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ICT in Teacher Education: the USP Experience

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Abstract

Consistent with the global trend, the Pacific island countries (PICs) are also attempting to introduce ICT in their teacher education programs. As a key player in ICT, the University of the South Pacific (USP), which owns its own satellite network, provides Internet, phone and data links, video and audio conferencing and video broadcast services to students in PICs. Through its print mode of delivery, it tries to serve the 'distance' students in PICs and the remote areas handicapped by poor infrastructure. However, owing to the scattered nature of PICs, financial constraints and underdeveloped infrastructure, communication has always been difficult. ICT, nevertheless, has the capacity to cope with these factors, enabling students to study from where they are and at their own pace collaborating and cooperating with the relevant members of the stakeholder families. At USP, ICT-driven pedagogy can be identified in three different teaching and learning styles: the traditional where students and teachers are present in a classical classroom; distance and flexible learning (DFL) using a variety of multi-media; and virtual. Using these ICT teaching learning approaches as a conceptual base, this paper discusses USP's ICT initiatives in teacher education suggesting a 'blended' mode of teaching and learning.

Introduction

For about 40 years, USP has been one of the leading providers of tertiary education in the Pacific Region and an international centre of excellence for teaching and learning, research and consultancy. One of its major pre-occupation has been to prepare teachers for the schools in the region. It serves the diverse needs of its twelve countries including Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu which are spread over 30 million square kilometers of the Pacific Ocean. The population of these countries range from about 1000 in Tokelau, the smallest, to about 800,000 in Fiji, the largest where the main campus of USP is located. Of its nearly 21,000 students about a half are studying via 'distance' (USP Strategic Plan 2006-2010: 2).

While the socio-economic and political environments in these countries vary considerably, they share similar development challenges such as poverty, unstable governance, environmental degradation, gender inequality and brain drain (Evans & Hazelman, 2006). Furthermore, these countries are diverse in their languages, cultures, traditions, religions and in the level of their education, development and the quality and the quantity of their teachers. The infrastructure, especially electricity and telecommunication provisions are underdeveloped in most of these countries and, thus, providing 'distance and flexible education' effectively is a challenging endeavor. However, USP considers DFL as the 'water in the sand' permeating the educational needs of the Pacific island countries and building pathways to achieving the EFA and Millennium goals.

It is underscored that the learning strategies and tools of DFL are equally relevant in the traditional classroom or on-campus teaching and learning. These enable the students and teachers to develop competencies such as critical thinking, decision-making, handling dynamic situations, working in teams, communicating effectively and transforming organizations into learning communities. Adding value to learning, DFL approaches extend the horizon of learning from the school to community and from a teacher to multi-disciplinary teams of educators working together in the learning process (UNESCO, 2002; Pelgrum & Law, 2003; Heredero, 2006).

While education is a key to development, DFL, infused with ICT pedagogy, is the 'master key' that can provide a powerful backing to EFA and on-going professional development especially to teachers who are responsible for facilitating education in their respective schools and communities. It is, therefore, important to re-orientate ICT in education, especially in teacher education, to support sustainable learning focusing on learning to learn and learning to live together habits.

USP: the ICT leader in the South Pacific

Information and communication technologies have been basic to the USP's teaching through distance and flexible education since its early years. From six courses in 1971, DFL courses have grown steadily to 340 in 2006. About 9,000 students, nearly a half of all the students enrolled at USP in 2005, study by the University's DFL mode of teaching, coordinated satisfactorily by USP campuses located in its member countries. Some of these include untrained and under-trained teachers because some PICs, such as Tuvalu and Nauru, do not have their own teacher training institutions. By 2010, the University expects to make all its

courses available through DFL and in this way it will capture the potential students who are currently unable to get access to course materials, library services and other resources. It is necessary, therefore, for USP to seek ways to advance its use of ICT, especially its Internet provisions. Several of its courses and programs such as Graduate Certificate in Tertiary Teaching are available online and three courses of Diploma in Educational Leadership are offered via the blended mode of delivery largely using Moodle.

