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Berlin
Germany

Further enquiries:

Prof PA van Brakel
Conference Chair: Annual Conference on WWW Applications
Cape Peninsula University of Technology
Cape Town
+27 21 469 1015 (landline)
+27 82 966 0789 (mobile)

Success indicators in implementing technology-enhanced courses during a professional development programme

S. Simelane
Directorate of Teaching and Learning with Technology
Tshwane University of Technology
Pretoria, South Africa
simelanes@tut.ac.za

Abstract

The development of technologies that can be used to make education more effective have created opportunities for the development of new methodologies in teaching and learning. Most higher education institutions throughout the world have already integrated their services to varying degrees with the Internet and other technologies that have potential for teaching and learning. It is this kind of integration of technology and education that is both challenging and daunting to lecturers, many of whom have very little experience of the technologies in question and most of whom have never been trained to integrate technology with teaching and learning. The aim of the study was to identify the success indicators of the technology-enhanced courses through investigating the implementation component of the Partners@Work programme at Tshwane University of Technology. Qualitative data was collected by means of a case study that uses an interpretive approach and that incorporates elements of ethnography. The participants in the study were those staff members who participated in the Partner@Work programme in the twelve months between June 2005 and June 2006. The data was analysed by means Atlas.ti™. This paper reports on the success indicators during the implementation component of the partners' technology-enhanced courses during the Partners@Work programme at Tshwane University of Technology. The findings of the study revealed that success indicators included the availability of required support, access to stable and reliable technology, a properly functional Partners@Work programme, the design of the development component of the P@W programme, and new multimodal approach to teaching and learning.

Keywords: success, implementation, technology-enhanced courses, professional development programme

Introduction

The development of technologies that can be used to make education more effective have created opportunities for the development of new methodologies in teaching and learning. Most higher education institutions throughout the world have already integrated their services to varying degrees with the Internet and other technologies that have potential for teaching and learning. It is this kind of integration of technology and education that is both challenging and daunting to lecturers, many of whom have very little experience of the technologies in question and most of whom have never been trained to integrate technology with teaching and learning. Twigg (2003) is of the opinion that higher education institutions should improve and supplement traditional technology-management courses by taking advantage of the ubiquity of the Internet and technology to empower faculty members to utilize and integrate technology with their

teaching and the learning experiences of their students.

This paper reports on the success indicators during the implementation component of the partners' technology-enhanced courses during the Partners@Work programme at Tshwane University of Technology. The findings of the study revealed that the success indicators included the availability of required support, access to stable and reliable technology, a properly functional Partners@Work (P@W) programme, the design of the development component of the P@W programme, and new multimodal approach to teaching and learning.

Aim of the article

The aim of this article is to identify, discuss and explain the success indicators that occur during the implementation component of the partners' technology-enhanced courses during the P@W programme at Tshwane University of Technology (TUT).

Literature review

International professional development programmes in educational technology

Quick and Lieb (2000), Guri-Rosenbilt (2005), and Viel, Brantley and Zulli (2004) state that a large number of international universities use professional development programmes to educate their staff in the use of technology in educational practice. They also maintain that educators have realised that computer technology has exerted a decisive influence on teaching and learning in the past decade or so in particular, and that information communication technologies in general have changed the face of education at all levels including higher education. Online learning has grown exponentially in higher education during the past five years with the advent and implementation of course management platforms (Abel, 2005b). Twigg (2003) states that technology is utilised in most higher education institutions as a new way of making teaching and learning experiences more powerful and accessible.

