to effectively teach the curriculum.

Monitoring and evaluation approaches could then include clear indicators that are calibrated to measure progress towards those aims. Such an indicator could exemplary be “X% increase in students that meet International Society for Technology in Education (ISTE) basic computer skills standards for that grade at the end of year 8.” This ensures that the objective, activities, and indicators to measure progress are aligned.

In defining appropriate objectives for ICT in education, it may help to clarify the domain in which ICT is to be integrated. ICT in education is a broad area, and while lines are not clear cut, but rather overlapping, a number of domains encompassing “ICT in Education” can be identified:

- ICT to support education management
- ICT to support school administration
- ICT to support teacher productivity
- ICT to enhance teaching
- ICT to promote computer skills
- ICT to provide community access to information and communication
- ICT to support student self-pace learning
- ICT to support distance learning

These domains are directly linked to education development goals, such as enhancing the quality of teaching, increasing the efficiency of education administration, or enhancing the development of critical life skills among youths. Guided by these broader goals and objectives, it is quite possible to design a successful school reform project that utilizes ICT as a lever for change in not only one, but several of the domains mentioned above. Such considerations are to be applied, both on school level, but also in terms of national education sector development plans.

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86 International Society for Technology in Education (ISTE) www.iste.org
In the specific case of Samoa, therefore, it would be important to better detail the objectives and aims of future ICT in education initiatives. This would allow implementers to better focus their activities and at the same time to design a monitoring and evaluation framework that is appropriate and realistic, taking project and country characteristics into account. At the same time, it would allow for more coherent messages and information to be shared about the initiative, clearly outlining anticipated outcomes and impacts. With this in mind, some issues of local ownership and buy-in, detailed in the section below, may be avoided.

B. Stakeholder Buy-In and Local Ownership

» Schools and Communities

Despite challenges, participating schools are positive about the changes that have happened in their schools so far, and the opportunities the new infrastructure, training, and network participation are offering them.

As case study findings indicate, the approach taken to engage schools and communities in the SchoolNet pilot project, however, may not have been the most appropriate. Future initiatives may want to consider engaging schools by providing information and support in the development of school-related strategic plans and appropriate business (if community access is to be a component of the project) or cost-recovery models at the outset of the project.

Training ahead of the arrival of the equipment could also be considered, at least for principals and ICT administrators. It is clear, however, that equipment installation should not be delayed to such an extent that teachers will not be able to apply in practice what they learned during training.

In terms of community engagement, it is important to clarify if community access, which was part of the SchoolNet model, truly is a priority element in the early stages of a schools’ technology adoption. It may have been overambitious to include this component under the initiative, and distracted efforts and resources from focusing on teaching and learning.

The study also highlighted and confirmed the importance and benefits of peer sharing as a lever for establishing local ownership. The exchange of experiences and the sharing of technical expertise and hardware costs (bulk ordering of hardware) resulted in the setup of computer centres in two Samoan schools before SchoolNet took place. These informal incidents of collaboration and peer support should be more formally supported and encouraged among schools, especially given the prospect of extending SchoolNet to additional sites. In order to generate local ownership and buy-in on a national level and among schools, it may be important to provide for regular structured opportunities for exchange and communication. Regular forums, workshops, and round tables may be one way; online learning communities or communities of practice another. Engaging representatives from these “champion” schools on national forums, such as the national ICT committee should be considered.

» ICT Administrators and Teachers

Case studies revealed that not all teachers in all schools are interested in engaging with ICT. These teachers prioritize other activities. Reluctance to engage and actively participate in the ICT initiatives is likely to be caused by a number of reasons, which may include fear of change; a negative attitude to technology; negation of the need for professional development to improve teaching practice; lack of information about tangible benefits of ICT for education; a lack of motivation for extra work – aggravated
by a perception of comparatively low salaries; and practical issues such as lack of public transportation after schools hours. Systemic issues can also play a role, when personal engagement and initiative are not being rewarded or appreciated.

Not all of the issues may be possible to address, but some steps can be taken, such as inclusion of teachers in the decision-making processes regarding the acquisition of ICT and related facilities, or more appropriate recognition of those teachers that do engage. This could be achieved, for example, through running a public recognition scheme that would select the “teacher of the month” from all those that have taken training, and share information about the award with parents and the community. It may also include organizing small contests among teachers, in return for free Internet time or print-outs for personal use, to stimulate application of ICT in classroom teaching. Also, appropriate schedules for teachers to receive training during free periods of the school day, as some of the schools already started. National initiatives need to be designed to step in, where school-level initiatives cannot sufficiently address the known obstacles.