Print mode, especially in teacher education courses, is still important and used widely because technology access in many parts of the region is unavailable or is of low quality owing to limited bandwidth and expensive international telecommunication and air transport costs. Educational technology or Internet access has, however, grown considerably at USP especially with the aid from Australia, New Zealand and Japan. In 2006, a new satellite providing a greater bandwidth for communication was established. Each USP campus now has teleconferencing facilities, computer and Internet access and telephony. Furthermore, some schools and students are now purchasing their own computers and are setting-up their own Internet facilities and accessing USP courses from their schools and homes. Currently an ICT centre is being built at USP through Japan International Cooperation Agency (JICA) aid program and it is expected that the bandwidth limitation issue will be adequately addressed (Implementation Review Study Report, 2007).

In brief, through its DFL initiatives, USP attempts to provide a unique, satisfying and stimulating learning experience to students and teachers away from the traditional classroom scenario. However, it realizes that its learning packages and technology for DFL students require much more than written materials to ensure that distance students undergo the similar learning experiences that their counterparts have on-campus. We would go a step further to articulate that DFL provides students with many more choices over and above the traditional face-to-face teaching. The rationale behind ICT-driven distance education has the potential to enrich the traditional classroom learning especially by extending the boundaries of learning to the community. Thus, USP attempts to follow ICT and DFL philosophy in its on-campus courses. As Naidu (2003) explains ICT in educational processes have the capacity to mediate asynchronous as well as synchronous learning and teaching activities. In particular, the learning experiences in the teacher education at USP are based on the pedagogy that ensure student-centred models in which students work in teams, take responsibilities for their own learning, learn at their own pace and in their own place of residence.

ICT Education in Secondary Education in Pacific Island Countries

The University of the South Pacific prepares ICT teachers for the secondary schools in PICs. Therefore, it is important to look briefly at the ICT education in secondary schools in PICs and the section that follows concentrates on it.

Two major pieces of work on ICT in secondary education in PICs (Williams, et al., 2004; ICT Capacity Building Project, 2005) stress the significance of ICT in the socio-economic development of the island nations. This coincides with the world-wide emphasis placed on ICT in all facets of living including the on-going learning process.

Based of their findings, these studies go on to stress the need for relevant educational policy changes to accommodate ICT education in schools and teacher education curricula. This policy initiatives and the 'political will' would enable students at various levels of the school system to attain ICT skills and expertise and improve their performance in activities such communication, health, education and social and economic activities by employing affordable digital network infrastructure. Genuine commitment on the part of the policy-makers and educational leaders is necessary to prepare policy-users including principals, teachers, students and parents. These studies revealed that the 'readiness' of the stakeholders, especially teachers and principals, is one of the major constraints in the successful development and implementation of ICT education in schools and their communities. ICT has now captured most of the commercial and educational sectors and, therefore, school leavers must have the basic ICT literacy for employability, worthwhile-living and sustainable development.

Another major problem that constrains the successful implementation of ICT in secondary schools in PICs is the shortage of appropriately qualified teachers. The William, et al. study (2004) reveal that while the CS/IT teachers in Fiji have basic academic qualifications, they are largely untrained because the majority has not done the education components of the teacher education program. Therefore, they are unable to take advantage of the pedagogical strengths of ICT that are introduced in the relevant curriculum studies courses of USP's School of Education. The other teacher education institutions in the Region should also include ICT in their education programs and the authorities concerned should make provision for in-service and on-going professional development workshops as new ideas and tools enter the school system.

The study also stresses that workshops on ICT should be organized for all the members of the school staff at school level so that they become ICT friendly and use the ICT pedagogy profitably in their classrooms. This viewpoint finds support in the following comments of Pelgrum and Law (2003: 58), "The prime focus of staff development in many countries has moved to the

training of all schoolteachers so that they can make use of computers in their day-to-day teaching activities, and the necessary staff development for principals and technology coordinators to lead and support ICT implementation across the curriculum".

