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UPGRADING TECHNOLOGY TEACHERS BY DISTANCE

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Introduction

Technology in its current form is a relatively new subject; it has no tradition or history in schools as a component of general education (Layton, 1993, deVries, 1993). In some countries is has derived from vocational programs such as in Taiwan, and in others it is influenced by craft subjects such as in Sweden. The tradition has also generally been gender biased. The new technology education is moving away from narrow vocational preparedness and from gender specificity. The culture of school technology (Puk, 1993; Layton, 1993) is developing, though still in its infancy, into beliefs about values, practices, content, methodologies and capability.

Many countries are developing technology education through challenges to traditional characteristics of schooling - the decontextualization of knowledge, the primacy of the theoretical and secondment of the practical, and the organization of the curriculum along disciplinary lines. Technology education emphasizes the context of the technological activity, learning is achieved through the interaction of theory and practice and it is interdisciplinary.

Some of the trends in technology education, which are obvious in a number of countries, include a movement from:

teacher as information giver to teacher as facilitator of learning

teacher controlled learning to teacher learner partnership

teacher centred learning to student centred learning

time age and group constraints to individualized learning

materials based organization to needs based activity

product centred to process centred

elective area of study to a core subject

social irrelevance to socially contextualized

Given the identification of these types of common trends, there is also a great degree of diversity throughout the world in technology education (Williams, 1996). This diversity ranges from the absence of technology education (Japan) to its compulsory study by all students (Israel), an instrumentalist approach (Finland) to a basically humanistic approach (Scotland), a focus on content (USA) to a focus on the process (UK), an economic rationalist philosophy (Botswana, China) to a more liberal philosophy (STS in the USA), a staged and well supported implementation of change (as proposed in South Africa) to a rushed and largely unsuccessful implementation (England), integrated with other subjects (science in Israel) or as a discrete subject (Australia).

Both the commonalities and the diversity are appropriate. The type of technology education developed within a country must be designed to serve that country's needs, and build upon the unique history of technical education resulting in a unique technology education program.

Nielsen (1997) has identified a number of reasons for insufficient numbers of trained teachers including a shortage of qualified candidates, the length of time required for certification, the expense of teacher education programs, difficulties in student access to teacher education sites and the scarcity of student places. In addition to these factors, an outcome of the renewed interest in technology education in smaller countries is that it is not well catered for in the higher education sector, including teacher-training institutions. One of the reasons for this is the limited number of higher education institutions, typically one or two, and the resulting limited flexibility and resources. This situation exists for example in a number of southern African countries, where technology teachers are trained to a certain level, for example a two-year diploma, and the provision is not generally available within the country to train beyond that, say to a bachelors degree level.

This paper describes an approach that has been developed and implemented in Mauritius, Seychelles and Botswana to meet this need. It will outline the principles of course design, the mixed mode of delivery and some of the issues of course delivery.

Forms of Distance Education

It is difficult to find current research about text-based distance education, this having been overtaken by online and internet modes of delivery. Of the 558 articles on Technology education I have in my Endnote library, and the 526 full-text online journals accessed through WilsonWeb, a number of searches revealed no research since 1990 on text-based distance technology education.

A comparison of this emphasis with the state of the world's population in terms of computer availability, phone lines and arguably that portion of the population in most need of education, indicates a significant imbalance. In low-income countries (40% of the world's population) there is 1 computer for every 250 people, in high-income countries (14.9% of the population and generally the origin of on-line distance education) there is 1 computer for every 3 people. In low-income countries there is 1 telephone line for every 37 people, in high-income countries there is 1 for every 2 people. There are about 400 million computers in the world and 300 million of them are owned by 15% of the world's population.

Category	% of World	PC's/1000	PL's/1000

of Country	Population		
Low Income	40%	4	27
High Income	14.9%	346	583

One cannot help but conclude that the current direction of distance education research is not serving the interests of the majority of the population who need an education. This is compounded by the high proportion of untrained and unqualified teachers in low income countries (Nielsen, 1997), and reinforced by the evaluation of distance education reported in this paper.

Course Design

The courses reported and evaluated in this paper have either been delivered or are currently operating in Mauritius, Botswana and Seychelles.