For ICT administrators, incentives may also include nomination for appropriate certificate-based training that would provide them with the skills and credentials they need. Currently, such a programme does not exist in Samoa, therefore opportunities for its development or international partnerships with providers of existing programmes should be explored. Furthermore, better recognition of the efforts of the ICT administrator, especially among parents and community members, will already help the situation.

The education system must also provide more support, especially collaborating with schools in the nomination of ICT administrators for professional development programmes, recognizing ICT administrators and principals on a national level (such as engagement in national forums, as mentioned above), and better financial and career-related incentives to foster change at the school level.

C. ICT Environment and Infrastructure

Despite the challenges raised by respondents of the case study, utilizing an expandable thin client configuration seems to have worked well for the schools involved. While there may be some concern over the specific processing capacities of the servers provided, the thin clients allow a CLC manager to centrally monitor and manage data exchange and activities on each of the individual terminals. This configuration also leaves less opportunity for individual workstations to be damaged because there are no individual data processing components to begin with. The core of the configuration, the central servers, are safely locked up at all schools. A further advantage of the configuration is that adding additional terminals to the thin client is generally cheaper than buying additional new desktop computers to expand a computer lab.

As case studies showed, some equipment, such as the photocopier and printers, seem to be more used than others. One of the reasons may be the lack of local skills in utilizing this equipment at the school, especially where training has not been sufficient to build the required familiarity. At the same time, the general absorption capacity in Samoan schools, given the early stage of technology adoption, may also need to be taken into account. Video recorders can serve the dual purpose of a video recorder and still camera, but realistically, schools seem to mostly make use of the latter function. It may also be more appropriate to add a laptop to the equipment package in lieu of the fax machine or scanner (if Internet is indeed functional, then email or fax application software, combined with the video recorder and its still camera function, can serve the same purpose). It should be emphasized that equipment packages and configurations need to be tailored to fit specific school development objectives, and not vice-versa.
Future initiatives may consider phasing-in equipment package installation into schools. The short duration of the SchoolNet project made phasing-in the equipment difficult. Schools therefore received the equipment all at once. Visiting schools shortly after the equipment had been provided, it was clear that they were overwhelmed. Months later, the video recorders in some schools still had not been unpacked or used, as schools were focusing on the computer, photocopy and print equipment. At the time of data collection, only three of the schools reported using the video recorders, and only rarely.

In addition, schools may need to be better informed about best practices in computer room setup and design. Some of the PCVs have already passed on very valuable experiences in approaches to maximizing air-conditioning power, reducing consumption, and designing appropriate computer-room facilities that should be documented and shared.

An additional concern related to the ICT environment is directly related to maintenance and replacement of equipment. Experiences show major difficulties already in the initial procurement of equipment. Availability of parts, shipping times and customs all played a large part in delays experienced by both projects, SchoolNet and this RETA. Even if the budgets are in place and funds are available, procuring or replacing any equipment seems to be a major challenge.

Stability of electricity, as well as cost for power expenditures, seems to be a big problem for most of the schools, especially the rural ones. It is worth considering alternatives to the conventional power grid. For example, a solar-powered community Telecentre, with funding by the International Telecommunication Union, was established in 2005 in the village of Ulutogia on Upolu Island. The Telecentre’s three computers, fax, copier, scanner, and printer are powered by two solar panels and a set of two batteries. With a loading time of 35 minutes they provide up to about 33 hours of power. The two solar panels have a capacity to charge and operate up to 12 batteries, which could easily address the power needs of a 15-computer lab, including printer, fax, and photocopy machines. Experiences with this solar-powered Telecentre pilot have been positive; no incidences of damage or dysfunction have been reported in over one year of existence.

D. Professional Development and Training

When interviewed, school stakeholders were very vocal in their demand for more training. There is a clear desire among many stakeholders to improve their skills, including skills in computer operations and in effective pedagogy for using ICT in education.

» School Management

International experience has demonstrated the important roles of school leaders and administrators in providing an enabling environment for school change.\textsuperscript{87} Introduction of ICT into teaching and learning faces the same requirements as other school-reform interventions. The nature of ICT, impacting on all of the key aspects of school life, learning, teaching and administration and management, makes it even more critical for school administrators to carefully plan, model, support, and monitor its introduction.