The advocates of ICT education in Fiji find it difficult to motivate teachers to undertake ICT-related professional development programs and courses. This is largely owing to the lack of career development opportunities in schools. As already mentioned, most ICT teachers do not take teacher education courses in their degree programs. The Fiji Ministry of Education provides qualified teacher status to those who have not majored in teacher education and two teaching subjects in their degree programs. Owing to shortage, the Ministry appoints ICT teachers as temporary civil servants or grant-in-aid teachers and they are replaced when trained teachers are available. According to Williams, et al. (2004) and Khan (2005), CS teachers felt that they are not given adequate remuneration and they treated their appointment as temporary. They also felt that they were insecure as the grant-in-aid teachers. There is, therefore, not sufficient reward provision in the school systems in the PICs to persuade teachers with ICT qualifications to stay in schools. According to Becta (cited in Pelgrum & Law, 2003) this 'drain' of trained ICT teachers to more lucrative IT-related jobs is not uncommon world-wide. Suggesting ways to address this problem, Khan (2005) suggests that the Ministries of Education in the PICs ought to provide better job security, induced salary and scholarship opportunities especially for ICT training and teacher education. Many PICs have identified similar constraints in the development, implementation and sustainability of ITC education. The University offers several courses in CS and IT but these are not obligatory in the teacher education programs of the School of Education except a first year CS course selected from three options. Most of these courses are designed to address the needs of the commercial sector and not to teaching.

The Fiji study, reinforced by the regional workshop, also found that the secondary school curriculum in computing science (CS) was not up-to-date. Owing to the lack of relevance, resources and commitment of the stakeholders, the computing science program was unable to make any significant impression on the overall teaching and learning process. As mentioned earlier, most CS teachers did not have any teaching qualifications. It was difficult, therefore, for these teachers to develop the CS curriculum as their work unfolded. Furthermore, most were not able to make their classes interesting by employing the ICT pedagogy. The curriculum was found to be too theoretical, overloaded and examination-driven. The classes were boring and were dominated by note-taking, rote-learning and with very little hands-on practice. According to Williams, et al. (2004), the content of the curriculum was rigid and there was little room for

flexibility. They write, “A few students stated that the CS/IT curriculum was treated as a Bible and that teachers did not want to divert from its outline. The students added that many teachers lacked creativity and a vision to improve the curriculum” (Williams, et al., 2004:27).

However, some countries (such as Niue, Fiji and Cook Islands) have attempted to introduce ICT pedagogy in their school curriculum. For example, Niue has ICT learning centres and the Solomon Islands the ‘People First Net and Youth First’ computer centres. Samoa intends to develop ICT centers in its schools whereas Fiji has plans for Tele-centres (Bakalevu, 2005). To provide updated information on key events in relating to education and ICT in the region, the Institute of Education (IOE) of the University of the South Pacific operates a network for Pacific Educators. Through this network, IOE is able to assist the member countries in developing their ICT curriculum and ICT-related professional development for teachers (Johansson-Fua, 2005).

Briefly, then, most PICs have taken initiatives in developing ICT in their secondary schools. According to Johansson-Fua (2005), however, the initiatives are hindered by the following common problems. The first relates to hardware facilities. The current supporting infrastructure cannot meet the demands of the hardware facilities as well as cope with the maintenance needs of the existing ones. The second concerns the limited finance available to cope with the high cost of Internet, hardware and software, telephone and electricity. The third major problem concerns the human resources in IT in these countries. In particular, there is lack of ICT experts and teachers and the problem is worsened by the high turnover of ICT teachers owing to the limited job security and career pathway. Consequently, it is difficult to develop a sound and integrated ICT curriculum, organize professional development programs in ICT pedagogy and awareness activities for teachers, students and the other members of the stakeholder community. Finally, equality and accessibility to ICT still remain problematic in PICs especially in establishing good infrastructure for ICT. Some of ways to address the problems, mentioned above, are suggested below.

