

Open Learning for an Open World: Reflections on Open and Distance Learning and Teaching at the Open Polytechnic of New Zealand

Edited by Jonathan Barrett

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Foreword

The Open Polytechnic is a unique tertiary education institution, both in New Zealand and globally.

In New Zealand it is the only specialist provider of open and distance learning (ODL). Worldwide, the institution's range of qualifications, from foundation to degree level, and the depth of its academic portfolio, from trades training to vocational business qualifications are unmatched, set it apart as an institution designed to cater for a wide range of upskilling needs.

The depth of the Open Polytechnic's experience in the ODL field, and the constant improvements we are making in our services, have enabled us to remain a world leader in ODL.

One of the greatest challenges, and opportunities, for ODL delivery is to cost-effectively offer high-quality education experiences to a wide constituency of learners that can be delivered in their own time and place.

Advances in technology have helped the outreach of ODL, but at the same time we must remain cognisant of the need for equity of access for a diverse range of learners to ensure that the use of technology promotes learning, rather than pushing it out of reach of those that need education the most.

In New Zealand, more and more adult learners are seeking to upskill themselves in a recession-prone and competitive job market, while at the same time needing to stay in employment while they gain their qualifications.

Internationally, governments of developing countries are looking for cost-effective ways to train millions of their people to help them build first-world economies.

ODL provides an affordable, time-tested solution to individual, industry and governmental education needs.

Our constant goal is student success. The Open Polytechnic's ongoing enhancement of our teaching and learning service provision is focused on helping our constituency of mainly adult learners achieve their learning goals so that they can realise their professional or personal aspirations.

This ebook highlights ODL teaching and learning at the Open Polytechnic, and features contributions from our leading researchers and ODL experts. We believe it makes a significant contribution to the wider body of work underpinning ODL research and practice. I hope you enjoy reading it.

Caroline Seelig

Chief Executive
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Open Learning for an Open World: Reflections on Open and Distance Learning and Teaching at the Open Polytechnic of New Zealand

Jonathan Barrett

Introduction

Open and distance learning (ODL) has developed as a popular form of education since 1840, when Pittman sent his students lessons in shorthand by post (Wallace, 1982). However, the contemporary information technology revolution has ushered in an explosion in ODL growth, particularly since numerous 'conventional institutions have perceived the "sunrise industry" potential of ODL and have set up subdivisions to develop it' (Simpson, 2000, p. 1). In contrast to such new arrivals to the field, the Open Polytechnic has offered ODL programmes for more than 60 years and remains a purely ODL institution. Although every tertiary education institution offering ODL programmes operates in its own particular context and faces specific challenges, certain issues are commonly encountered. These issues include: operating under fiscal constraints; seeking optimal use of information technology; retaining students; and ensuring students' learning experiences and outcomes meet or exceed those of conventional institutions. This e book is about the Open Polytechnic's engagement with these and other issues. It is hoped that the reflections of executive management and teaching and student support staff will be useful to anyone with an interest in contemporary ODL theory and practice. Before outlining the authors' contributions, some background information on New Zealand, its educational policy and the Open Polytechnic is provided.

- New Zealand's population is diverse and multicultural, but the country is one of the world's least densely populated, with a population of around 4.4 million people. Indigenous Māori make up around 15% of the population. New Zealand has a mixed economy that operates on free market principles. The country has a highly efficient primary sector, supplemented by an important services sector, including educational services (Statistics New Zealand, 2011).

- The Education Act 1989 contemplates various forms of tertiary education institutions, including polytechnics, universities and wānanga – institutions informed by Māori traditions and customs. Polytechnics, also known as institutes of technology, are ‘characterised by a wide diversity of continuing education, including vocational training, that contributes to the maintenance, advancement, and dissemination of knowledge and expertise and promotes community learning, and by research, particularly applied and technological research, that aids development’ (Education Act 1989, s 162(4)(b)(ii)). The current government expects polytechnics to:
 - enable a wide range of students to complete industry-relevant certificate, diploma and applied degree qualifications
 - enable local access to appropriate tertiary education
 - support students with low literacy, language and numeracy skills to improve these skills and progress to higher levels of learning
 - work with industry to ensure that vocational learning meets industry needs (Ministry of Education, 2010).

The Open Polytechnic began as the Technical Correspondence School, which was established in 1946 to provide resettlement training for returned servicemen and women following World War II. Because courses were offered by distance nationally, all apprentices, wherever they were in the country, could study uniform technical courses and sit examinations (Abbott, 2000). The Technical Correspondence School was renamed the Technical Correspondence Institution in 1963. As part of wider education reforms, the institution was renamed the Open Polytechnic of New Zealand in 1990, and became the specialist national provider of open and distance learning at tertiary level (The Open Polytechnic of New Zealand, n.d.). The first bachelor degree was offered in 1983, and now students may study for a wide range of certificates, diplomas and degrees. In 2010 the Open Polytechnic had 28,740 individual students, 78% of whom were aged 25 years or older, 58% of whom were female and 17% of whom were Māori. Of those students, 97% were studying part time and 70% were in employment. Furthermore, illustrating the institution’s important social equity role, 24% of students had no school qualifications (The Open Polytechnic of New Zealand, 2011).

In the opening chapter, ‘Distance Education at the Open Polytechnic: The “Institutional” Approach’, Mark Nichols discusses the Open Polytechnic’s approach to distance education in a post-industrial context. In particular, he explains the ‘institutional’ model used by the Open Polytechnic, which is characterised by a focus on the total student experience.

The quality of teaching materials underpins successful ODL. In their chapter 'Instructional Design: Theory and Practice', Polly Kobeleva and Luke Strongman consider instructional design theory, but also draw on the practical experience of the Open Polytechnic's Learning & Teaching Solutions staff.

Together with Raymond Young, Luke Strongman also contributes a chapter on research. Teaching staff are actively engaged in discipline-specific research, but ODL is an increasingly significant field of research across the institution.

Ensuring technology is used optimally is a critical concern for ODL. In 'Introducing Augmented Reality Imaging into Paper-based learning Materials for Engineering Trade Students', Gary Mersham and Sandra Maathuis-Smith highlight the innovative use of augmented reality to teach automotive engineers. Three supplementary case studies consider other innovative uses of technology at the Open Polytechnic: Zlatko Kovacic outlines his development of an automatic grader of advanced Office skills; John Green describes his involvement in the Second Life Education New Zealand (SLENZ) project; and Brian Pascall explains how real-time assessment was applied to a new financial adviser's course.

In 'Experiences of Teaching Faculty Enrolled in the Open Polytechnic of New Zealand's Certificate in Designing and Facilitating E-learning', Rick Fisher, George Chipindiku and Sandra Maathuis-Smith reflect on their experiences as students on the Open Polytechnic's programme for training experienced teachers in e-learning techniques. This chapter is supplemented by Puvana Natanasabapathy's 'Teaching Practices Discussion Group', a case study that discusses the active and popular teaching practices forum she convenes.

Ron Grant, Glenda Olivier, Caroline Rawlings and Catherine Ross are engaged with supporting students on a day-to-day basis. In their chapter 'Enhancing the Engagement and Success of Distance Students Through Targeted Support Programmes', they consider the context for student support and reflect on their own extensive experience in helping students to succeed. It is noteworthy that the authors are not teaching staff, but are actively engaged in research.

In 'Engagement Distance Students in Learning: What Matters to Students, What Motivates Them and How Can Engagement in Learning Be Fostered?', Catherine Ross analyses student motivation and looks at initiatives that benefit from an understanding of their motivation.

Retaining students is a crucial consideration for all tertiary education institutions, but a particular concern for those offering ODL programmes, which traditionally experience significantly lower retention rates than those of

face-to-face institutions. In 'Retention: A Critical Issue for Open and Distance Learning', Josephine Bourke considers the issue of retentions, and outlines various retention initiatives at the Open Polytechnic. It is interesting to note how student retention is approached at an institutional level, but also by self-motivated, individual teachers. This chapter is supplemented by case studies reflecting on retention initiatives implemented in their courses by John Veal, Les Morris and Ken Marshall. Mark Nichols also comments on institutional retention programmes.

The library, both as a traditional repository of books and as a portal to electronic databases, plays a critical role in any tertiary institution. But how do students actually use increasingly expensive and extensive library resources? In their exploratory study 'Student Use of Sources: A Collaborative Investigation of Resource Use in Psychology Assignments', Estelle Barnard and Nancy Weaver analyse student use of library resources in completing psychology assignments. They draw preliminary conclusions about resources used and grades attained. This is a promising area for further research that combines the skills and knowledge of Estelle, as a librarian, and Nancy, as an academic. Philip Clarke provides a supplement to this chapter. In 'Student Engagement and Library Use', he sketches the correlation between library use and student retention, and outlines future areas for research. Given the critical importance of student retention for ODL institutions, Philip's case study indicates significant possibilities.

The Open Polytechnic is a unique institution in the South Pacific region and is acutely aware of the help it can offer to its neighbours in the Pacific region. In her chapter 'Open and Flexible Technical and Vocational Education and Training in Commonwealth Pacific Countries', Terry Neal writes about the Open Polytechnic's involvement in technical and vocational education and training (TVET) in the Pacific region. This is one example of the Open Polytechnic's increasing participation in cooperative work outside its 'own backyard'.

Sustainability is an important subject for research and an institutional practice at the Open Polytechnic. In 'Sustainability in Education: Is Distance Learning an Answer?', Josephine Bourke and Ormond Simpson take a critical look at distance education and sustainability.

The e Book closes with a look to the future. In 'Articulating E-pedagogy for Education', Mark Nichols adopts a critical approach to technology and proposes five principles for e-learning application.

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Disclaimer

The views expressed by the authors are their own and do not necessarily reflect the views of the Open Polytechnic.

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Distance Education at the Open Polytechnic: The 'Institutional' Approach

Mark Nichols, Executive Director Faculty, April 2011.

The Open Polytechnic is a unique provider of higher education in New Zealand, in that its focus is solely distance education. As such, it is a 'unimodal'¹ provider of distance education, in that it does not provide face-to-face or blended² learning, except in limited circumstances.³ This institutional configuration is based on a value chain characterised by a division of labour, which represents a classic approach to distance education.

Distance education systems are ideally suited to offering flexible education at scale to part-time learners. They are characterised by higher fixed costs and lower variable costs than their on-campus equivalents, primarily because significant effort is expended on the design and development of course materials – an up-front cost not shared to the same extent by on-campus providers. The quality, cost-effectiveness, scalability and accessibility of distance education are clear from the success of the various mega-open universities around the globe. The United Kingdom's Open University, for example, has grown from an initial cohort of 25,000 students in 1971 to about 250,000 students in 2010. It has had over 1.6 million graduates through its virtual doors over the course of its 30-year history. Its 7000 tutors offer some 570 courses. Since 2005 the Open University has consistently rated in the top three universities in the United Kingdom in terms of student satisfaction, and in 2010 it achieved joint second place with Oxford University. Both ranked second equal to Buckingham College, the only privately funded university in the survey.⁴

The Open University has served as the model for similar large-scale institutions across the world. As with Open Polytechnic, some 70 per cent of Open University students are studying part time while in employment. The average age of Open University students is 32, and about 12,000 students with disabilities are active each year. The flexibility of distance education makes it an ideal option for second-chance learners – up to 44 per cent of the United Kingdom student population at the Open University starts undergraduate study without the entry qualifications normally required by other universities. It is likely that the Open University student population mirrors the approximate 98 per cent of Open Polytechnic students who study part time.

Distance education is timelessly defined by Holmberg (1977, p. 9) as including:

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- 1 This in contrast to 'dual mode', a term used to describe institutions that offer distance education alongside a face-to-face or on-campus course base.
 - 2 'Blended' learning is understood to include a measure of face-to-face contact, in the form of regular tutorials, workshops or block courses.
 - 3 This includes some of our Real Estate and Bachelor of Teaching (Early Childhood Education) programmes, the latter of which requires some form of face-to-face contact for workshops and practicums.
 - 4 These facts sourced from the Open University website (<http://www.open.ac.uk>).

the various forms of study at all levels which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms or on the same premises, but which, nevertheless, benefit from the planning, guidance and tuition of a tutorial organization.

It is important to note that the term distance education does not necessarily imply asynchronous communication, printed study guides, isolated learners, predetermined learning materials or the application of digital technology to the tuition process (actually, most use of online technologies in education is made by face-to-face providers; see Guri-Rosenblit, 2005). Distance education practice is diverse, to the extent that there is no such thing as a 'typical' distance education approach. Even within a single institution such as the Open Polytechnic, there is no 'average' distance education course or default approach to course design and delivery.

The 'systems' approach to distance education

Despite the diversity of possible course configuration, it is clear that distance education requires a particular institutional structure if it is to be done well. All institutional systems must be developed and maintained in a particular way. According to Moore and Kearsley (1996), a systems approach is the essential basis for understanding and practising distance education. A systems approach recognises the interdependence of various organisational functions (enrolments, teaching, course design, institutional management, marketing, finance and so on), and appreciates that each of these systems includes operational subsystems. This interdependence means that 'as we focus on any part of the system we need to hold in the back of our minds a picture of the total context' (Moore & Kearsley, 1996, p. 5). Each part of a system influences the other parts. For example, relaxing enrolment criteria might require a revision or simplification of course materials, the addition of further support mechanisms and a change in the style of teaching offered – each of which will probably have financial implications. Saba (2003) observes that distance education operations are characterised by complexity, hierarchy, dynamism, non-linearity, self-organisation (spontaneous adaptive behaviour), chaos and order. Any educational system will by nature be continuously adapting to internal problems and the external environment it operates within, because no system can ever be flawless or timeless. The various actors in a distance education system are not independent, and neither are they motionless. Instead, they are in a state of dynamic interaction and constant negotiation as they seek to optimise student success in a sustainable way. Consequently, it is difficult to significantly adapt an education model without major difficulty.

Moore and Kearsley (1996) model the teaching and learning process in distance education in terms of sources, design, delivery, interaction and the learning environment. While one leads to the next, each also interdependently influences the overall study experience of the student.

- **Sources** are where academic knowledge is found to inform the curriculum. It is at this stage that what is to be taught and how learning will be measured is decided on.
- **Design** is the stage of the process where course materials are developed by a team of instructional design, e-learning, graphic design and content experts.
- **Delivery** is facilitated through various media, which typically include print, but which increasingly feature the use of the internet and digital technologies.
- **Interaction** includes communications with a member of faculty and, increasingly often, other students, for the exchange of ideas. In distance education it is common for the course writer and the instructor to be different people.⁵ The nature of any interaction is largely determined in the design phase. Students will also interact with enrolment, support and other administrative staff in the course of their studies.
- The **learning environment** tends to be a student's own home, local study centre or place of work.

Even if a member of faculty is capable as an instructional designer and well versed in e-learning in addition to their content knowledge, Moore and Kearsley suggest that 'it is better if these responsibilities are carried by different specialists' (1996, p. 9). The difficulty is that the actual systems of instructional design and e-learning require high-level coordination in a systems approach – what might work for an individual course or member of faculty may not be desirable in the system as a whole. This explains why a systems view of distance education inevitably reveals a division of labour.

⁵ Moore and Kearsley (1996, p. 11) suggest that this separation has considerable benefit, because course writing in the design stage and teaching in the interaction stage require quite different skill sets. Where distance education occurs on a considerable scale, it is also not possible for the course writer to teach all students.

Industrialisation and the division of labour

Early distance education theory focused on matters of organisational structure (Garrison, 2000). Otto Peters (cited in Saba, 2003, p. 12), an enduring distance education theorist, defined distance education in terms of a division of labour:

Distance study is a rationalized method – involving the division of labor – of providing knowledge which, as a result of applying the principles of industrial organization as well as the extensive use of technology,⁶ thus facilitating the reproduction of objective teaching activity in any numbers, allows a large number of students to participate in university study simultaneously, regardless of their place of residence and occupation.
[Footnote added.]

To Peters, distance education is unique in that it requires the bringing together of complementary skills for the purposes of tuition. One implication of this is that, unlike on-campus tuition, ‘where teaching had been individualized to a great extent by the personality of the teacher, it was now *standardized, normalized and formalized*’ (Peters, 1998, p. 110). Peters’ idea of industrialisation recognises that distance education is based on specialisation and division of labour, both of which are essential to institutions seeking to offer scalable education based on high-quality pre-written course materials. Garrison (2000) describes Peters’ theory as ‘the most coherent, rigorous and pervasive example of distance education to date’. While industrialisation is characteristic of all formal education and is therefore really a matter of degree, the separation of course development and delivery functions is unique to distance education. Peters (2007, p.64) writes that ‘[t]he strongly industrialized nature of distance education is evident to anyone able to recognize and analyze the structure of pedagogical situations and processes and to compare them to the structure of industrialized production processes’.

6 It should be pointed out that Peters was not here necessarily referring to digital or online technologies – ‘print technology’ would be one of many intermediating technologies (including telephone) that Peters intended.

Peters does not seek to portray industrialisation as the optimal model for distance education; instead he sees industrialisation in action and describes it as such. Industrialisation is a descriptive rather than prescriptive theory (Peters, 2007). Peters' theory received both affirmation (by the likes of Greville Rumble) and criticism from others based on its harshness⁷ and representativeness (Keegan, 1996), even though the features of industrialisation were identified through a large-scale analysis of institutional case studies. It must also be appreciated that industrialism does not imply a lack of educational quality, a limited range of mundane tasks, or 'blue-collar' faculty. Academic staff working in an industrial form of distance education require strong qualifications in their particular disciplines, and an attitude toward student success that is unique in tertiary education. The academic prowess of faculty active in industrial distance education must be on par with those working in on-campus environments – what differs is how that prowess is applied. At the Open Polytechnic, academic faculty staff object to the terms 'industrialisation' and 'division of labour'. Faculty members show an interest in the entire student experience across the so-called 'value chain', a perspective that seeks improvement across the entire organisation. To faculty, the Polytechnic's students are primarily theirs. While Peters may well describe the managerial and process structure of a distance organisation as it might be summarily represented on paper, the actual organic workings of a healthy open and distance learning (ODL) institution are poorly represented. The term 'institutional approach' seems a more accurate one than 'industrialised' for describing operations at the Open Polytechnic; the term 'across the student experience' a better one for 'value chain'.

A formal ODL structure requires synergetic relationships across the course design and academic teams, and the application of a project approach to course creation. This, naturally, requires additional systems for formal course material revision and centralised portfolio maintenance. The development of course materials in distance education is a capitalised (that is, course materials are invested in and depreciated in ways that differ from face-to-face settings) and centralised activity.

Crucially, the industrial model needn't imply an impersonal or 'production line' relationship with students. As early as 1960 Börje Holmberg introduced the concept of a 'guided didactic conversation' as the means by which a

⁷ The criticism of 'harshness' is easy to understand given Peters' use of such terms as 'rationalization', 'division of labour', 'mechanization', 'assembly line', 'mass production', 'planning and preparation', 'standardization', 'functional change and objectification', and 'monopolization' in relation to distance education activity (Keegan, 1996, pp. 81–82). Peters (2007) also uses the terms 'automation', 'repeatability' and 'centralization'. Many of these terms are highly objectionable to education theorists. Peters himself notes that '[m]any educationists find it inadequate to apply industrial criteria to a pedagogical phenomenon and are not aware of the complexity of this theory' (2007, p. 57). Annand (2007) adds that '[t]he problem with most criticisms levelled against industrialized distance education is that they can be applied equally to any form of university education'.

distance educator adopts an interpersonal and conversational (colloquial) style in written materials that simulates an actual conversation with the student. Fundamental to Holmberg's work is the observation that 'feelings of empathy and personal relations between learner and teacher support motivation for learning and tend to improve the results of learning' (Holmberg, 2007, p. 69). The accuracy of this theory has been verified through empirical study. To Holmberg, effective distance education is based on dialogue – be it real (through written interaction, such as letter or email, or telephone) or simulated (through course materials adopting a conversational style). These two complementary forms of dialogue lend themselves to an institutional approach, as Holmberg (2007, p. 69) goes on to explain:

Distance education is based on deep learning as an individual activity. Learning is guided and supported by non-contiguous means which activate students, that is, by mediated communication, usually based on pre-produced courses. The development of courses may apply large-scale methods and may also be carried out for small groups of students. Subject-matter presentation and mediated interaction are the two constituent components of distance education, for which a supporting organisation is responsible.

Holmberg suggests that a clear, empathetic and learner-centred writing style for learning guides is the *sine qua non* of effective distance education course development. By extension, course writing requires more than just academic knowledge and an accurate account of facts; instructional design is as much an area of academic expertise and expression as are the subject areas commonly studied in higher education.

For the Open Polytechnic, the institutional model requires a shared academic responsibility for course development across Academic Services, Learning and Teaching Solutions, and Faculty. Unlike on-campus and dual-mode education providers, which tend to adopt a faculty-centred approach to course development and delivery (particularly at post-graduate levels), the Open Polytechnic requires a team approach. In fact, depending on faculty availability and expertise, academic input into course development at the Open Polytechnic is frequently contracted out. Academic freedom at the Open Polytechnic is therefore more restricted to freedom of academic opinion and research than to course development and delivery.⁸

Clearly, working within an institutional model alters the traditional activities and responsibilities of academic faculty. The teaching function in distance education is considerably different to that of on-campus and dual-mode institutions. This presents tremendous pedagogical opportunities. However, it can also be perceived as restrictive by those academic faculty members

⁸ It is worth pointing out that even in on-campus institutions academic freedom is frequently limited in the areas of course development and delivery; it is largely a matter of granularity of freedom.

anticipating a more direct – even solo – role in course development and maintenance. According to Beaudoin (1990, p. 26),⁹ the faculty role in institutional distance education might include the following:

1. Grading, after evaluating all student materials, preferably within 3 to 5 working days after receipt of students' work.
2. Maintaining regularly scheduled office hours once or twice weekly to initiate, receive and return messages to and from students.
3. Collecting incoming assignments and returning corrected assignments, at least on a once-a-week basis.
4. Advising programme staff of any problems requiring follow-up action.
5. Maintaining current course materials (for example, syllabuses, videotapes, exams) and updating course content as appropriate.
6. Preparing suitable supplementary materials to accompany course texts and other learning resources.
7. Developing alternative syllabuses and examinations as needed.

At the Open Polytechnic, administrative and development support is generally offered or else possible for most of these functions. The seven tasks identified by Beaudoin are emphasised differently by on-campus faculties, which would tend to focus on tasks 5 and 6 by necessity. The Commonwealth of Learning and Asian Development Bank (1999, pp. 8–9) lists the following as the competencies and attributes required of distance education faculties:

- ease with learners; awareness of particular needs and circumstances of learners
- expertise in a subject area or discipline, and in teaching that subject area or discipline
- knowledge of how ODL works, and about the kind of resources and time frames needed for ODL course delivery
- ability to work as a member of a team
- knowledge of administrative systems within one's own organisation
- openness to new ideas; new perspectives on one's discipline

⁹ Beaudoin's 1990 article remains an important one for distance education faculty; subsequent articles dealing with distance education workload tend to begin from an on-campus perspective where the concern is the changing teaching role in the context of online technologies. Broadly, literature related to the faculty role in distance education over the last two decades tends to focus on that for 'dual-mode' institutions.

- willingness to learn new approaches to teaching and learning;
- ability to balance demands of discipline with the needs of the learner
- ability to communicate needs of learner to institution and institution's perspective to learner
- interpersonal skills in learner advising, counselling, problem solving.

It is clear that distance education places a particular focus on the student (Saba, 2003). Beaudoin (1990, p. 22) suggests that a distance education faculty is 'an intermediary between students and available resources'. While the same could be said of on-campus education, it is clear that a distance education faculty may not have developed and normally do not present the resources studied by students. Any thought that the academic faculty role in distance education might be educationally impotent is quickly dispelled by Beaudoin (1990, p. 28):

The myth that there is a minimal need for strong faculty in such programs must be dispelled. It is precisely in the design and delivery of these new learning modes where the participation of competent and committed faculty, whether full-time or part-time, is most critical.

Distance educators are in a prime position to support student learning by focusing on academic feedback, student support and encouragement, and revising and supplementing learning materials. Each of these requires a particular level of specialist skill, in addition to the academic knowledge faculty members bring to the educational setting. The art of distance education requires a more supportive and deliberately interactive attitude than does its on-campus counterpart. Rather than merely **accompanying** course materials, academic faculty **complement** them in ways that contribute to the total student experience.

Industrialisation is a long-standing and proven approach to distance education. With the advent of the internet, however, it is possible for distance providers to make the transition to a post-industrial model, where faculty members are better able to participate directly in the entire teaching and learning process identified by Moore and Kearsley (1996).

The paradigm challenges of online learning

It is here that the literature-accepted term 'industrialisation' becomes useful. Technology can be harnessed to streamline industrial processes, making them 'superindustrial' (Peters, 2007). However, technology can also go further – the connectivity available through the internet has the potential to move distance education beyond industrialised models into post-industrial ones (Saba, 2003) that empower the teaching function of faculty. So, while technology can be applied within the bounds of the industrial model, it can also be used to transcend. In practice, applying technology to distance education typically leads to both (Sharma et al, 2007). Indeed, the move to post-industrial distance education has been seen as inevitable by some (for example, Garrison, 2000). However, the potential of post-industrialisation presents considerable challenges to institutions based on the classic industrialised model, as is the Open Polytechnic. In a post-industrial model the distance education provider comes to resemble a 'dual-mode' institution, in that course design, delivery and interaction are all the responsibility of individual faculty members and are performed through the desktop computer.

The post-industrial approach to distance education is criticised because of its lack of scalability and, generally, the loss of quality in its materials (Peters, 1998¹⁰). Indeed, post-industrialism largely resembles the 'craft'¹¹ model of on-campus education. Additional risks to the distance institution include portfolio risk (the loss of a craft educator also results in the loss of intellectual property) and more opaque and variable teaching behaviours, the latter including the tendency for course materials to be constantly added to rather than frequently optimised.¹² There is a risk that online resources will dominate over the institutionally produced resources, particularly where there is frustration in getting the latter revised in a timely way. Choosing a post-industrial approach will also require changes across the entire distance education system, for reasons outlined earlier.

Garrison and Anderson (1999) question the imperative of the industrial model for distance higher education on the grounds that it encourages a behavioural pedagogy. Further, they argue that communications technologies make possible a more constructivist form of education that is more compatible with higher education's mandate to develop knowledge rather than merely communicate it.

10 Despite these comments, Peters adopts a neutral stance toward post-industrialism in distance education. As mentioned earlier, he presents industrialisation as a descriptive theory.

11 Peters (2007) uses the term 'artisan' to contrast the industrial approach.

12 It is important appreciate the potential for additional materials. Examples already exist in the Open Polytechnic where academic faculty adds considerable value to course materials by drawing attention to current events and the relevance of course concepts to those events. These supplemental insights do not constitute compulsory nor cumulative additions to course materials.

They write (1999, p. 51):

The essential means of achieving the traditional goals of the major research university, regardless of the technology, is the provision of sustained reciprocal communication for the purpose of facilitating critical reflection and discourse. It is this process that has been proven effective in facilitating the construction of personal meaning and the continued development of worthwhile knowledge in higher education. All ideas must be open to debate.

Garrison and Anderson propose a 'little distance' education model as an alternative to the industrial one. It is important to note, however, that Garrison and Anderson write from the perspective of a major, research-led university seeking to compete with large-scale distance education providers. As an institution focusing on vocational and applied education at the levels of undergraduate degrees and below, the Open Polytechnic starts from a very different place. However, it may be possible for distance institutions to adopt a deliberate and managed approach to post-industrialisation where it makes sense to do so pedagogically. A solution might be found in terms of Michael Moore's classic theory of transactional distance.

'Transactional distance' is the term coined in the 1970s by Moore (2007) to describe the pedagogical distance between teacher and learner. The term immediately implies that the significance of 'distance' in education ought to be considered in educational, not geographical, terms. The theory suggests that greater 'distance' might be experienced in an on-campus lecture theatre than in an individual student's living room. The theory of transactional distance is based on three 'macro-factors': the 'structure' of the teaching-learning programme; the 'dialogue' between teacher and learners; and the 'autonomy' of the learner in terms of what, how and how much to learn. Essentially, Moore's theory of transactional distance is based on three observations:

1. As dialogue increases, course design becomes less structured and transactional distance decreases.
2. As course structure increases, the extent of dialogue possible decreases and transactional distance increases.
3. Learner autonomy and transactional distance are directly related – an increase in one will increase the other.

While the theory of transactional distance is one of pedagogy rather than organisation (Moore, 2007), it does have organisational implications. Transactional distance is increased when course materials are highly structured, as rigid learning materials make the student a largely independent agent in the educational process. Self-instructional materials enable the student to work on their own, without considerable guidance or input from a member of faculty.

On the other hand, transactional distance is reduced when the student is reliant on faculty's deliberate guidance and support through course materials. This might be through providing more flexible learning materials that encourage student autonomy and emphasise dialogue, the latter either directly with a member of faculty or across the student group. A flexible approach expands the role of academic faculty toward a post-industrial teaching model, without becoming necessarily detached from an industrialised division of labour – course materials can still be pre-written, but with more scope for faculty members to emphasise, supplement and complement them as they engage with students in online discussion and reflective activities more suitable for higher levels of study.

The choice confronting the Open Polytechnic (and other industrialised distance providers) therefore becomes one of maintaining or decreasing transactional distance through the use of digital technologies. Decreasing transactional distance has the advantages of permitting a stronger academic voice in course delivery (also recognising the advantages of social constructivism) and much greater nimbleness and adaptability in terms of what is actually taught.

Constraints to post-industrialism

Decreasing transactional distance and broadening the faculty role clearly presents major systems issues for a distance education provider. For the Open Polytechnic, an institution whose programme portfolio consists largely of diplomas and undergraduate degrees, the applicability of post-industrialism is arguably limited to the latter years of degree programmes. As Saba (2003, p. 13) suggests, at higher levels of study 'the need for structure decreases and autonomy increases, which leads to learning patterns of behavior that are more constructivist'. Even at higher levels of study, however, the actual scope of how 'loose' course development can feasibly be is somewhat limited by class size and financial viability. One of the issues with a systems approach is that it highlights those managerial factors that must inevitably shape educational ones. Around the globe, higher education providers must manage the complex tensions between education and financial good practice, and seek to find an optimal point where the educational outcomes best meet the financial investment of limited resources. Inevitably, as Annand (2007) concedes, 'organizational issues rather than learning theory significantly determine practice'.

At the Open Polytechnic, where an FTE (full-time equivalent staff) to EFTS (equivalent full-time student) ratio is used to determine workload, the level of financial investment is clear. Consequently, the ratio sets the limits for what is possible in a post-industrial sense. Rather than determine whether a post-industrial approach is desirable, it seems that the Open Polytechnic should consider the extent to which post-industrialism can be achieved in those courses (or, perhaps, at those levels of study) where it makes sense to apply it. Even in these circumstances it is necessary to apply the faculty resource as selectively as possible, making the most of the opportunities online discourse provides to empower learners and encourage peer interaction. Rather than being a full participant, faculty might be better off adopting an initiation and feedback role. Care must also be taken to avoid the tendency of online interaction to force a sameness of pace that removes the flexibility distance education has traditionally provided for the individual learner (Annand, 2007). Recent work by Lynch and Paasuke (2010) indicates how post-industrialisation might be applied in an interactive online distance setting. Lynch and Paasuke discuss the tutorial support model (TSM), a model developed for Open Universities Australia. This model suggests how online learning might be used to improve student outcomes by adopting a certain tutorial style that is both educationally effective and scalable.

Conclusion: The applicability of the industrial approach

Distance education at the Open Polytechnic is based on an institutional approach, in that its institutional systems are characterised by a focus on the total student experience. The institutional approach optimises the use of complementary expertise in course scoping, design, development and delivery in the pursuit of the Open Polytechnic's educational mission. As such, the institutional model requires a particular role for academic faculty in creating quality education that is consistent, scalable and effective. At its core the academic faculty role involves providing academic feedback, student support and encouragement, and revising and supplementing learning materials.

Increasingly, information and communications technologies provide scope for distance education to take a more empowering approach for faculty. While educationally defensible and potentially enriching for a distance teaching faculty, the post-industrial model also presents considerable difficulties for financial, portfolio and quality-management systems. However, it is both possible and desirable to adopt a post-industrial bias in courses at higher levels of education, provided the scope of post-industrialism is deliberate and builds on the strengths of the institutional system in place.

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Instructional Design: Theory and Practice

Polly Kobeleva and Luke Strongman

Introduction

The purpose of this chapter is to describe, using a pedagogical focus, the principles of instructional design in distance learning teaching. The chapter comprises five sections. The first section provides definitions and describes concepts of instructional design. In the second section the authors investigate the nature of instructional design. The third section concerns the integration of teaching pedagogy with instructional design. The fourth section describes elements of project management and instructional design. A mini case study that discusses the embedding of literacy and numeracy in an Open Polytechnic Level 2 Horticulture course is included. The fifth section discusses e-learning pedagogy and instructional design.

Definitions and concepts of instructional design

Arguably, curriculum-centred instructional design began as a form of 'instructionism', a teacher-centric mode of learning in which teachers lecture and students learn: 'The expert (teachers) "hold" the knowledge and "tell" the students, who in turn "hold" the knowledge' (Bridges, Baily, Hiatt, Timmerman, & Gibson, 2002, p. 210). Instructional design enables the teacher's knowledge to be related to the student within courseware. A leading definition of instructional design describes it as 'a systematic process that is employed to develop education and training programs in a consistent and reliable fashion' (Gustafson & Branch, 2007, p. 11). As Caplan suggests, 'In the ideal world, instructional media developers – those who will actually create the planned instructional materials with which the student will interact – are included in the course development process from the beginning, to consult with and advise course team members on development-related topics as they arise' (2004, p. 175).

Instructional designers thus develop procedures to effect changes to courseware and curriculum based on the mediating artefacts of tools and signs. Examples of signs used in instructional design include flowchart symbols, workflow shapes and audit flowchart shapes. Designers also use learning objects and technology to produce a changed object (that is, one with altered content, and possibly a changed objective), and develop or enhance courseware. Common issues for the creation of courseware include analysis, design, development, implementation and evaluation (Prasolova-Førland, 2011, p. 7). The main strategy of curriculum composition in virtual-assisted learning is to set a series of goals and objectives and consider how these can be best supported by online learning materials. Figure 1 (after Engeström, 1987, p. 78) shows the relationship between courseware, curriculum delivery and instructional design.

There is also a similar triangular relationship between instructional designers, their procedures and the mediating artefacts of tools and signs. The circle signifies the product of the instructional design process as a changed learning object, course enhancement, or technological improvement. The potential movement of the circle along the vectors of the diagram indicates the point of focus of pedagogical engagement with the instructional design process.

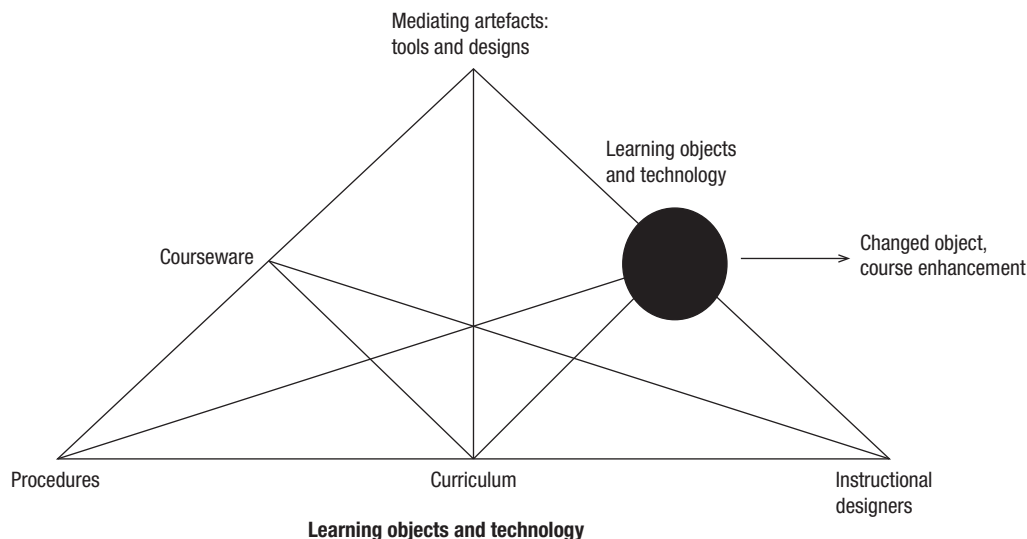


Fig. 1 Relationship between courseware, curriculum delivery and instructional design

What is instructional design about?