Principals and deputy principals of schools clearly need more than their admirable enthusiasm and willingness, they also need ongoing, appropriate training. Principals participating in the study specifically requested training at a central location, away from their everyday work environment and responsibilities, to allow them to fully concentrate on developing their skills. This should be blended with ongoing on-the-job support.

Areas in which principals require training include:
- computer skills
- management and business planning for principals, including a detailed analysis of usage and cost figures to properly manage the centre
- leadership and support of the integration of pedagogy, curriculum and technology

ICT Administrators
It is questionable whether a teacher should be responsible for anything beyond very basic ICT troubleshooting, but without an appropriate system for timely and reliable maintenance and support, the most feasible way to ensure operation of the CLCs and functioning of the equipment is to train one of the school staff.

Content areas for further training for ICT administrators may include:
- advanced skills in utilizing equipment
- skills in hardware trouble shooting and maintenance
- training of trainers to support fellow teachers
- ICT integration into teaching and learning (pedagogy and methodology).

Teachers
An assessment of existing computer skills conducted under SchoolNet indicated that most teachers required intense training. Throughout Schoolnet, some level of competency has been established, but the study results indicate that teachers are not yet confident in the use of technology for their own productivity or in their teaching.

It is important to emphasize, however, that effective and appropriate integration of ICT into teaching and learning requires more than just computer competency. Ultimately, the core competency required of teachers is the ability to make sound didactic and pedagogic choices regarding the appropriate tools, social forms, methods, and activities that would enable students to achieve the learning objective of a lesson or unit.

Ad hoc training does not meet best practices in adult education, which requires relevant, self-directed training which integrates learners’ immediate experiences and daily work challenges. Similarly to what had been suggested for principals, future initiatives could couple intensive trainings with school-based courses and ongoing support through telephone conferences or online training elements, where possible.

An important area for further training for all of the stakeholders is the SchoolNet portal; its use in teaching and learning, communication, and information sharing. Very few of the study participants had any knowledge of this resource. There is both a lack of information and a lack of appropriate Internet access to allow teachers to explore it.

E. Teaching, Learning, and ICT
The CLC facilities have allowed schools to teach computer studies classes more effectively. There are individual instances in which the facilities have been used to teach other subjects as well but, as outlined above, the ICT environment at the schools drives the way ICT is being made use of in the schools.
Experience has shown that computer labs mostly serving the development of computer skills and easily become the sole domain of the computer studies teacher. The use of a computer lab for other subjects requires cumbersome organizational preparation, including: booking the room, preparing the computers and other tools needed, moving the students, settling the students, locating and preparing the computer-based resources that are required, and monitoring student's activities. Given this amount of preparation involved, it is rare to see the computer labs used for other subjects.

It is necessary, however, to encourage teachers to utilize ICT tools and electronic teaching resources during their classes. For example, teachers can use software to better illustrate abstract topics such as dynamic geometry. For teachers to utilize ICT tools more effectively, an entirely different equipment configuration may be required. This may include mobile stations, coupling a laptop and a LCD projector, as provided in Mongolia,

88 This was the equipment package provided under the RETA in Mongolia. See Strigel, Carmen, Lkhayvasuren Ariunaa, and Sukhbaatar Enkhjargal. 2007. Where Desert meets Technology: Findings from ICT in Education Initiatives in Rural Schools in Mongolia. Mongolia Country Report. RTI International. ADB TA6278-REG. Research Triangle Park, for more information.

89 Under the Jordan Education Initiative (JEI), 100 “discovery schools” have been selected and provided with equipment, resources and training. One such model included the provision of digital whiteboards. More information on JEI can be found here: www.jei.org.jo. Furthermore, a study on the use of Whiteboards to support Literacy and Numeracy instruction under the “Embedding ICT in the Literacy and Numeracy Strategies” pilot project can be found on the website of the British Educational Communications and Technology Agency (BECTA) www.becta.org.uk.

90 Learn Street is a teaching method that organizes the classroom in different areas. In a Learn Street, students, in groups or individuals, move from area to area in an organized pattern to inductively experience new aspects of the topic under investigation.


Another configuration would be to have three to five computers in each classroom instead of a larger number in a computer lab. Such a model would allow for methodologies such as learn streets or student group research stations, or provide resources and information during the development of independent student projects. It is clear that such an equipment package, however, is very resource intensive.

Teacher education should assist teachers to develop skills in searching for and evaluating the quality of electronic resources and in utilizing ICT tools effectively. Teacher training should also enable teachers to design learning experiences (lessons) for their students that appropriately and effectively integrate ICT tools and resources, to enhance teaching and learning. It is critical to help teachers translate theoretical models of student-centred learning into practice.