1. Develop and implement ICT policy in education.
2. Develop, review and implement ICT curricula at all levels in education.
3. Integrate ICT in the school curriculum.
4. Introduce ICT in the teacher education institutions so that all teachers are familiar with ICT pedagogy.
5. Develop ICT leadership at all levels in the education system.
6. Conduct ICT awareness programs for teachers, students and the members of the school community.

7. Establish ICT centres in islands and remote areas equipping them with portable generators and IT hardware including Internet installation where possible.

(Source: Adapted from ICT Capacity Building Workshop, 2005).

ICT in Teacher Education

As already mentioned, USP is considered as the ICT leader in the South Pacific. It is the major tertiary institution that provides ICT education and ICT teacher education through it respective Schools. Through ICT and distance and flexible education, we provide students and student teachers a variety of ways in which they interrelate amongst themselves and other members of the stakeholder community. At USP, we employ three different styles of ICT teaching and learning. The first is the 'traditional' one in which the students and the lecturer is present in a classical classroom. The distance teaching style constitutes the second in which personal interaction in the class is substituted by multimedia and print materials. Finally is the virtual style where the relationship between students and the lecturers is established by a network. Owing to the infrastructure problems, already mentioned, and the contextual needs, we are now attempting to take the best from these approaches to facilitate effectively and efficiently in our teacher education programs as well as other courses offered by the University. In the recent years, some progress has been recorded on all these areas, however, constraints such as unavailability of suitably qualified human resources and relevant material resources, isolation and poor supporting infrastructure have hindered their progress considerably.

Traditional classroom style of teaching is prevalent in primary and secondary schools in PICs. Even at USP, many lecturers and students prefer 'face-to-face' mode of teaching to DFL. Therefore, there is a need to introduce ICT pedagogy at the classroom level. This argument is based on the learning philosophy adopted by the schools including tertiary institutions. In most educational institutions in PICs, the learning process is 'teacher-controlled' and the students are passive learners.

The schools which are committed to preparing students for the future information society empower them to become more active learners constructing their own learning situations. Thus, learning becomes a lifelong process where learners acquire constructive and inquiry-based skills as their living process unfolds. In the learner-centered approach the learners become architects of their learning process with the professional guidance from teachers/lecturers. In this learning mode, ICT applications become vital and more user-oriented. In this case the physical environment is made more suitable for learning individually and in small groups. Moreover, learning becomes more flexible in terms of 'time' and 'space'.

In fact, the use of ICT pedagogy in the traditional classroom involves a 'mentality shift' on the part of teachers, a change in curricula as well as the appropriateness of and familiarity with the digital language and new technologies in education including the use of CD ROM, electronic games to develop different skills such as e-mail, and online discussion forums to support collaborative writing, resource sharing and internet research. This new pedagogy in the classroom is an indirect way of empowering students and student-teachers to learn and use ICT in their day-to-day activities. The use of ICT at the classroom level also helps build awareness and confidence both in lecturers and students. For example, all students and lecturers at USP have access to computers and software that can be used to improve the quality of their presentation. They now communicate with one another by e-mail, discussion board, chat rooms and the like.

Opportunities to develop these skills are available at USP but owing to workload and the danger of destabilizing the status quo have led to the minimum use of ICT applications at the traditional classroom level. USP lecturers mainly use simple ICT applications such as word processing, power-point, e-mail and excel. Many are familiar with spreadsheet, discussion boards and online chat but these are hardly used at the classroom level. This is largely because of the lack of readiness of the lecturers to use ICT at the classroom level. Therefore, developing lecturer competence is an urgent need and USP is attempting to address this. It is noticed, however, that there are not many ICT courses in our teacher education programs. One of the CS courses at the first year degree level is optional. Student teachers who take CS as one of their major teaching subjects are trained to teach it in secondary schools. Most of the other teacher education institutions in the region do not prepare teachers in this area. This small number of trained CS teachers does not make an effective impression of ICT in schools. Many schools in the region are taught by untrained teachers as discussed earlier.