Ma and Runyon (2004) suggest that an Internet-based model of instructional design and implementation offers the following advantages: it encourages creative cooperation among faculty members, it standardise the format and appearance of learning and teaching material for individual modules and it provides standardised institutional assistance to new members of teaching staff. In addition an Internet-based model offers students all the information they need for their modules without the kind of degradation of information that occurs when students transcribe lectures delivered by traditional means and it standardises and facilitates student assessment processes

Ensminger and Surry (2002) believe that it is up to the institution, the faculty and the departments concerned to become involved in every detail of e-learning implementation. They identify the following eight circumstances that influence the success of implementing innovations: sufficient equipment and technological resources, incentives for utilising technology, the "comfort level" of users of technology, the expenditure of time that is necessary for training, the necessity of changing existing instructional methods

National perspective: professional development programmes in educational technology in South Africa

Over the past decade, many higher education institutions in South Africa have invested heavily in units and projects that specialise in programmes that introduce technology to their staff and that assist with the integration of technology with course content. The *Online Learning Centre* (OLC) at the Durban University of Technology (DUT) created one such programme called *Pioneers Online* in 2001 (Pete *et al.*, 2002). After the management of the University of Johannesburg had assessed the influence of technology in teaching and learning in various higher education institutions in the country, they created a unit called *Centre for Technology Assisted Learning* (CENTAL) in 2002. The mission of this centre was to design, develop and support an integrated multimodal approach to learning, teaching and assessment for the university. To improve the quality of teaching and learning at the University of Stellenbosch the *Virtual Information Space* project was initiated to encourage the sharing of useful information among postgraduate students, and to investigate the functionality of synchronous and asynchronous computer-mediated communication (Ekermans, 2003). Other South African higher education institutions such as University of Pretoria, Cape Peninsula University of Technology, University of Cape Town and Bloemfontein University of Technology have similar professional development initiative to empower lecturers in the use of technology in education

Success indicators

Several factors contribute to the successful implementation of technology-based courses. These factors include the availability of support, adequate technology, student exposure to and involvement in online teaching and learning, the attitude of faculty members towards online learning, courses, funding, appropriate modes of delivery, and sufficient time. Whoever wishes to implement online courses successfully needs to take all these factors carefully into account. Ensminger and Surry (2002) strongly advise higher education institutions to take all these factors into account before implementing online learning. Cross and Dublin (2002:94) maintain that success factors such as participation rate, successful completion, test scores and learner evaluation should be measured.

Abel (2005b) Ensminger and Surry (2002) Cross and Dublin (2002:94) encourage stakeholders to participate in the process of implementing web-base instruction in higher education institutions and become involved in decisions about planning and design. They also believe that management should always be actively involved in the implementation process and it should demonstrate visible support for the changes that are taking place.

In dealing with the resource issue such as computer hardware and Internet connectivity, Instructional Designers should encourage lecturers to implement modules and utilise computer laboratories where technical infrastructure will be able to cope with their

technology-enhanced modules within the institution (Pete & Fregona, 2004). Ensminger and Surry (2002) state that higher education institutions that want online modules to be successfully implemented should provide the necessary resources and technology. In order for the courses to be implemented successfully Volery and Lord (2000) emphasized that one needs to take into account the reliability, quality and medium richness in technology when implementing online learning. There should also be a network that allows synchronous and asynchronous exchanges to take place.

Volery and Lord (2000) state that students who are self-motivated and who possess computer literacy skills, prior experience and computers at home are much more likely to make the success of implementation. Guri-Rosenblit (2005) supports Volery and Lord (2000) and mentions that online learning offers students a variety of flexible learning opportunities to adapt and adjust their learning styles. Katz (1999:7) mentions that the traditional classroom with four walls and a “talking head” instructor will ultimately give way to efficient online learning experiences. He is of the opinion that a paradigm shift of this kind might well be forced on faculties by the students themselves because modern young students are part of the digital generation, they are accustomed to interaction and they approach learning as a plug-in-and-play experience. This generation has become thoroughly accustomed at home to learn by means of participation and individual experimentation (Katz, 1999). Abel (2005b) states that if online modules are to be successfully implemented, students should be offered more flexibility, costs should be carefully controlled and online learning should be used so as to reduce the need for physical classroom space. Broadbent (2002:152) suggest that e-learning can be successfully implemented if instructors use Gilly Salmon’s five phases of online learning which are designed to show how a learner progresses to increased independence as a result of an instructor’s action.