The current responses of schools, stating that more workstations are needed, are certainly understandable given high student-computer ratios. However, as can be seen from the above, an effective equipment model does not necessarily require a lot of equipment, but a clear understanding of its potentials and limitations. It may be advisable therefore to help schools explore and develop a variety of teaching and learning scenarios with the equipment they currently have.

International studies show that in many European countries,

91 past teacher training has concentrated very much (and often still does) on providing abstract computer skills and capacity in the use of software applications and the Internet. Relatively little attention has been paid to enabling teachers couple these skills with their professional capacity as teachers. As a result teachers are not confident in using technology in didactically appropriate ways in their classrooms.

Future initiatives in Samoa should take those international experiences into account and carefully plan the content and focus of ICT initiatives and related training. The consolidation between pedagogy, curriculum and ICT is critical. Local models need to be tried and experienced before initiatives such as SchoolNet are being scaled up to further sites.
F. Access

Providing access to ICT to teachers, students and community members, has been a key challenge for all of the schools participating in the study.

While schools voice a demand for more computer workstations, at most schools the number of computers is sufficient to provide classes to students in basic computer skills. As mentioned earlier, it may therefore be important to help schools find alternative teaching, organization, and access models to optimize the use of the numbers of computer they do currently have, rather than acquiring additional hardware.

G. Cost

According to the findings of the study, schools are struggling with two issues:
- Management of the CLC facilities
  Schools have not yet had a chance to fully cost-out expenditures and adjust their fees or budgets. Several of the pilot schools have not yet structured and implemented community access, therefore have not yet had a chance to truly generate revenue. Early discussion among schools also highlighted the concern that the communities, especially in the more rural areas, may just not offer enough of a market to realistically believe that recurrent costs of the facilities could be met by the revenue generated from the CLC.
- Charging for use of facilities
  The most common use of the CLC facilities is by teachers: for their training or for work-related tasks, for which schools feel they cannot charge a fee.

H. Sustainability

In terms of organizational sustainability, a key lesson can be derived from the study: The nomination of local ICT administrators at each school has been a critical factor in ensuring sustainability of ICT in education initiatives. While there are issues, and individuals are struggling in their roles, the ICT administrators are filling a critical function.

These champions on the local level need to be matched by champions on regional and national levels. As can be seen from other such initiatives, a key driver for successful ICT integration into education is a champion agency or team that can spearhead such innovations.

Future initiatives may consider the formation of an ICT in education working group including stakeholders from all levels of the education system. Such a scenario would provide a critical enabling environment for more sustainable ICT in education initiatives in the future.

I. Policies and Strategies

Strategic planning on the school level concerning the ICT initiative has mostly been short term, with little consideration of long-term organizational change management and school development. Cost recovery and sustainability require planning, however. As discussed in previous sections, the need for better planning and strategy development has been recognized by principals. It is a key part of any initiative for integrating ICT into education.
At the school level, policies need to be in place with regard to such factors as: access and use of facilities by different groups, teacher professional development, integrating ICT into teaching and learning, community engagement, and productivity. Linked to issues of buy-in and sustainability, development of school policies is most effective with the participation of all stakeholders, including teachers, parents and students. The box “ICT-related policies and strategies”, below, describes an ICT policy which was developed in a school in Mongolia, with the goal of improving productivity.

ICT-related policies and strategies at school level

In Mongolia, a school that participated in the IIREM project decided on a policy that requires teachers to develop all formal submissions, such as reports, timesheets, student assessment overviews, etc., electronically. At the same time, school management in turn also adopted this policy for itself. All communication from the principal to the teachers is being done electronically. Handwritten submissions are not accepted anymore. According to the principal and teachers, strict adherence to this policy has not been easy, especially at the beginning; but after a while it has noticeably increased efficiency of school management and teacher productivity. Now, everybody is so used to it, that this practice is no longer a challenge or questioned.

On a national level, study results in Samoa indicate that existing policies have not yet been coupled with appropriate action plans and clear budget allocations. Furthermore, there is no clear assignment of roles and responsibilities in terms of policy implementation.

J. Community Access and Awareness

The awareness programmes organized under SchoolNet proved to be effective in generating awareness of the initiative among communities. The campaign at the same time raised interest in accessing CLC services.