Instructional design is about the thinking behind the courseware teachers use in their lessons. It is thus a complex process that is 'creative, active and iterative' (Gustafson & Branch, 2007, p. 11). Instructional designers are interested in questions such as:

- What are the main constants (for example, the main learning objectives) and how are they accomplished most efficiently in every lesson?
- What makes one lesson better than another?
- How can lessons be designed for maximum or minimum impact?
- What lessons give one organisation an advantage over another?
- Can students be taught skills embedded within skills?
- Would some skills be useful for all time?

In distance education the importance of structure in developing text materials is designed to compensate for the geographical remoteness of the lessons and the temporal shifts that distance students enjoy (Lee & Rha, 2009, p. 373).

This is a shared responsibility between content developers, teachers and instructional designers. In distance education instructional design development intrinsically includes questions of technological use (Evans & Lockee, 2008, p. 12). Contemporary educators and instructional designers are concerned with questions such as:

- What technologies are available?
- How easy are these technologies to use?
- What are the uses that the technologies can be put to – what is it possible, probable, improbable or impossible to do?

However, as Rothwell and Kazanas (2004, p. 3) suggest, 'Instructional design means more than literally creating instruction. It is associated with the broader concept of analysing human performance problems systematically, identifying the root causes of those problems, considering various solutions to address the root causes, and implementing the solutions in ways designed to minimise the unintended consequences of corrective action'. In teaching pedagogy and instructional design structure is mainly contrasted with dialogical learning (that is, learning characterised by concepts such as transactional distance between teacher and learner). Structure refers to elements of the course design (such as learning objectives, activities, assignments, content and evaluation), whereas dialogical learning occurs in the interaction between the instructor and learners (Moore, 1993; Moore & Kearsley, 2005). Instructional designers accomplish the former, whereas teachers and educators carry out the latter, although there may be some overlap between the two.

Instructional design seeks to analyse the basic components of a learning problem as an open system and to remediate and integrate learning solutions to produce knowledge outputs. It is the 'linking science' (Tennyson, 2010, p. 1) that 'applies logic and scientific methods to the problems involved in designing and developing instruction' (Brown & Green, 2006, p. 24).

Instructional design and teaching in distance education

In distance education one of the main factors of course design and development is the alignment of the course design with the way it is going to be used (Evans & Lockee, 2008, p. 12). Although both teachers and designers would like to have full control over the tools, media, or mode of course delivery, often choices may be limited by what is available. However, these limitations must themselves solve the design parameters of the learner's needs. Media, delivery and content are thus important.

Alongside these considerations are the more deeply embedded questions of pedagogical integration into the 'teaching units' or modules of courseware. According to Moore and Kearsley (2005), the following points need to be considered in instructional design for distance education:

- What is the content?
- How should the material be sequenced?
- What are the best media to present the material?
- What teaching strategies need to be used?
- How can the students' learning be effectively measured?
- What systems for feedback are available?
- What methods should be used to create the learning materials?

The effectiveness with which these issues are addressed enables the instructor to maximise student engagement with the courseware. This in turn enhances the faculty teaching role. As Holmberg (1995, p. 66) states, the interaction of course materials and teacher in distance education aims to:

- arouse attention and motivate; present of objectives that are reachable
- make students aware of the expected outcomes of the study
- provide links to prior and future knowledge bases and interests
- present the material to be learnt
- guide and structure, offering learning guidance
- activate, inspire (providing manageable learning tasks)
- provide feedback
- promote transfer
- facilitate retention.

Figure 2 outlines the key components of the interface of instructional design and teaching in distance learning (after Evans & Lockee, 2008; Anderson, 2004; Zheng & Smaldino, 2003; Keller, 1984). In this diagram the instructional design stages lead directly to the teacher–student interface through the instructionally designed courseware. The stages of courseware development – analysis, technologies, design and development – lead via instructional goals to the affective teaching domain and knowledge content interface (courseware or learning management system). Through the learning management system and knowledge content interface, the teacher and student interact through learning modules and teaching instruction – tutorials, simulations, virtual labs and e-resources.

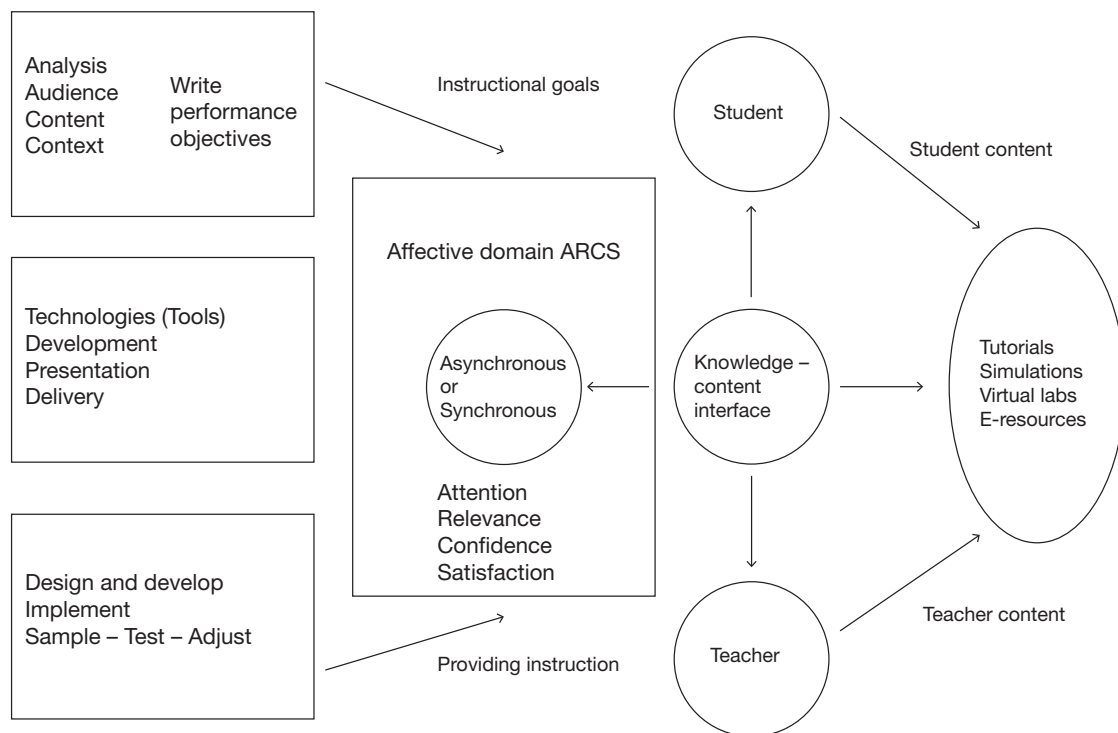


Fig. 2 *Instructional design and the distance learning interface*

As shown in Fig. 2, the design and development of courseware, the decisions of what technologies to use, and analyses used to enhance course capabilities are informed by instructional goals. Cognitive and affective considerations that aim to captivate the student in the learning process are shown in the diagram as ARCS – attention, relevance, confidence and satisfaction. The teacher-instructor and student interact at the knowledge–content interface in tutorials or virtual learning exchanges.

At the basis of instructional design is an interest in and understanding of research on thinking and learning. Considerations of ‘learner characteristics’ are thus important as a factor of design (Zheng & Smaldino, 2003, p. 157), as

is 'student satisfaction' (Zheng & Smaldino, 2003, p. 159). Good instructional designs conform not only to the requirements of the discipline, but also strategic evaluations concerning the learning efficacy of the design and any possible improvements. In distance education, instructional designers and faculty instructional planners need to be mindful of both the place and time-shifting aspects of distance learning (Herring & Smaldino, 1998). Strategies for overcoming these factors include (Willis, 2000, p. 199):

- diversifying and pacing course activities
- using both locally and universally relevant examples
- conciseness
- participation and retention activities
- a relaxed mode of delivery.

Courseware that integrates these components is more likely to be successful than courseware that does not. Furthermore, Elias has identified eight universal instructional design principles that apply to distance education (Elias, 2010, pp. 111–112):

1. Equitable use – useful and accessible design for people of diverse abilities and geographical habitats.
2. Flexible use – the learning design is suitable for a wide range of abilities, schedules and levels of accessibility.
3. Simple and intuitive – easily understood regardless of experience.
4. Perceptible information – design features are easily communicated.
5. Tolerance for error – ambiguity of use is minimised.
6. Low physical and technical effort – the design can be used easily.
7. Community of learners and support – interaction amongst users is achieved easily.
8. Instructional climate – feedback comments are welcoming and inclusive.

The design of courseware needs to satisfy the above qualities to create learning efficiency and a course that is easily and efficiently delivered and taught by the lecturer. But how is this achieved by the instructional designer? The 'ADDIE' adage is a popular mnemonic that abbreviates the key instructional design components of: analyse, design, develop, implement and evaluate (Brown & Greene, 2006, p. 8). The instructional designer, educator, content specialist, teacher and editor must work together to map the larger concept of the courseware. The various learning objectives should be organised into identifiable units, components and modules. General 'rules of thumb' have been identified by Reigeluth and Carr-Chellman, including values with subgoals constituting learning objectives, priorities and methods. Other considerations include content, and recognition of the learner, the learning environment and instructional development constraints (2009, p. 33).

Despite these influencing factors, there are no definitive constituent parts there is no definitive operational procedure for a universal theory of instructional design practice, other than the pragmatic application of learning pedagogy to specific examples of course, curriculum or subject development:

Instructional designers tend to look at thinking from a pragmatic viewpoint – that is, what is important to know about thinking and the studies done on thinking that will help them develop efficient and effective structural interventions. Thus, instructional designers are considered to be eclectic – they borrow from different perspectives and use what works for a given situation to produce the desired results. (Brown & Green, 2006, p. 38)

However, instructional design requires both specific cognitive abilities characterised as knowledge and skills, and executive abilities, which are needed to plan and anticipate future needs, set priorities and self-regulate. Instructional design also involves 'metacognition' – the practice of 'thinking about thinking' – and the ability to control mentalistic process. In this, Bloom's taxonomy of the cognitive domain is relevant. The taxonomy includes six levels: knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom, Engelhart, Frost, Hill, & Krathwohl, 1956). This can be distinguished from, but is nevertheless related to, students' cognitive achievements. Educators, instructional designers, content specialists and teachers must also design courses with students' cognitive achievements clearly incorporated in learning outcomes. These cognitive outcomes are generally of two kinds: first, 'receptive learning', which consists of 'declarative knowledge, information, concepts, or theories'; and second, 'critical thinking learning', which may contain controversial issues requiring critique, argument and discussion (Lee & Rha, 2009, p. 378). However, as Fisher, Chipinduku, and Maathuis-Smith suggest (2010, p. 7):

. . . e-learning design needs to address the needs of a diverse body of stakeholders. The overall result is potential conflict between the competing needs of the designer, content specialist, delivery agent, and student. One size certainly does not fit all, and it may be necessary to disentangle the needs and desires of the organisation seeking to implement e-learning solutions from the actual needs of the end user.

Thus the teacher and designer both need to play an integral role in the process of courseware development, keeping in mind the needs of the end-user – the student. This necessitates a consultation process that reflects a value chain of learning from identification of learning needs to delivery of course instruction.

Project management and course design

As well as the design of courseware, instructional designers are also involved with the project management of course design. Although many of the day-to-day tasks of instructional designers are concerned with course development, they may also be concerned with curriculum portfolio review – making decisions about what courses to develop and which courses to revise or discontinue in any given programme. These decisions need to be made in close consultation with the various stakeholders in the courses, while balancing student, academic and management requirements. This involves academic and economic analysis, as well as project management. A basic formula to use when analysing the cost-benefits of course development was identified by Gilbert (1967):

$$P = \frac{VN}{C}$$

Where P = Priority
V = Value of solution
N = Number of people

From an economic viewpoint, courses can be assigned a priority quotient by multiplying the value of the solution (in units) by the number of learners as customers, divided by the cost of the solution. Decisions about course implementation, continuation or retirement may be informed by a 'break-even' chart. Figure 3 compares the break-even point between two alternative course scenarios (after Romiszowski, 1981, p. 160).

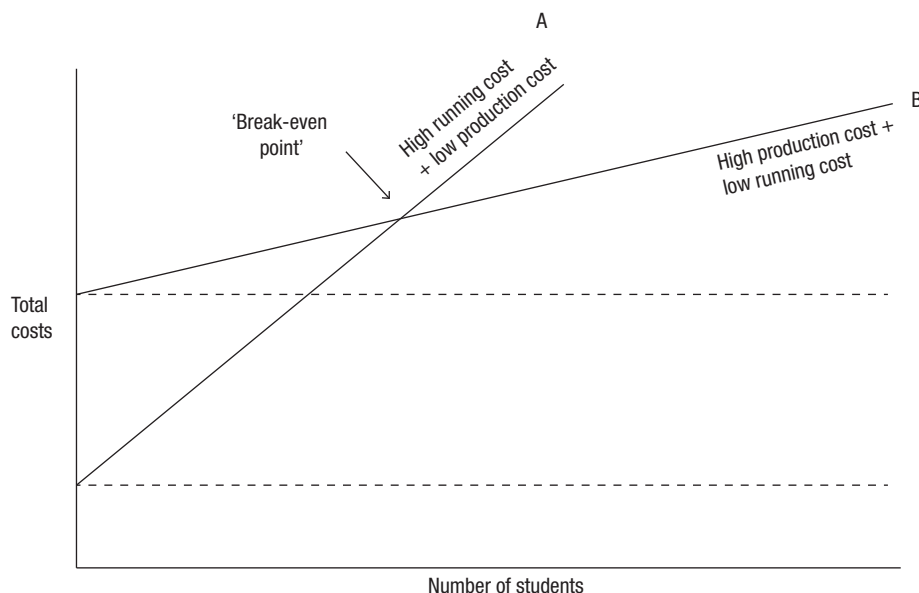


Fig. 3 Break-even point between two alternative courses

With low usage course A (print-based course delivered by teacher – low production cost/high running cost) is cheaper. However with greater student numbers the break-even point is passed and course B, the online course (high production cost/low running cost) is the more economical alternative.

Project managers also carry out performance analysis, which enables them to effectively design the work-implementation process. A typical instructional design project plan is given below (after Gaither (1980); Rothwell & Kazanas (2004)):

Table 1: Instructional design project plan

Functions	Plan	Schedule	Control
Activities	Identify resources and times when needed	Prepare guidelines for each resource	Establish means to monitor and evaluate resource utilisation
Methods of accomplishment	Monitor expenditures Monitor use of human resources Monitor time Plan and monitor project milestones	Charts People Budget Equipment Facility use Milestone dates	Budget reports Activity reports Time reports

Monitoring these various performance indicators enables project managers to retain control of the course development process. Furthermore, course design goals must be set for defining the courseware to be taught. One of the leading instructional design plan formulations is that of Kemp, Morrison and Ross. It has nine main features (cited in Brown & Green, 2006, p. 11):

1. Identify instructional problems and specify goals for designing instruction.
2. Examine learner characteristics that influence instructional decisions.
3. Identify subject content and analyse task components.
4. Specify instructional objectives.
5. Sequence content within each instructional unit for logical learning.
6. Design instructional strategies so that each learner can master the objectives.
7. Plan the instructional message and develop the instruction.

8. Develop evaluation instruments to assess the objectives.
9. Select resources to support the learning activities.

Instructional designers thus develop procedures to affect changes to courseware and curriculum based on the mediating artefacts of tools and signs. They also use learning objects and technology to produce a changed object, or develop or enhance courseware. It is generally recognised that there are five levels of technological adoption: familiarisation, utilisation, integration, reorientation and evolution (Bridges et al., 2002, p. 221).

In the next section a mini case study is presented that demonstrates the embedding of literacy and numeracy with instructional design principles in an Open Polytechnic Level 2 Horticulture course.

Case Study: Embedding literacy and numeracy in Level 2 Horticulture

Authors

Name: Anne Mason.

Position: Literacy and numeracy advisor.

Job function: To provide expertise, support and practical advice on embedding literacy and numeracy.

Name: Richard Drummond.

Position: Instructional designer.

Job function: To provide advice and consultancy services on the design, development and revision of learning materials and on the appropriate use of educational technology.

Problem

The 2006 Adult Literacy and Life Skills survey indicated that many New Zealand learners in entry-level tertiary education programmes had low levels of literacy and numeracy. As a result, the *Tertiary Education Strategy 2010–2015* (Ministry of Education, 2010) aims to improve literacy, language and numeracy skills and the outcomes of learners enrolled in study at Levels 1 to 3 of the National Qualifications Framework.

Because the Open Polytechnic is an open and distance education provider, the principal mode of learning at Levels 1 to 3 is through the written word. It is thus essential to embed into our learning materials literacy-enhancing strategies and supports, as well as providing, as far as possible within often technical contexts, a plain style of English appropriate to the literacy levels of the learners.

The Open Polytechnic prioritised the National Certificate in Horticulture (Introductory, Level 2) qualification as an appropriate programme to embed literacy and numeracy in an endeavour to raise the literacy and numeracy skills of learners who were just starting out in the horticulture industry.

Reflection on problem

When enrolled in these courses, learners can gain credits at Levels 2 and 3 of the

National Qualifications Framework.

Anne's role as literacy and numeracy advisor was to support course writers and advise them how to embed literacy and numeracy in 15 Horticulture courses. In particular, the level of vocabulary was too high for many learners, so added vocabulary support was a main focus in the revision.

Richard's role as instructional designer was to ensure the coherence of the learning materials, to ensure that best current practice in embedding literacy and numeracy aids was incorporated into the courses, and to further increase accessibility learners at Levels 2 and 3.

An unresolved issue is that, while the Tertiary Education Commission (TEC) has provided a number of useful guidelines for embedding of literacy and numeracy, there are no published criteria as to what is an 'acceptable' level of literacy and numeracy embedment, particularly in open and distance learning materials. This is perhaps because of the need to judge learning materials on a case-by-case basis, but it has caused problems in the past. The risk is that without criteria the acceptability of literacy and numeracy embedding becomes a matter of subjective judgment. The development team, therefore, designed and documented its own brief as to what it thought would be appropriate levels and forms of embedment.

Theoretical underpinning

This case study is underpinned by theories related to the teaching and learning of adult learners with particular reference to TEC's *Learning Progressions for Adult Literacy* (2008) and supporting documents. The approach is underpinned by Vygotsky's theoretical framework of scaffolding, where learners are provided with initial support in their instruction so that they become independent at a later stage.

Actions by Anne Mason

The process of embedding involved the following:

1. As a new learning and numeracy advisor, I gained information about embedding literacy and numeracy at tertiary level from various sources. These included instructional designers and their documentation, previously embedded course materials, professional development events, TEC key literacy and numeracy documents, and the National Centre for Literacy and Numeracy for Adults website.

2. From these sources I developed guidelines on 'providing clarity and embedding literacy' for writers, which included sections on organisation, language, teaching, learning and support.
3. A practical workshop with the writers included discussion on the writing and revision process, background information about embedding literacy and numeracy in the tertiary sector, TEC's learning progressions and supporting documents, and practical activities to implement aspects of the guidelines on embedding literacy.
4. I provided writers with detailed feedback on the first sections of their course revisions.
5. Several meetings were held with those involved in the process (for example, project leader/technical editor, instructional designers, literacy and numeracy advisor, project manager and editors) to discuss shared about embedding literacy and numeracy during course revisions.
6. I supported instructional designers with detailed comments and notes for each course related to effective embedding of literacy and numeracy.

Anne's results

1. Brief guidelines for dealing with difficult or multi-syllable vocabulary included:
 - Key words: Define when first used and include a description and example. Use bold typeface for emphasis and add to a glossary.
 - Common subject-specific words: Support when first used – for example, further information in brackets or adding an alternative word.
 - Non-subject-specific words: Replace if not necessary or add support.
2. The more content revisions writers made for each course, the less effective they were at embedding literacy and numeracy.
3. Revisions included more support in the introductions to each section – for example, links were made to existing learning and earlier learning material and, where possible, authentic examples.

Actions by Richard Drummond

1. As instructional designer I had had experience in embedding literacy and numeracy strategies into a range of programmes and brought that experience to bear on the present context.
2. A set of in-house guidelines for embedding literacy support and literacy strategies within the learning materials for the programme were agreed between instructional designers and the learning and numeracy advisor. These can be grouped as follows:
 - Navigation support (introductory and linking paragraphs, navigation icons).
 - Vocabulary support (in-text explanations of technical words, plus provision of a glossary giving easy explanations).
 - Contextual support, including enhanced use of relevant illustrations.
 - Literacy strategies (for example, boxed notes explaining prefixes, word families and so on).
4. The learning materials were then further reviewed after the literacy and numeracy advisor's review, with a view to incorporating plain English style – such as short sentences, plain words and bulleted lists – and providing visual support to the text.

Richard's results

1. **Frustrations:** 'Retro fitting' learning and numeracy strategies into a pre-existing set of text-heavy courses while at the same time updating content and assessment provides a less satisfactory end product than a course that has been purposefully designed to embed literacy and numeracy strategies. Time and budgetary constraints precluded the latter approach. However, I am satisfied that the support and strategies built into the learning materials will make the text and concepts more accessible not only to students with literacy difficulties but to all students.

One of the more useful components in the literacy and numeracy toolkit – literacy-building and comprehension activities – although discussed with the writers, was not provided by them. One suspects that it may have been beyond their comfort zone. However, this shortcoming was noticed by the review team, who devised appropriate literacy strategy activities and embedded them into the learning materials. Current topic-centred activities and assessment tasks are also checked and modified as required, to ensure that the requirements are clear and that students are guided and supported in their responses.

2. **Successes:** A draft course was returned to a tutor/writer after the learning and numeracy components had been added in, and his unsolicited comment was that the material was now much more readable than it had been before and that students should be able to find their way around the course more easily.

Future possibilities – general application

1. The guidelines were used with a workshop of other writers in another Level 2 course.
2. The brief guidelines developed by the team will be shared with other editors working on Horticulture courses.
3. Lessons learnt from Horticulture courses will be transferred to other projects.

This case study highlights the way in which flexible and timely responses are employed within the Learning and Teaching Solutions directorate at the Open Polytechnic in response to government educational performance indicators. The embedding of literacy and numeracy in courseware according to instructional design principles shows the agility and pedagogical responsibility of the organisation in fulfilling student learning objectives within the National Qualifications Framework.

E-learning pedagogy and instructional design

Lein (2009, p. 1) points out that e-learning strategies have produced a revolution in world instruction whereby e-learning technologies that were initially used to convert existing instructional material into digital formats now facilitate geographically dispersed distribution, consistency and reduced costs. It has been suggested that because of the distance factor the pedagogy of e-learning is more behaviourist, and that is it is concerned more with responses to external stimuli and less with the internal processes of learning. However, as Poley (1998, p. 975) suggests, 'Learners need to be at the centre of the process. Learners can learn from each other and from teaching faculty'. Furthermore, knowledge of these internal learning processes may be explicit in course, curriculum and online campus design. This may take the form of 'breaking learning material into smaller instructional steps, which have a progressive interactive or modular quality against which the learner's performance may be measured providing positive and negative feedback' (Lein, 2009, p. 2). Bronack et al. (2008, p. 64) remind of us of the interrelationship between language, technology tools and learning:

... as soon as we as learners became aware of language, signs, symbols, and gestures, we became forever embedded in communion with the artefacts and intents of others. Even if when alone, one uses social speech inside his/her own head and interacts with artefacts of others' experiences with the intent of using the residue of those experiences as a way of shaping their own. The learner then shares their own experience back onto those cues, which in turn, either solidify or reshape them. (2008, p. 64).

However, behaviourism is not the only model of pedagogical theory that has been applied to the distance learning environment – its major rival is cognitivism, which is often conceptualised as a response to how the learner's mind processes and uses information. Consequently, cognitivism offers to more fully explain human behaviour by modelling mental structures. Cognitivism may be characterised by the use of schema and maps to organise content (Allen, 2007, p. 41) and emphasises the role of the learner's 'thoughts, beliefs, attitudes and values' in the learning process (Schunk, 2007, p. 17).

A third pedagogical model of e-learning is constructionism. Following on from 'cognitivism' in defining learning as a contextualised process of constructing knowledge, the learning is learner-centric and learners take an active role in the learning process, acquiring knowledge for themselves and processing it in a subjective way. Pedagogically characterised by activity-based learning, constructivism is based on three main principles:

1. Learners learn from their own framing of knowledge patterns and understanding.

2. Learning is achieved through active experience and occurs when the learner uncovers inconsistencies between current knowledge, their own experiences, and instructional knowledge, so it is thus concerned psychologically with the 'cognitive-dissonance' paradigm.
3. Learning is adaptive and occurs in a socialised or remotely mediated context through interactions with an instructor and peers.

The constructivist model learning is predicated on the learner's ability to adapt, and has similarities with the question-and-answer mode of enquiry used in the Socratic method (Wachira et al., 2008, p. 2).

This model is deemed to be suited to the distance education mode in so much as it accounts for the spectrum of learning from 'high-contact' students, who respond to intensive teacher stimulus to 'low-contact' students, who seek to solve a problem on their own, rather than be given the knowledge or instructions for the problem (Modritscher, 2006, p. 7). A feature of both high and low-contact distance education is the necessity to give students 'point of need' access to educational resources (Lein, 2009, p. 2). As Piskurich suggests, good instructional design will 'help you or whoever instructs [the] course to facilitate the participants' learning effectively and efficiently and, most important it will help . . . make sure that what is in your program is what your trainees need to learn' (2003, p. 3).

A fourth model of pedagogy relevant to instructional design is 'connectivism'. The main premise of this theory is that knowledge is distributed across courseware and hence less emphasis is placed on its propositionality. The main proponents of this theory are Downes (2007) and Siemens, who argue that knowledge can be considered a series of connections formed by actions and experience – a bit like a 'join the dots' puzzle. Connectivism is also a difficult theory to apply to the modality of instructional design, aside from conceptualising courseware as units within a network while in some senses this is fitting, given that courses are taught within programmes and degrees, like behaviourism before it 'connectivism' tends to downplay the role of internal mental processes and individual agency in the learning experience. Arguably, it is a term better suited to the uses of technology.

Instructional design for learning variety and future issues

In distance education instructional design is paramount for a number of reasons. First, it provides structure in the delivery of education. Second, it must do so for a wide range of learners – with or without high school qualifications, prior tertiary study experience, special needs or learning disabilities. Flexibility is highly desirable, as it allows the tertiary education institution to encompass the varied learning needs of distance students. Considerations of ‘learner characteristics’ and ‘student satisfaction’ are significant factors in instructional design (Zheng & Smaldino, 2003, pp. 157–159). As Burgstahler suggests, soundly designed instructional materials and activities should ‘make the learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write [. . .] attend, organise, engage, and remember’ (cited in Elias, 2010, p. 110).

Distance students include those whose learning journey is a means to overcome ethnic or age differences. As Elias suggests, distance education students ‘may face a variety of physical, learning, psychological, visual, and hearing challenges’ (2010, p. 110). Furthermore, distance learners may feel isolated from one another, the tertiary education provider and their instructor, since they are often studying while working and bringing up families or caring for relatives (Elias, 2010, p. 12). Both pedagogical and instructional design elements must contribute to supporting diverse groups of learners. For example, for Māori learners the important elements are the provision of a culturally responsive environment, the mutable roles of teacher and learner, ‘tuakana–teina’ relationships between learners, and the marriage of collective responsibility with individual responsibility (Greenwood & Te Aika, 2009). As Tamati suggests, ‘e-Ako is a pedagogical philosophy which underlies an online teaching environment, and enables Māori to follow a similar concept by using technology’ (2008, p. 19). In order to achieve increased participation and greater knowledge outcomes for Māori, an inclusive approach is necessary ‘so that everyone participates fully in group dialogue, and is not excluded from the e-learning whānau’ (Tamati, 2008, p. 19).

Increasingly people, most notably ‘knowledge workers’ (educators), will create and actively maintain online personal learning environments as a way of capturing their continuous learning journey (Martin, 2007). Open-source learning management systems will continue to improve, allowing more and more add-ins (that is, it will be possible to integrate a large variety of Web 2.0 tools into a course). As many software applications are now web-based, these applications and learning management systems will become more and more interoperable. The proliferation and fast development of new technologies necessitates the need for people working

with technology in education to 'have a clear and articulate set of reasons for employing a certain technology in a particular way' (Sandford, 2006). Although it is desirable for instructional designers and teachers alike to keep abreast with new technology, both must be thinking first and foremost about learners and how to help them achieve the learning outcomes.

In summary, instructional design is integral to any education environment. It provides the building blocks of the learning process and mediates between the educational constructs and the student. There is an increasing trend for flexibility and openness in courseware design and for the use of more sophisticated and innovative technologies for furthering the reach of education within both mobile and global contexts. Future issues concern the various ways in which courseware, methods of course delivery and teaching may be effectively monitored for quality of design.

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Research at the Open Polytechnic of New Zealand

Luke Strongman and Raymond Young, with Polly Kobeleva

The Open Polytechnic's vision for research¹

This chapter describes research at the Open Polytechnic of New Zealand in the context of its practices. It does this using a variety of perspectives. First, it discusses the concept of research and its applicability to the organisation. Second, it considers the dynamic environment in which research is conducted in education. The discussion is then broadened to consider the tertiary environment for research in New Zealand. Consequently the focus turns to the development and implementation of an organisation-wide strategic plan for research at the Open Polytechnic. Elements central to the Open Polytechnic's internal research strategy are considered, namely kaupapa Māori research, and a case study that provides an exemplar of the applicability of research to teaching practices and tertiary education pedagogy. Research management in the open and distance learning (ODL) environment is then examined, which leads to a second case study that discusses the development of a Moodle page used for dissemination of research information in the School of Information and Social Sciences. The chapter concludes with a consideration of the future issues underpinning research at the Open Polytechnic.

Research is an essential activity in any institute of technology or polytechnic. Aside from the knowledge and recognition research might bring to a tertiary organisation, it also directly informs teaching practices. It does this in a variety of ways: it ensures curriculum currency and coherence; it anticipates learning trends; it validates ideas and confirms or disconfirms hypotheses; and it ensures that knowledge is transferred and shared with students, faculty staff, community, business and government. Furthermore, research can inform management practices and provide a basis for innovation and organisational adaptation and change. The complex roles of research thus require successful focus and vision within an organisation.

¹ This section is adapted from *The Open Polytechnic Research Strategy 2010–2013* (Open Polytechnic of New Zealand, 2010). The authors would like to acknowledge the role that the Open Polytechnic Research Strategy Steering Group played in the formulation of this strategy.

The vision for research within the Open Polytechnic is one of a dynamic, collaborative culture of rigorous enquiry that informs and enhances subject knowledge, strengthens the degree portfolio, and makes a significant contribution to New Zealand's cultural, social, environmental, economic and scientific development and the ODL community. The Open Polytechnic's vision of research recognises the importance of maintaining its leading role in open and distance education, its commitment towards the needs of diverse learners, and its mission to support vocational and lifelong learning and national development goals through excellence in open and flexible learning.

The main determinants of quality in the distance learning tertiary organisation are public accountability, student learning, faculty productivity and performance, programme effectiveness and institutional evaluation (Gumport & Sporn, 1999, p. 112). While there are significant steps the organisation can take to support and enhance the quality of the internal research environment, this inevitably and intrinsically takes place in a wider educational and societal context. This wider educational and societal context needs to include listening to stakeholders, in terms of both 'civic responsibilities' and 'voices from the employment sector' (Cookson, 2002, p. 5). As Sissons (2011, p. 17) has suggested, institutes of technology and polytechnics deliver three main strengths in research: (a) strong applied research capability; (b) technology transfer; and (c) training. However, the focus of research in terms of its application to enhancing teaching quality is paramount for faculty engagement in the student learning process. This dimension is central to the Open Polytechnic's vision for research.

Research into ODL²

The Open Polytechnic is New Zealand's leading provider of distance education. It is the only polytechnic or tertiary education organisation (TEO) that specialises in distance learning provision. At the Open Polytechnic the capacity of distance learning curriculum development and delivery is high. As research into ODL has long been prioritised as a research objective, increasingly the technology and pedagogy of research at the Open Polytechnic has been orientated towards conducting research in an ODL context. However, curriculum development is also attuned to blended learning, which provides a combination of printed materials, web-based support and face-to-face teaching.

Distance learning involves education in which students are separated in terms of time and space from their peers and instructors: 'as a result it becomes necessary to introduce an artificial [sic] communications medium that will deliver information and also provide a channel for interaction between them' (Moore & Kearsley, 1996, p. 1). With the increasing use of personal computers, email and internet, mobile phone, digital media, videoconferencing and collaborative software (such as cloud works), new tools are introduced into the distance educator's repertoire of teaching aids. Consequently, distance education and e-learning are sometimes used interchangeably – the central theme of e-learning being that it requires an 'online presence'. As Wachira, Keengwe and Onchwari suggest, 'e-learning can potentially transform education by providing high-quality educational experiences available to those whose location, economic and personal constraints have prevented them from pursuing their educational goals' (2008, p. 1).

Traditionally, distance education remediated the disadvantages of those whose 'life role, geographical location, disabilities, and socio-economic circumstances' have made conventional learning difficult (Poley, 1998, p. 976). More recently, distance education theorists have posited that it is a natural extension of face-to-face learning, through reconceptualising ways in which the proximities of traditional education delivery can be seen as 'less distant' forms (Mersham, 2009). However, distance learning programmes that are designed for the medium, rather than simply technology driven 'add-ons', are equivalent to or often better than face-to-face programmes. While as Brown (2001) has commented there may be a disappearing distinction between face-to-face and distance education, as the traditional close-proximity modes engage with new technologies and synchronous delivery, a leading feature of distance education

² This section is adapted from 'Combinatorial research product development for online research infrastructure and instructional use at an independent tertiary provider' by Luke Strongman and Raymond Young (2011).

remains its asynchronicity – the fact that online teaching modes are available to the student 24/7. However, distance learning and e-learning are distinct. As Poley suggests, '[e]ffective distance education focuses on learners achieving defined outcomes within a specified time period at a cost that is affordable' (1998, p. 975).

There are two immediate benefits of distance learning compared with contact learning. First, it may be the only method by which students from geographically remote areas have access to institutionalised learning. Second, distance education substitutes intellectual capital (in the form of instructionally designed course material and online campus course pages) for face-to-face teaching time, which can result in lower costs for the student and organisation than with face-to-face teaching. As Poley states, '[d]istance learners have never been a homogenous group, and we can expect the heterogeneity to grow with increasing learner numbers and diversity of program offerings' (1998, p. 976). Despite the fact that larger teacher-to-student ratios may be achievable in distance education compared with face-to-face education, it is important to note that research and pedagogy differs among different disciplines and across varied curriculum offerings. Correspondingly, ODL research also reflects the practices of a diverse range of academic staff.

Research in the distance learning environment has different parameters than in contact education. The modifiers of class contact are largely the online teaching infrastructure, asynchronous learning and the use of platforms such as Moodle for learning management system teaching practices. There are considerable benefits in the distance learning environment, such as:

- real-time communication and assessment
- asynchronous communication – 24/7 global environment
- 'virtual' research collaboration
- electronic publishing and dissemination of information
- real-time access to research results and research resources
- rapid access to external research funding information
- blended and multimedia presentation of research results.

But there are also disadvantages, such as:

- varying access and usability of online resources (external)
- decentralisation of student learning experience, leading to issues of engagement and/or autonomy.

Highly structured courses with low dialogue result in larger transactional distance and more emphasis on the learner to be autonomous. Transactional distance reduces in courses with frequent dialogue and low structure, because learners receive ongoing communication and instruction that may be modified (Moore and Kearsley, 1996). Therefore, there needs to be careful research into the development of courses, from both content and instructional design viewpoints.

As Law states, we need to determine how to enhance cost-effective teaching and learning strategies with research that supports degree teaching (1997, p. 14). The challenges of research in the ODL environment include being responsive to the needs of stakeholders, ensuring curriculum currency and vocational relevance, validating accreditation standards for degree teaching, and ensuring the advancement of disciplinary knowledge. The Open Polytechnic also sets priorities in terms of maintaining excellence in the pedagogy and practice of teaching scholarship, using new technologies in innovative and effective ways, maintaining awareness of our bicultural and multicultural contexts, and ensuring that we are providing optimum educational services to our student body – all of which require a dynamic approach to research.