A teacher education course in technology education derives its content from three main sources. One is the educational system for which the teachers are being trained. Information from this source includes syllabi, methodologies, school contexts, etc. The second source is the technological activity that takes place in society, and the third source is from the discipline that is being studied, in this case technology education. The research and literature of the discipline gives guidance on content, structure, learning patterns and methodologies.

All these systems are vital sources for the design of a teacher-training course in technology education. Graduates need to be suited to the system in which they are going to work, but their tertiary studies should be more than a repetition of the secondary syllabus at a deeper level.

Each course was designed to accommodate the above characteristics in the context of the appropriate education system. This meant significant local input with regard to the local educational system and the social/technological context. It was found that it is difficult to do this at a distance and requires face-to-face negotiation.

A guiding principle of the course is that students must learn how to learn. With technology changing as rapidly as it is currently, there is a limited life span in the skills students are now taught. Students must be taught how to independently develop new skills, how to find out about new materials, equipment, and systems. Then when the need later arises for personal professional development, or for school development, teachers are well equipped for the task.

The contextual goal of the courses is also the sustainable development of the country. This applies to individual teachers who, as a result of this course, will:

- develop relevant and current content knowledge in technology education;
- incorporate contemporary pedagogical skills into their teaching;
- be better equipped to guide the development of young students;

• understand international best practice in technology curriculum development.

Typically courses had to be designed quickly. The identification of a market opportunity was followed by the development and submission of a proposal to the key people in the market. A lengthy delay at this stage could have resulted in missed opportunities. The initial proposal was clearly identified as a flexible starting point for discussion and negotiation about the structure and content of the course, then the specifics were modified later.

Initial proposals were not specifically costed, but a range of delivery options were outlined, with an indication of the relative expense of each option. Sponsors do not necessarily choose the least financially expensive option, as other factors such as ease of administration and perceived quality of delivery are important factors. In one country the most expensive delivery option was selected because that was the traditional approach to upgrading teachers in that country.

If the market opportunity was identified by a person not connected with the coordination or delivery of the course, then it was found necessary for a person expert in the content of the course would visit the sponsors to negotiate the course, answer questions, and evaluate the environment in which the course would be delivered. Important information related to facilities and equipment, prior experience and education of the potential students, cultural and regional considerations, local coordinators and living conditions.

As a result of these initial visits and communication, a specific and costed proposal and course design was developed and signed by the appropriate parties. Responsibilities of all involved were specifically detailed. This detail is essential, and can significantly impact on course success. For example in a course that was delivered in Mauritius, student consumables were the responsibility of the local sponsors. This proved to be a greater expense than was anticipated and would have impacted significantly on university revenues.

Course Delivery and Structure

The Design and Technology Bachelor of Education (Secondary) program is designed to prepare students to teach Design and Technology at all year levels in the secondary school. The award is granted after the successful completion of four years of full time study (or equivalent), that is 8 semesters at 4 units each semester, or 32 units. The remainder of the suite of undergraduate courses available in this area include a 3-year Bachelor of Arts, a 2-year BEd upgrade for diploma holders and a 1-year BEd upgrade for BA holders. These are all subsets of the 32 units of the Bachelor of Education, which provides a pool of units from which to select the most appropriate for the specific market. So for example, the 16 units of a 2-year BEd upgrade offered in one country may be different from that offered in another because they are selected and matched to the specific needs of the market.

The courses are delivered through a combination of distance mode and intensive workshops/lectures over a period of up to four years. Students study part time, and enrol in two units per semester. The part time study involves readings, assignments, assessment and examinations being forwarded to the students, in concert with a two-week period of intensive lectures/workshops in their country. This provides about 30 hours of face to face interaction for each unit in the middle of each semester. So students do some study both before and after the on-site classes.

The advantages of this mode of delivery include:

• no disruption to schools through the absence of teachers;

- education activities and discussions can be based on current practice;

• the opportunity for collaborative teaching and research between local staff and university lecturers.

The upgrade course consists of three types of units:

- Education Studies: studies in the theory of education, educational psychology and teaching studies and practice.
- Curriculum Studies: studies of relevant curriculum resources and related teaching.

- Content Studies: appropriate specialisation content.

The balance of these units varies depending on the local context and needs.