It is also important to stress that all the lecturers preparing teachers in USP's School of Education (SOE) should be prepared first so that they could integrate ICT in the teacher education courses. SOE has taken initiative in this direction and now offers a course on 'Pedagogical Principles of Online Learning' in its Post Graduate Diploma in Tertiary Teaching program of study (USP Calendar, 2010). The course is designed to provide a variety of student-centred instructional methods that are effective for students in online courses. In this course, students receive practical experience in organizing and teaching online.

Teacher Education through DFL

The University of the South Pacific also offers its teacher education programs through DFL mode. This is a popular approach because teachers in service are able to study while they are serving in their schools. Pre-service teachers also take education courses by DFL because not all can financially afford on-campus studies. The effective use of ICT is, therefore, essential. The University of the South Pacific has been responsible for teacher education for all levels of formal education from early childhood through to tertiary for a number of years. More recently, USP's School of Education (SOE) has been successful in externalizing most of its teacher education programs. In particularly, it has fully externalized its BEd primary in-service program and it is proving to be popular with practicing teachers. SOE is now in the process of externalizing its early childhood and special education degree programs.

Moreover, it has substantially externalized its secondary, pre-service and in-service teacher education programs. To support its teacher education programs, SOE offers a number of certificates and diplomas such as a certificate in non formal and community education and a diploma in leadership and change through its distance and flexible mode of delivery. There is, however, a need to make these programs more widely accessible to teachers in all PICs. Teacher capacity building is one of the priority areas of the DFL program at USP. It focuses on the need to improve and sustain learning by providing more opportunities for practising teachers at primary and secondary levels. Through its post graduate certificate in tertiary teaching program, it prepares lecturers for tertiary teaching. This program is now available online.

Through DFL mode of delivery USP is now establishing pathways for untrained teachers into its existing BEd primary and secondary teacher education programs. Moreover, USP is creating similar pathways in its Diploma in Leadership and Change program of study for primary and secondary school leaders.

Virtual Style of Teaching

University has also attempted to put a number of IT courses in its virtual style of teaching. As mentioned earlier, in this style a permanent relation between students and lecturers is established by a network. This was seen as necessary because of the spatial nature of the Pacific region and the USP mission to reach the learners in its twelve countries. The effort here was to take the courses to the learners wherever possible.

USP offers a number of CS and IT courses so that its graduate can response ably to the development needs as well as participate actively in the modern digital globalizing world. To meet the demands of ICT education in the region, it now offers some of its courses by distance.

In its first introductory course on information system, which depended largely on purchased materials (RAVAGA et al., 2001), difficulties were experienced in coordinating it by distance. Some of the difficulties included

a. Computer software and hardware were difficult to obtain and maintain.
b. There was severe lack of technical expertise in such a new area.
c. Enrolment has to be limited due to computer access.
d. Local tutors for student support were necessary but hard to find.
e. Regular development of the courses was difficult.

(Source: Evans & Hazelman, 2006)

In the light of these difficulties, it was realized that coordinating computing science at distance was fairly difficult. The School of Education was also planning to put some of its courses online. However, it was quick to learn from the computing science experience and decided to use a more blended approach to deliver its distance courses and programs.

The Blended Approach

After the 2000 political crisis in Fiji, USP introduced a number of courses that use online technology using the blended approach. It included televised broadcast, videoconferencing and audio distance learning, as well as distance learning delivered by printed materials, videocassette and audio tape. Video broadcast courses were developed from an immediate need to deliver face-to-face courses to students in this political crisis. Now the broadcast lectures receive online support and they have become a normal mode of course delivery. USP now sees this approach as a fast way to make face-to-face courses available in the region where time and resources are not readily available to develop print courses. In the video broadcast lectures, the students are not gathered in one classroom but are spread throughout the USP region. Despite the location of students, they are treated as equal members of the class, however, the difference is that the distance students learn to use different type of technology such as audio conferencing, video conferencing or computer based Website to communicate with the lecturers and other students in the class.