The tertiary research environment in New Zealand

The external tertiary research environment in New Zealand is characterised by some contestation between TEOs for government funding, varying degrees of interorganisational collaboration and support, and strong internal constraints for resources, including time, money and space. The Tertiary Education Commission (TEC) is charged with giving effect to tertiary education strategy, approves organisational funding, and administers the Performance-Based Research Fund (PBRF), the main instrument of research funding available to TEOs in New Zealand. The PBRF is an external government-sponsored measure of the contribution of individual staff of TEOs to the research endeavour that is aggregated across each TEO's organisation according to the combined value of submitted evidence portfolios demonstrating the quality and extent of research endeavour within the organisation. Another measure is TEC funding according to the amount of external research income generated. As well as the PBRF, TEO researchers may also compete for public and private research funding through such bodies as the Ministry of Science and Innovation, the Ministry of Internal Affairs, the Royal Society of New Zealand, and private not-for-profit philanthropic enterprises such as the Todd Foundation. The Open Polytechnic has had notable success with grant approvals and sponsorship from Ako Aotearoa: National Centre for Tertiary Teaching Excellence and the Teaching Learning and Research Initiative.

Research is fundamental to all degree teaching in New Zealand. It is a requirement of the Education Act 1989 that all those teaching on degree programmes should also be engaged in research activities. The Ministry of Education's *Tertiary Education Strategy 2010–2015* vision for tertiary education includes: '[Producing] high quality research to build on New Zealand's knowledge base, respond to the needs of the economy and address environmental and social challenges' (2010, p. 6). Expectations of providers include 'increasing the number of Māori and Pasifika students enjoying success and achieving at higher levels' and 'strengthening research outcomes' (p. 10). Identified core roles of polytechnics include undertaking 'applied research that supports vocational learning and technology transfer' (p. 18). In terms of monitoring, government expectations include 'higher first year retention rates, particularly for Māori and Pasifika students' and 'more high-quality research that meets New Zealand's economic, social and environmental needs' (p. 22). Research is thus an integral part of the *Tertiary Education Strategy 2010–2015* and *The Open Polytechnic Research Strategy 2010–2013* (The Open Polytechnic of New Zealand, 2010). Funding from TEC is dependent on approval of an investment plan. A plan must include, among other things, information on how

an organisation will give effect to the government's current and medium-term priorities. The national accreditation body is the New Zealand Qualifications Authority (NZQA), which vets and accredits certificates, diplomas and degrees. It recognises that research is an intrinsic component of curricular activities, in essence providing the building blocks of tertiary degree teaching. In New Zealand, only those programmes that have NZQA accreditation are also eligible for funding per student enrolment from TEC (or student achievement component).

Research underpins degree teaching in other ways. New measures of teaching accountability, such as retentions, completions and progressions, necessitate that TEOs support their teaching activities with research into best-practice methods. Research into teaching pedagogy recognises the increasing importance of the role of research in effective teaching practices. Research practices may also be informed by biculturalism. The official integration of Te Tiriti o Waitangi (The Treaty of Waitangi) into government-related policies, including the internal policies and strategy portfolio of the Open Polytechnic, is a requirement recognised at the national level. For the Open Polytechnic the increasing focus on the needs of Māori learners has been reflected in its increasing engagement with Māori learners at national and local levels, both through the development of strategy documents and engagement with whānau, iwi and hapū, and through such events as the Hei Tauira hui held in August 2011. As the concept of rangahau suggests: 'As more Māori conduct and participate in research in a range of disciplines, 'new' ways of researching that protect and extend whānau, hapū, iwi, and community and their knowledge, are being developed' (Rautaki Ltd & Ngā Pae o Māramatanga, n.d.).

The Open Polytechnic Research Strategy³

The Open Polytechnic Research Strategy 2010–2013 (The Open Polytechnic of New Zealand, 2010) was designed to set the direction for research at the Open Polytechnic. It was a collaborative engagement in planning across the schools and directorates that brought together researchers and managers to consolidate organisational knowledge of research practices and processes and to provide future direction for research across the organisation. The strategy outlines the vision, goals, aims and objectives to promote high-quality research, scholarship and teaching that support degrees and contribute to the Polytechnic's goal of becoming a national leader in ODL design, development and delivery. The Open Polytechnic's Māori Research Strategy is an integral part of the strategy. The strategy aligns with Treaty and statutory requirements and the government's objectives and expectations for the tertiary sector, and also aligns with the Open Polytechnic's strategic objectives, investment plan, teaching and learning framework, and relevant policies. The cultural diversity of Open Polytechnic learners and their communities creates an imperative that research is culturally responsive and accounts for the diversity of learners and their communities. This is particularly relevant when considering different cultural pedagogies. Moreover, scholarship needs to account for different epistemological traditions that vary across the community of Open Polytechnic learners, taking into account, wherever possible, issues related to cultural diversity and kaupapa Māori. The research strategy draws on and integrates the disciplines within Faculty and across directorates within the Open Polytechnic. Quality is a central axiom of the strategy. As Cookson suggests, '[i]f open and distance learning institutions are to increase access and equity, they will only be effective as they enact a genuine commitment to quality' (2002, p. 2).

³ This section is adapted from *The Open Polytechnic Research Strategy 2010–2013* (Open Polytechnic of New Zealand, 2010).

Kaupapa Māori research

Kaupapa Māori research refers to research that assumes the validity of Māori worldviews, epistemology and ontology, and has as its primary agenda the advancement and development of Māori through research (Smith, 1992).

Acceptance of the validity of kaupapa Māori research is reflected in the Open Polytechnic's strategy commitment to the three Treaty of Waitangi principles, namely partnership, active protection and participation. Moreover, it recognises the special relationship that the Open Polytechnic has with Māori as tangata whenua and Treaty partner.

A project that outlines the usefulness of research to the teaching and learning of the tertiary organisation is the Ako Kaupapa Māori Early Childhood Education project, which is a national project funded by Ako Aotearoa.

The purpose of the Ako Kaupapa Māori in ECE project was/is to evaluate the extent of the use and understanding of Kaupapa Māori in Early Childhood Education, both by current practitioners in the sector and by future practitioners (current ECE students); to seek information from those practitioners and from selected Māori kaumatuas and kuia as to what they thought was needed to improve that use and understanding; and, consequently, to develop educational tools that would both facilitate and improve practitioners use of KM in ECE. (M. Marfell-Jones, personal communication, July 5, 2011)

Thus the project aims to consolidate knowledge of kaupapa Māori processes in the early childhood education (ECE) sector. It is an example of a successful collaboration with a national sponsor, as the project is both externally funded and internally supported by the Open Polytechnic. The project involves research developing hands-on (experimental learning) ECE-specific tools to provide teachers with a holistic view of kaupapa Māori rationale, processes and practices in order to implement a Māori worldview (te reo me ona tikanga) in a culturally and pedagogically appropriate way.

Open Polytechnic academic staff member Jonine Nager comments that in terms of kaupapa Māori research one of the fundamental underlying philosophies is relationships: 'Māori have been the object of research projects for over 150 years, with very little being returned back to the Māori community. A number of guidelines have been developed by leading Māori researchers, such as Wally Penetito, Graham Smith and Linda Smith. These include: (a) face-to-face development of relationships prior to, during and after the research; and (b) articulation of how the research will be of benefit to Māori' (J. Nager,

personal communication, July 20, 2011). Nager herself has been involved in small research projects in which she has incorporated kaupapa Māori research principles. As she comments:

Part of my work included working with the whānau to ensure that the research would be of benefit to them and working alongside kaiako within the kōhanga reo. My involvement with this kōhanga reo had developed over a period of 10 years, both as a parent and a trustee. The kōhanga reo was also based in my local community, therefore I was able to work within the kōhanga as I had built up reciprocal relationships of trust. (J. Nager, personal communication, 20 July 2011)

Considerations of toko-ā-wi (institutional support), pūkenga (knowledge and skills) and tikanga (protocols) thus inform the ongoing sustainability and 'capacity building' of Māori research at the Open Polytechnic.

Support for research at the Open Polytechnic

The Open Polytechnic Faculty is composed of three schools: the School of Information and Social Sciences; the School of Business; and the School of Workplace Learning and Development. Each of the schools is supported by a central research committee that administers and oversees research in the Open Polytechnic. The research committee also supports a research incentive scheme, which rewards quality article publications, and a growth fund, which provides seeding money for strategic research projects. All research conducted at the Open Polytechnic that involves human subjects requires approval by the Polytechnic's Research Ethics Committee. Particular account is taken of Treaty of Waitangi considerations, including how the proposed research involves Māori and produces positive outcomes for Māori learners and their communities as part of maintaining accountability to Māori consistent with the Treaty of Waitangi principles of partnership, active protection and active participation. Information about research is coordinated by a research manager.

The Open Polytechnic Research Strategy 2010–2013 (The Open Polytechnic of New Zealand, 2010) recommends that each school develop its own research plan. Staff members are supported through access to research information by an intranet and by governance regulations. Within schools, the school research plans provide foci and objectives, and operationalise the research activities of the schools. An online campus research support Moodle page has also been successfully piloted in the School of Information and Social Sciences. It has resulted in increased research outputs through more availability of information for staff. The system has gained external recognition for its innovative use of a Moodle online campus for research and has also been instrumental in recognition of the quality of research at the organisation for accreditation purposes (a discussion of the implementation of the research Moodle page will be continued in Case study 2).

The research activities of the Open Polytechnic are summarised annually in an Open Polytechnic research report. This identifies areas of focal and topical interest and new research projects, and lists all staff research publications. The areas of staff research are defined according to six main themes:

- discipline research at degree level
- ODL research – pedagogical and technological approaches and innovations
- practice-related research – research linked to vocational, professional and industry practice

- pedagogical research – academic staff research their own teaching practices
- research that contributes to community development and transformation
- research that promotes and advances Māori development.

This chapter utilises two case studies to illustrate the enhancement of the research environment at the Open Polytechnic. The following case study illustrates how staff engagement with research enriches teaching and learning competence, staff teaching practices, curriculum development, learner engagement and student feedback, as well as contributing to scholarly research knowledge and understanding.

Case study 1: Marking as a writing process⁴

Example/problem

Marking practices are an essential part of academic teaching and student learning. Effective marking practices are frequently characterised by operative 'rules of thumb' involving established cognitions and procedures applied by teachers to students' assignments. However, there is a need to understand these marking practices more comprehensively in the ODL environment in terms of responsiveness and feedback and methods, in order to provide practitioners with better guidelines for marking and students with better feedback. In this study, researching marking practices involves an innovative exploration of marking as an extension of writing practice (Keene, 1993; Marsen, 2007; Guffey, 2009).

Reflection on example/problem

In the context of assessment of learning, provision of feedback has attracted considerable research interest, as feedback has long been recognised as one of the most powerful influences on student learning and achievement (Hattie & Timperley, 2007; Gibbs, 2010). More recently, researchers also started looking at what kind of feedback students consider effective and how they are using it (Crisp, 2008; Walker, 2009). However, the process of giving written feedback – that is, how educators go about marking – has not received much attention and further research is certainly called for (Bailey & Garner, 2010).

⁴ Case study 1 was written by Polly Kobeleva, Lecturer in Communication, whose job roles at the Open Polytechnic of New Zealand in 2011 are: Course Leader 72144 *Professional and Technical Writing*; Course Leader 72182 *Writing for the Web*; Convenor of Certificate in Technical Information; researcher.

Theoretical underpinning

An extensive review was conducted to survey recent literature on the provision of written feedback on assignments and assignment marking in tertiary education. This was augmented by an organisation-wide survey on marking practices, as well as focused, qualitative interviews with markers/faculty members.

Action

It stands to reason that marking can be compared with either academic or business writing, since the marker's text can probably be appropriately likened to a brief investigative report, rather than, say, a novel or a poem. The number of stages authors distinguish in the traditional writing process varies from three (Marsen, 2007, pp. 2–17; Guffey, 2009, p. 33; Reep, 2009, pp. 6–17) to four to eight (Keene, 1993, pp. 30–51; Emerson, 2007, pp. 20–24), to up to 20 in some sources (Keller, 2004, p. 161). The precise number is not crucial, as the advice that textbook authors offer and the techniques they recommend to novice writers for each stage tend to be largely similar. It has been repeatedly emphasised in literature that the marker's conception of the purpose of what they do 'has a powerful shaping effect on the nature of their comments' (Ivanic, Clark, & Rimmershaw, 2000, p. 59). Therefore, the casestudy undertook to investigate this purpose and outline the characteristics of good marking practices.

Results/expectation of results

Analysis of the recent literature on the provision of written feedback shows that a number of conditions must be met for the feedback to be effective and realise its full potential to enhance learning. This alone partially explains why (as both students and educators well know) it does not always do so. The way markers go about providing comments is only one of the numerous variables in the complex feedback process, but unlike many others it is one that markers have direct control over. The questionnaire findings illustrate the repertoire of actions and techniques that experienced markers employ, which can be of interest to new markers and staff in charge of marker training.

Considering marking as a special form of the traditional writing process appears to have some merit in terms of providing a framework for describing and reflecting on the marking practice. Mapping the questionnaire findings on to the stages of the traditional writing process highlighted areas of strength, as well as the need to pay further attention to how markers: (a) plan what feedback to give; (b) determine the organisation and placement of feedback; and (c) revise the quality of feedback.

Hattie and Timperley caution on the need to distinguish between the sentiment that feedback is desirable and the question of how effective it is: 'In general, feedback is psychologically reassuring, and people like to obtain feedback about their performance even if it has no impact on their performance' (2007, p. 95).

Future possibilities – general application of case study: Marking as a writing process

A paper that was prepared as a result of the case study provided a critical analysis of marking as a form of feedback provision, offered insight into what academic staff do while marking, and compared marking with the traditional writing process (Kobeleva, 2011). Through qualitative and quantitative research, the paper outlined:

- conditions under which feedback is likely to support learning
- students' and markers' perceptions of written feedback
- characteristics of marker comments, and the effectiveness and usability of various types of comment.

By reflecting on and experimenting with the marking process, and anticipating future directions in marking practice and pedagogy, educators will hopefully be able to provide more feedback that makes a difference to their students' learning.

Research management in the ODL environment

Surprisingly, there has been very little research conducted into research management in the ODL environment. However, the research that has been conducted has revealed that those in management recognise that information and communication technology (ICT) is a pervasive change agent (Helsloot & Jong, 2006).⁵ Like people management, the use of ICT provides the ability to integrate and transfer knowledge in new ways. While ICT may contribute to broader, more flexible systems and new distributions of authority, it can also provide access to uniform information at local and regional levels. The use of ICT also reflects changing organisational dynamics, including research training and information empowerment (the basic exchange of information in the research environment). It can mesh organisational strategy, business strategy and information strategy in one system.

As Murgatroyd and Woudstra state, most research concerning the management of distance education is either 'descriptive, prescriptive and speculative', or narrowly focused on the practice of management (1989, p. 4). Management is divided into continuous processes (which can be anticipated and planned for) and those that are discontinuous (non-anticipated, but requiring a response) (p. 5). The adaptability of the Open Polytechnic's online campus allows for both, through its ability to modularise information. Murgatroyd and Woudstra identify the need to generate understanding while finding paths between networks of people and problem solving. In this respect the online campus research page discussed in Case study 2 provides a platform or hub for knowledge management and communication. It also encourages a sense of community among faculty members.

According to Murgatroyd and Woustra, the keys to effective planning may include: organisational identity; a sense of purpose; core business; and responses to new opportunities (1989, pp. 6–7). A management action plan for research network implementation needs to include: developing and sustaining planned and approved programmes; balancing aspirations with resources; responding to shifts in changing environments; forward thinking; internalising the goals and objectives of the organisation; improving service to staff and students; and improving the quality of the research and teaching experience (p. 5). Structures and systems need to include: creation and enhancement of the organisational culture; path finding; measurement benchmarks; provision of services; environmental constraints; and strategic planning (p. 15). However,

⁵ See, for example, 'Combinatorial research product development for online research infrastructure and instructional use at an independent tertiary provider' by Luke Strongman and Raymond Young (2011).

the use of learning management systems to implement research strategy among school staff is also intended to support the actual research activities themselves, by integrating research information and providing interactive forums for staff to share research knowledge.

The following case study demonstrates the way in which online technologies may significantly enhance the quality of research information available to diverse and geographically dispersed staff within the Open Polytechnic by facilitating and communicating a sense of a research community.

Case study 2: The School of Information and Social Sciences research Moodle page

The Open Polytechnic School of Information and Social Sciences online campus research Moodle system was developed in 2008–2010 to provide staff who are also researchers (at all levels, from emerging to senior) with research information relevant to the school in terms of: research strategy and plans; research planning; research ethics; research regulations; Māori research; research grants; PBRF; journal links; mentoring; discipline-specific resources; conference information; and publishing information. All school staff can access the Moodle system and the online campus research page and receive regular information updates through the news forums. They also have access to the multi-function modules. As one staff member, Natilene Bowker, has commented:

The School's research page effectively provides a home page centralising a vast range of resources for doing research. As a new academic staff member your research needs are catered for in diverse ways: presentations cover developing a research proposal; applying for funding; some basic training in statistical software; and advice on publishing and thesis editing. This 'one-stop shop' for research information also provides a space for understanding the research climate within a New Zealand academic institution (via information about the PBRF and the School's research strategy), and identifying research connections, through a research mentoring programme, conference news and updates, and links to external research networks. While this research page is officially designed for the School of Information and Social Sciences, it could easily lend its research information services to other schools within Faculty. (N. Bowker, personal communication, May 16, 2011)

The system satisfies Murgatroyd and Woudstra's six criteria of management issues in distance education (1989, p. 11). First it provides a solution to the problem of transition management – how operational technology and systems can change without damage to the organisation. It also represents good resource management in that it maximises the value of capital investments and maintains the currency of research information across three centres (Information Science, Education Studies and Social Sciences) and in the regions (Early Childhood Education and Information and Library Studies lecturers based outside of Wellington). The system minimises risk management by using available technology in an innovative way. It provides further familiarity for staff with operational systems and effective research information for people management, and also enhances staff adaptability to change and dynamic information flows. Aside from the learning management system platform there are very few investment costs, except labour, and electronic and maintenance overheads. Finally, it is eminently compatible with environmental scanning and keeps staff and managers abreast of research developments.

The online campus system provides research information and supports activities, prioritisation of tasks, goal setting and targets. As Heaton-Shrestha, May and Burke suggest, it: 'enhance[s] . . . effectiveness in a variety of ways: by making materials, notes, hints, tips and websites easily accessible; by maintaining an awareness of "what's going on"; and by allowing better organisation and tracking of their own learning' (2009, p. 87). It is also an effective management system for the implementation of research strategy and operational considerations. It provides a locus for the coordination of balancing resources with priorities, and supports research through: enabling, facilitating and nurturing research activity and networking across three school centres. Other advantages include: low compliance costs; minimal misuse of data in employment relationships; high level of support for emerging researchers; as the system is an intranet, there is no extraneous 'noise' from competition; it facilitates management of change and supports academic freedom, but is not used as an evaluation tool; and finally it may enhance social integration. As one academic staff member has commented:

Researchers in academic institutions tend to work either in isolation or with a few colleagues. A disadvantage of this approach is that it limits sharing of the wealth of research knowledge and experience, and restricts cross-discipline collaboration. Online research information platforms have the potential to address these limitations and encourage a collaborative research culture. Academics are able to discuss areas of common interest and research questions with cross-discipline applications. It also provides a platform where senior academics can mentor emerging researchers. Centralised platforms also consolidate information that is useful for all researchers – for example, grant opportunities, conference information and institutional policies. (H. Peters, personal communication, May 27, 2011)

Mentoring, the practice whereby a more experienced researcher takes an interest in the research development of a less experienced colleague, may take place both formally and informally within Faculty. A formal scheme has been established in the School of Information and Social Sciences that recognises the mentoring relationships in the school. Experience has shown that it is possible to mentor and supervise research students effectively and with positive outcomes through learning management systems such as Moodle.

Under Morrison's (1993) formulation, the online campus research platform provides pathways that offer continuity and depth, a 'focused academic resource base', links to a community of scholars, and personalised support. It also satisfies Law's criteria of flexible learning opportunities expanding provision into niche areas and overcoming geographical constraints (1997, p. 16). As Daniel (cited in Law, 1997, p. 18) argues, 'open learning is a goal or an ideal; distance education is neutral, it can be open or closed, flexible or inflexible'. Despite the need for many facets of education, including research, to be focused on knowledge transfer and fact assimilation (Fox, 1983, p. 15),

the common approach internationally is the autonomous, synchronous model internal to organisations, and in this respect the online campus research page parallels faculty study programmes, timetables, teaching and communication (Law, 1997, p. 18). However, while 'individualised' focus may predominate on a local scale, it is not unusual for two strategies to be utilised in an overlapping manner – the online campus system demonstrates both control and an ability to be used autonomously (Holmberg, 1985, pp. 8–10). This enables staff to be more purposeful and focused in their research activities. Used in tandem with the school plan it provides a tool for research management across the school. However, it also serves to provide research information for Education Studies and Information and Library Studies staff members who are based in the regions. It provides 'a valuable space to disseminate research information, share research projects and promote research dialogue amongst faculty. This is particularly important for faculty based throughout the country' (A. Maxwell, personal communication, August 3, 2011). Thus the system has the capacity to transcend geography and time to deliver a unified research 'presence' across the School of Information and Social Sciences.

The system has consolidated the management of research as a knowledge-intensive service that puts research and development in adjacency with teaching, while transferring and making available knowledge resources in an innovative system (Marttila, Lytinen, & Kautonen, 2008, p. 418). It provides a linkage between general and technical information and the local requirements of end-users (p. 419). According to Bushway, there are three main facets to research: basic and applied 'research and development' that advances knowledge and policy support for monitoring significant developments; technology support for applied research and development that underpins the economy; and research that supports degree teaching. This includes strategic and applied research and transfer activities that encourage the exploitation of knowledge across multiple geolocations, involving cooperation and collaboration in synchronous and asynchronous time (2007, p. 7).

The effectiveness of the implementation of this Moodle online campus research intranet in the School of Information and Social Sciences at the Open Polytechnic was evidenced by a direct 25 per cent increase in research outputs produced by the school between 2008 and 2010 (an average of 10 per cent increase across six subjects). This supports Lei's claim that: 'How, and what, technology is used – is a more significant factor (in educational outcomes) than the quantity of technology use' (2010, p. 455).

Future issues

In the competitive research environment of today the Open Polytechnic will need to manage its resources (time, financial, and human capital) carefully in order to fulfil its potential as a research-focused organisation specialising in curriculum design and degree teaching by ODL. It will also need to predict or anticipate future developments and prioritise its research initiatives accordingly. As with economic growth, there are two main factors that drive research growth. These are working 'harder' and working 'smarter' (Little, 2011, p. 8). Thus the organisation has developed a strategic model for assessing research capabilities, providing the framework to take research forward.

The principles identified in the strategy reflect many different areas of priority to:

- support researchers
- develop the necessary research support infrastructure
- reflect and enhance cultural diversity
- meet the standards of tertiary scholarship and research
- keep up to date with curriculum and subject specialisations
- develop leading research in ODL
- support a diverse student body in its learning
- maintain the commitment of our stakeholders
- develop new research relationships, collaborations and synergies.

Research processes and outcomes need to benefit students and support the Open Polytechnic's student-centered approach to teaching and learning. Future research themes, collaborations and directions will inevitably reflect this focus. Potential areas of focus for future research include: new educational technologies; social media; advances in learning design; new learning concepts; research to provide greater insight into factors that influence and strategies that enhance student success; and blended learning. Non-academic factors are also likely to become increasingly important as the Open Polytechnic responds to changing student demographics and looks to provide clearer pathways for students to make the transition from secondary to tertiary study. Moreover,

our understanding of lifelong learning is likely to be fundamentally challenged as research into the changing nature of work, society and politics delivers new insights and perspectives on vocational education and training.

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Introducing Augmented Reality Imaging into Paper-based Learning Materials for Engineering Trade Students

Gary Mersham and Sandra Maathuis-Smith

Introducing augmented reality imaging into paper-based learning materials for engineering trade students

Abstract

How can we better represent course content (for example, engineering components) that does not translate well into a paper-based medium? And how can we deliver this content without reliance on networks or online technologies?

We propose that one solution to these questions is the use of augmented reality (AR). This chapter describes our journey of discovery as we investigate the possibilities of using AR technology to render 3D objects in paper-based course materials. This is not a technical document of the inner workings of AR technology but a description of the processes required to implement AR technology within Open Polytechnic courses.

The project was conducted by an Open Polytechnic cross-discipline team, with participation from other work areas across the Open Polytechnic.

Introduction

This chapter describes a project that tested whether three-dimensional (3-D) images could be delivered through the paper-based medium of an Open Polytechnic course instruction manual.

Augmented reality (AR) is a technology which results in a blending of the real world with virtual objects. Unlike virtual reality, where the user is immersed inside a virtual world and explores a simulated reality, AR lets the user see the real world and real objects and superimposes virtual objects or data over the top. To the user it seems that the virtual and real objects coexist.

Figure 1 shows a computer screenshot of a ball bearing (virtual object) superimposed over a page containing a two-dimensional (2-D) image of the ball bearing (a real object).



Fig. 1 Computer screenshot of a virtual ball bearing superimposed over a real 2-D image

Background

The project began after casual discussion between colleagues about developing a project that would be cross institutional in nature, and might contribute to the quality of our teaching materials. Sandra Maathuis-Smith, academic staff member, School of Information and Social Sciences; Gary Mersham, academic staff member, School of Information and Social Sciences; Martin Glaeser, academic staff member, Applied Technology Centre, School of Workplace Learning and Development; and Cheryl Brown, instructional designer in what was then the e-Learning department, formed a team to devise a suitable project.

According to the Open Polytechnic Investment Plan for 2008–2010:

The Polytechnic focuses on the delivery of open and distance learning mainly through printed learning resources with freephone/email and increasing e-support, supplemented where appropriate with audio/visual media and contact support. (The Open Polytechnic of New Zealand, 2007:5)

... few Open Polytechnic learners say they would choose online-only delivery if it was available. Over 90% continue to express clear preferences for either print-based distance learning (supported by freephone and email access to lecturer, library and other support services) or 'mixed mode' distance learning (the print-based service plus e-support services). (The Open Polytechnic of New Zealand, 2007:9)

These two statements suggest that our students prefer paper-based materials with communication and support via electronic means.

International evidence shows that within the open and distance learning (ODL) academic community, there is an emerging consensus that learner need and preference, not technology, should drive pedagogy and delivery. ODL will not be either print-based or 'online' but will use appropriate mixes of available media designed to meet different learner needs (The Open Polytechnic of New Zealand, 2007:9).

Many of our courses contain content which does not translate well into a paper-based medium – for example, plumbing valves, electrical components, chemicals, and so on. How can this content be delivered to the students via the print medium without reliance on networks or online technologies? Augmented reality is proposed as a solution.

One of the biggest problems facing distance education providers that offer engineering courses is the lack of contact learners have with physical artefacts such as tools and components, and the lack of experience they have of physical engineering processes. Our first premise was that the identification, assembly and disassembly of components in an engineering system can be better explained and demonstrated when the learner has access to a 3-D representation of the individual components and their positions in space. The adage goes that 'A picture is worth a thousand words'. A 3-D image would exponentially increase that to many thousands.

This paper describes our journey of discovery as we investigate the possibilities of using AR technology to render 3-D objects in paper-based course materials.

The project was supported by Todd Cochrane, a Weltec academic staff member who researches and teaches in this area, and Mark Billingham and Julian Looser from HITLab NZ, a human interface technology lab. Staff within the Information Services department and the e-Learning team at the Open Polytechnic also provided advice. Ian Rowe from Ako Aotearoa's Central Hub provided financial support.

We established that the project would be based on five principles:

1. Paper-based enhancement: The project would not require the internet to deliver the content but would use computing technologies to enhance the imaging affordances of a paper-based medium.
2. Sharing of results: All results would be shared with all interested parties.
3. Partnership: The project was a partnership between four sectors of the Open Polytechnic.
4. Communication: Communication would be open at all times and all ideas or issues that any team member brought to the table would be considered.
5. Openness: All documentation would be made available for team members on a Moodle course page.

This working paper outlines the project and describes the processes required and the issues faced by the project team. This is not a detailed technical piece on the workings of the software used or the intricate processing within the computing equipment. The process is described in a 'how-to' document, so that the effect can be duplicated across courses and disciplines.

The project team hopes that the use of augmented reality technology would provide a way to 'test the waters' for future research and development in the area of augmented course materials.

Development and implementation

The project was implemented in the Engineering Unit Standard course US19873 *Demonstrate Knowledge of Bearings Used in Machines and Equipment*, an 8-credit Level 3 course offered at the Open Polytechnic.

We set out our initial aims in providing augmented reality enhanced course materials as follows:

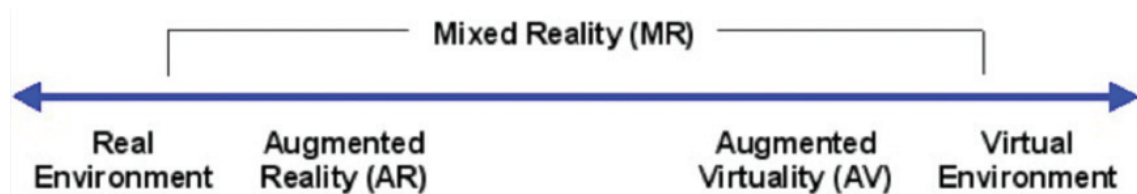
- the ability to manipulate 3-D images
- being able to view the images in context with the text
- being able to view the images in perspective
- having an immediate ability to view the images as they are embedded into the printed medium
- not needing to learn to use software
- making the user more active rather than passive
- not needing to be connected to the internet.

What is augmented reality?

Augmented reality (AR) is sometimes referred to as mixed reality. It is a blending of the real world and virtual objects. Unlike virtual reality, where the user is immersed inside a virtual world and explores a simulated reality, AR lets the user see the real world and real objects and superimposes virtual objects or data over the top. To the user it seems that the virtual and real objects coexist.

AR technology is a part of the emerging field of tangible interfaces. These in turn are part of a wider body of technologies called 'ubiquitous computing' – computing technology that is so embedded in the world that it 'disappears'.

Milgram (1994), (In Billinghurst, 2001) points out that computer interfaces can be placed on a continuum according to how much of the user's world is generated by the computer.



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Moving from left to right, the amount of virtual imagery increases and the connection with reality weakens.

Through the use of AR technology the printed page can become a means to stop students being static, passive consumers and make them active observers of dynamic content or participants in the animated interactive virtual environments.



Static, passive consumer



Passive observer of dynamic content



Active participant or observer in the animated interactive virtual environments

Copyright © IEEE.

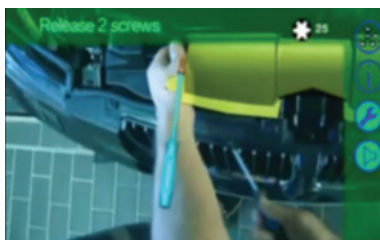
This means that textbooks and printed course materials no longer need to be static sources of information (Billinghurst, Kato, & Poupyrev, 2001).

In the past some of the issues of AR have been in the cumbersome hardware and restrictive and costly viewing devices such as head mounted goggles and helmets. This has been largely overcome with the use of handheld devices and the magic mirror technique, which was utilised for this project.

AR is gaining in popularity and is increasingly used, particularly in the following areas:

- **Movies** – many have AR supported websites, for example:
 - Transformers: www.weareautobots.com/nz/index.php
 - Star Trek: www.youtube.com/watch?v=v9Zl1e5pAHA
- **Advertising and promotion** – for example, Earth hour: www.youtube.com/watch?v=8Ztnfpl0MPc
- Music videos – for example, the Lost Valentinos music video: www.youtube.com/watch?v=T4Nuje_YCoM
- **Packaging** – for example, Doritos: www.youtube.com/watch?v=tJ_4tYUIQ8Y
- **Online catalogues and magazines** – for example:
 - Mini: <http://www.mini.de/de/de/webcam/index.jsp>
 - Esquires: <http://www.engadget.com/2009/11/10/esquires-augmented-reality-issue-goes-on-sale-and-we-have-video/>

Shelton (2003) suggests that because AR is used in entertainment and games some question its pedagogical value, but argues its merit lies in its ability to allow for viewing things in a natural environment that otherwise would be impossible to show, such as labels on parts of an engine or forces on the poles of a magnet.



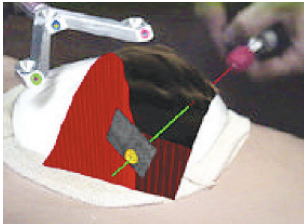
Copyright © Gizmodo.

BMW has been using AR to train the mechanics and technicians in their workshops. Instructions, tools and location are all conveyed to the mechanic looking through head mounted glasses into the engine bay. Audio commands are played through an earpiece and the text is displayed next to the relevant components.



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In the military AR has been used for simulations and warfare training (Howard, 2007). An AR training system which can be used to train soldiers in how to effectively operate new tools, repair machinery or navigate away from danger. AR simulations can allow soldiers to experience unusual or dangerous conditions in a controlled environment. In the field, soldiers can be shown annotations of enemy movements, geographical layouts, escape routes and so on.



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In the medical domain, AR has been used to combine medical imagery, scans and equipment readouts with the physician's view of a patient. AR has been utilized in medical applications for over a decade, using see-through head-mounted devices to view imagery on real patients.

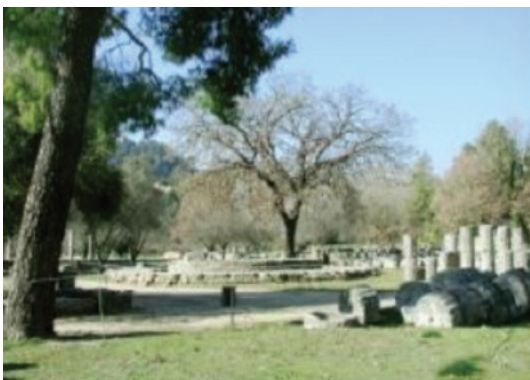
Ultrasound imaging has been used to render real time data and images over a patient's body. For example, an image of a foetus can be overlaid on the mother's abdomen and as the mother, user or foetus moves, the image showing the position of the foetus moves too.



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AR in architecture increases visualisation of new developments, and assists in collaborative urban planning (UCL Bartlett School of Graduate Studies, 2006).

In archaeology AR has been used to 'reconstruct' ruins (Vassilios, Karigiannis, & Ioannidis, 2003).



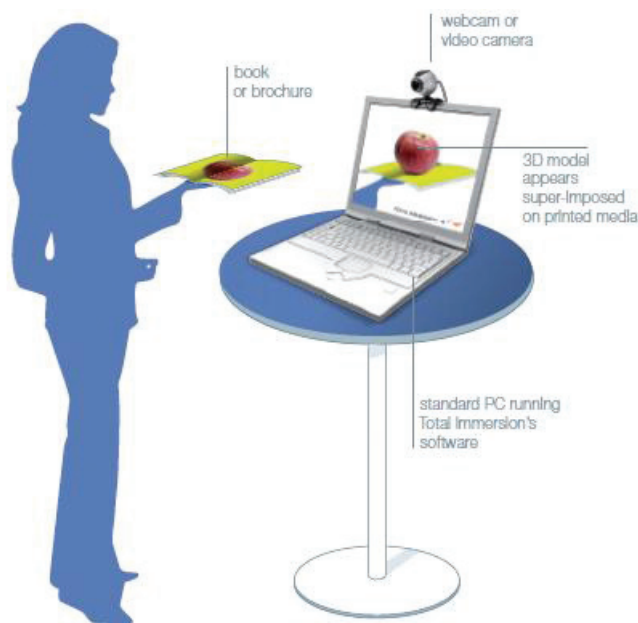
An AR reconstruction example: The Philippion Temple at Ancient Olympia

Copyright © Cultivate Interactive.

The visualisation technique in each of the above examples is 'see-through head-mounted displays'. These can be cumbersome, restrictive and expensive. For application in the distance education realm these headsets are not feasible so we opted for the 'magic mirror' visualisation technique. This technique utilises inexpensive, and in most cases, very common computer equipment and a webcam, to allow students' to visualise the 3-D content.