The courses were proposed in the context of a joint venture between the University and the local Ministry of Education (in the case of a sponsored cohort), with the provision of concurrent opportunities for postgraduate study (MEd or PhD) for local lecturers. This study can be done by distance, and opportunities for supervision and guidance would arise through the undergraduate course activities. In some instances a fees-only postgraduate study scholarship for the top academic student has been provided upon completion of the course.

Costs and Responsibilities

The sponsor's responsibilities may include:

- Nomination and resourcing of a locally based program coordinator;
- Recruitment of the cohort of teachers into the program;
- The provision of an appropriate venue for the on-site teaching;
- Funding time off for course participants, for example 1 day/week during semesters;
- The provision of consumables and technical support for the on-site teaching;
- Organization and funding of mentors;
- Organisation and invigilation of examinations.

The University's responsibilities include:

- All costs associated with university or local staff conducting the in-country teaching;
- Provision of all distance education materials;
- Implementing enrolment and recording procedures;
- Reasonable remediation of failing students;
- Setting and marking assignments and examinations;
- Granting the relevant degree.

If the government sponsors the program, it is funded on the basis of a specific number of students being the minimum in the cohort. If the number of students drops below that level, the cost will be maintained. It is generally agreed that a specific number of students above that level can be enrolled for no extra cost.

Issues

Level of Technology

Technology education in teacher training serves the dual role of providing experiences and activities which teachers can model in their schools when they begin teaching, and experiences which enhance their understanding of technology. Both are important because teachers need starting points for their teaching, but also need a sophisticated awareness of the nature of technology. In extending educational experiences across cultures, the correct balance, and the justification of the balance between these two goals is imperative. The principles of appropriate technology become relevant in the selection of technological activities.

Facilities

In some countries the facilities are not available to offer units that would normally be considered core units. For example in technology education these could relate to computer assisted drawing and machining, advanced materials, electronics and a range of computer based units. In some countries the units cannot be offered, in others the unit content can be modified to enable it to be offered in an appropriately contextualized way.

Local Politics

There is invariably a political dimension involved in the context in which the course is delivered. A local course coordinator is invaluable in steering through the potential pitfalls of teaching site selection and dealing with local institutions and authorities, which may respond to a variety of agendas. This can nevertheless be a source of frustration as the sense of urgency felt at the source institution is not always replicated in going through the protocols in the local delivery context.

Lecturers

It takes some time interacting with a class for a lecturer to develop a rapport with students, and when they spend 30 hours together over two weeks the relationship seems to become quite strong. Students do not want to go through this ‘getting to know the lecturer’ period with a new lecturer for every unit. However, if the ‘expert’ in each unit is the person sent to do the teaching, then many different people are involved in a course. It has been necessary at times to restrict the number of people involved in course delivery in order to help ensure student comfort.

It is appropriate to occasionally localize course material to the extent that a local person is involved in presenting to the students. This can, however, be perceived negatively by the students, who consider they are paying for an overseas course, and that is what they want, not local lecturers.

Currency

Currency restrictions may inhibit the ability of students to purchase course material. This can occur at both a personal and national level if there is close monitoring of the country’s foreign currency reserves. This has been overcome at times by selling resources in local currency to the students and then using that income for local expenses of the project, but still may result in curtailing the resources available to students.

Course Duration

Some of the students have been dissatisfied with the duration of the course. They would have preferred for example to study for three semesters per year and complete a two year

full time course in under three years part time, than study for two semesters each year over four years.

Communication

Because standard means of communication such as mail, internet and fax can be unreliable or non-existent, communication with both students and coordinators in the host country can be frustrating. Typically some students have internet connections, and mail and fax are unreliable. This means forward planning is critical, and normal processes may sometimes need to be circumvented. For example an unreliable mail system resulted in a batch of exam papers going missing and alternative strategies had to be devised; and assignments, both to and from students, are express mailed together rather than individually.

Conclusion

For many students, text-based distance education represents their only source of educational opportunity. In the area of technology education, a successful mode of delivery incorporates a period of intensive face-to-face interaction with a lecturer. Detailed planning is vital, but flexibility in the implementation of those plans is just as important in order to overcome unforseen barriers.

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