Information sharing and marketing of such initiatives are important drivers in generating local ownership and buy-in, raising recognition, rewarding engagement, and attracting public support. Community access, in turn, can be a tool to generate appropriate demand and informed feedback for the school. Greater training among parents and community members to utilize the technology may also dispel possible misconceptions or unrealistic expectations, while at the same time generate demand for its appropriate use in teaching and learning.

K. Education System Support and Involvement

The MESC Information Technology (IT) unit, instrumental in the implementation of the SchoolNet project, is staffed by only two people. One of the two staff is responsible for IT support and maintenance for all schools in the country. Clearly, this is neither sufficient nor sustainable, especially as more and more schools are equipped with and use ICT. The ministry may do better by establishing appropriate partnerships with private sector firms or other organizations to share the responsibility for managing ICT integration into schools.

Apart from brokering such partnerships, there are a number of other areas in which the MESC could play a key role. These include setting minimum standards and quality criteria for equipment in order to guide schools’ procurement processes outside specific donor-funded projects. Furthermore, in absence of a strong and dedicated Professional Association, MESC may also suggest standards related to ICT competencies of teachers and education administrators. MESC could also be involved in the formulation of appropriate, country-wide ICT in Education indicators, in order to ensure better data collection and measurement of the longer-term impacts of ICT initiatives on the quality of teaching and student learning.

L. Private Sector Involvement

Private sector involvement in ICT in education in Samoa is mainly limited to the provision of maintenance and services for equipment and facilities established under SchoolNet. Few private sector involvement or partnerships have been established. As case studies indicate, many of the rural schools in the country cannot draw on the private sector in their communities, which limits partnership options.

New partnerships should be explored, however, to address some of the most urgent needs and issues schools are facing in terms of infrastructure and support services. International experiences may provide some helpful examples to be considered and possibly adapted. The use of a small business, run by young entrepreneurs, to provide maintenance and servicing to the schools may be such an example. Providing the business with a one-year contract would give stability to the small business and room to attract additional customers, while the schools could draw on timely services from a dedicated service provider. Another example is negotiating with an existing business to share its Internet bandwidth with a school nearby outside the business’ peak hours.

Conclusions

Overall, the study found that schools are very enthusiastic about being part of an ICT initiative. ICT administrators, in particular, have taken ownership of the initiative and are very engaged, often investing considerable personal time.

Teachers and schools face a range of challenges, including infrastructural issues such as lack of power, telephone and Internet access, which hinder the effective use of ICT in teaching and learning. Schools also struggle to optimize use of the technology, due to a lack of appropriate professional development. While many teachers have developed basic computer skills, they have not yet become confident in using the technology to improve their own productivity and bring about pedagogical change. At the same time, ICT administrators and principals are requesting more support in technology management and organizational integration of ICT. Such support is needed in order to align the aims of ICT initiatives with overall school development objectives.
A small number of schools have already started to provide the community with access to the ICT equipment. Community access and provision of technology-enhanced services, such as photocopying, provide small but important budget contributions for schools. This revenue is critical to cover ongoing costs, such as toners and paper. The majority of parents seem to be willing to support the school beyond regular school fees to help cover some of the additional costs in return for their children being able to make use of the new tools.

The ongoing costs are a major concern for school principals and school committees. Organizational challenges, such as lack of personnel to manage community access, coupled with external challenges, such as lack of after-hours public transport, constitute critical barriers to further access.

Teachers and schools are also struggling to clarify roles and responsibilities vis-à-vis the larger education system and are unclear about the support that they can expect from the government and other actors in the country. The study found that great advances have been made at the national level in formulating guiding policies for the use of ICT in education. At the same time, however, important follow-up activities, such as targeted budget allocations, the harmonization of school development strategies with national education development objectives, and the necessary organizational adjustments (distribution of roles and responsibilities) within government and other education stakeholders, have not yet been fully implemented.

The study results identify useful lessons learned from the ICT in education initiatives implemented in Samoa. The results of the study indicate that the initiatives have been successful in contributing to generating an enabling environment for ICT as a catalyst to enhance teaching and learning. At the same time, however, the results of the study have highlighted a number of areas which require additional work in order to better meet local needs and educational goals.

With this in mind, a number of critical issues have been raised that should be considered before ICT initiatives in their current form are expanded to additional schools. Overall, there is reason to believe that if such considerations and lessons learned are taken into account, necessary steps undertaken, and appropriate interventions put in place, ICT can prove to be a valuable tool for improving access to, and the quality of, education in Samoa.