Magic mirror technique

The person holds the marker in view of the webcam, the video stream is captured and sent to the computer for processing, and the video feed is then sent to the screen showing the real and digital content.



Copyright © Total Immersion.

Augmented reality (AR) has the potential to engage and motivate learners to explore material from a variety of differing perspectives, and has been shown to be particularly useful for teaching subject matter that students could not possibly experience first hand in the real world. (Kerawalla, Luckin, Seljeflot, & Woolard, 2006, p. 163)

It was this statement and the prospect of enhancing the students' experience, coupled with the fact that a large amount of the Open Polytechnic's courses are in print that prompted the initiation of this project.

Methodology

The project entailed developing a process to embed AR targets into printed course materials. The materials developed were trialled with a group of users to see whether or not having access to the images helped them engage with the material. It was felt that engineering students might benefit from being able to manipulate components depicted in three dimensions. After discussions with the engineering school centre manager, the bearings unit 19873 was selected because there were 3-D graphics readily available to use for the development of 3-D objects. The student profile also seemed to capture the characteristics of a subject group who might, in the future, benefit from the AR experience.

Learners enrolled in the trade engineering courses are usually contracted apprentices with the engineering industry trade organisation. They are mostly male and aged between 18 and 25, although there are some older apprentices (up to 50 years of age). Most have minimal school qualifications. Most have NCEA Level 2 or below, with the majority being at Level 1 or below. Many fit the description of a 'kinaesthetic learner'.

The project used a system approach based on the ADDIE model, a 'five-phase instructional design model consisting of Analysis, Design, Development, Implementation, and Evaluation, in which each step has an outcome that feeds into the next step in the sequence.' (Learning Theories Knowledgebase, 2009, November).

This is how the ADDIE model was applied for this project.

Analyse	The analysis involved in-depth discussions with the course tutor regarding the learners' needs, the difficulties they were encountering and ways we believed the project could help solve those needs in the future. We had agreed that we would try to embed the AR targets into the material, so we needed to decide on the images, and agree on the best process to use the software that was available.
Design	Once the process was decided, images were chosen and sourced, a way of embedding the images discussed, and terminology agreed.
Develop and implement	The targets were developed and embedded into the materials, and users tested the software and applications. As a result, some changes were made to the instructions for users. Pre-release user testing was carried out.
Evaluate	A survey instrument was devised and feedback from users was collated, the project process evaluated, and recommendations made.

(Brown, Glaser, Maathuis-Smith, & Mersham, 2010, p. 8)

During the development phase a close relationship was established with HitLab, the company which developed BuildAR, the Augmented Reality software used for creating AR scenes in this project. The team appreciated the help given to them by developers – this involved advice on using the software and creation of an executable file and a viewer to enable users to easily run it on their computers.

At the time of the project, the BuildAR software was available free of charge. According to Mark Billingham of HITLab NZ and ARtoolworks the free version of BuildAR will remain available, but the intention is to bring to market a low-cost professional version with more functionality. The BuildAR software is available for download from the HITLab NZ website at: www.hitlabnz.org/wiki/BuildAR

We identified a need for a viewer of AR content, instead of access to the whole development suite. After consultation with HITLab NZ, they developed a viewer – this software allows viewing of the AR content already created. The viewer will be included in the new version of the BuildAR software. The reason we used these tools for the AR development was primarily that the software was free, and that support and development was New Zealand based.

Process and discussion

The project team aimed to insert up to 20 AR targets for roller bearings into the printed course material and to supply software that would enable the learners to view the rendered images on their computer screens. While roller bearings are common artefacts, there are variations that are not commonly used and learners might not see all of them in workshops.

A range of bearings described in the existing learning material was identified from the SKF (a large roller bearing manufacturer) website at:

www.skf.com/portal/skf/home/products?newlink=first

Appropriate images were readily available in a variety of 3-D formats copyright-free, thus reducing the time needed to source suitable images.

It was expected that once this concept had been proved and a process developed, it could be used to render other, rarer, artefacts.



Fig. 2 An image of a roller bearing, viewed on a computer screen via a webcam focused on the augmented reality target

An AutoCAD (industry-standard design software used in engineering and architecture) design file for each bearing was downloaded. AutoCAD was then used to open each file and export the 3-D CAD model in a file format that could be further converted into an ASCII format object file (.obj). This .obj format was then converted into an OpenSceneGraphic (.osg) format compatible with HITLab NZ's AR software.

The .obj format files were very large and although they did open and run in the BuildAR software, they were very slow to load. The .obj files were optimised by converting them to binary format object file (.ive) or .osg formats using a conversion tool (osgconv) supplied by HITLab NZ.

The files were then exported to BuildAR software. A folder containing the set of images was created. The AR software and graphics files were then burnt onto DVD for pre-release evaluation and user trials.

BuildAR software was also used to generate an image that was used as the target, which triggered the software from the printed page. The team decided to use a target in the form of words and a heavy black border so that the webcam could easily distinguish between the target and the other artefacts on the page, such as figures and images.

We purchased basic Microsoft VX-500 webcams for users in the trials and incorporated the pages with the embedded targets into the course material. We also developed instructions for loading the webcam and running the viewing software.

User testing

Once the materials were developed they were user tested. The participants for the user testing group were selected from staff at the Open Polytechnic and consisted of five participants across a range of computer skills and job descriptions. Lecturers, from a variety of disciplines and a Moodle technician were approached and asked to volunteer their time. According to Neilson (2000) the best results for pre-release user testing of this kind are obtained when there are five or fewer users.

Using an observation technique, the user group were observed in a controlled environment where they were given a workstation, the software, a web camera and the instructions. Each participant was also allocated an observer from the project team. The observer had a list of criteria to check as the user attempted to install and run the camera and AR software (Appendix 4).

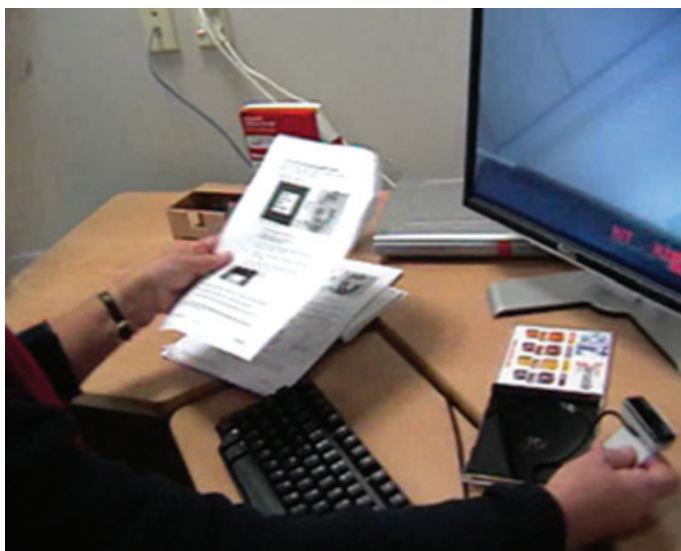


Fig. 3 One of the users loading the webcam

Each user was provided with a set of instructions, a set of course materials with integrated graphics, a Microsoft VX-500 webcam and a DVD with the AR viewing software.

The users were situated in the Open Polytechnic's multimedia lab. Two used Dell laptops with separate Hewlett Packard monitors, while the other (the highly confident user) viewed the material using only the Dell laptop. All computers were loaded with Windows XP.

Over a 1-hour period the users were asked to load the camera, following the instructions, then insert the DVD with the AR viewing software and run it. Once that was done they were asked to focus the camera on the AR targets embedded in the loose-leaved printed materials. They were not given all of the course materials.

Three project team members observed the users, focusing on the ease with which users were able to understand the instructions, load the camera, identify the AR targets and load the DVD.

The observers were instructed to interact with the users as little as possible. Towards the end of the hour the users were free to discuss the session with the observers, and they completed a survey which provided an opportunity for them to describe their experiences (see Appendix 4).

The staff members who collaborated on the project believed that kinaesthetic users (those who learn by doing, moving and manipulating) would benefit from being able to view and manipulate virtual 3-D images using a webcam and a computer.

Conclusion

The feedback provided said that the files opened easily, but one user had some difficulties with positioning the webcam in relation to the targets in the coursework and thus generating the 3-D images. The process of adding easily-accessible 3-D graphics to augment the paper-based learning packages used for teaching trade engineering theory has potential.

We anticipate that since the process is workable, learners in real estate courses (about 200 per year) and other trades courses (1,000 per year) could benefit from using AR images in their course material at the Open Polytechnic. The process is transferable – which means that learners in other polytechnics and training institutes would benefit.

While there appears to be great potential, relatively little is known about the capability of this technology to support teaching and learning, especially in the distance learning environment.

Recommendations

The project demonstrates the insertion of AR objects into Open Polytechnic print coursework is feasible. Further research will be needed to assess whether the use of the technology has a positive impact on student learning.

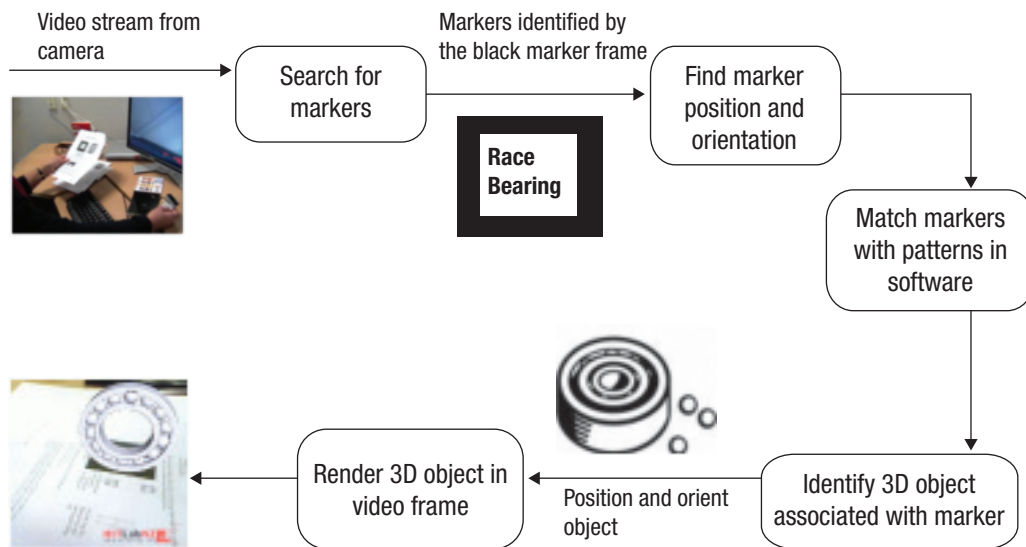
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Vassilios, V., Karigiannis, J., & Ioannidis, N. (2003). Augmented reality touring of archaeological sites with the ARCHEOGUIDE system. *Cultivate Interactive*, 9. Retrieved from <http://www.cultivate-int.org/issue9/archeoguide/>

Appendix 1: Overview of how the AR system works



1. The camera captures video of the real world and sends it to the computer. Software on the computer searches through each video frame for any square shapes.
2. If a square is found, the software uses some mathematics to calculate the position of the camera relative to the square.
3. Software on the computer searches through the patterns for a match.
4. Once a match is found the corresponding computer graphics model is drawn from that same position.
5. This model is drawn on top of the video of the real world and sent back to the display.
6. When the user looks through the display they see an image overlaid on the real world.

The computer is able to do this calculation fast enough that the square marker can be moved and the computer graphics will move with it. The only requirement is that the camera has to be able to 'see' the whole square marker in order for the tracking to work. (HITLabNZ, 2009)

The three main components are therefore: patterns, markers and 3-D objects.

BuildAR software has an inbuilt function for the creation of patterns and markers. After many iterations and trials with file formats and image complexities (symbols, black and white pictures, colour pictures) we settled on using words. The words served two purposes: firstly they told the user what they could expect (for example, 'Race Bearing'); and secondly they were simple for the camera to pick up, but different enough for the software to differentiate between targets. The file format accepted by the software was a bitmap (.bmp) format. The .bmp file is loaded into the 'generate markers' function, the heavy black frame is automatically added and a matching pattern file is saved by the software. These pattern files can be exported as an image file and printed or saved for inserting into documents; in this case they were inserted into course materials. At this stage we had the marker (printed or embedded target image with the thick black frame) and the matching patterns (internal to the software).

The 3-D content was a more problematic. Initially BuildAR would only accept object (.obj) file format; unfortunately these are huge and take a long time to load in the software. HitLabNZ came to the rescue with a convertor program that was written for us to convert the .obj files into a much more compressed .ive or native Scalable Vector Graphic (.svg) formats. These files were much smaller and loaded very quickly.

The 3-D objects that we obtained from SKF's website were opened in a computer-aided design software and resaved as .obj file type. During this process some detail was lost and the images did not render true to reality. This issue was something we had to live with as it was the concept of seeing the 3-D objects that we were interested in rather than the quality of the images.

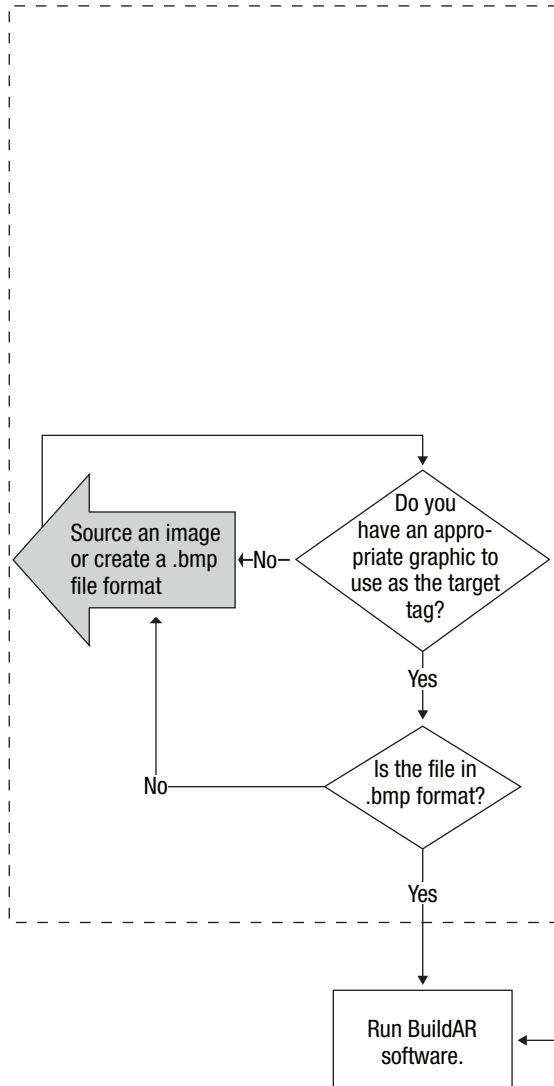
Viewing: The secret is in the squares

As described earlier, the marker has a heavy black frame around it. This frame serves as a delineation for the computer to recognise markers or tags. It also tells the computer what content to read, that is, the image inside the black frame.

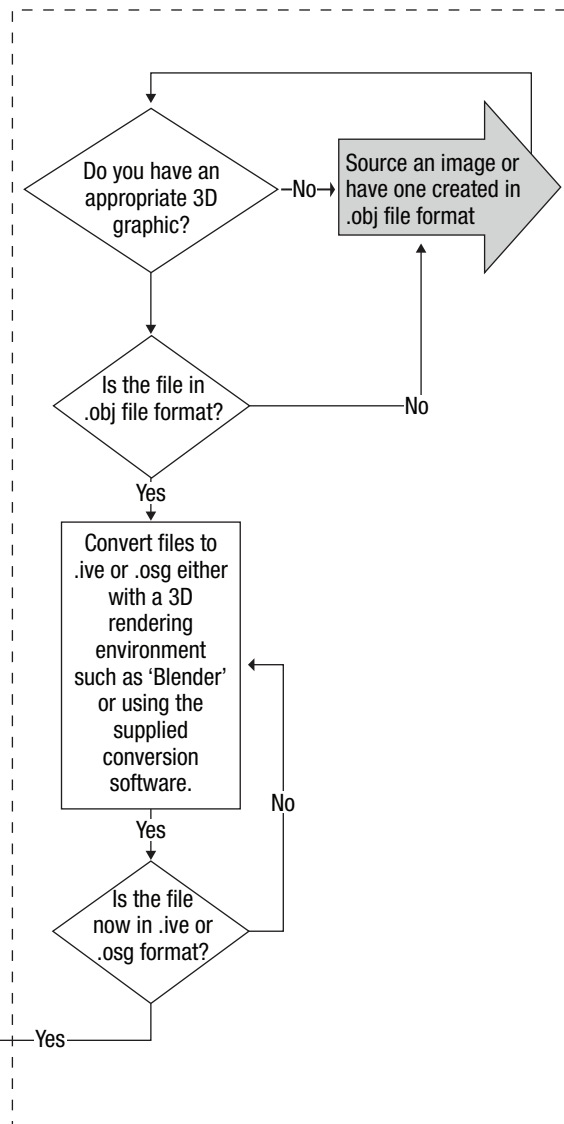
There is a lot of development with colour images and even markerless AR but for this project we kept it simple. By using a plain black and white image we could use a very basic and inexpensive webcam to read the markers.

Appendix 2: Development of a scene for AR application

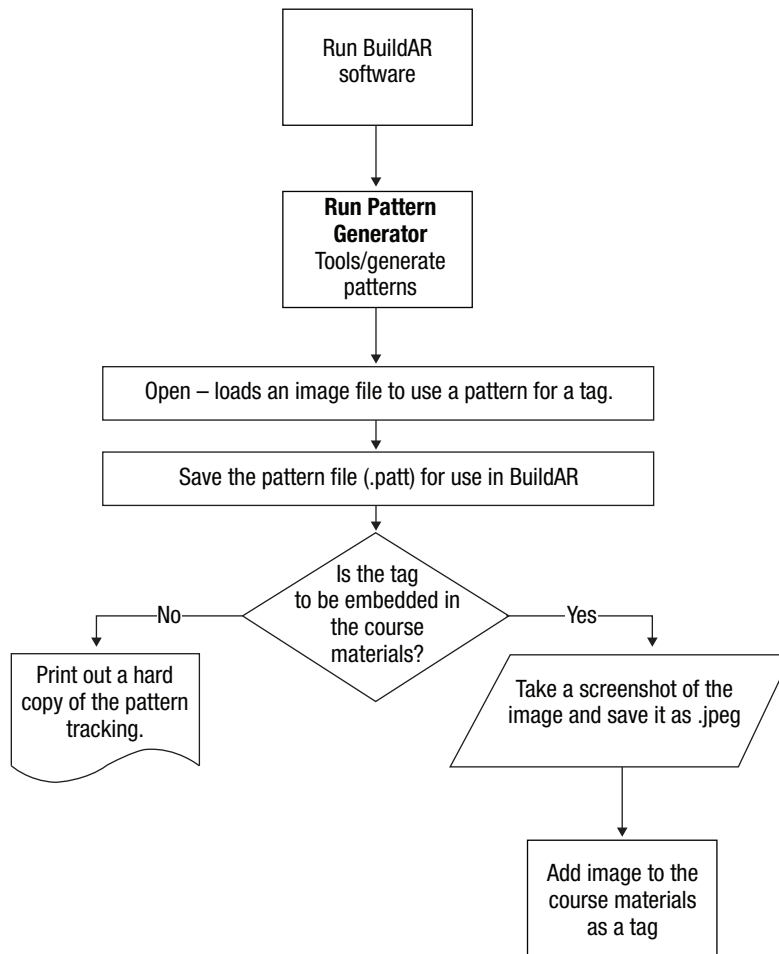
Tag and Pattern Generation process



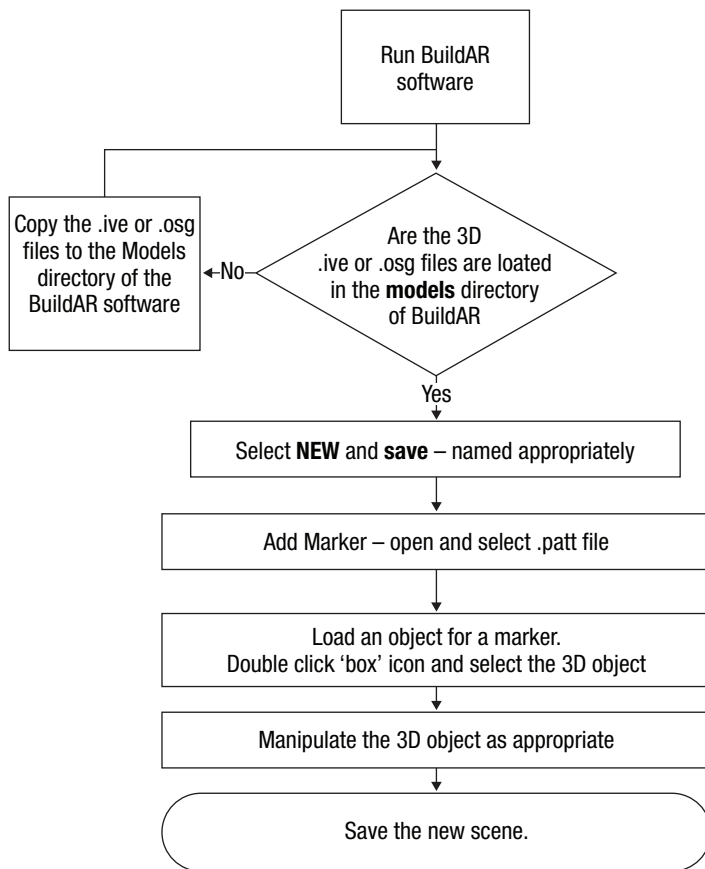
3D Graphic process



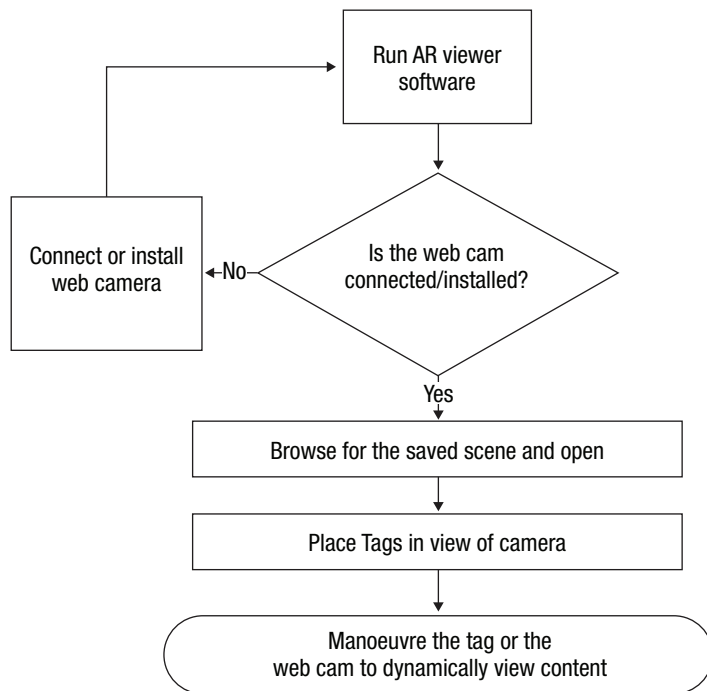
Tag and pattern generation process continued



Creating the scene for AR application



Viewing the scene



Appendix 3: Definitions used in this project

Augmented reality (AR) (also known as mixed reality): This is a blending of the real and virtual worlds. Where a live video stream is captured via a web camera attached to a computing device and is superimposed with digital content.

BuildAR: Software that enables the user to create augmented reality scenes on a desktop. It is produced by HITLab NZ. The basic version can be downloaded free. We chose to use this software because it is intuitive to use, it is free, and we were able to get valuable support and advice from HITLab NZ staff.

BuildAR viewer: Julian Looser of HITLab NZ (julian.looser@HITLabnz.org) created an application that would enable the user to view the AR content from the DVD or CD-Rom without having to install any files on their system. It also enabled the user to go straight to the part of the application that 'read' the targets, without having to work through the entire program.

CAD software: Computer-aided design software that enables the design of real or virtual objects.

For this project we used AutoCAD because it was already in use in the Open Polytechnic. AutoCAD is produced by Autodesk (<http://south-apac.autodesk.com>).

File formats: The main formats referred to include:

- .ive:** File format that contains data that describes dimensions, variables, attributes and data. Can be multiple or single files.
- .obj:** A simple data format that represents 3-D geometry.
- .osg:** OpenSceneGraph. An open-source file format used for visual simulation, virtual reality and similar applications such as games.

Images: We have used this term generically – to apply to all visual material such as graphics, figures, and targets; and specifically – to apply to the pictures of roller bearings and artefacts on the printed course materials, and the 3-D images seen on the computer screen.

Magic mirror: The 'magic mirror' visualisation technique is when a display device (in this case a computer screen) acts as a 'mirror' displaying the 'live feed' from an attached webcam together with virtual objects.

osgconv: This is a command line utility that converts 3-D models between different formats. It converts models into the native format used by open scene graph, the software library on which BuildAR is written. Files loaded into the .osg format will load faster than they would in their original formats. Files end with the extension .osg (for text-based type) or .ive (for binary type). The binary format takes less time and space and loads faster. Because it only holds textures, a single file only is required. For .osg files the textures are stored as separate files, but with the models.

The project team found that the use of either file format was acceptable and made no difference to the user.

Pattern: The corresponding image stored in the BuildAR software to match the printed target in the course materials.

Targets/tag/markers: For the purposes of this project we used this term to mean the images embedded in the print material that can be 'read' by a camera-like device (in this case a webcam). The target triggers the software to open a previously associated 3-D file and is used by the software as a reference point.

Trigger: To activate the response from the camera-like device and the software that 'reads' the code.

Appendix 4: Pre-release user testing observation sheet

You will be observing **one person** as they use the augmented reality material.

Please:

- observe how they use the material and note what was easily completed and what caused difficulties
- record your notes and be ready to discuss any observations you have made with the team.

Observer (name) _____ Date _____

Action	Observation
Reads the introduction/ instructions	
Loads the CD-Rom	
Directs the webcam to the correct graphic	
Image appears on screen	
User manipulates the image on the screen	
User moves to another image	
User closes software etc	

Ease of use	
How many times did users ask you for help? Where, when, why, how?	
Did the user get lost in the material? <i>'What am I meant to do now?'</i> <i>Note: This could mean either 'Where am I meant to go?' (navigational); or 'What task should I try to perform next?' (educational)</i>	
<i>Bug reports</i>	
<i>Additional comments</i>	

Case study: Developing an automatic grader of advanced Office skills

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Problem

Growing student numbers and reduced student-to-lecturer ratios have led many academic disciplines in tertiary education to consider alternative forms of assessment, namely automatic assessment systems. Work on further development of these systems was also triggered by a shift in the role of lecturers in the new learning paradigm – they became facilitators, creating the learning environment, providing guidelines, commenting on students' work, giving feedback and so on. Finally, advancements in technology have also helped to enable automatic assessment development, as well as generally improving the student learning experience, through, for example, learning management systems such as Moodle.

Reflection on problem

The Open Polytechnic is using the Moodle learning management system integrated with the student database, enabling electronic submissions for essay-like assignments (both as attachments and as questions in quizzes), online marking and, in case of Moodle quizzes, storing marks directly, without human intervention in the student record. Use of this link from Moodle to the student database was additional motivation for us to design and develop online assignments that could be automatically marked.

Theoretical underpinning (if any)

Application and analysis levels in Bloom's Taxonomy.

Action

71150 *Information Systems* course is an introductory Level 5 course for the Information Systems and Technology major. Students are required to have hands-on experience of Microsoft Office programs – that is, to have built spreadsheet and database applications. They also need to create a presentation and write reports to a client. Practical tasks in both assignments (Excel and Access applications) are developed around a case study that describes a small, local, New Zealand-based business.

We designed these practical tasks to cover higher-ranked objectives of Bloom's Taxonomy (for example, 'application' and 'analysis'). Therefore, besides building spreadsheet and database applications, students were asked to use these applications to answer a few questions relating to different scenarios relevant to the business in the case study.

All automatic grading systems built to assess Office skills (spreadsheet and database skills in particular) require students to submit the actual application (Hill, 2003, 2004; Waldman & Ulema, 2008). To further reduce the amount of time required to handle students' assignments, we decided to design an assignment that would ensure that the Office software was used, as well as its particular feature, but without asking students to submit the actual application. That was at the same time the most challenging part of the conversion process. Since the summary pivot table in our case study is small in size, students might try to find solutions manually. As we are not asking students to submit the actual application assignment, tasks had to be designed in such a way as to prevent students from finding the solution manually.

We were using user-defined functions and Excel objects to check whether the attributes in a student workbook are according to the requirements or whether a particular function/feature had been used (for details see Kovacic & Green, 2010). Since we are not asking students to submit the actual application, they have to collect information from their workbook about any discrepancies between tasks requirements and their solutions. When the attributes of their workbook are checked, the outcome is stored in a separate Answers worksheet. The results of the checking procedure are 'scrambled' using the

Excel random function. This function generates a random number from one of the subset of numbers ('correct' and 'incorrect' set of numbers), depending on whether the answer is correct or not, or whether the attribute is according to our requirements or not. Students are asked to enter these numbers from the Answers worksheet into the online quiz. The online quiz will then recognise if the number belongs to the 'correct' or 'incorrect' set of numbers and will allocate marks accordingly.

Results

The conversion of assignments into the Moodle quiz format was undertaken with expectations that it would be beneficial for both students and lecturers. The major expectation was that introduction of an automatic grading system would significantly decrease turnaround time for assessments' while at the same time reducing the lecturers' workloads.

We found the following advantages of our automated grader system for students and staff.

For students:

- Instant feedback on formative real-time assessment quizzes aids learning and motivation.
- Instant feedback on summative real-time assessment quizzes provides instant feedback on their success
- Real-time assessment quizzes provide structure for less organised, less clear thinking students.

For staff:

- Although the initial set-up involves a substantial amount of thought and effort, the results provide great ongoing workload benefits from then on, enabling staff to concentrate on providing ad-hoc feedback to student questions not already covered by the other course resources. This is therefore also a student benefit.
- As staff workload is reduced, staff members are able to do research that underpins the degree course and thus remain current. This is therefore also a student benefit.
- Moodle quizzes enable lecturers to receive statistics on the validity of their questions.

Most of students loved the fact that they are getting immediate feedback and the marks they have scored. A few students disliked the fact that the automatic grading system required extreme attention to such details as spelling and spacing in their input.

Future possibilities – general application

Although design and development of an assessment were done for the practical software skills, this application of computer-based assessment integrated with the Moodle learning platform can be transferred to other subject areas, with the aim of assessing higher-level skills in Bloom's Taxonomy.

In future work we need to address issues of plagiarism and authentication of candidates, just like in any other form of assessment in distance education.

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Case Study: Second Life Education New Zealand Project

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Example/problem

Distance education can be an isolating experience for some students. The Second Life multi-user virtual environment (MUVE) affords the opportunity for students studying by distance and online anywhere in the world to 'meet up' with classmates to discuss course content or socialise as if they are in the same room and therefore not studying alone. The Second Life Education New Zealand (SLENZ) project involved educationalists from all over New Zealand and was jointly led by Nelson Marlborough Institute of Technology's Clare Atkins and the Open Polytechnic's Terry Neal. The lead developer, Aaron Griffiths, is a former Open Polytechnic student. Executive Director Operations, Colin Cumming, was a member of the steering committee, while John Green acted as 'critical friend' to the project, conducting several hours of 'walk-through' testing of the Midwifery and Foundation Learning pilot builds on Kowhai Island in Second Life.

Reflection on example/problem

I purposefully did not involve myself in the builds themselves, as I needed to remain completely objective and able to experience the pilot builds as a student would without any prior knowledge or experience of the space. It was my role to provide feedback to the team on the content, the pedagogy, the functionality of the spaces and objects, and how well the activities matched the learning objectives.

Theoretical underpinning (if any)

Behaviourism, cognitivism, constructivism, situated learning.

Action

I engaged with the project as a reviewer taking the role of a student completing the activities exactly as instructed while wearing the hat of an experienced online educator. The Midwifery space allowed for the simulation of a birth, allowing a safe space for students to practise the process and experience simulations of problems before experiencing the real thing. The Foundation Learning space was an interview simulation. If spaces were difficult to negotiate or did not function as expected, or instructions were unclear, this was noted. Missing information, animation issues and areas where the pedagogy did not match the objectives were highlighted.

Results/expectation of results

I was asked to recommend five 'top critical changes' for each programme. For the Midwifery pilot these were:

1. Purposeful activities must match clear objectives.
2. Students should understand questions before going into the space so that their observations can be more focused.
3. There are not enough clickable objects to be consistent with the richness of the requirements of the activities.
4. Student reporting should be centralised for the sake of both students and teachers.
5. Some of the writing and multimedia tends more towards affectation than instruction.

For the Foundation Learning pilot the top critical changes were:

1. Lack of sound/predominant ambient sound was very disturbing and detracted from the simulation. Sound is an important part of any ambience and is as important as the visual simulation.

2. Some video did not function.
3. Blue was selected as the colour for 'Go' on buttons on the Hyperdome console. Green was suggested to be a more intuitive colour.
4. It was suggested that the adoption of correct body language, voice tone and eye contact in the interview was best done by videoing a real-life role play since the Second Life interface is not good enough to provide this successfully. These could be played back in Second Life for student comment. It was recommended that this final stage be 'real'. More complex body language was missing from the simulations in the pilot project. Some of the animations were physically unreal – for example, both feet slid simultaneously in the horizontal plain during the bowing simulation for Japanese greetings.
5. The Welcome notecard was pure marketing of the SLENZ project and needed to be removed or moved elsewhere.
6. While Pasifika clothing was available, there were cultures not represented in the clothing store.

Future possibilities – general application

For the Open Polytechnic Second Life represents a useful 'physical' space in which to 'meet' our students as a group 'face to face'. It continues to surprise how quickly the face and even the name of a student's avatar replace the name and actual face of the student when recalling a particular student to memory. While only suited to smaller groups, it is possible to break larger groups into breakout groups or invite cohorts of the group at different times for seminar-type interactions. The space is also ideal for students to meet up for a social, activity-based interaction, and for the sorts of interactions that build confidence and a feeling of belonging to a group.

SLENZ links

<http://slenz.wordpress.com/2009/08/05/the-slenz-update-%e2%80%93-no-122-august-03-2009/>

<http://slenz.files.wordpress.com/2008/12/slliteraturereviewa1.pdf>

Case study: Applying Real-time Assessment to Unit Standards

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Problem

The Financial Advisers Act 2008 (FAA) introduces a Code of Professional Conduct for Authorised Financial Advisers (the Code) and, for the first time in New Zealand, requires financial advisers to demonstrate minimum standards of competency, skills and knowledge. As the industry training organisation (ITO) for the financial services industry, ETITO is responsible for a new National Certificate in Financial Services (Financial Advice) (Level 5), the minimum qualification for a financial adviser. The qualification contains 16 unit standards and advisers must complete 50 credits to attain the qualification. In November 2009, ETITO engaged the Open Polytechnic to assist with large-scale national training for the new standards.

There were three major issues:

- Size of market: ETITO estimated that up to 50,000 advisers could require training and assessment under the new qualification.
- Limited time frame: The qualification would need to be attained by the authorisation cut-off date of 1 December 2010 (later extended by the government to 1 July 2011).
- Legislative uncertainty: The government was still considering changes to the FAA, while the Securities Commission, the sector regulator, continued to consult on the draft Code. In both cases it was known there would be amendments.

A key problem for the Open Polytechnic was to find an efficient, flexible and cost-effective method of assessing such a large number of students in such a short time frame.

Reflection on problem

A cross-functional project team from across the Open Polytechnic was established to consider the best solution. The decision was made to maximise the use of real-time assessments (RTAs). This was an innovative approach to the assessment of unit standards, which are typically based on the submission of workplace evidence. The project team reviewed the 11 unit standards the Open Polytechnic would be assessing and decided that 7 could be assessed using RTA, since they permitted assessment in simulated situations and/or required students to 'demonstrate knowledge of' a subject.

Action

Using the open-source Moodle learning-management system, the Open Polytechnic created a customised online assessment method that was academically rigorous (meeting the appropriate skills levels in accordance with the taxonomy of the New Zealand Qualifications Authority Framework) and enabled distance learners to undertake summative assessments in a time and place that suited them.