Pete and Fregona (2004) encourage instructional designers to provide incentives, resources and rewards so that online lecturers will be motivated, stimulated, encouraged and sustained in their practice. Volery and Lord (2000) recommend instructors to become proficient in the handling of the technology and advise them to be able to undertake troubleshooting exercises. Whereas Guri-Rosenblit (2005) feels that instructors need to become facilitators and mediators rather than masters of knowledge. Katz (1999:7) supports Guri-Rosenblit and maintains that lecturers in the twenty-first century in higher education institutions should be able to be designers of learning experiences, processes and environments in which students can learn and work together with lecturers. In this way lecturers will come to be regarded as consultants or coaches than merely teachers. Berge (1998) confirms Katz and Guri-Rosenblit’s statements and further states that one of the benefits that online learning offers instructors is that modules are much easier to update and revise.

Research methodology

The research question is “Is it possible to envisage whether a technology-enhanced module that is developed as part of a comprehensive professional development programme such as P@W, will be successfully implemented? In order to answer the main question, the researcher needs to understand the factors that lead to successful outcomes by answering the following sub-question “What are the indicators for

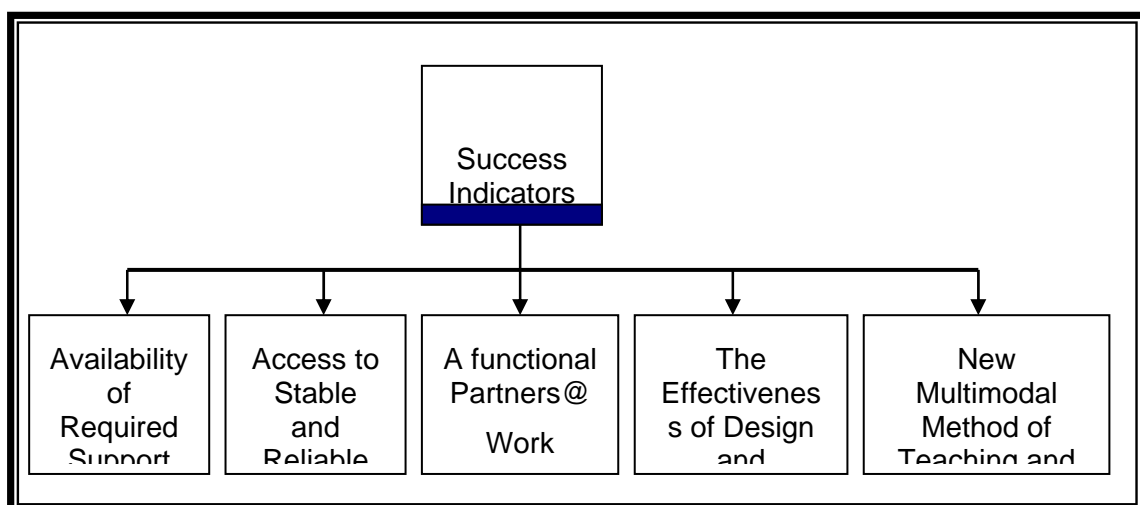
successful implementations of technology-enhanced educational material and why are these perceived as necessary for success and achievement? A qualitative case study was conducted with lecturers at TUT who participated in the professional development programme in the use of technology in education.

Qualitative data was collected by means of a case study that uses an interpretive approach and that incorporates elements of ethnography. Henning *et al.* (2004), McMillan and Schumacher (2001), Merriam (1998) and Welma and Kruger (2004) state that a qualitative case study is used to obtain an in-depth understanding of a particular situation and the meaning of that situation for those involved in it. A qualitative case study therefore relies on an intensive description and analysis of a singular unit or bounded system. In this research the case study is defined by the implementation component of the P@W programme and whether the partners concerned were able to implement their technology-enhanced courses successfully. The participants in the study are fourteen staff members who participated in the P@W programme in the twelve months. Therefore, the unit of analysis is the group of partners who participated in the P@W programme between June 2005 and June 2006. I collected data from focus group, individual reflections/blogs, document analysis and personal observations and reflections. Data was analysed by means of a computer qualitative data analysis software Atlas ti™.