USP's SOE now offers one program, i.e. Graduate Certificate in Tertiary Teaching, via online mode of delivery, blending it where possible with face-to-face tutorials. In another program, namely, Postgraduate Diploma in Educational Leadership, three courses are available via the blended mode using Moodle as the LMS. These courses employ strategies such as videoconferencing, face-to-face tutorials, audio-tutorials using USP's satellite network, class discussion forums using Moodle, print mode where necessary, and teleconferencing including

email, mobile telephones and 'Skype'. While 'Skype' is used by only a few students, it sets the face-to-face kind of scenario and we see it as a potential medium of communication in future.

These courses have been popular in PICs and the students have expressed their satisfaction through student evaluation reports (Sharma, 2009). This finds support in a current study entitled 'Learners' satisfaction, and preference for, different instructional delivery modes: a case study from the University of South Pacific' (Raturi, 2010). In brief, we stress that the blended approach has the potential to facilitate reflective learning, constructivism, and dialogic and collaborative learning enabling the learners to 'learn to learn' and chart the 'uncharted waters' that they would confront in their daily living.

Exhibit 1 shows a unit-content of a course. It is stressed that the various components of the unit provide constructive alignment among the different elements of the curriculum on the one hand and the tools to unlock students' thinking and learning on the other.

Exhibit 1

Weeks 5 & 6 - Unit 2: Planning the curriculum - situational analysis

(24 August - 5 September)

- Learning Outcomes
- The key issues in Unit 2 (power-point presentation)
- Key Readings
- Forum: Readings
- Self-learning activities
- Forum: Self learning activities
- Reflective Writing No.2 - Unit 2 (Individual Submission)
- Forum Discussion Task No.3 (Unit 2)
- Forum Discussion Task No. 3 [post here]
- Unit 2 Evaluation Student-Feedback
- Weeks 5 & 6 checklist

Source: Sharma, A., 'Course Organization' in ***ED402 Curriculum Design and Evaluation in Higher Education***, Semester 2, 2009, in Moodle.

Conclusion

In this paper, an attempt was made to discuss ICT in education including teacher education. The paper acknowledges that some of the early complexities and constraints in ICT education still continue to exist despite the fact that the hardware is cheaper now-a-days. As Williams

(2005) stresses, “the diverse characteristics of the islands themselves compound the challenges”. The poor communication link owing to underdeveloped infrastructure, isolation, limited finance and unavailability of suitably qualified teachers are some of the constraints that hinders the successful implementation of ICT in our teacher education initiatives. Despite these limitations, USP is making a steady progress in this direction with the upgrading of its ICT capacity.

This paper identified three different styles of facilitating ICT education at USP: tradition classroom; distance learning; and virtual. The usage of ICT at the traditional classroom level depends on educational philosophy the school holds. The school that takes student-driven learning is committed to preparing active and lifelong learners. In such schools ICT pedagogy flourishes.

The second is DFL which is fairly popular in our teacher education programs. Currently, our teacher education programs are fully or partially offered via the print mode and, wherever possible, they are supplemented by audio teleconferencing, videoconferencing, e-mail communication and face-to-face tutorials.

The third is the virtual style. Some of the teacher education courses are offered online. However, the problems, already mentioned, still exist making it difficult for the students to do their studies successfully. In particular, the Internet access and speed are still relative low, the communication between the main campus and other campuses is not sufficiently coordinated, the technical staff support is often unsatisfactory and the infrastructure is not so well developed to provide consistent support.

Despite these limitations, we feel that ICT-driven flexible learning *is* appropriate for the PICs. If our ultimate goal is to use distance education and online learning as a way to overcome our challenges, and move students towards a more constructivist framework, we need to develop ICT skills in the stakeholders so that they are able to participate actively in the development of learners and the nation. This is where the blended approach stands out because it has the potential to draw the best from all the three ICT learning styles as shown in Exhibit 1.

As access improves and skills develop, the blended learning approach will encompass a much greater part of our teacher education courses enabling students and student teachers to access our courses from their homes or local study centres. The approach will also enable students to interact with other students from across the region as well as expert facilitators from in and beyond the South Pacific region. It is felt, therefore, that the blended approach to presenting

teacher education, including professional development, is most appropriate in locations such as the Pacific Island countries.

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