Although the Open Polytechnic was already using Moodle, the system was designed for achievement-based assessments, where a student's level of achievement is assessed against a range of learning outcomes and allocated a mark/grade. The student was allowed only one attempt at the assessment. The unit standard approach, however, uses competency-based assessments, where a student is assessed as being competent or not competent against a range of performance criteria. The student must demonstrate competency against each performance criterion to be competent in that unit standard. Resubmissions may be permitted until each performance criterion is met.

To meet the specific requirements for unit standards the Open Polytechnic customised Moodle so that the assessment questions were drawn from categorised question banks, with each category corresponding to a specific performance criterion within the unit standard. The system was designed to select questions randomly from each category at each student attempt. To accommodate multiple submissions, Moodle was programmed to recognise which questions the student had already answered and select an alternative question when the student reattempted the question. In this way the Open Polytechnic could ensure the student was being retested on the relevant performance criterion, but with a question that required a different answer. To avoid confusion for the student, any questions answered correctly at the first (and any subsequent) attempt were programmed to be greyed out, thereby clearly highlighting those questions that did not need to be answered again.

One of the requirements in using RTAs was that learners had to achieve 100 per cent in each assessment to demonstrate competency against each performance criterion in the standard. This created a reporting problem, as Moodle was designed to upload the first available mark (in this case the first attempt, whatever the percentage) to Integrator – the Open Polytechnic's student-management system. Therefore, Moodle was customised further to ensure that while the mark for each attempt was visible to the student on Online Campus no marks were uploaded to Integrator until the student achieved 100 Per cent.

Results

Our initiative was adopted by the ETITO as a core part of their assessment methodology for the National Certificate in Financial Services (Financial Advice) (Level 5).

RTA has been a key factor in the overall success of the Financial Services project.

For the Open Polytechnic:

- This programme has received over 8100 course enrolments from nearly 2000 individual students. It would have been impossible to manage this significant assessment workload in a cost-effective manner without RTAs.
- When changes were made to the FAA and the Code, the Open Polytechnic was able to update the assessments quickly and in a cost-effective manner without disadvantaging the student.

For students and the financial services industry:

- Students really enjoyed the ability to complete assessments where and when it suited them and to receive immediate feedback.
- The nature of RTAs has motivated students to complete the qualification within the designated time frame.
- Knowing that we could respond quickly to any legislative changes enabled the Open Polytechnic to provide training and assessment at the earliest possible time, giving students the opportunity to study while the financial services industry waited for confirmation of the final composition of the FAA and the Code. This was important given the very tight time frame for authorisation.

Future possibilities – general application

The Open Polytechnic plans to apply RTAs to other unit standard-based qualifications. Work has already been undertaken on:

- National Certificate in Electrical Engineering (Advanced Trade) (Level 5)
- National Certificate in Real Estate (Salesperson) (Level 4).

Experiences of Teaching Faculty Enrolled in the Open Polytechnic of New Zealand's Certificate in Designing and Facilitating E-learning

Rick Fisher, George Chipindiku and Sandra Maathuis-Smith

Abstract

In 2008, the Open Polytechnic of New Zealand offered a new programme in e-learning, the Certificate in Designing and Facilitating E-learning (Level 5). The programme consists of three compulsory courses. The courses are vocational in focus and build upon knowledge, involving an introduction to current e-learning theory, practical training in e-learning facilitation, and the creation of an individual e-learning course. The authors are lecturers at the Open Polytechnic, and were among the first students to complete the new qualification. In this chapter they summarise their experiences in completing the Certificate, as well as key lessons they learned while attempting to translate current teaching practices into an online learning environment.

Introduction

The purpose of this chapter is to provide a summary of selected learners' experiences while completing the Open Polytechnic of New Zealand's programme OP5440, Certificate in Designing and Facilitating E-learning (Level 5), in order to:

- provide a subjective overview of the experiences of teachers attempting to upgrade their e-learning skills, as guidance for others who may be interested in this subject
- identify common learning outcomes that bridge the discipline areas of the learners who undertook study in the programme, as a way of identifying shared issues and generic e-learning solutions
- foster discussion among participants in the programme, and the wider teaching community, in order to generate ideas for further action research in e-learning.

This chapter should not be construed as a critique of the Certificate programme. Rather, it attempts to synthesise key principles derived from the collective experience of e-learning students, in seeking best practice in e-learning. In this context, this chapter can be broadly categorised as practice-based research, as it has been conducted primarily for practical, problem-solving reasons (Wilkinson, 2000). To the extent that the chapter includes reflections on the part of the participants that may lead to improvement in e-learning work practices, it may also be categorised as action research (Wilkinson, 2000). The data within it, and the voices quoted from the learners, are derived in part from the assignments that the authors completed as part of their studies, and from post-completion reflection upon their experiences.

The Open Polytechnic of New Zealand is this country's only dedicated distance education provider. Its emphasis is upon open and distance education at tertiary level. The primary method of delivery is via print-based courses, with some blended delivery courses, and a growing number of fully online courses (Open Polytechnic of New Zealand, 2007). Moodle is the preferred learning platform, and there is a well-developed Online Campus for students.

Like other institutions in New Zealand and elsewhere, the Open Polytechnic is facing commercial and competitive pressure to diversify its teaching portfolio, in order to attract and maintain students (see, for example, the Ministry of Education's *Tertiary Education Strategy 2010 – 15* (Ministry of Education, 2009)).

This entails the Polytechnic building upon its current strengths in open and distance education. It includes scoping increased opportunities for e-learning. In making these decisions, the Polytechnic is guided nationally by the *Tertiary Education Strategy 2010 – 15* (Ministry of Education, 2009), and other obligations under governing statutes, notably the Education Act 1989. However, none of these include specific guidance on the future of e-learning.

Because there is at present no national strategy that deals with e-learning, there is little guidance available to institutions seeking to build capacity in this area, in the context of a regulatory framework. In the interim, the Tertiary Education Commission and the Ministry of Education have funded a project, coordinated by Massey University, to develop guidelines that may help institutions to improve their e-learning practice. The e-learning guidelines project (see <http://elg.massey.ac.nz>) includes advice for students, staff and managers, to promote best practice in e-learning design and delivery.

The current definition of e-learning provided by the New Zealand government is:

learning that is enabled or supported by the use of digital tools and content. It typically involves some form of interactivity, which may include online interaction between the learner and their teachers or peers. (Ministry of Education, 2004a, p. 1)

E-learning shares some of the characteristics of traditional distance education, such as the potential for geographical distance between teachers and students, and a shared requirement that learning is carefully planned and guided. However, there are also striking differences between e-learning and distance education (summarised by Fisher, 2009). The most noticeable of these is the provision of printed, mailed materials in traditional distance education. In addition, traditional distance education students have a very different learning profile than typical face-to-face students, and also different needs (including the need for education with applied or vocational value). Another key distinction is that there is no absolute requirement for online access, or even a computer, in traditional distance education.

As a result, the building of capacity in online learning must be approached with caution, and the blanket application of e-learning avoided (see, for example, Rumble, 2001). Realising this, the Open Polytechnic undertook new programme development to cater to the needs of teaching faculty at the Polytechnic and elsewhere. These relate primarily to professional development that provides vocational education in the ‘why’, ‘what’ and ‘how’ of e-learning. The result was the creation of the 60-credit, Level 5 Certificate in Designing and Facilitating E-learning.

The programme was opened for enrolment in 2008. Teaching faculty at the Open Polytechnic with an interest in e-learning were encouraged to enroll, as well as anyone else with an interest in the topic.

Programme details

The OP5440 Certificate in Designing and Facilitating E-learning is designed to appeal to a wide variety of professionals interested in learning more about e-learning theory, design and facilitation. A summary of its objectives, copied from a description of the Certificate on the Open Polytechnic website, states:

This programme is designed for education and training professionals such as teaching staff, trainers, community educators, instructional designers, learning support staff, librarians and knowledge managers, human resources staff, and other people in related support roles wishing to design and facilitate e-learning experiences within a variety of learning contexts. The focus is on the practical application of adult learning theories with an emphasis on e-learning methodologies, including the concepts of learner-centred, self-paced learning, supporting learners at distance, providing authentic learning opportunities and the development of meaningful learning relationships. This programme provides a professional development opportunity for those professionals who find themselves having to make decisions about incorporating e-learning into their practice or develop their skills in using e-learning. (Open Polytechnic, n.d.)

The three courses comprising the Certificate are:

OP5095 Transforming Learning Experiences

- A study of e-learning theory and communication processes.

OP5096 Facilitating Online Learning Experiences

- An introduction to good practice in online facilitation.

OP5097 Instructional Design for E-Learning

- An exploration of key factors that influence instructional design processes for effective e-learning, including the creation of an online course in Moodle, using appropriate e-learning tools.

The recommended text for the Certificate is Gilly Salmon's *E-moderating: The key to teaching and learning online* (2004).

About the participants in the study

Rick Fisher (Rick) works for the Natural Resources Centre, School of Workplace Learning & Development, at the Open Polytechnic. He teaches environmental science courses at certificate, diploma and degree level. Delivery is entirely by distance, involving mailed, print-based materials, supplemented by additional materials and guidance posted on Online Campus. Quite variable use is made of Online Campus by Rick's students. Some access the online course page regularly, and stay in close contact by email. Others have no online access, or voluntarily choose not to access online resources.

George Chipindiku (George) works for the Applied Technology Centre, School of Workplace Learning & Development, at the Open Polytechnic. He teaches light and heavy fabrication, and mechanical engineering. At present all of his students study by distance, using mailed materials. This is supplemented by occasional face-to-face teaching. However, George's teaching portfolio is moving more towards project-based, purely online teaching courses, with an accompanying need to become more aware of current e-learning design.

Sandra Maathuis-Smith (Sandie) works for the Open Polytechnic's School of Information & Social Science. She teaches information and library studies courses at diploma and undergraduate degree level. The majority of Sandie's courses are delivered in print, with the exception of a web-based electronic records management course.

Sandie: The student profile is mainly women in their late thirties, whose use of Online Campus is patchy. Completing this certificate has given me the skills and insight to utilise Online Campus and techniques to encourage regular use of it by students. I look forward to converting to blended delivery mode for my courses in the near future.

In summary, the participants had teaching experience covering a broad range of disciplines, involving potentially different student needs. Rick's teaching needs lent themselves to independent study, and a hands-off approach, while Sandie and George's students required regular intervention and guidance as they acquired practical skills, involving regular one-on-one interactions, including telephone conversations, and in George's case some face-to-face contact. However, at the time they enrolled in the Certificate, the authors all shared a common teaching thread, namely the use of Moodle as an online learning system. Moodle is the preferred online learning system at the Open Polytechnic. All of the authors manage their own online course pages. These pages include embedded content, email links, and various forums so that students can interact with each other and with the tutor.

Within their use of Moodle, however, the desired learning outcomes were different for the students enrolled in the Certificate.

Sandie: Unless I have an external motivator to learn a theory or use new technology, it gets put off. So my lifelong learning philosophy is to undertake projects or study that enable me to explore new concepts or technologies. My incentive for enrolling in the e-learning certificate was the opportunity to enhance my teaching and to investigate the e-learning environment. The variety of assessment encouraged the exploration and application of different theory and tools, to design and implement e-learning solutions. This approach matched my philosophy because the assessments offered an external motivation to experiment with a variety of techniques and tools to increase my understanding of the e-learning environment and improve my teaching.

Rick: Environmental sustainability is a theme that underlies much of my teaching. My research has shown that distance education can be a great deal greener than face-to-face teaching. In terms of legitimacy I was therefore drawn to e-learning as a possible tool for green education. On a practical level I was also interested in learning more about Moodle. Apart from using it to add recent materials to my courses, and to provide emailed advice about assignments, I didn't really know much about Moodle, or how to make better use of it.

George: The driving motive for tutors is the interest in enhancing the quality of teaching and learning in their areas and the urge to discover how e-learning can assist them. For an effective practice with e-learning, the academic staff need to develop new skills, embrace changes in the nature of our role, and then reassess the pedagogies we employ. Pedagogically sound and accessible ways of embedding e-learning into everyday practice can be achieved by linking theory with practice. For instance, in the engineering area that I teach, it is crucial to develop a shared understanding of how, when and where to apply e-learning to the best advantage of learners. All trades are practically oriented – hence, including practical simulations in the online content will raise the interest of our learners.

OP 5095: Transforming learning experiences

The aim of this course is to introduce learners to current thinking and practice in e-learning, and to understand the impacts of these approaches on their practice as an education and training professional. Learners will evaluate the implications of adult learning theories for e-learning in the distance education context and the implications of e-learning for learners in this learning environment, evaluating different learning approaches in order to make decisions about the mode of delivery. Learners will also explore e-learning communication processes and evaluate their effectiveness for good practice in distance learning and discuss a range of critical success factors in e-learning environments and then reflect on their own teaching and learning practice and how this translates into an e-learning environment. (Open Polytechnic of New Zealand, n.d.)

OP5095 is the first course in the Certificate. It is a prerequisite for the other two courses (although in exceptional circumstances other enrolment arrangements may be made). Student assignments in all of the Certificate courses involve the creation of independent student portfolios. The portfolios include completed assignments for individual work, and reflective essays that relate to learning outcomes associated with group work. Online group work is a significant component of all three Certificate courses. However, because there are no group submissions, the only opportunity to assess group work is by way of individual, reflective essays, which include copies of relevant contributions made by students to group tasks.

The major tasks in OP5095 are the creation of a television advertisement for a teaching institution wishing to promote e-learning, a case study of an organisation seeking to build e-learning capacity, and reflective work on teaching styles as they relate to current e-learning theory. There is also an opportunity for students to assess selected e-learning tools.

The primary learning outcomes associated with OP5095 involve subjective and objective enquiries into the issues associated with adult learning, and the ways in which e-learning may contribute towards fulfilling student 'needs'. Such enquiries require canvassing of the needs of stakeholders involved in e-learning course design, development and delivery, as well as the needs of the students themselves. Assessments for this part of the course are based upon role plays, scenario setting, and a literature review that confirms the distinctiveness (if any) of emerging e-learning pedagogy. Learning outcomes that bridge the gap between e-learning theory and practice are created via individual student research into the top 10 current e-learning trends, with a requirement to provide underlying explanations for the trends. As part of this research, students are asked to use an e-learning tool of their choice, and to report back on their experiences.

One of the primary results of the participants' experiences in completing this course was learning that constructivist learning theory is the primary pedagogical tool in the development of e-learning principles, with a number of studies devoted to it (Gruba, 2004).

George: Both in the story and the advert we witness the address of a situation whereby there are individuals learning on the job for the purposes of advancement or as a result of managers' expectations. Coupled with this motive is the fact that adults want to be the origin of their own learning and often they will resist learning activities they believe are an attack on their competence. As such, courses intended for professional development need to give participants some control over the 'what', 'who', 'how', 'why', 'when', and 'where' of their learning. Again, the advert for flexible learning addresses these issues. For instance, the courses offered for tradesmen are relevant and align professional development learning and their day-to-day activities.

Some authors have called the developments in technology applied to e-learning a revolution of new learning, particularly with regard to the joint influence of constructivism and information technology upon learning. Authors such as Martens, Bastiaens and Kirschner (2007) list characteristics of such learning, including collaborative work and learning, development of higher order skills, self-assessment, coaching, independent learning – all of them in the context of e-learning.

One of the first tasks in this course required the participants to engage in group work, in order to create a hypothetical television advertisement for 'The Flexible Polytechnic'. One of its key learning outcomes was the demonstration that e-learning design needs to address the needs of a diverse body of stakeholders. The overall result is potential conflict between the competing needs of the designer, content specialist, delivery agent, and student. One size certainly does not fit all, and it may be necessary to disentangle the needs and desires of the organisation seeking to implement e-learning solutions from the actual needs of the end user. For example, there are some types of learning that require face-to-face contact, notwithstanding the availability of online teaching, which could increase enrolments and cut costs – essentially doing the same job, but much less effectively. An example of this within the Open Polytechnic is the retention within engineering courses of opportunities for face-to-face contact, to ensure that students have direct access to tutors if required.

A learning outcome shared by all of the participants was that it is important to distinguish e-learning as a servant, not as a master. For example, distributed learning programmes have been driven by technology, in terms of availability and cost, rather than by learning goals linked to desired cognitive and behavioural competencies, to the extent that some providers have deliberately distanced themselves from pedagogical issues. There is even a term applied

to the mapping of new technologies on to existing platforms – ‘repurposing’ – which requires no reconceptualisation of learning (Kozlowski & Bell, 2007). Because the Open Polytechnic still emphasises the value of traditional distance education involving printed materials, to date this has not been a problem in course revisions.

The independent research the participants conducted pointed out key connections between e-learning and the needs of the adult student, including:

- The importance of blended delivery to ensure that e-learning supports and supplements, but does not monopolise, learning. The primary delivery method favoured by the Open Polytechnic currently involves paper-based materials, supplemented by the Online Campus management system. By default, most courses are therefore blended, with the Online Campus component being a supplemental learning tool.
- Offering educational opportunities so that adult students can earn as they learn, bearing in mind that most adult learners will be unable to afford to undertake full-time study. This ‘anywhere, anytime’ concept of learning applies equally to e-learning and traditional distance education.
- Using online technologies to allow adult students to learn remotely, with instant access to online library and other supplementary learning materials.
- The importance of creating an atmosphere of substantial student autonomy in order to promote individual, tailored educational goals.

A very powerful learning outcome associated with this course was an exploration of personal learning and teaching styles, using online personality-type tests. In their reflective essays, the students wrote the following:

Sandie: I have found that I am a balance of visual, reading and kinaesthetic modes and facilitator/delegator teaching styles. My aural style or any style that involves listening is always very low,. This is reflected in my learning choices, as I will not use voice chat options, preferring to type, and I will not choose podcasts or MP3 formats if there are other options. I seldom listen to music or use a telephone – preferring to email or have face-to-face interaction. My teaching styles are favourable for the online medium and value problem solving, and the development and practise of skills for the individual. Both my teaching and learning styles are evident in my courses. There is practise and application of skills by the individual across a variety of situations. Although I appreciate the potential benefits, there is no group work or audio content in any of my courses at present. This is a clear case of personal styles influencing teaching.

Rick: After doing the two tests I was able to confirm that my university learning does indeed favour a ‘visual’ approach, involving copious note taking, clarity in instruction, and the judicious use of overhead materials. Being a ‘reading/

writing' learner, I prefer the written word above all else. This raises the spectre that online learning may not serve me very well. I note with apprehension an observation by Feenberg and Xin in the course materials that 'online lecturing, either in print or video, lacks the interactive qualities essential to good teaching' [Feenberg & Xin, n.d.]. Uh-oh!

George: I am an auditory learner, who employs both visual and verbal learning styles. Essentially I learn best when information is presented visually and in a written language format – that is, I benefit from information obtained from textbooks and class notes, but at the same time experience a full understanding as I listen to the class lecture. The strengths of my learning style come from having a knack for ascertaining the true meaning of someone's words by listening to audible signals like changes in tone.

The above comments are personal to the participants, and may not acknowledge the ways in which e-learning, if properly designed, can replicate traditional learning and get around some of the issues that are raised. Indeed, some of these issues deal not so much with learning and teaching styles, but with recognising a whole new literacy associated with e-learning. This can involve a whole new set of skills associated with reading and writing online, all of which may be teachable, if properly designed (Leu & Zawilinski, 2007).

One of the course tasks was individual student research about current 'hot topics' in e-learning. The exploration of current e-learning trends uncovered fairly consistent results among the participants' independent research, including the growing use of open source software, and the potential for new technologies such as mobile learning. The latter is an interesting example of the uncertainty about whether e-learning must adapt to new technologies. Karrer (2006) argues that mobile learning will be disappointing because it will remain scattered, and focused on podcasts and video casts for audiences with easy access, rather than resulting in the uniform adoption of mobile as a learning platform of choice. Sharples (2007) advocates for mobile technology, but raises other issues, including the functionality of such a small device with regard to e-learning needs (for example, data exchange and information flow).

A key learning outcome associated with identifying individual teaching and learning styles was the difficulty in finding a balance between teacher-centred classroom learning and the student-controlled learning that is characteristic of the online classroom. An example of the power of the latter occurs where people may learn more from failure than by being shown what is expected of them (Sierra, 2006). This is easy in an online world, where no one can see you fail, and where there are easy opportunities to repeat tasks. The issue is complicated by research suggesting that there is some uncertainty about the value of the 'minimally guided approach' that is so favoured by current e-facilitation practitioners (for example, Salmon, 2003). Such an approach is

not supported in all situations, and a competing case may be made in some instances for direct, strong instructional guidance as a more preferable medium of delivery than the constructivist approach (Kirschner, Sweller, & Clark, 2006). Stated another way, this was the participants' first introduction to the debate about whether e-learning facilitation should be more 'a guide on the side' than a 'sage on stage'. Debate about this issue continued in the second course in the Certificate.

E-learning tool: Blog

The use of a blog as an e-learning tool was the topic of George's independent research. His primary conclusions were:

- Blog is a contraction of web log. A blog is often used as a personal diary, or a daily pulpit for sharing thoughts, collaborative space, or breaking news, or as a general outlet for speaking to the world. Basically, it is a frequent, chronological publication of personal thoughts and web links.
- Blogging can be a perfect medium for a person to keep track of the progress of their thoughts in various life instances. This is because a blog is more than just a journal, in the sense that it offers additional insight that writing in private does not provide.
- Engaging in a blog will keep a person constantly on the lookout for article ideas. Hence, it is a great skill to develop because it helps the person to become more observant, and therefore more interested in other facets of the subject-matter about which they are blogging.

E-learning tool: Social bookmarking

After exploring the del.icio.us social bookmarking tool, Sandie's conclusions on social bookmarking were:

- This was the ultimate in explorative learning and resource discovery. I found myself darting all over the Internet, then back to del.icio.us to slingshot off in a different direction.
- The potential for collaborative teaching, learning and research is huge. I added many resources to my account and linked to other users with similar interests.

- Adding existing bookmarks/favourites from other browsing software is automated. Adding web pages while surfing the Internet is effortless.
- This is like having research assistants, as other people have researched, retrieved and evaluated resources for you on specific subjects.
- Cognitive stresses have been mitigated by the collaborative nature of this system, one-click capture and a clean, simple site design with clear navigation.
- You can create your own keywords for tags or easily choose from the existing tags to the same site – this also preserves the linking relationships.
- The software soon becomes transparent and the discovery of networks, new keyword tags and the excitement of resource discovery take over completely.

Since being totally immersed in the social bookmarking phenomenon, I have experienced how it fits adult education principles:

- It allows self-directed, autonomous learning.
- It is ubiquitous – you can get to your resources from any Internet-connected computer.
- It allows informal learning
- It allows collaboration, sharing of resources.
- Control and choice is with the learner
- It supports the just-in-time and relevance aspects of adult learning
- It provides for respected opinions – when another user connects to your bookmarks they are indicating that they agree with your value judgement of a resource.

Even if these sources are part of a specific course they will be available to the network and learner way beyond the completion of a course, leading to a source for lifelong learning.

E-learning tool: podcasting

Podcasting as an e-learning tool was the topic of Rick's independent research. His primary conclusions were:

- A Google search of podcasting (Holtz & Hobson, 2007) garnered 24 hits in 2004 – a year later it reached 100,000,000 hits, fuelled in part by the recognised advantages of podcasting:
 - ability to subscribe, rather than merely download, through RSS (most commonly expanded as 'really simple syndication')
 - podcasts are essentially episodic, so you can commit as desired to ongoing instalments
 - podcasts are detachable via MP3 files, so you can listen to them wherever you wish, whenever you wish
 - barriers to producing podcasts are (purportedly) very low.
- iTunes is the preferred podcast interface at the Open Polytechnic. An hour takes up about 20–25 megabytes of memory, and it is very easy to download from iTunes to an ipod shuffle, for playback on headphones or in a car.
- Most podcasts are free, and there is a great deal of content coverage available, suitable for most disciplines.
- Podcasts can be added to a Moodle course page, but only with difficulty at present. Creating your own podcasts requires some specialised equipment, including not just a microphone but a mixer, and more importantly a website from which to launch the podcast. In this sense it is important not to confuse a podcast with a simple audio file.

OP5096: Facilitating Online Learning Experiences

The aim of this course is to introduce education and training professionals to good practice in online facilitation. The course offers the learner an opportunity to experience hands-on what it means to facilitate groups of learners online. The learner will explore and experience a variety of facilitation approaches and online facilitation methodology to support a diverse learner population in an e-learning context. (Open Polytechnic of New Zealand, n.d.)

The major tasks in OP5096 involve group work to resolve problems in hypothetical e-learning case studies. To do so, students research current best practice in e-facilitation. Vocational tasks include exploration of Moodle's features, and an opportunity for students to host chat sessions. The latter task includes practise in summarising chat sessions for assessment purposes.

The first assignment associated with this course is the preparation of a generic advertisement for an e-learning facilitator. In preparing the advertisement, the participants were required to review the primary needs of e-learners, using the learner profiles discussed previously in OP5095. Many of these are based upon the Salmon (2003) five-stage model for online education and training. The five stages describe a set of steps for online learners, leading from initial engagement in e-learning to an ultimate stage of student development that fully integrates their individual e-learning experiences. Each stage requires the acquisition of technical skills that in turn require different e-moderating skills. From a tutor's perspective, each stage also requires different approaches and e-learning tools. The first step, for example, is student engagement. This requires particular emphasis on a warm, nurturing environment that encourages students to contribute – slowly at first, and then with increasing critical comment. 'Ice-breaking activities', designed to foster group coherence and group identity, are important in these early stages. Consequently, an embedded, summative quiz would be inappropriate as an e-learning tool at this early stage, having greater effectiveness if used later on.

Another task in the course required the participants to demonstrate understanding of how meaning and mood are conveyed in online messages. Because there is no opportunity for non-verbal cues in online messaging, great care is required to ensure that meaning is accurately conveyed solely by written text. With practise, the participants were able to categorise different messages, using the four interaction types identified by Berge (1995). The four types of interaction are: (1) pedagogical (relating to the educational role, in focusing on concepts, principles and skills); (2) social (creating a social environment for learning); (3) managerial (setting the agenda and procedures for online conferencing); and (4) technical (making learners comfortable and minimising

technical obstacles to learning). Each type of message requires its own 'comfort level', and varying degrees of critical content. Participants are also required to make it clear to the facilitator what particular role they are fulfilling when a message is sent:

George: One other aspect that changed my perception about the role of an e-learning facilitator was the social support role. Previous experience showed that students in class can naturally develop social ties without much influence from the lecturer. Surprisingly enough, it is different with online facilitation, as the tutor takes the role of a social supporter. Essentially, this role is vital in ensuring participation by, and retention of, students. Hence, you are expected to provide emotional support, and facilitate collaboration, most importantly remembering that students need recognition, acknowledgement and positive feedback. Tied to this aspect is the mediator role, whereby the tutor should resolve any conflict that results among students.

The limited ability to convey meaning in written text, and the inability to ask for immediate clarification (as would occur in a classroom setting), results in potential difficulties for e-learning facilitators. The case studies and group work in this course offered the participants a plethora of learning difficulties that could occur when teaching online. Among the most nettlesome of these is the 'online lurker'. There is really no way for a facilitator to know that things are going wrong, unless the student says so. Unfortunately, silence is also part of 'lurking', which Salmon (2003) states is not necessarily a sign that something is wrong. She cites research in which 75 per cent of trainees reported active participation online, but half also pointed out the value of passive participation, also known as 'browsing', 'listening' or 'lurking'. This is more frequent among late starters, and may therefore be a bit easier to spot and distinguish from silence associated with things going wrong, which is probably more likely to occur at later stages of an online course.

Personal teaching experiences prompted particular research enquiries from each of the participants.

Rick: It occurred to me to ask: 'In determining the perfect e-learning student profile, is gender an overlooked issue?' Salmon (2003) refers to it, but only in the context of access [to a computer]. I took this question to Ormond Simpson, a professor of e-learning visiting the Open Polytechnic, who provided the following advice:

- There isn't a lot of data on this.
- While male students may be more technically savvy than females, females are more likely to engage in group work, which may explain in part why females tend to do about 5 per cent better on average in distance learning than men at the Open University (United Kingdom).

- In the context of establishing a good e-learner profile, Professor Simpson gave me a copy of a new study by Anagnostopoulou & Parmar (2008) that looks at student retention, and asks which learning skills differ between traditional and e-learning classes. Their study includes additional categories of 'communication' and 'problem solving'. They conclude that all of the skills noted above, and the additional two skills noted here, are needed in face-to-face and online learning. The two noticeable differences between traditional and e-learning skills appear to be in 'the context and the degree of importance of the skill'. They note things like 'writing', which in an online world extends to keyboard skills, and 'listening', which in an online context means much more selective learner control. Another interesting finding in their study is that the technological skills of learners differ depending on whether they are using them for personal or learning purposes. Synchronous communication, for example, is much more likely to be used in personal than in coursework settings. Therefore, it appears that an e-learner profile must be context-sensitive, in addition to identifying the degree to which the particular skill is to be relied upon in an e-learning environment.

Consideration must also be given to the development of the online voices of students in a course. This raises interesting issues about personality. The experiences of the participants in this study confirmed that personality can play an important role in determining who will contribute (sometimes too much!) to online group work.

George: Quite surprisingly, the [primary] approaches [used by students in group work] were not gender oriented; instead, it was a revelation of different personalities taking dominance over what was assumed to be the best approach.

One of the key learning outcomes for this course was commitment by students towards the development of their own personalised online 'voice'. This is a highly individual exercise, which was ably demonstrated by the requirement that every student host their own chat session with other students.

George: In the session that I facilitated I managed to arrange the time and date in advance, in order to give more time for the participants to get prepared. Preparation meant that each student was expected to have access to a computer at the same time, despite different time zones. This arrangement was made through the [group] forum [to which I had been assigned]. However, there is one mistake that I made during this process – I failed to inform the participants about my topic. The discussion was on group cohesion. Hence, it would have made it easier for the group to achieve better outcomes from the session if I had provided some background information. In addition, this could have created an opportunity for the group members to research the topic beforehand. This is not surprising if you consider what would happen during a traditional class if the teacher did not develop and implement some classroom management and discussion facilitation skills.

Sandie: I have facilitated many chat room sessions in the past and had my fill of this medium a long time ago. The chat session was a painful exercise, but it was interesting to look at the 'chattiquette' involved in this exercise. I had not thought of why I did things or responded in a certain way until faced with facilitating this

chat session. Metacognitive processes were invoked as I started to associate the techniques I was employing with the guidelines in the literature. It helped that the other students were scrutinising every move and technique I used.

I don't think that I would use 'chat' as an activity in my courses, as my courses are promoted as being 'study at your own pace', and forcing students into a synchronous activity is not conducive to studying at your own pace.

Rick: I had never been in a chat session prior to this exercise. I found that it took some time to establish a communication rhythm of sending / responding, and that chat hosting was surprisingly stressful. I reviewed the set text, Salmon's website and related links such as Flexitips (2001), White (Full Circle Associates, n.d.), and Hudson (2007) to confirm my understanding of what good facilitation should include. The single most challenging thing about this exercise was how to find ways to stay focused, but relaxed! Authors like White (Full Circle Associates, n.d.) point out that a busy chat can be exhausting, and boy they aren't kidding. As these authors point out, chat is immediate, unlike other learning, and you are on the court the whole time. My partner was watching me at home and said that my shoulders were absolutely knotted afterwards, requiring her to massage them after the chat. Tips to avoid this from the literature include working up slowly, especially to controversial topics, getting yourself a co-host, taking announced, online 'bathroom breaks' if absolutely necessary, and simply getting more practise.

Hudson (2007) identifies two particular difficulties with chat. The first is how to assess it. What constitutes 'A' grade chat, versus 'C' grade chat? One indicator is the extent to which the facilitator can keep a given discussion thread focused on the task at hand, ensuring that it receives adequate discussion before moving on. From a learner's point of view, a higher grade could be awarded to students whose chat transcripts demonstrated an ability to stay on the topic, reframe ideas, and comment critically about the subject-matter.

The second difficulty relates to how the facilitator summarises what has been said in a chat session, in terms of later providing feedback to a given group of students who were present in the session. Salmon (2003) advocates the use of 'weaving', which entails the selective use of student contributions to create an overall script, or summary, of what was said.

OP5097: Instructional Design for E-learning

The aim of this course is to introduce education and training professionals to the process of instructional design in e-learning. This course prepares the learner to design and use effective and engaging learning activities in the online environment. Learners will review key factors that influence the instructional design processes for effective e-learning and explore how technology can overcome existing issues and enhance the teaching and learning experience for learners. (Open Polytechnic of New Zealand, n.d.)

The most important outcome of this course is independent student work, leading to the creation of individual online course frameworks, with appropriately embedded learning tasks and associated e-learning tools. The ancillary tasks associated with the course are related to e-learning course creation.

One of the most important goals in course design is to make information purposeful for learning. This requires care in selecting the right context for the course audience. A course in machinery design, for example, could include a running theme of placing students on the factory floor of a hypothetical company, facing various problems that need to be overcome as the students make their way through the course. The best examples mentioned in the course materials are those that make learning real, by creating an environment similar to that in which students may find themselves upon graduation. 'Purposeful learning', in this context, refers to new learning models described by authors such as Oliver (2000) and Cole and Foster (2008) that now recognise that people actually transfer learning with great difficulty, and are constructors, not receivers, of knowledge.

George: Instead of having students receive information-loaded links devoted exclusively to the coverage of course content, I endeavoured to engage the students in the learning experiences, which were designed not only to enable them to learn content, but also to learn process, implying the process of 'learning how to learn' and developing empowering 'lifelong learning' skills. It is for this reason that I designed real-life scenarios, so that by going through the tasks the students will be self-equipping themselves to face life challenges. I also considered the fact that real-life issues are more interesting and extremely motivating, encouraging the students to engage more with the course material.

Designing an e-learning course requires much more than a series of embedded links and activities. It is for this reason that Johnson (2005) (among other authors) advises that content specialists should never be unleashed on course design, for fear that it will become a regurgitation exercise in reciting facts, rather than a process of constructive learning.

George: In designing my course I focused more on developing a learner's comprehension and expertise, rather than on improving usability issues. Technology developed through this process was meant to support the learner's needs by giving them a variety of tools to use to help them through adaptable tasks. In this respect I had to ensure that in the introductory phase of the course I laid out different links, such as 'Which resources will you have access to' and 'What do you need to get started'. These tools were added to ensure that the student had a smooth transition into the course.

In designing activities, students in OP5097 are guided by the advice noted in the secondary literature, including (after Johnson, 2005) designing activities that:

- require learners to combine course knowledge in new ways and within new contexts
- incorporate information without too much distraction from learning activities
- provide some entertainment
- avoid a set text (also mentioned by Oliver, 2000)
- provide strategies for learning, rather than solutions per se
- provide 'ill-structured tasks' – as noted by Oliver (2000), these allow students to flesh out difficulties in tasks, as they construct their own personalised learning outcomes.

In addressing these design difficulties, it is important to ensure that meaningful contexts useful for real-life situations are chosen, with plentiful resources and support. Quinn (2006) and Johnson (2005) offer good advice on creating a learner-centred approach, in terms of drilling into deeper motivational levels by providing a 'hook', telling students what happens if they don't 'get it right', and maintaining motivation through interesting game-like approaches.

Johnson's (2005) advice is to '[m]ake use of storytelling. This can range from framing the whole course within the context of a story, to sporadically inserting a brief anecdote which drives home a concept'.

Sandie: Records management, as you can imagine, is a prescribed discipline. To make it more interesting I decided to take the students outside of their 'office' and transport them virtually to 'Kiwiana Park'. The idea of a story appealed to me because there is so much scope for different environments. The principles and skills are the same in all the records management situations, but by dressing it up in a Kiwiana Park costume I hoped to make it interesting and a bit different, thereby maintaining the motivation of the students. Using 'characters' such as Koro the cheeky kea and stories of his antics, I added an emotional layer to the learning. The emotional content I hoped would engage the students' imaginations, while at the same time they will be inadvertently learning transferrable skills.