Findings and discussion

This section focuses on a qualitative analysis of the experiences of the fourteen partners who successfully implemented their technology-enhanced courses during the implementation component of the P@W programme. Figure 1 illustrates in graphical form the success indicators that occurred during the implementation component of the P@W project.

Figure 1 Success indicators for the implementation of P@W projects



Success indicators

This section discusses the success indicators that arose during the implementation component of the technology-enhanced courses of the particular P@W programme under discussion. The list of success indicators includes the availability of required support, access to stable and reliable technology, a functional P@W programme, the effective design and development component of the P@W programme, and a new multimodal method of teaching and learning.

Availability of required support

The word *support* in this study refers to the help, encouragement, cooperation, collaboration and assistance that various people gave to the partners during the P@W programme. The following four factors were identified as having a bearing on the availability of required support. Firstly, institutional factors. These included the influence exerted by various stakeholders on the partners' study, by TUT management, and by the computer laboratory technicians. Secondly, faculty-related factors. These were concerned with the deans, the HODs, the partners' colleagues, and academic departments as a whole. Thirdly, factors related to the Directorate of Teaching and Learning with Technology. These referred to the Instructional Designers and fellow partners. Fourthly, factors that relate to academic development support. These concerned the Curriculum Designers. During the implementation component of P@W programme, the partners needed the support of various stakeholders to implement their technology-enhanced courses successfully.

Institutional support as a success indicator

P@W programme was developed because of management's deep concern about the low throughput and graduation rates in the university. In response to the problem, they identified the necessity for a academic development and support strategy that would increase the throughput and graduation rates of students at TUT (Tshwane University of Technology, 2005-2009). This document envisages the use of educational technology as one of the most important factors for attaining this goal.

Stakeholders: Cross and Dublin (2002:94) are on the opinion that the involvement of stakeholders in e-learning projects is a necessary condition of successful implementation. Abel (2005b) also emphasises the useful role played by stakeholders and is of the opinion that certain leadership styles are also a success factor. This study confirms that the partners saw the necessity of involving their particular stakeholders in the process as they began to modify their pedagogies and integrate technology with their teaching and learning practices. One partner noted that *it is important that the institution of higher learning start developing the 21st century model of learning that will involve stakeholders of the institution in the process of modifying pedagogies and innovation to teaching and learning.*

Computer Laboratory Technicians: Fiorentino (2002) noted that the computer laboratory support staff from the Faculty of Technology Lab in his research were responsible for making sure that the infrastructure was sound and in good running order and ready for student use. The partners in my own study would agree with Fiorentino's sentiments about the indispensability of computer laboratory technician support because they themselves were deeply appreciative of the input and efforts of the computer laboratory technicians during the implementation component. One of the partners asserted that *the implementation practice was very difficult, but interesting, sometimes what he designed, did not work as he wanted it. But he had support from their technicians*

Faculty support as a success indicator

This section discussed the contributions of the deans and directors, the HODs, and the partners' colleagues from their own departments. *Deans and directors:* Most of the deans took this brief to heart. They made various efforts to support the partners from their faculties for the duration of the programme and that they also familiarised themselves with what partners were doing and what kept them busy. One of the partners reported that she *did a show-and-tell via a video conferencing which her dean attended*. Other partners kept communicating with the director by using other forms of communication such as e-mail.

Head of Departments: Some of the partners implemented their modules successfully with the support of their HODs. In some cases it was the fulfilment of a head of department's dream to see different technologies being used in various ways in their departments. As one partner put it: *For many years it was a dream of the head of department to capture all the basic cookery methods on video and make it available to the culinary study students in the library*. There was obviously more motivation for the partners to implement and to fulfil all the requirements of the project when they were personally supported by their HODs. When HODs showed an interest in what was happening and were both keen and enthusiastic about the integration of technology in the teaching and learning activities in their departments, it became much easier for the partners to implement their courses.