The Moodle tools trialled by the participants in this study included quizzes, frequently asked questions (FAQs), glossaries, the addition of photos and embedded videos, and the use of supplementary tools such as Microsoft Photostory 3. Samples of participants' subjective experiences in working with Moodle included:

Sandie: To help cope with workload issues I trialled a FAQs page. The FAQs page served its purpose well (see comment below) but also had a side effect – it became a tool for students to answer each other's queries. This in turn led to social interaction and became an example of the adult learning principles of recognition of prior experience and respect from the other students. The students started to show ownership of the course by responding to each other. (I have looked at the 'hit' statistics on my course and the FAQs page had over 3000 views – it was week 3! Many of the students were referring to the FAQs page to answer other students' queries! Fantastic! Imagine if even 10 per cent of those views were emails for the tutor to answer. Phew!)

Rick: I relied to some extent on the course materials and also on Cole and Foster (2008). They have a pretty good description of the various Moodle tools. It's on their advice that I included a glossary. I didn't know how powerful a tool it could be until I saw how it could be linked to student motivation to contribute to the course, to help them with learning, and even in assessment. Very cool tool.

In embedding text within their individual courses, the participants were guided by key advice available in the OP5097 learning resources. This included:

- keeping sentences short and simple
- using the active rather than passive voice
- using active verbs
- breaking up the writing into chunks, interspersed with photos and activities
- trying to be conversational
- doing more than merely reciting learning outcomes, by enlivening them in an easy to understand 'what you will learn' resource.

One of the major assignments in OP5097 is group work to establish marking criteria for the assessment of student courses. Massey University has conducted research in this area (Milne & Dimock, 2006). It refers to key areas for assessment, dating back to the Ministry of Education report *Taking the Next Step: The Interim Tertiary e-Learning Framework* (2004b), which suggests that a good online course should demonstrate:

- a consistent learner-centred approach
- good e-learning practice (notably a sound pedagogy)

- opportunities for collaboration and group work
- innovation
- affordability / sustainability
- a focus on New Zealand's unique identity / qualities (a learner-centred approach, a mix of face-to-face and distance education, geographic remoteness).

Online courses cannot be judged by the same criteria as face-to-face or print-based distance learning. Assessment is therefore based largely upon the goals of e-learning, and the success in achieving these goals. An assessment schedule for e-learning could thus refer to the following criteria:

Access and flexibility: How accessible is a particular technology (for example, Online Campus) for learners? How flexible is it for a particular target group – for instance, trade apprentices, working 60 hours a week?

Expense: What is the cost structure of each technology, including computers and software? What is the unit cost per learner? Does the organisation provide any form of assistance? How do costs differ between technologies within a particular context?

Teaching and learning: What kinds of learning are needed, bearing in mind some aspects of learning cannot be done without certain tools? What instructional approaches will best meet these needs? What are the best technologies for supporting this teaching and learning?

Usability: What kind of student interaction does this technology enable? How easy is the technology to use? How long will it take for a student to learn?

Organisational structure: What are the organisational requirements and the barriers to be removed (including technical support and funding) before this technology can be used successfully? What organisational changes need to be made? To me this has been an issue, particularly when dealing with the industry training organisations.

Sustainability: How new is this technology? How reliable is it? (In the past Online Campus has had some problems with the speed and grunt required from the computer.) How will this technology contribute to institutional renewal?

Speed: How quickly can courses be mounted with this technology? How quickly can revisions be made to materials?

Conclusions

A key component of action research is to derive recommendations to guide future decision making in the subject-matter area being studied. Two important recommendations arising from this research suggest the importance of further research in respect of workload. In particular:

1. How much time does it actually take to design an online course, or to supplement traditional distance education courses with online versions / supplements?
2. How much time does online course facilitation take?

The latter question is perhaps the easier to answer. The general thinking from authors like Salmon (2003) is that the more that students are engaged and involved, the less marking and other administration workloads will be for the facilitator. The participants in this study uncovered a number of tips for reducing facilitator workload. They include:

- Formation of small online working groups, tasked with delegated work that is more focused on subsets of the original, broader learning enquiry, in order to carve it into more manageable 'bites', with more ownership of the learning outcomes for students. This would also allow for more immediate feedback and assessment of how students are doing as they progress through the task, rather than a single, final assessment based on grading an essay.
- Creation of a discussion board forum for questions and answers associated with the task – for example 'What will my subgroup be researching?', 'How do we present our results?', and so on.
- Rejigging email under Outlook to create new 'rules', so that Outlook puts all related emails from the working groups that have been created into a folder that is easy to find.
- Greater use of course announcements rather than sending emails to all learners.
- Use of Moodle tips from authors like Northam and Sauls (2005) to save time, including saving course announcements rather than keeping them available for a limited time, so they can be used again the next semester, and seeing whether materials can be kept invisible to learners until needed, so they correspond with the course schedule associated with the task.

With regard to overall workload, there was considerable uncertainty as to how much time facilitating takes, as well as the time it takes to design an e-learning course from scratch.

George: What was different from a classroom teacher's role was that the facilitator had to monitor student participation almost all of the time, including the weekends. This is contrary to a traditional classroom situation, whereby student participation is only available during the lecture periods. At the same time, with online facilitation there are no physical cues that can indicate feedback from students, hence the demand for more monitoring tools. This included monitoring student contribution.

In terms of total time for course development, Rick spent approximately 120 hours designing his course. This is undoubtedly much more time than the Certificate contemplates, but was associated with Rick's desire to develop his online course to completion as a 'real' online course, and as part of his own e-learning research. It does raise the question, however, of whether Open Polytechnic faculty enrolled in the Certificate have a genuine desire to create a working course as an outcome of their studies. If they have, to what extent can they can seek professional development time to do so?

In terms of the facilitation workload issue, key lessons derived from the secondary literature include:

- The importance of asynchronous, threaded discussion groups as a primary tool in promoting critical thinking in online courses and reducing instructor workload (Mandernach, Dailey-Herbert, & Donnelly-Salles, 2007).
- The rapid fall-off in facilitation time for online compared with face-to-face teaching – but only after an initially longer period has been required for design and development (Northam & Sauls, 2005).
- How few studies have so far been devoted to the actual time it takes to facilitate a course. Mandernach, Dailey-Herbert and Donnelly-Salles (2007) was the only reference that could be found. The authors came up with an average figure of 3 hours per week in total to facilitate discussion groups. The result has been a shift among those faculty members who are facilitating towards a longer work week, with variable total work hours.
- How important it is, if at all possible, to consider the time constraints in facilitation delivery in the context of developing an online course (Brandon, Ganci, Hyland, & Lyons, 2003).
- How the delegation of certain tasks can be extremely helpful, including:
 - group work and the breakdown of larger groups into smaller, interactive subgroups (Salmon, 2003)

- injection of delegated debate subjects into online student discussions, rather than mere fact finding – debate also helps in encouraging motivation and personal meaning (Salmon, 2003)
- although not strictly delegation, use of tools like bulletin boards (Northam & Sauls, 2005) and chat. Provided that care is taken in ensuring an appropriate and consistent assessment, chat provides for a rapid marking of typed commentary among a group of students, and so avoids the tedium of marking long essays (Hudson, 2007).

When discussing the workload of students enrolled in e-learning courses, one of the subject areas that attracted the most discussion among the participants and others enrolled in the Certificate was the difficulty in creating consistently positive outcomes using group work.

Rick: It was difficult because my experience to date in group work for the Certificate suggests that group work can be a little like going to the dentist – necessary, useful, but not always very much fun, and not always engaging.

Sandie: I have found that group work is not for me. So even though I know the group discussions gave me valuable insights into others' views and perspectives, I prefer to have all the task requirements in front of me and be left to it. The feeling of being 'held back' or being forced to 'restart' with the class was very frustrating for me. It felt like being in a classroom and having to wait for the rest to catch up. As adult learners we have individual life responsibilities and commitments to contend with. Forcing a learner into synchronous or group work to a schedule dictated by the course leader, or even class consensus, is to me not conducive to e-learning or distance learning. There are facilities, such as forums, that can be utilised to facilitate the same learning gained from sharing of views and perspectives – without the tight time frames or added complications of marking shared work.

The issue of how to use group work effectively is a key recommendation for future research. In terms of other e-learning action research, the following areas are likely to be worthy of further investigation:

- Enquiries into student retention, and monitoring tools to evaluate why students might drop out. This subject was of particular interest to visiting scholar Professor Ormond Simpson from the Open University. Because students who drop out are not present for an end-of-course evaluation, a key question is therefore how to obtain earlier feedback. This issue also applies to most Open Polytechnic courses.
- Research into student perceptions of learning before, during and after a course. The New Zealand Qualifications Authority places a lot of focus on ensuring that course assessments include objectives, key learning outcomes associated with each objective, and a clear indication from students 'when

they've gotten there'. In an online course, how do you ensure that a student is 'getting it', even with regular feedback and assessment? In a classroom, immediate feedback loops are much easier to create.

- Further examination of e-learning pedagogies. The literature suggests that if you get the pedagogy correct from the beginning, the e-learning course design that follows will be better framed.
- Evaluation of activities / courses and taking on board student experiences early on in the course, so as to improve assessment within the course rather than at the end of the course.

Finally, in the course of the external review of this paper, the authors were asked to comment on the extent to which the learning they acquired in their Certificate studies has been translated into practice. In particular, they were asked whether there is at present scope within the Open Polytechnic to incorporate into their own courses such things as a constructivist approach to learning and assessment, and aspects of blended delivery, and to otherwise apply what they have learned in their own online course pages.

In the short term, the answer to this question is almost certainly 'yes'. Sandie, for example, incorporates 'weaving' into her course feedback, while Rick has moved towards a more active facilitator presence on his online course pages, and has attempted to incorporate tools such as Photostory to create a more dynamic learning environment. George has used the skills he acquired to develop additional online course resources for an engineering calculations unit standard, and is presently developing an engineering materials unit standard that will be delivered entirely online.

It is too soon to answer more general pedagogical questions, such as the extent to which the participants favour a 'guide on the side' approach to facilitated learning, rather than a 'sage on stage' approach. An answer to this question will likely require several iterations of online course delivery. The longer-term view of online course development is also more problematic, due to issues associated with the speed and ease with which course revisions can be made, as well as the money and time commitments involved in course development. Like other institutions, the Open Polytechnic will need to keep abreast of future trends in e-learning, as part of its overall strategic plan. It is within this context that questions about online course development and its integration into blended delivery are most likely to be answered.

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Case Study: Teaching Practices Discussion Group

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Background

The Teaching Practices Discussion Group (TPDG) was formed in 2006 to provide academic staff with an opportunity to discuss teaching practices and exchange ideas with other practitioners, with a view to enhancing the educational performance of teachers and students.

The TPDG offers an avenue to develop a shared vision across the various disciplines to achieve consistency and promote collegiality between the various disciplines. It is a useful platform for dialogues that can serve the inquiring mind to push the boundaries of teaching towards discovering new dispositions and innovations in the open and distance learning (ODL) environment. This group contributes to the Open Polytechnic's research strategy by serving as a seeding bed for further research and ongoing evaluation of the quality of teaching and learning. Discussions include pedagogical and technological approaches, innovative and transformative teaching practices, demonstrations and presentations of useful practices.

Discussions are kept informal to allow academic staff to freely express their views. However, the formalities associated with organising, facilitating, reviewing and reporting on the discussions are maintained to ensure the progress of the group is monitored and improvements are made where possible. The group meets on a weekly basis to organise the monthly sessions. The primary audience is Faculty, although discussions are open to anyone who is interested in joining the discussions.

Progress and initiatives taken

The progress of the TPDG has been significant over the years. The TPDG initially had a solitary member, but it has now grown into a four-member team that is responsible for organising the sessions. Discussions, which were initially held on a semi-regular basis, are now held regularly on a monthly basis. The continuous intellectual dialogues have been rewarding in terms of professional development and raising awareness of various matters associated with teaching and learning.

In an effort to raise the TPDG profile and gain stakeholder support, various initiatives have been taken. The terms of reference for the TPDG were prepared to clarify the purpose and objectives of the group. An informal email survey was circulated to understand the subject areas that staff members were keen to hear more about. This helped when setting discussion tracks for the sessions. Key points raised during the sessions were initially disseminated through a dedicated TPDG discussion forum. While this forum is still available for extended dialogues on any topic of interest, the information is now disseminated through the Open Polytechnic's intranet. TPDG intranet pages were developed to enable quick dissemination of information to a wider audience. Communication is kept as inclusive as possible, in order to attract the participation of staff in different roles. TPDG banners for different channels of communication (such as emails, documents and the intranet), intended for different purposes were developed to promote its presence and mission.

Any documentation to support the discussion sessions is prepared with the New Zealand Qualification Authority's requirements of self-assessment and external evaluation and review (EER) in mind (New Zealand Qualifications Authority, n.d.). An evaluation form was prepared to draw on the experiences of our participants and to gather their feedback, for continued improvements in terms of the quality of the sessions.

Future possibilities

The progress of the TPDG so far has been encouraging. Future possibilities are as follows:

- Developing the paradigm shifts needed to excel as ODL practitioners and achieve sustainability in the digital age. This includes aspects concerning the governance and management of our practices and processes, which contribute towards sustaining our students, the staff, the institution and the ODL environment at large.
- A stronger commitment towards self-assessment and EER requirements (New Zealand Qualifications Authority, n.d.) would help to promote sustainable practices, which will contribute towards the overall educational performance of the institution and in turn help it to gain recognition from external governing bodies.
- Engaging with other institutions to develop partnerships or pursue collaborative efforts will help to promote the work of the TPDG and increase the institution's profile as an open and distance education provider. The intra-organisational learning gained from the regular TPDG discussions and inter-organisational engagements will also contribute toward sustainability initiatives (Iarossi, Miller, O'Connor, & Keil, 2011).

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Enhancing the Engagement and Success of Distance Students through Targeted Support Programmes

Ron Grant, Glenda Olivier, Caroline Rawlings and Catherine Ross

Abstract

Tertiary student engagement and success is of strategic importance (Ministry of Education, n.d.), and success in terms of course and qualification completion is a key requirement of the government's funding regime. Yet many students do not complete their courses and qualifications successfully. When students study at a distance and are physically separated from teaching and support staff and other learners, study can be challenging and success elusive. Distance students often report feelings of isolation, little sense of connection and belonging, and difficulty maintaining engagement in and motivation for learning. However, early and appropriate learning support can have a positive and lasting effect on student success outcomes.

This paper describes three learning support programmes, delivered by the Learning Centre at the Open Polytechnic, aimed at enhancing the engagement and success of distance students (the Learning Centre is responsible for providing learning support services to students). The first is facilitated, online study skills workshops, designed to help students build the requisite skills for self-directed, independent study so that they continue that study and complete their courses successfully. The second is a peer-mentoring and support programme, informed by learning-motivation theory and a strengths-based approach, and focused on establishing relationships with students, helping them to make a positive start to their studies and persist with them. The third is an e-mentoring programme for indigenous students, which uses an appropriate cultural model in the design and operation of its online space. Anecdotal evidence shows an increase in the success rates of students participating in these programmes, in addition to high levels of student satisfaction with the programmes.

Editorial note

A glossary of Māori terms used in the course of this paper is provided at the end of the paper. Glossary terms appear in **bold** text where they first appear. Māori terms that are defined in the body of the commentary are not repeated in the glossary.

Introduction

Students bring to their study a wide range of backgrounds, experiences and expectations. Many have few or no formal qualifications and begin their tertiary education journey unprepared for the independent, self-directed learning that is required. Additionally, students can lack the academic skills necessary for successful study (Wingate, 2006; Kartika, 2007). When these factors come together in a distance learning environment, where students are physically separated from teaching and support staff and other learners, the isolation, coupled with a weak sense of connection to the learning community, means students can struggle to maintain their motivation and engagement in learning (Ross, 2009). Furthermore, studying is often just one of a variety of activities that students are involved in. Increasingly, students are in full-time or part-time employment, which means they have less time to devote to their studies. In 2010, 98 per cent of Open Polytechnic students were studying part time and 70 per cent were in the workforce (The Open Polytechnic of New Zealand, 2010).

Tertiary student engagement and success is of strategic importance (Ministry of Education, n.d.). While an increased level of success in terms of course and qualification completion is a key requirement of the government's funding regime, many students, particularly part-time students, do not complete their qualifications (Scott, 2009). Significantly more first-year students drop out of study than do returning students, and so the first-year experience is critical to student success (Earle, 2007; Krause & Coates, 2008). Early and appropriate learning support in the first year of study has a positive and lasting effect on student success outcomes (Crosling, Thomas, & Heagney, 2008; Earle, 2007; Gibbs, Regan, & Simpson, 2007).

This paper describes three support programmes aimed at enhancing the engagement and success of first-year distance students at the Open Polytechnic.

The first is facilitated, online study skills workshops, designed to help students build the requisite skills for self-directed, independent study so that they continue that study and complete their courses successfully.

The second is a peer-mentoring and support programme, informed by learning motivation theory and a strengths-based approach, which focuses on establishing relationships with students, helping them to make a positive start to their studies and persist to successful course completion.

The third is an e-mentoring programme for indigenous students, which uses an appropriate cultural model in the design and operation of its online space. This programme aims to improve student engagement and success by providing support that meets not only students' learning needs, but their cultural needs as well.

Facilitated online study skills workshops

Preparing students for learning can have a positive and lasting impact on their success. Study skills-development programmes are effective preparation (Kiernan, Lawrence, & Sankey, 2006) and help students to acquire the requisite academic skills (Groves, Bowd, & Smith, 2010), in addition to building confidence (Bailey, Derbyshire, Harding, Middleton, Rayson, & Syson, 2007). Study skills programmes delivered online offer distance students these same skill-development opportunities, in addition to providing a means to connect with other students and staff. Students respond well when technology fosters interaction and relationship building (Foster, 2011).

At the Open Polytechnic web-enhanced learning is considered part of mainstream education, and all programmes at Level 5 (equivalent to the first year of a degree) and above have an online component. Some students are comfortable with technology and online learning, but many find this environment challenging. These students report being anxious about their ability to cope with academic requirements, manage their time effectively and deal with the isolation of studying at a distance.

To help students prepare for online and distance study, the Learning Centre has developed two online study skills workshops: StudyWise and ExamWise. These workshops are aimed at increasing first-year student success by helping students to develop the requisite skills to succeed; promoting engagement with their studies, staff and fellow students; and enhancing their understanding of the Open Polytechnic's academic culture. The workshops are delivered each trimester and are free.

All online courses at the Open Polytechnic are accessed through the Online Campus, which uses Moodle course-management software. StudyWise and ExamWise workshops are also delivered on the Online Campus, which makes StudyWise the ideal vehicle to introduce students to online learning and ensure that they are familiar with their learning environment.

The workshops are advertised on the Online Campus and Learning Central (the Open Polytechnic's online study skills and support repository), and promoted by academic staff on their online course pages. Personal invitations are also sent to all first-year students and students identified as needing extra support. Key features of the workshops are that they are facilitated by learning advisers; they are asynchronous, flexible, and provide just-in-time learning; and they are available and accessible when needed, at times that suit students.

The StudyWise workshop aims to ease students' transition into distance tertiary education by providing them with an understanding of what is expected of them as online, distance students. StudyWise also presents a 'friendly face' to welcome students into what for some is a strange new environment.

The StudyWise online workshop starts 2 weeks before the commencement of each trimester and runs for 3 weeks. During this period students can access the workshop at any time and spend as much or as little time on it as they have available. Students typically spend between 4 and 8 hours working through the workshop resources and participating in the discussion forums. The workshop modules contain resources and activities covering all of the key academic skills areas. They are provided in a variety of formats, such as targeted readings, interactive exercises, audio and video clips, slideshows, hyperlinks to websites and facilitated group forums. StudyWise topics include:

- an introduction to the Polytechnic and Online Campus, the learning advisers who facilitate the workshop, and the workshop itself. Students are provided with information aimed at familiarising them with the Open Polytechnic. One behaviour associated with student success is making use of institutional resources, including support, so that they are also encouraged to seek timely assistance and view this as a strength, not a weakness
- organisation – students are encouraged to organise themselves, their study space and their files
- goal setting and motivation – the importance of goals and motivation is explained and students are encouraged to set personal goals
- time management – many students are time poor. It's essential that they learn to manage their time, plan their workload, and balance their work, life and study commitments
- learning preferences and study techniques – students explore their learning preferences and the different ways of learning, and study tips, techniques and strategies
- basic research – locating, evaluating and using information
- reading and writing for assessment, including writing online, netiquette, understanding and planning assignments, making notes, and editing and proof-reading

- APA referencing – why it's necessary and how to reference correctly
- plagiarism – what it is and how to avoid it.

The online forums, facilitated by a team of learning advisers, provide a safe place for students to develop and practise their online skills before the trimester starts. This is particularly useful for students who are not yet comfortable with online forums and feel nervous about participating. The forums can also provide a sense of community and belonging, which serves to counteract feelings of isolation and loneliness. In addition, the workshops provide an opportunity for students to interact with the learning advisers and access early, personalised support.

The ExamWise online workshop provides tips, strategies and techniques to help students prepare for and manage exams. The week-long workshop is offered each trimester, a month before exams start. It thus serves to motivate students and keep them on track for the final hurdle to successful course completion. ExamWise is also facilitated by learning advisers, and includes online forums. The forums are used mainly for motivation – students are encouraged to motivate one another – and for students to ask questions and obtain clarification of any issues regarding exams. ExamWise topics include:

- preparing for exams, including managing study time and planning for revision
- motivation – setting goals and the crucial role these can play in achieving study success
- concentrating and active learning – tips and strategies to help keep students on track
- revision strategies and memory techniques
- understanding and answering different types of questions
- managing and reducing stress
- what to do before, during and after exams.

The Learning Centre has been delivering online study skills workshops since 2007 and students have enrolled in increasing numbers since then. While around 20 per cent of first-year students participated in the ExamWise workshops in 2010, only 10 per cent participated in StudyWise. Increasing student participation in the latter workshop is a priority for the Learning Centre.

To date around 80 per cent of students who have participated in workshops have gone on to successfully complete the course that followed the workshop (participation is defined as logging in to the workshop at least once). This rate is higher than the overall successful course completion rate for first-year students, which was 60 per cent in 2010. However, the successful course completion figure for workshop participants must be interpreted with caution. It could be argued that it is the more organised and academically able students who take advantage of skill-development programmes, and that therefore the positive impact of such programmes on success is marginal.

Students who participate in the workshops report high levels of satisfaction with the workshops, as illustrated by the following feedback:

It covers study skills for distance learning with what to expect time management wise and how to set up your study area and also how to motivate yourself to study because the onus is on you to do it. I am new to online learning and I found moving systematically through the workshop eye-opening. I made sure I opened a wide variety of different links and windows, just to experience the new mode of learning. I am so glad to have become familiar with online learning through StudyWise.

And:

Sets everything out clearly and gives you confidence about exams. It is easy to use and very helpful. It makes me feel confident that I'm not alone in feeling anxious at exam time.

Student mentoring programme

As well as preparatory programmes and academic support, peer-mentoring schemes can contribute to increased levels of student success. Peer mentoring, where experienced students provide guidance and support to less-experienced students, is well established as an effective support strategy in tertiary education (Tahau-Hodges, 2010; Terrion & Leonard, 2007). Not only do mentoring programmes for first-year students contribute to increased self-esteem and academic confidence (Dewart, Drees, Hixenbaugh, & Thorn, 2006), but also students who participate in such programmes report increased feelings of belonging and a successful transition to university (Glaser, Hall, & Halperin, 2005). Mentoring programmes have also been proven to have a positive impact on the engagement and success of distance learners (Boyle, Kwon, Ross, & Simpson, 2010).

The Learning Centre developed its student peer-mentoring programme in 2005 and has further developed and refined it subsequently. In 2010 more than 4000 students participated in this programme. The programme's development has been informed by work carried out by Ormond Simpson at the United Kingdom's Open University and it is his model of proactive motivational student support (Simpson, 2008), in particular, that has informed the most recent delivery of the mentoring programme.

Simpson (2008) found that a combination of phone calls and a strength-based approach, using positive psychology, had a significant positive effect on the successful course completion rates of distance students. He argued that the traditional method of concentrating on weakness was not an effective way of improving student performance, and that research suggested people do best when they focus on their strengths. Louis (2009) concurs, and asserts that students who use their strengths more report increased engagement in and intrinsic motivation for learning. Furthermore, helping students become aware of their personal strengths boosts their self confidence and contributes to their development as autonomous learners (Macaskill & Denovan, 2011). With this in mind, Simpson suggests that peer mentors should concentrate on emphasising the positive during their contact with students. In other words, they should focus on students' existing competencies or strengths, draw out their past successes, and validate effort rather than achievement.

The student peer-mentoring programme has the following objectives:

- to welcome students to the Open Polytechnic learning community and help them make a positive start to their study
- to help students plan their study and manage assessment tasks
- to help students build confidence, work with their strengths and feel competent in their study
- to encourage students to contact their teacher or support staff with any concerns they have.

The programme offers support to all first-year students via telephone during weekday evenings, when students are most likely to be available to discuss their study. It is a programme of proactive contact with students, rather than one that relies on student self-referral. Contact occurs at times that have been identified as key points in students' progress through their courses, and is aimed at providing timely and appropriate support to enhance learning and encourage persistence.

The peer mentors contact students within the first 2 to 4 weeks of their course start date. The conversation focuses on getting started, confirming students' goals for study, and identifying strengths and how these can be applied to learning. Where appropriate, a discussion on preparing for and tackling the first assessment task might be included. Subsequent contact is made to see how students are progressing and, if necessary, give reassurance and encouragement to help keep them 'on track'. Mentors emphasise student effort where necessary and reinforce the notion that increased effort will increase their ability to learn.

In order for relationships and conversations with students to be authentic and meaningful and achieve positive results, careful selection and thorough training of the peer mentors is essential (Henry, Bruland, & Sano-Franchini, 2011). In our experience an effective peer mentor has a successful tertiary background, self-confidence, enthusiasm, cultural awareness, a lot of patience, and an ability to work in both a one-to-one situation and as part of a team. Terrion and Leonard (2007) concur, and list the characteristics of successful peer mentors as university experience, communication skills, supportiveness, trustworthiness, empathy, enthusiasm and flexibility.

Peer mentors are specifically recruited and are paid for the work that they do. They must be current students or recent graduates, but do not need to be studying in the same discipline as the students they support. They are chosen for their ability to empathise with diverse students, as well as a mature attitude

to cultural differences. Mentors receive training in the strengths-based approach and work from a script that provides a guide for conversation rather than a prescription for it.

Student responses to the mentoring programme have been very positive. Students tell us, both during conversations with peer mentors and through solicited feedback, that contact with the mentors is encouraging and motivational, and helps increase their self-confidence. A typical comment is:

I needed someone to look over my shoulder and the phone calls from the mentor helped me through a time when I didn't want to do any work. She also helped me work out some really good techniques to help me with my study.

Students also report that, among other things, the phone calls help them to develop a sense of belonging to the institution and a learning community, and they say this is important for their learning. As one student stated:

I felt really good after the mentor talked with me. Studying all by myself is very lonely so getting phone calls from her made me feel like I belonged to a group. It helped me keep going with my study.

These outcomes are supported in the literature. Glaser, Hall, and Halperin (2005) report on a project involving 1200 first-year students at the University of New South Wales that found that peer mentoring had a positive impact on students' successful transition to university and them feeling part of the university community. Similarly, a United Kingdom Staff and Educational Development Association report on student-to student support (Potter & Hampton, 2009) reveals that such support has a positive influence on students' academic achievement and self-confidence.

The peer-mentoring programme has had a positive impact on successful course completion rates too. During 2007, this programme, which involved approximately 2000 students, delivered a 6 per cent average increase in successful course completion rates. This outcome aligns quite neatly with results from similar programmes at the United Kingdom's Open University and Korea Open National University. An increase in retention of 22 per cent at the Open University is reported by Simpson (Boyle et al., 2010), but this was with just a small group of first-year students. Korea Open National University provides a bigger data set. It recorded a retention increase of between 5 per cent and 14 per cent for the 1900 enrolled and new students who took part in the mentoring programme, as opposed to those who did not (Boyle et al., 2010).

Tūakana-tēina e-Belonging: Culturally relevant peer mentoring

The positive outcomes delivered by the peer-mentoring programme at the Open Polytechnic have generated the design and development of an online mentoring programme for first-year **Māori** students. Māori students who participate in formal mentoring programmes are more likely to complete their courses successfully than those who don't (Tahau-Hodges, 2010). Furthermore, matching experienced students with first-year students in e-mentoring schemes has proven to be successful in helping students to engage with learning and persist with it (Dewart et al., 2006).

The e-mentoring programme, Tūakana-tēina e-Belonging, uses technology to best advantage to reach students and provide support that not only meets their learning needs, but their cultural needs as well. A strong sense of cultural identity is linked to academic success for Māori students (Adds, Hall, Higgins, & Higgins, 2011). The e-mentoring programme is about **whakawhanaungatanga** in cyberspace, and is aimed at building an online learning community and fostering students' connection with and belonging to that community. Evidence from previous studies at the Open Polytechnic reveals that Māori students consider 'a sense of belonging' and 'a place of belonging' to be critical factors for their academic success (Ross, 2009).

Deci and Ryan (2000) suggest that to be fully engaged and successful students must feel accepted and affirmed, and that they belong. However, many students with cultural backgrounds that label them 'non-traditional' do not have that sense of belonging, and they often feel uncomfortable in traditional institutions (Laird, Bridges, Morelon-Quainoo, Williams, & Holmes, 2007). Consequently, they do not feel engaged; nor do they feel supported. Feeling unsupported can be stressful to students. When Māori students experience stress and discomfort, they are likely to experience a lowered sense of well-being, reduced motivation and less enjoyment of their learning (Gavala & Flett, 2005).

Rather than leaving it to students to seek a sense of connection and belonging, institutions need to adapt their cultures and environments to meet the needs of students from diverse backgrounds (Johnson et al., 2007). Mentoring programmes have proven helpful in creating more culturally responsive environments (Goh, Seet, & Rawhiti, 2011). The Tūakana-tēina e-Belonging programme, with its purpose-built online space, signals the Open Polytechnic's commitment to supporting its Māori students in culturally relevant ways.

Tūakana-tēina e-Belonging is a mentoring programme that takes place in an online space that has been specially designed, both visually and structurally, to reflect Māori practice. The space has been named the iWhare, which reflects twenty-first century e-learning, incorporating **kaupapa Māori** pedagogy for a distance learning environment. It is a place for Māori students to connect and establish relationships with other Māori students during their first trimester of study. The programme aims to foster a 'sense of belonging' (whanaungatanga) and a 'place of belonging' (turangawaewae) among the students.

The concept of tuakana-teina is not new, and within a kaupapa Māori context it literally means 'older sibling looking after younger sibling'. In the learning context, however, it has taken on the meaning of a more-experienced student (tūakana/mentor) looking after and guiding a newer student (tēina/mentee) in a holistic manner. Peer mentoring within kaupapa Māori is based upon Māori values and principles, which set the framework for the Tūakana-tēina e-Belonging programme. Tūakana-tēina e-Belonging is also informed by a number of theoretical frameworks, including Māori pedagogy, positive psychology and a strengths-based approach.

Using a Moodle platform, the online mentoring space has been designed to reflect a dual purpose: to encourage academic learning; and to replicate the values, principles and customs of a **marae** complex. To this end the online site comprises three separate spaces, so that the key Māori concepts of **whānau**, **aroha**, **manaakitanga**, **rangatiratanga**, **kotahitanga** and **kaitiakitanga** are visible and active. The three spaces are Whānau, Iwi and Wahi Akoranga, and they serve different purposes.

Whānau

Whānau comprises individual spaces for each small whānau group of tūakana and their tēina. Each space is visible and accessible only to those who belong to it. The Whānau space has been purposefully set up to replicate the notion of whānau, whereby students and their mentors can talk about their **whakapapa**, their learning and other cultural issues in a private space.

Iwi

Iwi is a single space that is accessible to all whānau groups. It replicates the notion of iwi on a marae, whereby discussions, conversations and debates are held in the **wharenuī** and everyone is involved. The protocol for meetings held in a wharenuī is very different from those held elsewhere, and participants have to learn the required etiquette for speaking. This requirement is replicated in the Iwi space, and tūakana and tēina are given guidelines on etiquette.

Wahi Akoranga

Wahi Akoranga (training space) is accessible only to the tūakana. In kaupapa Māori there are some elements of learning that are dedicated to the learner and others that are dedicated to the teacher. This is where the notion of tohunga (learned expert) has its place in Māoridom.

The Whānau, Iwi and Wahi Akoranga spaces provide a suitable online environment within which tūakana can mentor and support tēina effectively. For cultural values and knowledge to be expressed within a kaupapa Māori context, the selection of ‘learned experts’ is paramount. Tūakana are experienced and successful students, who are not necessarily studying the same subjects as the students they mentor. They are selected on the basis of their academic record and knowledge of kaupapa Māori. Tūakana must be willing to support a small group of first-year students for the duration of a trimester and be available to their group for approximately 5 hours a week. They are not paid for the mentoring, but they do receive a koha (donation). One student who agreed to participate in the programme as a tūakana said:

I am keen to help support and guide other students through their learning and I can't wait to see where this journey takes me.

Tūakana participate in an online training programme before they begin mentoring tēina. The training programme has been carefully planned so that tūakana engage fully with it. The following requirements were incorporated into its design:

- creation of a sense of kanohi-ki te-kanohi (face-to-face) interaction
- implementation of Māori pedagogy
- facilitation of online **kōrero** using kaupapa Māori concepts.

The training programme comprises six modules. These reflect the above requirements, while at the same time using kaupapa Māori and e-learning practices to ensure that the training is successful. Each training module is staircased to maximise both learning and training, and the modules are interlinked, motivating, engaging and fun. To date, all of the tūakana who have completed the training programme have reported that they feel fully prepared and ready to mentor their tēina online.

The Tūakana-tēina e-Belonging programme is in its first year of operation, so no conclusions about the extent of its success can yet be made. Nor can the question 'Is it possible to create a virtual sense of belonging?' (Huijser, Kimmins, & Evans, 2008, p. 54) be answered. However, preliminary evidence and feedback from tēina indicate that involvement in the programme is helping tēina feel connected and supported, both culturally and academically, as they manage the demands of their first year of distance study. Typical comments are:

It's been great to meet with other Māori learners and from the kōrero we are all doing really well. What I like about this kōrero – it's different because we talk about whānau, our whakapapa, our tūpuna. But at the same time we are helping each other with our study.

And:

A real bonus for me is being able to kōrero with others and listen to the success stories.

This preliminary evidence suggests that the Tūakana-tēina e-Belonging programme may help dissolve some of the challenges first-year Māori distance students face by weaving together Māori culture, pedagogy and the online environment to support and enhance their learning.

Conclusion

This paper has described three different learning support programmes for first-year distance students and considered the impact of those programmes on student engagement and success outcomes. While the majority of students participating in the online study skills workshops report high levels of satisfaction with their workshop experiences and go on to complete their first course successfully, a more in-depth examination of the impact of the workshops on student learning is required. For example, what impact does workshop participation have on the qualification completion rates of students? Furthermore, is the development of the skills students need for effective study best delivered within a generic framework? This 'bolt-on' approach to study skills development has been criticised (Wingate, 2006), and it is suggested that such development is effective only when it is embedded in discipline-specific content (Groves et al., 2010). We agree, and therefore more work needs to be done towards this end.

The results achieved by the two mentoring programmes suggest that peer mentoring is valued by students and contributes to successful outcomes for them. By harnessing both 'low-tech' (telephone) and 'high-tech' (online) tools, and underpinning their use with appropriate pedagogy, peer mentoring has the potential to enhance the learning experience of diverse students in their first year of distance study in significant ways.

Overall, the results of the three approaches in terms of supporting first-year students studying at a distance suggest the programmes are working well. However, more work can be done to ensure that we continue to develop and deliver the most effective learning support programmes to meet diverse students' needs and promote study success.

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Glossary of Māori terms

Note: Many of the descriptions used in this glossary are specific interpretations for the purposes of the Tūakana-tēina e-Belonging programme and do not denote the fullness of meaning normally associated with the word or term.

Aroha	To care; affection
Kaitiakitanga	Guardianship; trustee
Kaupapa Māori	Things Māori
Kōrero	Discussion
Kotahitanga	Collaboration, standing together as one
Manaakitanga	Caring for others, being generous, empowering, respecting others
Māori	New Zealand's indigenous people
Marae	Meeting place
Rangatiratanga	Self-awareness, self-esteem, confidence
Whakapapa	Connection, identity
Whakawhanaungatanga	Building relationships
Whānau	Family
Wharenui	A meeting place; meeting house

Engaging Distance Students in Learning: What Matters to Students, What Motivates Them and How Can Engagement in Learning Be Fostered?

Catherine Ross

Abstract

The engagement, retention and success of tertiary students in New Zealand is of strategic importance, and improving student success remains a focus of government and tertiary education organisation policy and practice. However, engaging and retaining students can be particularly challenging in a distance learning environment where students are separated from teaching and support staff and other learners. In such an environment students often report feelings of isolation, little sense of connection and belonging, and difficulty maintaining engagement in and motivation for learning. This paper reports results from a case study on first-year student engagement at a distance learning institution in Aotearoa New Zealand. Using survey and interview data, the study examined a number of aspects of student engagement: transactions within the institutional setting, including teachers' work and institutional culture; student motivation; influences external to the institution; and demographics. Findings revealed that the institution and the teachers played a significant role in whether or not students engaged in learning at optimum levels. Students' own motivation for learning also played a vital role.

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Introduction

The engagement, retention and success of tertiary students in New Zealand is of strategic importance, and improving success remains a focus of government and tertiary education organisation policy and practice (Ministry of Education, n.d.). How to achieve success, as measured by student retention, has been the central focus of much research over past decades. More recently researchers have examined student engagement, because students who are fully engaged in their studies are more likely to persist and successfully complete them (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006).

The literature offers a number of definitions of engagement. Chapman (2003) suggests that engagement is students' active participation and cognitive investment in their learning, in addition to an emotional commitment to it. Kuh (2004) declares it is the effort students dedicate to learning activities. However, it is the Australian Council for Educational Research's (2008, p. vi) definition of engagement, where students are positioned as being involved 'with activities and conditions likely to generate high-quality learning', that reveals that engagement is more than simply the outcome of student effort. Indeed, certain conditions and activities are needed in order for students to be successfully engaged in learning. Those activities and conditions sit within institutional structures and cultures (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005), relationships between students and teachers, and students and students (Umbach & Wawrzynski, 2005), students' motivation for learning (Schuetz, 2008), and factors external to the learning environment (McInnis, 2003).

However, engaging and retaining students can be particularly challenging in a distance learning environment where students are separated from teaching and support staff and other learners. In such an environment students often report feelings of isolation, little sense of connection and belonging, and difficulty maintaining engagement in and motivation for learning (Ross, 2008). Unfortunately, the student engagement literature is largely international. While there is a small body of work arising from the New Zealand context, there is very little that reports outcomes for students in open and distance learning (ODL) in that context. So while the existing literature might help to shed some light on ODL student engagement in Aotearoa New Zealand, it is more likely that investigation of that particular environment will yield more useful findings.

This paper reports results from a case study on first-year student engagement at an ODL institution in New Zealand. The study examined a number of aspects of student engagement: transactions within the institutional setting, including teachers' work and institutional culture; student motivation; influences external to the institution; and demographics. In addition to reporting the case study findings, this paper outlines some ways in which the institution in the study and its teachers might foster students' engagement in learning.

Review of student engagement literature

Institutions have a significant role to play in engaging students successfully. Successful institutions establish cultures that focus on student success, emphasise student learning in their mission, hold high academic expectations of students, aim for continuous improvement, invest money in student support services, value diversity, and effectively prepare students for learning (Kuh et al., 2005). In short, institutional learning environments matter.

Engagement with learning is enhanced in environments where institutions provide a comprehensive programme of academic and other support, particularly in the first year (Reason, Terenzini, & Domingo, 2006), along with an inspiring curriculum in which skill development is embedded (Kift, 2004). Similarly, preparing students for learning can have a long-lasting and positive impact on engagement and success. Successful preparatory programmes include first-year seminars, transition and bridging programmes, and orientation processes (Kuh et al., 2006; Pittaway & Moss, 2006; Youl, Read, & Schmid, 2006). Study skills development programmes (for example, essay planning) can be effective, especially where such planning comprises a component of the final course assessment (Kiernan, Lawrence, & Sankey, 2006). Equally effective are learning to learn programmes, particularly where those programmes are embedded in discipline-specific content. Zeegers and Martin (2001) found that students who participated in a learning to learn programme in an introductory chemistry class were less likely to engage just in surface learning. In addition, these students achieved better assessment results, and more of them persisted with their studies compared with the previous year's cohort.

In addition to preparatory programmes and academic support, peer-mentoring schemes are said to contribute to increased levels of student engagement and achievement. Dewart, Drees, Hixenbaugh and Thorn (2006) describe a mentoring programme for first-year students that resulted in increased self-esteem and academic confidence in those students who participated compared with those who did not. Likewise, Glaser, Hall, and Halperin (2005) report that students who took part in peer mentoring attributed their successful transition to university, a feeling of belonging and the development of academic skills to the mentoring programme, indicating that students directly value such programmes for their own learning and institutional engagement.

Just as influential as mentoring and other support programmes in achieving optimal levels of student engagement is the extent to which diversity is positively reflected within institutional environments (Te Tari Mātauranga Māori, 2007). Johnson et al. (2007) found that the racial climate in an institution, as indicated by students' perceptions of whether or not they felt accepted and respected by students and staff from racial/ethnic groups different to their own, had a significant effect on the degree to which students felt comfortable and included. Feeling comfortable and included leads to a sense of belonging that is positively implicated in students' levels of engagement – when students feel accepted and that they belong, their engagement with learning is strengthened (Deci & Ryan, 2000; Read, Archer, & Leathwood, 2003).

Equally critical for student engagement is the learning relationship between teacher and student. Mearns, Meyer and Bharadwaj (2007) assert that students work harder and express their opinions more readily when teachers are approachable, organised, well-prepared and sensitive to students' needs. Bryson and Hand (2007) agree. Enthusiastic teachers who spend time developing relationships and trust with students are more likely to engage them in learning than those who do not. Reason et al. (2006) also maintain that teachers play a significant role in student success. Their study revealed that students who thought their teachers had given them academic support achieved more highly than those who did not. In the same vein, Kuh et al. (2005) declare that when teachers establish high academic standards and support students in achieving these standards, students do so. Kuh et al. (2005) also claim that assigning students challenging assessment tasks strengthens engagement, but only when prompt and detailed feedback is given. There is further literature that positions teachers at the centre of student engagement (Kuh et al., 2006) and argues that teachers' attitudes and behaviours have a direct and significant effect on students' engagement with learning (Umbach & Wawrzynski, 2005).

While interactions between teachers and students have an influence on whether or not students engage successfully, so too do those between and among students themselves. Moran and Gonyea (2003) found that students attributed their study success to the academic interactions they had with their peers, rather than those with teachers or their own efforts. Others (Lambert, Terenzini, & Lattuca, 2007; Umbach & Wawrzynski, 2005) discovered that engagement and success was particularly strengthened when students worked with their peers in groups and on collaborative learning tasks. Krause (2005) agrees that working together in groups has a positive impact on student achievement and claims that the same is accomplished when students work together in learning

communities. Furthermore, students' sense of belonging is strengthened through their participation in such communities. In a similar vein, Zhao and Kuh (2004) argue that students apply more effort to their learning and are more deeply engaged in it when they take part in learning communities.

While relationships with peers and positive interactions with teachers lead to increased engagement with learning, students must still be motivated and willing to engage. Indeed, motivation is seen as a primary driver in engagement for learning (Yorke & Knight, 2004) and in student success (Simpson, 2008). Being motivated and willing to act are strong influences on whether or not learners engage (Ainley, 2006; Schuetz, 2008). There are a number of theories of learning motivation (Simpson, 2008) and some suggest that learners are motivated by an intrinsic interest in the subject (Venturini, 2007) or by particular personality traits (Caspi, Chajut, Saporta, & Beyth-Marom, 2006). Others propose that learners' self-efficacy (Yorke & Knight, 2004; Llorens, Schaufeli, Bakker, & Salanova, 2007) and confidence in their own abilities (Fazey & Fazey, 2001) are key motivational drivers for engagement. However, Schuetz (2008) declares Deci and Ryan's (2000) theory of motivation, self-determination theory (SDT), to be the theory that best explains learner motivation for engagement. SDT positions learners as individual agents who are active within their social environments and have clear goals for their learning and positive self-theories.

Despite students being strongly motivated to engage with their learning, and teachers and institutions providing optimal learning environments, influences external to those environments that are integral to students' lives and identities (Kasworm, 2003) can work to undermine student engagement. These influences include family and employment commitments, and personal, social and cultural factors. The pressures that arise from these influences play a significant role in determining whether or not students persist with their studies. Burtenshaw, Ross, Bathurst, Hoy-Mack and Zajkowski (2006) found that distance learning students who considered withdrawing from study did so because of such pressures. Dealing with personal problems and the demands of family can be stressful and force students to reconsider their commitment to study and whether or not to continue (Ross, 2008). Studying part time is also associated with lowered levels of engagement and success (Earle, 2008; McInnis, 2003; Scott, 2009). Part-time study is increasingly common, as students take on paid employment in order to support themselves. Krause, Hartley, James and McInnis (2005) found that full-time students in paid work reported that work interfered with their studies and their level of academic achievement.

The literature reviewed here presents student engagement as complex and influenced by myriad factors. While some literature argues that student motivation and effort is a key factor in engagement, other work claims it is the way educators practise and relate to their students that has the greatest impact. Other literature highlights the critical roles that institutional structures and cultures play in engaging students successfully. This study investigated the question of how the institutional environment, student motivation and external factors influence student engagement with learning in a distance learning setting, with the purpose of understanding what influences student engagement in an ODL institution in New Zealand.

Research method

The research employed a case study method. The case study institution was located in New Zealand. It was of medium size (approximately 22,000 students), and delivered a variety of vocationally focused sub-degree programmes, and some degree programmes, via distance learning to mostly part-time learners in the workforce. The project was approved by the institution's ethics committee.

The case study integrated a survey and semi-structured interviews to seek the views of students enrolled for the first time with the case study institution. The survey, comprising a forced-choice questionnaire, contained four scales, gauging transactions within the institutional setting, including teachers' work and institutional culture; motivation; influences external to the institution; and demographics. The questionnaire transaction scale comprised 26 items divided into three clusters: relational transactions between teachers and students; learning transactions within the wider institution; and the effects of teaching and environment. Each item had two subscales: how important that item was for learning; and how well it was done. The importance subscale was divided into four choices: very important; important; little importance; no importance. Similarly, the 'how well was it done?' scale comprised four choices: very well; quite well; not well; poorly.

Twenty-four items were used to determine students' motivational needs as identified by Deci and Ryan's (2000) SDT, namely competency, agency and relatedness. Students were asked how important each item was in motivating them to engage. A separate scale (10 items) was included in the questionnaire to determine how often (monthly, weekly, daily) students acted on their motivations. Students were asked to indicate the frequency with which they acted on competency, agency and relatedness items. Semi-structured interview questions were based on findings from the student survey. These aimed to explore the issues that emerged in more depth.

Participants

The paper-based survey was sent to a sample (900) of students enrolled for the first time that was representative of the gender, age and ethnicity of the institution's student population. A total of 82 responses were received. The response rate was a disappointing 9 per cent.

Of the students who returned questionnaires, 52 per cent were female. Ten per cent of the students were Māori and 6 per cent Pasifika. Only 6 per cent were aged 20 and under. Part-time students made up 73 per cent of the group and 52 per cent were studying at certificate level.

Ten students who had returned completed questionnaires were interviewed – six female and four male. Every third student from the list of those who had returned interview consent forms was selected, until 25 students had been chosen. Each student on the list was contacted by telephone to arrange an interview time. If a student was unavailable, the next student on the list was contacted. This process was repeated until interviews with 10 students had been arranged.

Analysis

Survey data was analysed by a statistician using SPSS software to produce a simple percentage frequency distribution table. The 'very important' and 'important' scores were combined and results summarised in bar graphs. High importance items are those that over 80 per cent of respondents thought were important or very important. Medium importance identifies items that between 50 and 79 per cent of respondents thought were important or very important. Low importance items are those considered to be important or very important by fewer than 50 per cent of respondents. The interviews were transcribed and data analysed to identify statements that offered further explanations for the key findings from the survey.

Findings

Transactions within the institutional setting

High importance

Of the 26 items in the transaction scale, students indicated that 13 were of high importance on the importance subscale. Figure 1 presents these results.

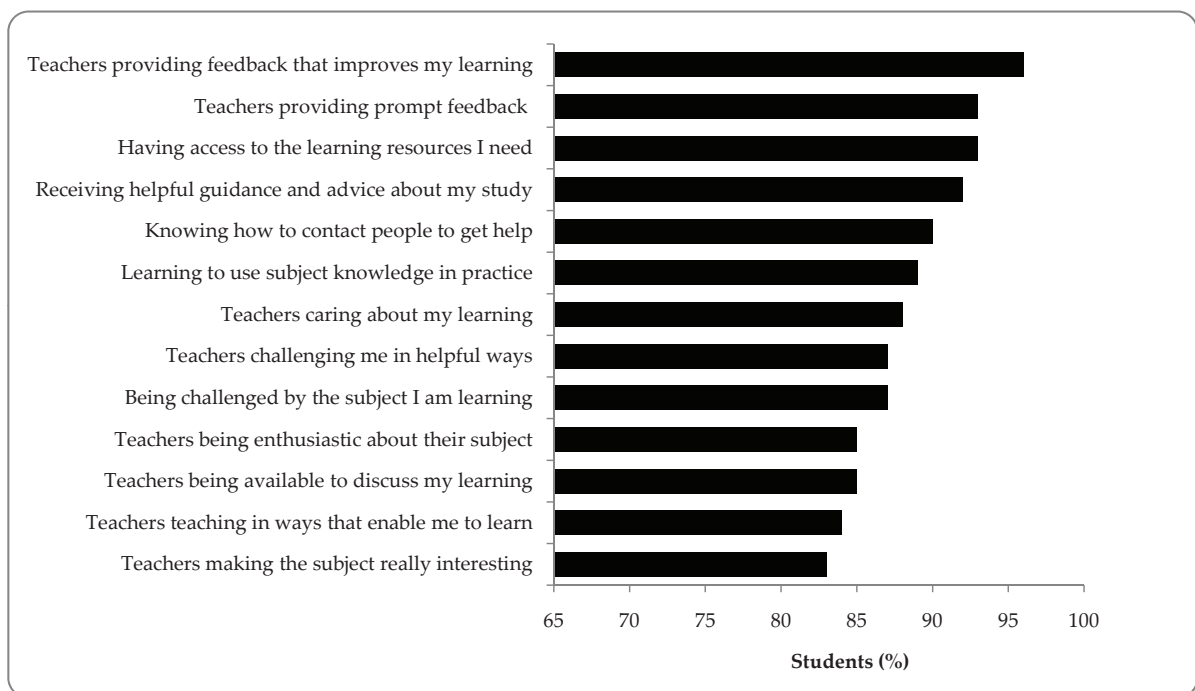


Fig. 1 Institutional items of high importance to students' learning

The majority (eight) of high importance items concerned relational interactions between teachers and students. Three items concerned learning interactions within the wider institution. Students also said it was important for them to be challenged by their subjects and able to put what they learned into practice.

The interview data provided further explanatory details. In their interactions with teachers, students appreciated those who were responsive and supportive:

She rang me to see how everything was going. It wasn't important, but it was awesome that she took the time. It was really quite personal instead of just being another person's work to check. (S5, p. 3)

When teachers were unresponsive students noticed and this had an impact on their attitude to learning:

It really drummed home that you are on your own and it's not that I needed support it was just that with extramural learning you can sort of leave it and I think if he had dropped in at six months to see how I was going it might have buoyed me up a little more. (S4, p. 3)

It was important to students that teachers were available and approachable, which enabled the acknowledgement of mistakes as part of the learning process:

She is very approachable . . . I have already rung her once about something. I knew I had done wrong but she said don't worry about it because it's the first year and you are allowed to make mistakes and she was very helpful. (S2, p. 2)

Students also said it was important that their teachers cared, as this was another demonstration of support, which was also personalised:

I found that the tutors were just really there for you; there was communication all the time, not in your face, but you felt they were there for support. They rang personally three or four times without me asking to find out how I was going and it really boosted me because it was the first time I had studied in a long time and to hear that from a tutor was just fantastic. (S8, p. 1)

Some students wanted a close relationship with their teacher. For instance, in response to a question about the importance of relationships and regular contact with teachers, one student stated:

Yes, definitely a big factor. You need someone to talk to when you are doing correspondence work. (S7, p. 3)

Other students didn't feel the need:

I'm not really worried about having a close student/teacher relationship. I guess as a learner I can work things out for myself. (S3, p. 4)

Receiving prompt feedback that improved their learning was particularly important to students. In fact, this item was the most important of all the high importance items in Fig. 1. When feedback on assignments was not forthcoming, students' learning suffered:

I've been a bit disappointed over how long it has been taking to get them back. You put all this work in and you are thinking how you have done and it kind of impacts on the next assignment. If I've made some huge mistakes I want to know now so I can think about the next assignment. (S8, p. 2)

In addition to showing the importance to students of relationships with their teachers and other students, Fig. 1 reveals the wider institutional interactions and activities that were also very important, namely accessing resources, receiving advice and guidance for learning, and knowing how to contact the right people.

Students said it was essential for them to receive the right information and that people were helpful. When asked about the ease of access to information and how important it was that people were helpful, one student remarked:

I think it's very important. I was worried about doing it wrong so you need people to deal with who are helpful and pleasant on the phone – didn't want some old battleaxe. No one wants to feel they can't ring up and get information if they need to. (S6, p. 3)

They also needed services that were responsive. Many students used the institution's library and appreciated the responsiveness of that service:

They are very helpful and will always go out of their way to make sure the books are sent to you straight away. Like one lady photocopied the whole of *Te Whariki* for me and posted it to me and said I could keep it so that would have been a lot of time for her to do that and I really appreciated that. (S2, p. 3)

While students made quite high use of the library, they most frequently used the internet to access relevant information to support their study. A number of students not only used the internet to access information, but also to increase their understanding of a particular subject or concept:

I will read it a few times just to make sure my brain is working and then I will carry on reading past it and come back with fresh eyes and then if I'm thinking I can't get this I will go on the internet and Google it. (S4, p. 5)

Accessing the internet was for some students the means through which they could be completely independent in their learning and not have to rely on teachers or other staff for help:

It would take longer because I know exactly what I need . . . if you have someone on the phone or use e-mail it takes so much longer. It's easier to skim a few articles or websites and get the information and so on. (S1, p. 2)

Additionally, some students said they had found that the resources provided on the institution's online learning management system were very useful.

Medium importance

Figure 2 presents those items that students deemed to be of medium importance to them. Of the 26 items in the transaction scale, 10 were of medium importance on the importance subscale.

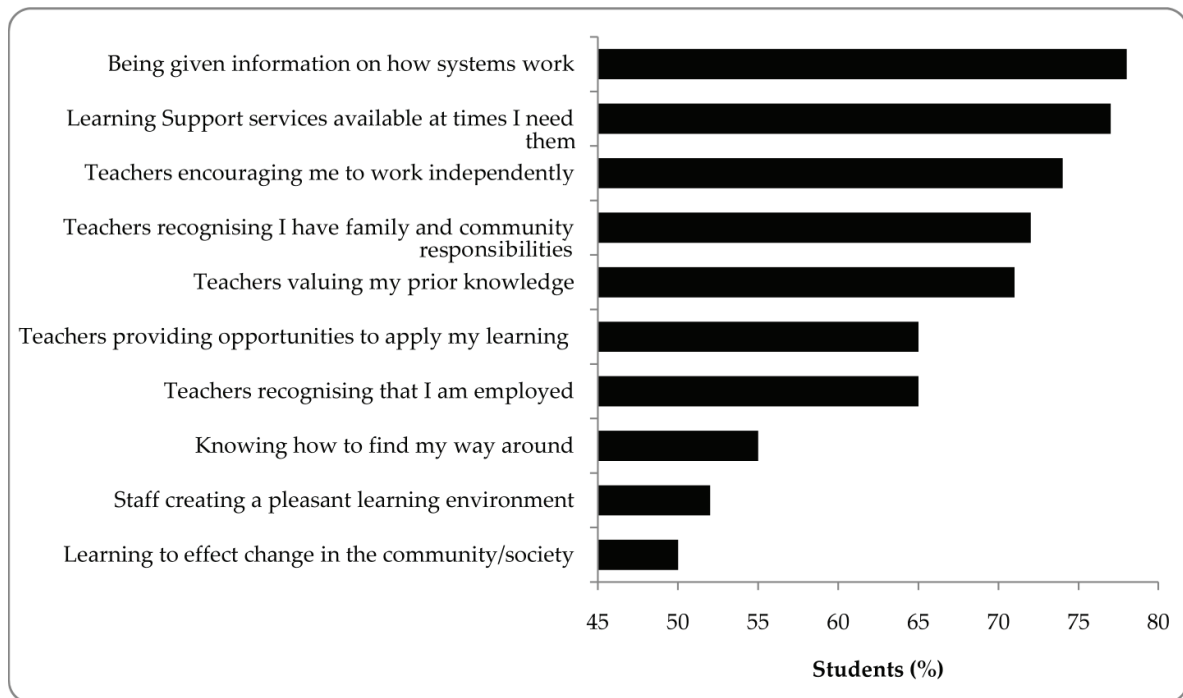


Fig. 2 Institutional items of medium importance to students' learning

The finding worthy of note here is students' use of the institution's learning support services. While the students who completed the survey said it was quite important for learning support services to be available, very few of those interviewed said they had used these services. A number of students said that they hadn't needed to because they could manage on their own:

I don't need academic assistance and there isn't a lot of external research required in my course and what there is I manage to do. (S9, p. 2)

One student said she hadn't bothered using learning support services because she perceived it as a bit of a hassle. Most students reported that they used non-institutional support – for example, employers, friends and family. Many students were part-time students who were working full time:

I talk to my employer because he is qualified and he is really helpful ... pretty much all my questions he has been able to answer. (S3, p. 2)

Other students relied on family and friends for support:

I have a good support network around me: a great flat mate who's been to University, she's been there and done that and she's given me tips about time management and my mum has been pretty good. (S5, p. 2)

Low importance

Finally, of the 26 questionnaire items only three items were given a low importance score by the students. Students did not consider that being encouraged to work with other students, questioning teachers' practice, or having their cultural background respected were important for their learning.

While working with other students was least important for students' learning, some said they really enjoyed it:

The tutors encouraged a lot of student interaction online which I really enjoyed. I got a lot of encouragement and support from the other students and a lot of good ideas – we could bounce ideas off each other and I learnt a lot. (S8, p. 1)

Other students thought that interacting online with fellow students could be beneficial:

Forums, chat areas or some sort of collaborative environment where students can catch up and exchange ideas would be a useful adjunct to the course. (S9, p.5)

Performance and importance ratings

In the second subscale of the questionnaire transaction scale, students were asked to score how well the items were performed by the institution. In order to quantify how well the 26 items were performed in the institution, the differences between the scores for importance and performance were examined. For every item the institution showed a percentage difference between ratings for important/very important and perceptions of how well they were performed. Where percentages for the 'how well was it done?' response exceeded the percentage response for 'importance', student expectations could be said to have been met. On the other hand, where respondents scored items more highly on importance than on how well things were done, student expectations were not met.

The extent to which these differences could be due to chance was examined using the t test for dependent means, in which the mean scores of importance and performance are correlated to produce an indicator of significance. Where the t test indicated that the probability of differences being due to chance was less than 5 per cent ($p < .05$), the difference was considered to be significant. In Fig. 3 the plus (+) and minus (–) signs are used to show where the differences were significant. The minus signs indicate where importance scores exceeded performance scores significantly, while the plus sign shows where the institution's performance exceeded importance significantly. Eighteen of the 26 items showed significant differences between importance and performance. Overwhelmingly, these differences showed performance not meeting

expectations. These results are shown in Fig. 3. Importance has been divided into its three frequency bands: 'H' for high importance items; 'M' for medium importance items; and 'L' for items of low importance.

1. Teachers providing prompt feedback	Importance	H
	How well	–
2. Teachers providing feedback that improves my learning	Importance	H
	How well	–
3. Teachers challenging me in helpful ways	Importance	H
	How well	–
4. Teaching making themselves available to discuss my learning	Importance	H
	How well	–
5. Teachers teaching in ways that enable me to learn	Importance	H
	How well	–
6. Teachers making the subject really interesting	Importance	H
	How well	–
7. Teachers valuing my prior knowledge	Importance	M
	How well	–
8. Teachers being enthusiastic about their subject	Importance	H
	How well	–
9. Teachers encouraging me to work independently	Importance	M
	How well	–
10. Teachers encouraging me to work with other students	Importance	L
	How well	–
11. Teachers recognising that I am employed	Importance	M
	How well	–
12. Teachers recognising that I have family and community responsibilities	Importance	M
	How well	–
13. Learning support services being available at times I need them	Importance	M
	How well	–
14. Receiving helpful guidance and advice about my study	Importance	H
	How well	–
15. Knowing how to find my way around	Importance	M
	How well	–
16. Teachers providing opportunities to apply my learning	Importance	M
	How well	–
17. Being given information on how systems work	Importance	M
	How well	–
18. Knowing how to contact people to get help	Importance	H
	How well	–
19. Being challenged by the subject I am learning	Importance	H
	How well	–
20. Having access to the learning resources I need	Importance	H
	How well	–
21. Having my cultural background respected	Importance	L
	How well	+
22. Teachers caring about my learning	Importance	H
	How well	–
23. Learning to effect change in the community / society	Importance	M
	How well	–
24. Being encouraged to question teachers' practice	Importance	L
	How well	–
25. Staff creating a pleasant learning environment	Importance	M
	How well	–
26. Learning to use subject knowledge in practice	Importance	H
	How well	–

Fig. 3 Institutional items important to students' learning and how well they were done

Student motivation

High importance

Of the 24 motivational items, nine were of high importance. Figure 4 shows that students placed a high value on agency and on feeling competent in their study. Agency and competency were equally important.

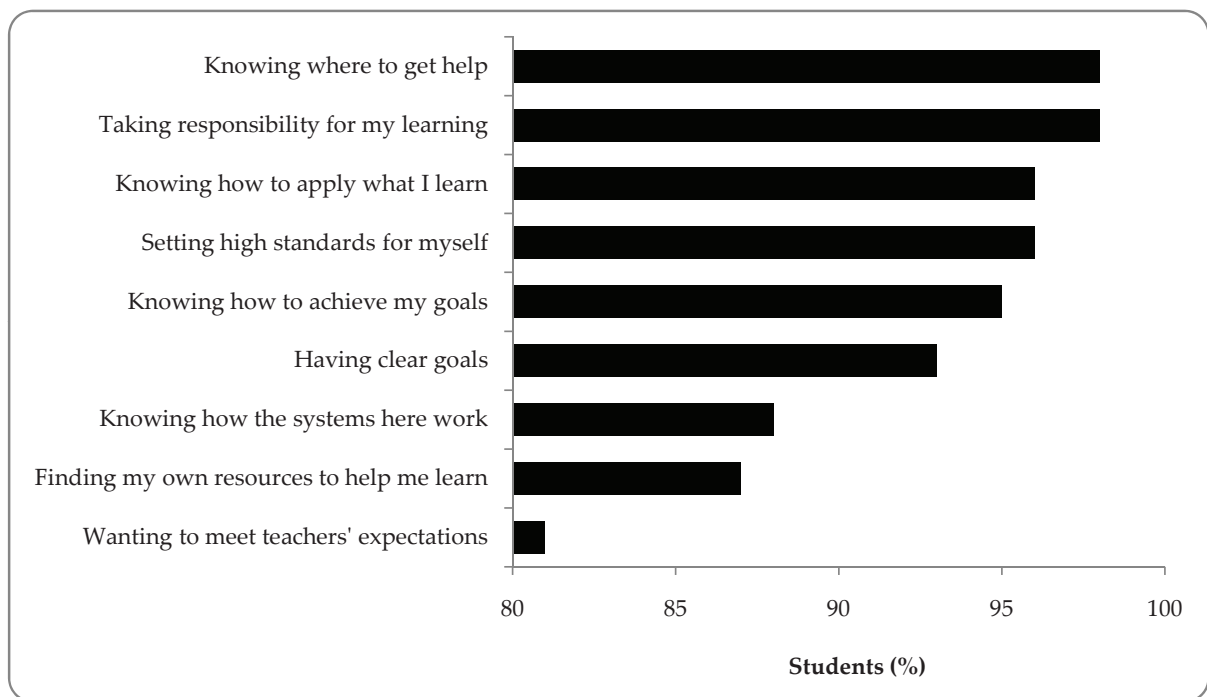


Fig. 4 Motivational items of high importance to students' learning

Interview data revealed that students were keen to take responsibility for their own learning. They liked working on their own and finding their own resources. They knew where to get help and would access support services only if needed:

Maybe it's a bit arrogant of me to think I don't need support but part of me thinks if I needed it I would be quite confident asking for it. (S4, p. 2)

Students also set high standards for themselves:

I like to achieve and I want to do well so I put in more than most and I enjoy learning the peripheral information as well. (S10, p. 5)

Although not everyone did:

I try not to get too hung up on my assignments being perfect. I just let it go. (S1, p. 2)

Students' motivation was also strongly related to their learning. As seen in Fig. 4, having clear goals and knowing how to achieve them were important motivators for engagement. Unsurprisingly, most goals were related to jobs and careers. One student said:

I am doing an advanced marketing course to enhance my career. I have done some marketing, but very little and it is basically to further my career. (S10, p. 1)

Another was passionate about her field of study:

I'm really keen to know more about environmental issues. I'm very passionate and I'm hoping to find some employment in that field. (S7, p. 1)

One student explained how she used her study goals to stay motivated and manage her workload:

Keeping an eye on my ultimate goal . . . taking things one step at a time rather than getting overwhelmed by the course as a whole. (S6, p. 1)

Figure 4 also shows that knowing how to apply what is learned was important to many students. Being able to apply their learning to the real world was highly motivational:

If the assignment relates to a real world scenario then I really enjoy that . . . the theoretical side and the real world and linking the two together I find very interesting. (S8, p. 1)

Medium importance

Of the 24 motivational items, six were of medium importance. Figure 5 shows that when items of medium importance are taken into consideration, students were most strongly motivated overall by competency items. Some relatedness items were also important. Students wanted to feel valued, be accepted by their teachers and meet teachers' expectations. Some also needed to feel that they belonged:

Emails from the tutors and support from the other students, just having a chat online has been good, it makes you feel like you belong. (S8, p. 4)

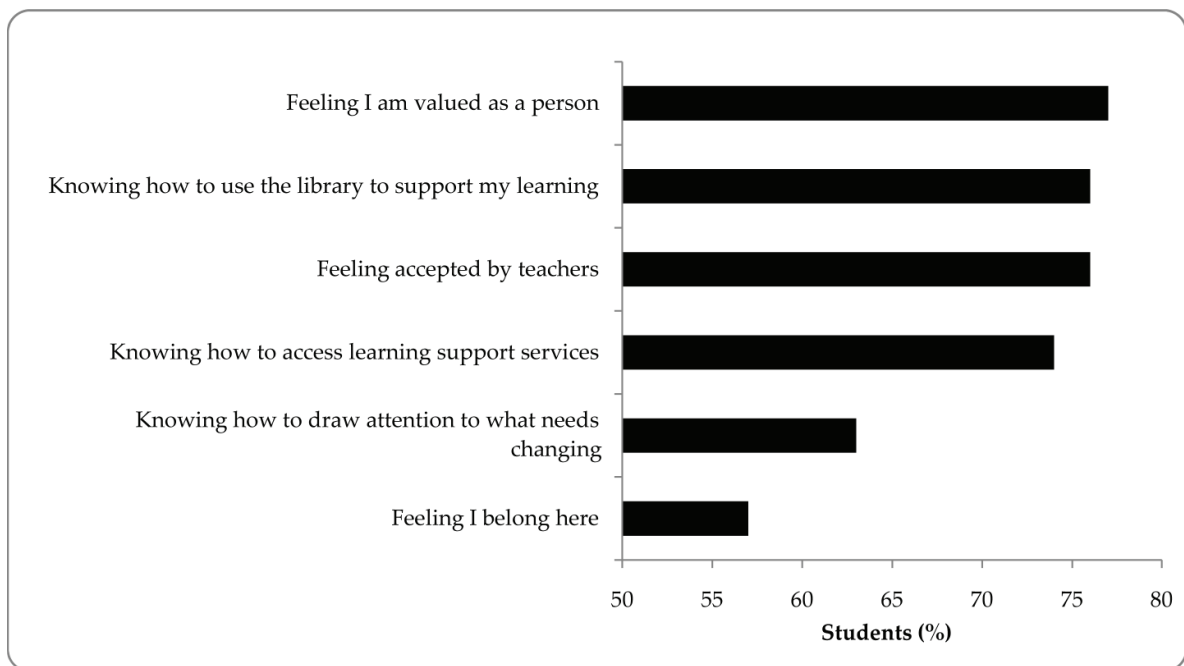


Fig. 5 *Motivational items of medium importance to students' learning*

Low importance

Conversely, as can be seen in Fig. 6, students were motivated by relatedness items in a minimal way only. Of the 24 motivational items, nine were in the low importance category.

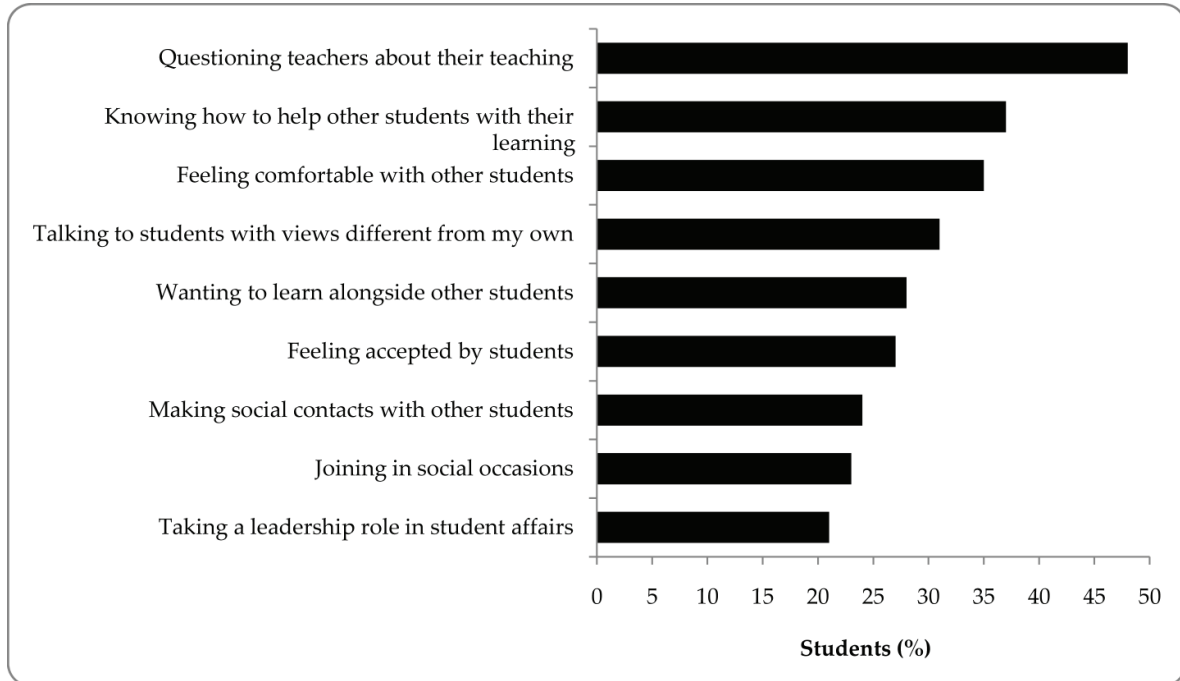


Fig. 6 *Motivational items of low importance to students' learning*

Very few students needed to establish relationships with other students – it was not very important to them. Students did not feel the need to be comfortable with or accepted by other students in order to be engaged in their learning. Nor did they need to learn alongside others.