Partners Colleagues: Guri-Rosenblit (2005) state that the implementation of technology-enhanced modules requires teamwork. Collaboration between academics, colleagues and professionals played a crucial role during the capacity building, design and development, implementation and research components of the P@W programme. It was up to the partners to encourage their colleagues and fellow lecturers to support and buy into everything that they had prepared and learned during their time on the programme. The technology-enhanced courses that partners designed and developed were often therefore useful to other lecturers in their departments. The lecturers found that by sharing the learning materials they could increase their utility. Collaboration on the part of staff members therefore permitted other lecturers also to integrate technology into the teaching of their subjects.

Academic Departments: It is important for a department to support their partners so that the implementation of technology can run smoothly. It is obviously necessary for members of departments to know what partners are doing before they can help them to implement technology-enhanced materials.

Support from the directorate of teaching and learning with technology as success indicator

Van Ryneveld and Van der Merwe (2005) note that it is because the Directorate of Teaching and Learning with Technology are the organisers of the P@W programme, that they provide various kinds of support (such as technical support and individual attention) for the duration of all four of the components of the P@W programme. In this section, I will discuss what an analysis of the data has to say about the contributions of Instructional Designers and the partners.

Instructional Designers: Abel (2005b) emphasizes how important and necessary it is for individual Instructional Designers to offer their services to the lecturing staff of the university. Van Ryneveld and Van der Merwe (2005) agree with Abel and state that Instructional Designers need to provide a readily accessible instructional design service and should in addition contribute to the training and professional development of staff. One of the partners described the staff of the Directorate of Teaching and Learning with Technology metaphorically as *magicians*. This partner referred to the directorate in the following words: *And then, you meet the magicians: they are a hand of wonderful people that make you believe in humanity again! They are Instructional Designer, video editors, technology specialists, graphic artists, programmers, multimedia experts, researchers, curriculum designers and many others.*

Fellow Partners: Because the partners developed deep and meaningful friendships among themselves for the duration of the programme, they came to rely on one another for help. One of the partners made the following remark about her colleagues and the staff of the Directorate of Teaching and Learning with Technology: *We absolutely rejoice each other, as well as all the kind of staff and activities we do. We really have become friends and form a "safe" environment for each other.*

Academic development support as a success indicator

Curriculum Designers: Marra (2004) argues that education programmes should integrate technology into their curriculum. The incorporation of Curriculum Designers into the P@W programme therefore exerted a positive influence on the technology-enhanced modules in terms of its outcomes, the SAQA standards, assessment, assessment criteria and the OBE approach as a whole. One partner made the following remark: *The study guide was loaded to WebCT™ and the OBE requirements were met*

with regard to outcomes from the knowledge gained from the Curriculum Designers.

Stable and reliable technology

Ensminger and Surry (2002) argue that higher education institution should provide enough resources and technology to make the implementation of technology-enhanced courses successful. Volery and Lord (2000) note that if one wants to do this, one needs to take the reliability, quality and complexity of the technology into account when implementing online learning. The official policy makers of TUT would find themselves in agreement with both Ensminger and Surry (2002) as well as Volery and Lord (2000) because technological innovation is one of the main strategic features of TUT as a university of technology (Tshwane University of Technology, 2005-2009).

The availability of infrastructure contributed to the successful implementation of the partners' technology-enhanced courses. The partners relied heavily on the Electronic Resource Centres and i-Centres (Electronic Resource Centres and i-Centres are the computer laboratories at TUT) of the various learning sites to implement their technology-enhanced courses. While the i-Centres are maintained and managed by private companies, the Electronic Resource Centres are managed by TUT Library. One of the partners noted that they were *lucky to have a dedicated computer laboratory for their subject*. Partners revealed that students had spent more time accessing their learning material than they had previously spent in the computer laboratories, and that the *preliminary results showed an increase in the pass rate*. One partner indicated that students were *encouraged to take ownership of their studies*. Fiorentino (2002) maintains that it is the technological support of qualified staff that ensures that the infrastructure is ready for students when they need to use it. Tshwane University of Technology (2005-2009) states that students have a "right" to use open-access computer laboratories in places such as Electronic Resource Centres and i-Centres on all of the university's six learning sites. Other partners were fortunate enough to have access to computer laboratories in their own departments. One partner wrote: *The time spent in the computer-drawing lab by the students increased.*

Berge (1998) states that online learning contributes to successful implementation because it allows students to access servers, networks, the Internet and bandwidth. The main concern of TUT when it comes to accessing online material is the need for reliable, high-bandwidth Internet access together with a disaster recovery plan for all staff and students. One partner made the following observations:

In our Electronic Resource Centre the bandwidth was not much of a problem. We did not experience problems with the bandwidth. When we all logged in at the same time, it was slow, but once we were there, it worked perfectly.

A functional P@W programme in the use of technology in education

The P@W programme is a professional development programme for university staff that focuses on the use of technology in education. The P@W programme was originally

introduced to train faculty members to integrate good pedagogical practice into technology-enhanced courses by utilising various forms of technology. Twigg (2003) states that higher education is challenged to improve the quality of teaching by means of professional development programmes in educational technology. The intervention of the Redesign course in various universities in United States of America effected a major change in the teaching and learning process in technology-enhanced courses by making them more active and learner-centred. At the University of Washington, for example, the Programme for Educational Transformation through Technology was introduced with the aim of encouraging thoughtful, innovative and collaborative uses of technology in teaching and learning (Bruce *et al.*, 2004).

The P@W programme took place over a period of twelve months and contributed to the successful implementation of the partners' technology-enhanced courses because it taught the partners how to use educational technologies and apply them in their teaching practice. A partner indicated that *Partners@Work 2005 can be seen as a playground encompassing a lot of toys. In order to enjoy playing with these toys, one first has to know the rules of the playground and [know] what each toy [is] used for.* Although the P@W programme was funded by TUT (Tshwane University of Technology, 2005-2009), each partner was funded by means of a "seed funding" that supported their projects. According to the Tshwane University of Technology document (2005-2009), the twelve months of the P@W programme are utilized in various ways. Partners who are faculty members are released from their teaching duties to join the programme for six months. During that period, they develop technology-enhanced teaching and learning materials for their particular subject. But their time is also used for training and professional development activities. The partners used the last six months of the programme to conduct research, to write it up, and to implement the learning materials that they have developed.

The design and development component as well as the capacity building components of the P@W programme ensured that the partners were sufficiently expert in the use of the technology and that they were able to conduct troubleshooting exercises. As one of the partners said: *I was nowhere technologically speaking, with no formal computer literacy training, [and] my skills were so unreliable when I joined P@W programme in June 2005.* An e-moderation online course teaches facilitation skills and the management of online learning (Van Ryneveld & Van der Merwe, 2005). One of the partners noted that she had *spent a month on an e-moderation course as a student* and that this had introduced her *to a virtual learning environment.*

The effective design and development

An important part of the P@W programme was to expose the partners to variety of educational technologies such as laptops, video and audio, DVDs, VHS, compact disks (CDs), video conferencing, audio conferencing, graphics, and mobile technology (Van Ryneveld & Van der Merwe, 2005). The partners appreciated the value of this exposure, and one partner agreed that they *had been taught how to utilize different media and technologies to enhance* their courses. One partner mentioned that she *knew that technology [had] enormous potential in providing high value learning materials.* Another partner made the following observation: *Different technologies were introduced to give us an opportunity to choose what works best in designing our subjects.* [These technologies included] *FrontPage, Blackboard, Camtasia, and Respondus, StudyMate*

video creation, script writing and video conferencing.

In the P@W programme, the partners were exposed to various software applications and were trained to use them in practice. The web tools to which they were exposed included Respondus™, StudyMate™, Camtasia™, Impatica™, MicroSoft FrontPage™, Perception™, Virtual Training Course™ (VTC) and Blackboard™. Partners selected those software applications that were most relevant to the didactic requirements of their courses. One partner indicated that *each of us starts to feel at ease with technology and different software: our self-image is suddenly boosted... and the spell begins.* Approaches to teaching and learning used by the partners have to be harmonised with the prevailing outcomes-based education philosophy that is the sole educational method and philosophy sanctioned by the government for teaching and learning in South Africa. One of the partners noted that *at TUT, education and training need to be inline with OBET principles.* The curriculum designers helped the partners to incorporate outcomes-based teaching methods into their technology-enhanced courses.

New multimodal method of teaching and learning

According to Tshwane University of Technology (2005-2009), TUT encourages the use of educational technologies in a multimodal programme delivery system so that it can optimise learner opportunities and success and accommodate the diversity that is apparent among learners. Guri-Rosenblit (2005) states that technology can enrich, support and enhance traditional methods of teaching. Traditional classroom settings at TUT are both supplemented and enriched by technology. One of the partners indicated that *it was an opportunity to have my subject online which is an exciting opportunity to expand the boundaries of a traditional classroom.* The majority of the partners incorporated an approach to teaching and learning that combined online and face-to-face education. One partner mentioned that she *used a mixed method that combined Blackboard™ material to be accessed by students, together with the traditional board and chalk method.*

One of the partners revealed that she had *personally improved the quality of work and lecturing* [and that she had also] *improved her electronic assessment.* The partners used the web tools effectively in each of the learning units and this gave the students ample time in which to recapitulate and so understand the content. The students enjoyed and appreciated the immediate feedback they received and the fact that they could practise over and over again to improve their test scores.

Recommendations and conclusion

One of the main recommendations is that if the implementation of technology-enhanced modules is to be successful, it is necessary to offer staff a comprehensive professional development programme in the use of technology for online teaching and learning. Once staff members have been trained in this way, it will be relatively simple for them to measure the possible success of their online implementations. Decision-makers in

higher education can avoid wasting time and resources by measuring the possible success of their implementations against success indicators that have been identified in this study and elsewhere in the literature. It is recommended that the professional development programme in educational technology train lecturers to measure the possible likelihood of the success of their technology-enriched courses against the benchmarks identified in this research.

It is crucial for any institution that would like to implement technology-enhanced modules successfully to solicit the unequivocal support of the management of the institution and the staff of the institution as a whole. All of these people are stakeholders who can either make or break the implementation of technology-enhanced modules.

It is necessary for the computer laboratories at TUT (such as the Electronic Resource Centres and i-Centres) to upgrade their computer hardware, networks and infrastructure and to increase their bandwidth speed to more realistic dimensions so that partners will have some chance of implementing their technology-enhanced modules successfully. It is vital for any institution that plans to implement online modules to ensure that Internet connectivity, network access and bandwidth speed are such that online teaching modules will have some chance of being successfully implemented. The P@W programme should continue its work of improving and supplementing traditional modules by taking advantage of the opportunities offered by the Internet and technology. The programme should empower faculty members to utilize and integrate technology to enhance the quality of teaching and learning.

It is crucial to realise that the design and development component is a continuous and on-going process. In order to implement a fully fledged technology-enhanced module successfully, lecturers need time, training, exposure and support. All participating lecturers should be taught how to utilise and integrate various technologies with their teaching and learning so that they can design and create their own outcomes-based technology-enhanced teaching and learning materials. Online facilitators should be encouraged to make a careful study of the needs of the students that they have to teach. If the students concerned are undergraduates and if are enrolled at a residential university, then a multimodal hybrid approach is recommended.

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