One student said:

I've never enjoyed a classroom environment anyway which I find stressful, so working from home is fabulous. (S8, p. 3)

Another student disliked working with other students, particularly on shared tasks:

It depends on who's in your group. Some people are not highly motivated and you think 'oh no, I'm stuck with this person and I wanted a high mark'. I'm high mark orientated and I know straight away I will have to hold back in case they think I'm a know-it-all and that's why I prefer to work by myself. (S2, p. 4)

Some students, however, thought working with others could be useful:

It would be quite helpful. Like if you knew that once a month there was going to be an open forum and you could log on and bounce ideas off other students. (S4, p. 3)

Others found that interacting online with fellow classmates was a positive experience that helped them feel connected to the institution and to their peers:

I did worry about being separated from other students and not feeling like a part of it. I had no idea that there was going to be this on-line element but when I found out about it I thought it was a good idea because it made you feel connected. (S7, p. 3)

Meeting teacher expectations and being accepted by their teachers, in addition to feeling valued, were the only relatedness motivating items of any significance to emerge from this study. When students did not feel connected or valued they disengaged. When asked how connected he felt to the institution one student replied:

Feeling terribly disconnected to be honest. Everyone likes to feel valued. I'm just a number. I don't feel particularly well engaged. (S9, p. 4)

Staff knowing students' names made a difference:

She used my first name, so you feel like I'm not just a number or just another person, she used my name. (S5, p. 4)

Students also felt valued when staff were flexible about assignment and programme requirements:

They were very helpful with changing my programme. I've been an awkward student and they worked it out really well. (S7, p.4)

However, when flexibility was not forthcoming students suffered:

Twice now when I've asked them to be a bit flexible the answer was no. The whole idea of doing a distance learning course for me was so that I could manage and organise my own time, not for them to say right you will do this when we want you to do it . . . they should be making it a bit easier because life is stressful as it is. (S2, p. 6)

Frequency of student action

In addition to finding out what motivated students to learn, students were asked to indicate the frequency with which they acted on competency, agency and relatedness items. Figure 7 shows that frequency. Daily and weekly scores were combined to give the frequency of student action.

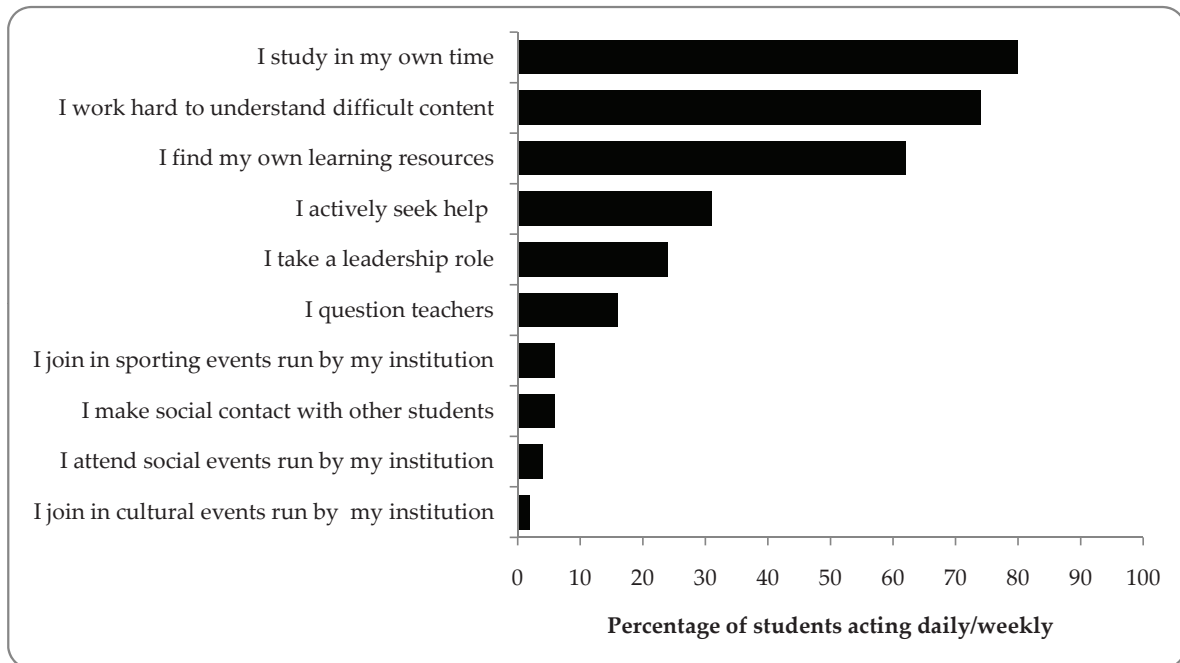


Fig. 7 Frequency of student action

The findings worthy of note here are that students will work hard to understand difficult subject matter and are willing and able to seek additional resources to aid understanding – they are motivated by these items and they act on them. In addition, they will actively seek help when needed, although this was relevant for only 32 per cent of the sample.

Influences external to the institution

Students reported dealing with a variety of challenges in their daily lives that had an impact on their study. These challenges are detailed in Fig. 8.

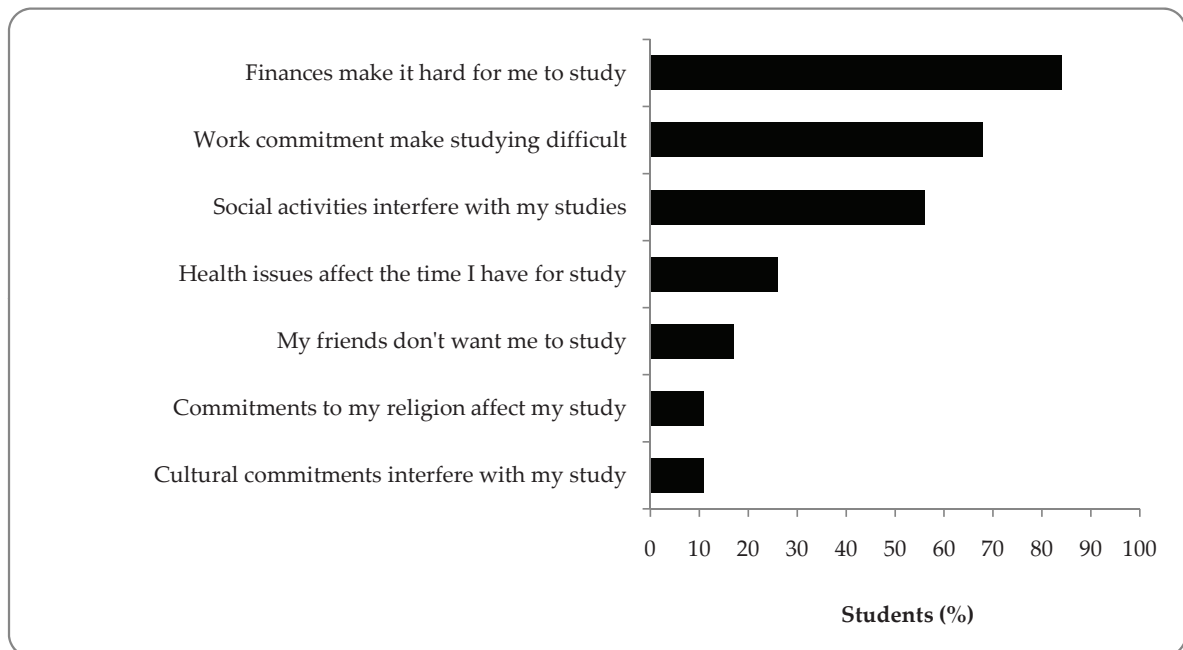


Fig. 8 Items having a negative impact on student success

As can be seen in Fig. 8, financial constraints and work commitments were the two items that had the most impact on students' success:

Probably the number one thing that turns me off learning is that I finish my day at work then I feel I have more work to do. (S3, p. 1)

Many students worked full time and had family and other commitments in addition to their study:

I am a mother, wife and homemaker and I work and am a student as well. (S2, p. 1)

Constantly dealing with a variety of commitments meant students were often too tired to study. One made the comment:

It's all the social commitments, family commitments, just being busy at work and coming home feeling really tired and not feeling like it. (S4, p. 2)

Others faced challenging personal situations that made study difficult:

Because I am a solo mum now and finding time to study and juggle work and it's very hard. I broke up with my partner three months ago and study has hit a brick wall. (S1, p. 1)

Some students found they simply had no choice but to put their study on hold when faced with changed personal circumstances:

I've actually had to put it on hold at the moment because my youngest is disabled and she uses up a lot of my time. (S7, p. 1)

Despite facing all of these different challenges, students were proactive in organising themselves to succeed and were well supported in their studies by family, friends and employers, as shown in Fig. 9.

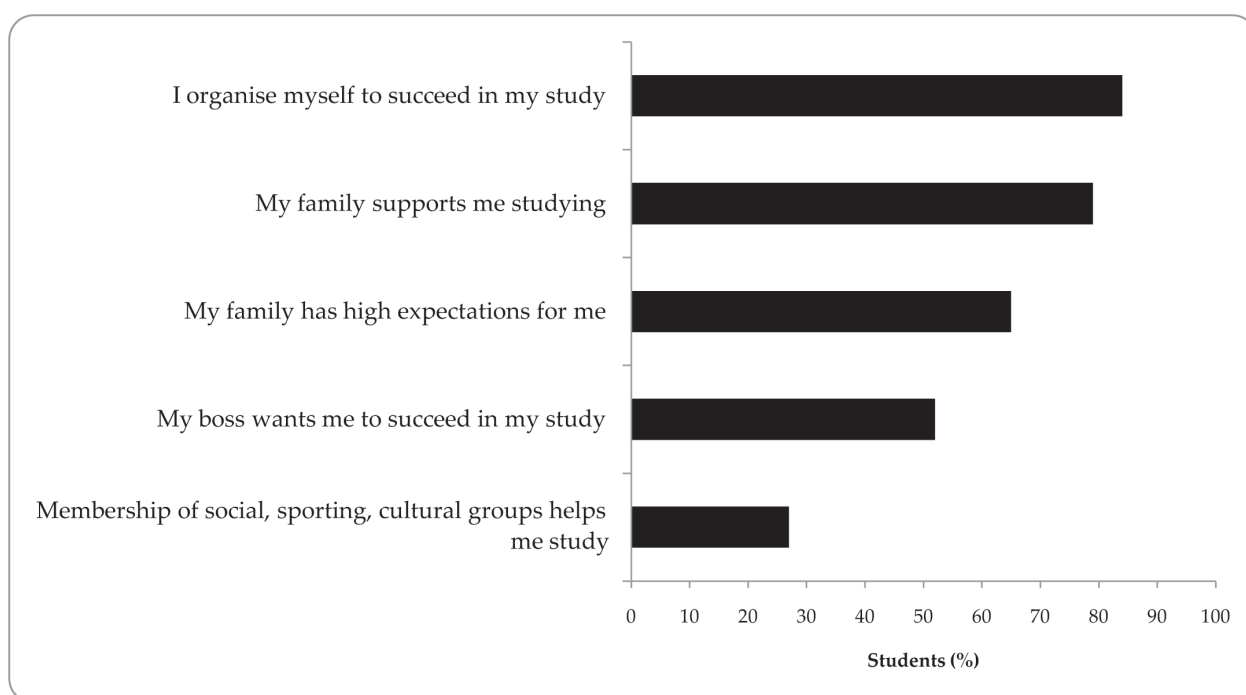


Fig. 9 Items having a positive impact on student success

Families held high expectations for students and provided good support. They dealt with household tasks to free up time for study:

I'm lucky I've got quite a lot of support from my husband and my family and they give me the time that I need. (S6, p. 1)

Families were also encouraging and motivational, and students depended on them:

I depend on my partner to help me a bit because he is studying as well so it's good if we can support each other. I'm pretty hopeless when it comes to self-control. (S4, p. 2)

Equally important for student success was support from employers. Those students who had supportive employers reported that such support had a positive impact on their study and levels of achievement:

I've got lots of support from my employer . . . he is giving me four hours study time a week (paid) at work. I have to do at least four hours study at home too. But the support my employer has given me has definitely encouraged me to put in the effort myself and also made it easier to get started. (S3, p. 2)

Discussion

It is clear from this study that the institution and the teachers played a significant role in whether or not students engaged in learning at optimum levels. It is also clear that students' own motivation played a part. Additionally, students reported that a variety of non-institutional items had an impact on their engagement and success. These items were mitigated to a greater or lesser extent by the support structures that students had around them.

The data show that the actions and attributes of teachers and the effects of teaching featured prominently (10 of 13) in those transactions that students indicated were highly important to them and their learning. Eight of those 10 items related to teacher behaviours and attributes. Students wanted teachers who cared, challenged them, provided prompt and useful feedback, and were readily available to discuss their learning. Furthermore, students needed teachers to be enthusiastic, make subjects interesting, and teach in ways that enabled them to learn. That teachers and teaching are fundamental to student engagement is well reflected in the literature. Umbach and Wawrzynski (2005) maintain that teachers' behaviours and attitudes have a profound effect on students – teachers 'play the single-most important role' (p.176). Similarly, Kuh et al. (2006) confirm that teachers are at the heart of engagement. In particular, enthusiastic teachers who establish high academic standards, assign challenging assessment tasks, and develop trusting relationships with students are more likely to engage them in learning than teachers who don't (Bryson & Hand, 2007; Kuh et al., 2005).

While students in this study specified that relationships and interactions with their teachers were very important, they reported that a number of those interactions were not carried out as well as expected. Overall, results revealed that students' expectations were not always met. The data in Fig. 3 illustrating those interactions that were important to students and not very well done provide some direction in terms of ways that the case study institution could optimise teaching and learning interactions with students in order to engage them more effectively.

In the same way that teachers and teaching were important to students' learning and engagement, so too were a variety of institutional items. Most notably, students said they needed study advice and guidance that was readily available to them, and they must have access to relevant and sufficient study resources. Students also emphasised that it was critical they knew

how to contact the right people when they needed help. Indeed, in an ODL environment where students largely work through learning materials on their own, it is not surprising that these items feature highly on students' 'important to have' lists. They are critical to learning and success.

Besides it being very important that students knew how and where to get help, it was equally important for 77 per cent of them that learning support services were available at times that students needed them. It is useful to note that students' expectations in this respect were not met as well as they could have been (see Fig. 3). Perhaps there is a mismatch between the times the students in the case study institution are studying – at night time, after work and family commitments are completed – and the times that learning support services are available. Learning support availability tends to be more in line with those tertiary institutions that have students on campus during the day.

The provision of a variety of support services is important to student engagement and success. Such services help students to become efficient learners (Hu & Kuh, 2003) and institutional investment in support services yields positive results for student engagement (Kuh et al., 2005; Pike, Smart, Kuh, & Hayek, 2006). What's more, when those services are delivered within a student-centred institutional culture, specifically one where support of learning is emphasised and student success is the central focus, student engagement and achievement is maximised (Kuh et al., 2006; Porter, 2006).

In addition to institutional and teacher interactions, student motivation was also strongly implicated in whether or not the students in this study engaged with their learning. Feeling competent in their learning was important to students and they were strongly motivated by that. This finding is supported in the literature. Fazey and Fazey (2001) also found that feeling competent to meet the demands of study was a strong motivator for student engagement and action. Likewise, Llorens et al. (2007) discovered that self-belief was a key motivator for engagement. Yorke and Knight (2004) concur – when students feel competent they set themselves goals and persist in overcoming obstacles. This finding is supported by other research from the case study institution that found that students who persisted were 'determined to succeed', and that this determination was intimately connected to strong motivation for learning driven by very clear goals for that learning (Burtenshaw et al., 2006). Students in the case study also liked being autonomous and working on their own. That many students preferred to manage on their own is not surprising in an ODL context. In such a context students need to be autonomous to be successful, so discovering that students were motivated by that, while unsurprising, is nevertheless a positive finding.

Conversely, the students in this study did not want or seek relationships with other students. Relationships were not important motivators for engagement. Despite the fact that relatedness was not valued as much as agency and competency items by students in the sample, relationships, relatedness, connection and belonging are important to many other students. Māori and Pasifika students in particular in the case study institution have reported that they want and need to feel connected, and that a sense of connection and belonging encourages and motivates them to engage with their learning and to persist (Ross, 2008). Other research supports this finding – when students feel accepted and that they belong, their engagement with learning is strengthened (Deci & Ryan, 2000; Read et al., 2003). That students in this study were not motivated by relatedness items perhaps reflects the fact they are not well connected to the institution as they work to balance the often competing commitments of family, employment and study. In addition, being geographically distant from the institution, the lack of a physical campus and part-time study could very well work against students developing close learning and social relationships with other students.

It is evident from the data that competing commitments had an impact on students' engagement with learning, but only to a moderate extent. Students overcame challenges by being well organised for study and having good family support. These two items exerted the strongest influence on student engagement of all the non-institutional items. Being well organised and having strong family and other support also has a positive impact on student persistence and success. Burtenshaw et al. (2006) established that students who persisted in their studies manipulated their social environments to their advantage. Specifically, students made full use of the people, places and facilities around them to ensure they were successful.

This study has limitations. The research was a small case study and consequently these conclusions and the following practice suggestions can be tentative only. Further research is needed.

Suggestions for practice

The data from this case study reveal that teachers and teaching, the institutional environment and students' motivation were more strongly implicated in whether or not students engaged with their learning than the non-institutional items of family, employment and social influences. It therefore makes sense to identify those aspects of teaching, the institutional environment and motivation that can be translated into suggestions for practice for the case study institution. In doing so it would be most useful to focus on improving those institutional transactions that are important to students but are not yet being performed at the expected level.

For teachers this means:

- providing prompt feedback to students that improves their learning
- caring about students and valuing their prior knowledge
- challenging students in helpful ways and teaching in ways that help them to learn
- providing opportunities for students to apply their learning
- being enthusiastic about their subject and making it interesting for students
- recognising students' employment, family and community responsibilities.

For the institution this means:

- providing access to the resources students need for their study
- providing helpful guidance and advice to students about their study
- ensuring students know how institutional systems work
- providing learning support services at times students need them.

Additionally, in considering student motivation for engagement, the institution and teachers could foster students' belief in their own competence and provide more opportunities for some students to develop learning and social relationships with other students.

Finally, the institution could explore ways to help students' families, friends and employers to understand the demands of study and how best to support their student family member/employee.

Conclusion

This research was a small case study involving only 82 first-year students and results must be interpreted with caution. Findings cannot be generalised across ODL or other tertiary education environments, or even across all first-year students at the institution in this study. However, a number of the findings are supported by the literature and previous research from the case study institution, and can sustain the suggestions for practice outlined. The practice suggestions fit neatly with many of Chickering and Gamson's (1987) seven principles of good practice in undergraduate education, and in conjunction with the findings described in this paper offer the case study institution the opportunity for reflection and action so that first-year ODL student engagement for learning might be fostered.

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Retention: A Critical Issue for Open and Distance Learning

Josephine Bourke

Introduction

Student retention, which is particularly problematic for open and distance learning (ODL) institutions, has become a critically important issue as funding has been linked to programme completion. Consequently, it is necessary to gain a better understanding of retention, and the variety of reasons why learners do not continue with their studies (Woodley, 2004). Indeed, Ashby (2004) considers that defining retention is more difficult than just using the institutional approach – that is, successful completion of the selected course or programme. Consideration needs to be given to other perspectives on retention, including seeking to understand the requirements of the student and actual or prospective employers (Ashby, 2004).

At the Open Polytechnic, a number of strategies have been tried to improve retention and completion. These strategies have implications for provision and delivery (of the courses and programmes), which need to be considered overall. This chapter looks at some of these strategies and provides discusses some of their implications, before making suggestions for further research and study. It begins by discussing existing literature on retention in distance learning. It then focuses on retention issues through a number of short case studies. The first case study highlights the institutional perspective, while those that follow address both individual and group approaches. The final section of the chapter considers the effect of the various interventions and provides a discussion of future directions.

Retaining distance students

When considering retention in an ODL environment, this chapter considers the three most important areas to be the readiness of the learner to deal with the required level of learning, how the learner understands of the requirements of the distance provision, and the learner's required outcome.

Learner readiness

Learner readiness can be a problematic area, as the information available to prospective students needs to provide adequate assistance to enable appropriate selection without being too extensive. Some form of pre-course

understanding is important to retention (Ashby, 2004), but while there is some use of prerequisites (which can be helpful), there are a number of courses for which entry criteria is limited. Learners may have to bear their own responsibility and risk when enrolling in courses for which there is no entry criteria, but that risk will be shared more broadly where institutional funding is tied to learner performance (Simpson, 2006).

There is general recognition that most adult learners at least have the potential to be self-motivated. They are able to set goals, but they also require learning that is relevant and practical, and gives them the opportunity to apply their own experiences (Knowles, Holton, & Swanson, 2005; Lieb, 1991). Some of those experiences may be negative, reinforcing the concept that context plays an important role in how this self-motivation potential is developed (Knowles et al., 2005). Failure to complete courses could in part be due to learners not having realised that the learning process needs work and can be difficult at times – they are not ready to learn at the level at which they have enrolled.

If adult learners are not ready to learn, they might reinforce any previous negative experiences, and confirm themselves as inadequate learners. Facilitators, lecturers and course designers need to be aware of this possibility, and more pre-enrolment counselling might be helpful. Knowles, Holton, and Swanson (2005) believe that adults need involvement in the collaborative process of planning their study. Selecting the correct course for them is important (Maathuis-Smith et al., 2011). If adult learners have an opportunity to participate in the planning process, outcomes may include enhanced commitment to studies and more self-direction.

Learner motivation is of central importance to learner success (Simpson, 2008). Self-determination theory suggests that students need to have some freedom in their study behaviour (Simpson, 2008), yet in reality many adult learners are directed to study by an employer or influencer, and as such they are more conscripted learners. Adults who are conscripted learners have a different approach to those who learn voluntarily (Cross, 2009), and this might be particularly relevant if there is some negativity about the proposed learning. Adult learners are individuals, and it seems that theories need to be responsive to individual requirements, as 'Andragogy works best in practice when it is adapted to fit the uniqueness of the learners and the learning situation . . .'

(Knowles et al., 2005, p. 3).

Learner understanding of distance education

Research has drawn attention to the difficulties of retention for distance learners, and this may be particularly salient as institutions seek to increase participation and improve retentions (Ashby, 2004). According to Woodley (2004), part-time students have many more social demands to deal with in addition to their academic studies. The part-time nature of distance learning provides a flexible option and improved access for many, but the demands of employment and family are difficult to manage in addition to study requirements (Yorke, 2004).

A number of approaches have been suggested that could assist with retention in distance learning, including the significant interventions highlighted in the following case studies. Communication is regarded as important, as is an approach to learning design that understands the learning difficulties associated with the distance option. Kember's model (quoted in Yorke, 2004) suggests that gaining an understanding of the individual capacity of learners to manage their studies might be helpful, but later research has indicated that there may be difficulties in applying this model to distance education (Woodley, De Lange, & Tanewski, 2001). According to Simpson (2008), there is a need for a new theory of learner support for distance learning, perhaps including elements of self theory, the strengths approach and proactive support. However, there is also an indication that seeking a single theory of distance education may be limiting (Holmberg, 2003).

Distance learning may be well suited to the needs of adult learners whose other life commitments mean that they cannot study through classroom activity, but it is also limited by the risk that these extra demands will compromise learning (Yorke, 2004). It includes teaching and learning in a form that provides presentation of subject information with learner–teacher interaction – implying a one-to-one relationship between the learner and the assigned teacher. There is usually some form of support provided in addition to teaching, such as learning support and instructional design. Some research has indicated that student-to-student mentoring may assist in retention and engagement for distance education (Boyle, Kwon, Ross, & Simpson, 2010). However, this is still open to discussion as an approach, particularly when a student has an extremely limited amount of time for study (Billett, 2010).

Learner expectations of outcomes

Learner expectations of outcomes is an interesting area that has not always been highlighted in distance education research. However, it is understood that adult learners come to their study with requirements that may be met by outcomes that differ from the expectations of their educational institution (Ashby, 2004). Measuring retention simply using an institutional definition might therefore be ignoring what could be defined as the 'student dimension' (Ashby, 2004). For some students, completion of their goals may be achieved by passing a single course, or just learning the materials (without assessment). According to Ashby (2004), most of the research into retentions in distance education has been from the institutional perspective, which limits the success factor from the student dimension.

It could be interesting to consider epistemological identity theory as it applies to learner motivations – if the learner is convinced that the learning is exactly what is required (Simpson, 2008), who is to say when they have completed that learning? There may be some self-perception about this success, with learners finding their own fulfilment by achieving their own goals (perhaps reflecting achievement goal theory (Simpson, 2008)).

Retention strategies: Overview

In the following case studies an institutional perspective on student retention is provided, followed by a discussion of courses (ranging from Level 4 to Level 7, and covering a number of different disciplines). Common to the lower level courses was a lower level of retention through to completion (either of courses or qualifications). The Level 7 course appeared to have excellent completion rates over time, with little apparent impact from the considerable lecturer intervention. In each study, several approaches to retention are provided, and each highlights a number of issues that arise when dealing with distance-based adult learners. Issues with retention have an impact on both learner success and the organisation offering the learning opportunity.

Case study 1: The institutional perspective

Provided by Mark Nichols, Executive Director, Faculty.

The decision to study as an adult and also to try distance education can come with difficulties. Often working full time, and with family responsibilities, such learners may find that attending an on-site institution is not possible. They may also be dealing with considerable gaps between their prior study experience and this new venture. Some will have been working for many years, and they will have learnt a lot in that time. There can be issues, however, particularly if students are unsure of what level is the best starting point for them. Some students decide to enrol in higher level study, but within a few weeks realise that this would be too difficult to manage with work and family commitments. It is important that such students have the opportunity to make a change – getting the right student into the right course for them is part of the institutional approach to managing student achievement.

Steps taken to retain students overall

With retention being such an important part of the overall aims of both the organisation and the learner, the Open Polytechnic has become even more conscious of the importance of student engagement. Early contact with new students is being used as a tactic to assist with this. It is also proving a good place to find out whether the student considers the course they have enrolled in to be appropriate for them. While every effort is made to ensure that learners understand the requirements of courses prior to finalisation, there are sometimes issues when the enrolment is completed – for example, the learner finds the level too high, or perhaps the workload is too difficult to fit into their lifestyle. The Open Polytechnic puts an emphasis on getting the student into the right course for them, and this is an important retention strategy.

Other actions that have been taken to help students to complete their learning are:

- Clustering of small study units into topics is helpful. Some study units (particularly unit standards) are quite specific to a section of learning, and they may not provide sufficient context for learners to become engaged. Clustering similar, small units into a topic that provides learners with context and a more substantial learning experience is considered to be a good step towards retention of these learners to successful completion.

- Embedding due dates in the materials is also an approach that provides learners with better understanding of their course requirements and timetables. For example, in any learning experience there needs to be some form of assessment, and helping learners to meet the due dates of these is important to gaining retention.
- Improving student engagement through early contact is regarded as an important step to success. Learners who feel that they can contact their teachers often, may be able to identify (and rectify) a problem before it becomes too difficult.

The institutional approach has been adopted by the academic staff members who teach courses, who are also committed to improving retention. This is evidenced in the following case studies, which cover group, individual and overall strategies, and indicate some of the outcomes from these initiatives.

The group approach

The following case study highlights the approach of one lecturer to a group of Level 7 students. The case study focuses on an accounting-related course (offered at the third year of a bachelor degree) that is quite technical. It also requires completion of a number of prerequisite courses prior to enrolment.

Case study 2: Group strategies

Provided by John Veal, Principal Lecturer, School of Business.

Taxation is a Level 7 accounting course offered as part of Open Polytechnic's Bachelor of Business (B Bus) degree and taken primarily by students completing the academic requirements for membership of the New Zealand Institute of Chartered Accountants. As with all B Bus courses at Open Polytechnic, *Taxation* is delivered in distance education mode using a combination of printed course materials, online learning activities, and telephone and email support from a lecturer. The online component of the course is provided via a dedicated course page on the Open Polytechnic's Online Campus

Steps taken to improve retention in *Taxation*

The overall strategy to maximise student engagement and retention in *Taxation*, developed through trial and error over a number of years, is to:

- make the course requirements as clear as possible
- improve the instructional design approach
- use a learning approach best suited to the topic
- keep students motivated by regular communication throughout the trimester
- provide students with a variety of learning resources, to suit different learning styles and make learning enjoyable
- respond promptly to student enquiries
- give friendly, constructive and timely feedback on student assessments.

Specific elements of this strategy are set out in the appendix to this chapter. However, it is important to emphasise that the way in which the course is delivered and supported is not static. Enhancements are continually being made to encourage retention.

Answering individual needs

While all distance teachers will have some form of group approach to retentions, there are some instances where the individual stands out as requiring more assistance. This section looks at two individual approaches that resulted in successful retention.

The first considers a student who, despite literacy difficulties, wanted to complete a trade qualification at Level 4. The second looks at a mature student who wanted to finish a Level 4 certificate in management, despite having no other qualifications.

Case study 3: Individual approach 1

Provided by Les Morris, Lecturer, School of Workplace Learning.

Rosco wanted to qualify in his trade. In order to do this, he had to complete his Level 4 National Certificate. This required considerable theoretical study, as well as practical work, over a period of several years. He had not had much success in earlier attempts to gain qualifications, but he was keen and ready to get ahead. Rosco had chosen distance study because of his personal circumstances, but there was a problem that was going to cause him significant completion difficulty – most of the learning for the trade qualification that Rosco needed was delivered in print format, and Rosco had literacy problems.

Steps taken to improve the individual's retention chances

Rosco was one of a number of students managed by the distance teacher in the trade qualification. However, his issue with literacy was identified early on in the qualification, and the teacher made considerable individual effort to help Rosco. The efforts included:

- Making individual contact with Rosco at the beginning of each module and going over the requirements specifically. Being able to speak to his tutor allowed Rosco to check that his understanding of the requirements of both the module and the assessment was correct.
- Receiving regular reminders in the mail of his study progress allowed Rosco to keep track of his progress and the date by which he needed to successfully complete his studies.
- The friendly non-judgemental approach of his tutor gave Rosco the confidence to ask for help without the danger of being made to feel foolish.
- Rosco's tutor had experience in helping students with literacy and numeracy challenges and this meant Rosco was accommodated on a one-to-one basis.

While Rosco's situation is highlighted in this case study, there are a number of students who fit into this category (having literacy difficulties). This outlines the problem faced by distance teachers who are managing large classes, and who might be required to undertake considerable work to improve retentions

for students whose need is individual. The second case study highlights this requirement with a student who also came to distance study without previous qualifications and who was not confident with independent learning.

Case study 4: Individual approach 2

Provided by Les Morris, Lecturer, School of Workplace Learning.

Eileen was a bit of an anomaly as a student. In her late fifties, she had never achieved any qualifications before and had come to think that she might never achieve academically. Eileen was deeply involved in her community, but despite all of her commitments, Eileen had decided to take a Level 4 management certificate. She studied part time and by distance, as there was no way she could attend an on-site institution.

This case study reflects the experience with Eileen as she studied one of the Level 4 management-related courses that she was required to do for her certificate.

Steps taken to assist the individual

Eileen was quite a proactive person, and her approach was to telephone her course leader and ask for considerable feedback and support (she would sometimes read out the question, mention her intended approach and request comments). Her successful completion after several years of part-time study was her own work, but she received considerably more support from the teaching institution than many other students.

The individual steps taken to assist Eileen were largely initiated by her. She would telephone when she needed assistance, and when she had time to talk. Eileen would also use the contact as a social network, often discussing personal issues as well as those related to the coursework. Although Eileen required considerable support, she was also highly committed to her work, and once confident that she was making progress; she would complete and submit her assessments within the agreed timeframes.

As with other courses, the feedback on the assessments was crucial to Eileen's successful completion of the Level 4 management-related subject. Special care was taken to ensure that the feedback reflected the content of the telephone conversations, so that Eileen could see her progress and identify areas where she could improve. As a result of the support Eileen received good grades for her work, and was extremely pleased to complete her qualification.

Considering qualifications

There are other students who require individual support, but for whom the outcome of their study is different. The next case study highlights the issue for programme or qualification completion. In this instance a student successfully completed one course in a qualification, but did not re-enrol for another – resulting in an effective withdrawal from the qualification.

Case study 5: The overall question

Provided by Ken Marshall, Lecturer, School of Information and Social Sciences.

Adele started her study at Level 6 with enthusiasm. She had decided to start the business-oriented qualification with communication skills study, and she was well supported by her lecturer, who provided regular emails and individual contact. Adele successfully completed her course, but to date has not enrolled in further study. The lecturer who supported her successful completion does not know why she has not re-enrolled, or does not wish to complete the qualification.

Steps taken to help the student complete her qualification

Adele was provided with the normal support in her Level 6 course. As a student who made good progress, she was not identified as needing more specific, proactive support.

However, her decision not to enrol in further study means that she is not completing her qualification at this time. In light of government requirements to show qualification completions, a learner's decision to postpone further study needs further investigation. The teacher has no current responsibility or resourcing to follow up students with regard to their qualification, yet this might be a fertile ground for further exploration.

Retention data and suggestions for further research

The results of the retention interventions by the distance teachers are interesting. The retention and successful completion rates over 10 years for the Level 7 *Taxation* course are shown in the following table:

Table 1: Retention rate history – Taxation

Year	Retention rate (%)	Successful completion rate (%)
2010	85	72
2009	84	64
2008	86	64
2007	79	58
2006	87	76
2005	87	81
2004	75	64
2003	82	67
2002	81	72
2001	82	72

As can be seen from the table, despite the significant group approaches the retention rate has remained fairly stable over 10 years, as has the successful completion rate. There are considerable implications from this data, raising the following questions:

- What effect has the considerable retention work being undertaken by the distance teacher actually had?
- Does the requirement for students in this course to have already undertaken prerequisite courses have any impact on retention?
- As this course is taken as a final year degree course, when students are approaching qualification completion does that have an impact on retentions and completions?

These questions are particularly relevant in light of the issues with the lower-level courses. The examples noted in the individual case studies highlight the relative successes of intervention strategies with individual students. These successes might perhaps also reflect the proactive support approach, with some elements of the strengths approach (using learner strengths as a scaffold) and self theory (where the students understand the value of effort in their learning approach) (Simpson, 2008).

While the highlighted students achieved as was appropriate to their needs, the overall completion rates in the courses that they chose were quite different to those for *Taxation*. The lower-level courses were not semesterised, so students completed within their enrolment period (from 8 to 12 months, depending on the year) with no set assessment submission dates. In particular, retention for the Level 4 management course over a similar period was as follows:

Table 2: Retention rate history – Level 4 management-related course

Year	Retention rate (%)	Successful completion rate (%)
2010	35	33
2009	35	33
2008	32.5	32.1
2007	42.9	42.9
2006	33.33	33.33
2005	34.96	34.96
2004	37.78	36.44

It can be seen from these figures that despite increasing intervention from the distance teacher the retention rates for this Level 4 course remains considerably lower than those for the Level 7 course. Further research is needed to examine the retention levels, particularly in light of the following:

- Considerable retention work is underway and the effect may be a slight improvement, but there is still some distance to go.
- No prerequisites are required for this course, which is open to any students who apply.
- This course is part of a qualification that does not have as specific a pathway to completion as degree-related courses

The implication from the retention rate of the Level 7 course is that having successfully passed through the required prerequisites the learners had reached a level where they were aware of the work required, and were able to see the benefit of managing this workload. This may be reflective of the findings of Maathuis-Smith et al. (2011), where differing levels of student achievement on entry appeared to be mitigated by employment and qualification recognition, perhaps reflecting epistemological identity theory (Simpson, 2008).

The Level 4 courses and qualifications were positioned more at entry level, with less obvious promotional pathways for jobholders who completed them. Learners did not need prior learning or prerequisite completed courses, and

they did not need any prior academic achievement in order to enrol. The Level 4 case studies may also reflect the application of self-motivation theory, where the learners were personally motivated to succeed (in these cases) (Simpson, 2008), but needed considerable support to complete their courses.

Further research into the differences between semesterised and non-semesterised course completion should be considered. It would also be useful to gain a better understanding of whether the difference in the level of study makes a difference to retention rates in an ODL environment. While research exists that considers retention in distance learning, much is focused on higher-level courses, and the issues faced by those studying at lower levels are less well addressed. It may be that different strategies could be used for those on entry-level or lower-level courses, to enable them to get started on their study pathway.

Conclusions and strategies for the future

Retention and completion have received considerable attention in distance learning research, but despite this research attention, the data in this chapter indicate some contrary outcomes. To begin with, it appears to be important for students to be able to deal with the required level of learning. This may reflect the process of understanding their own goals, perhaps associated with reaching competence in their chosen area as suggested in achievement goal theory (Simpson, 2008).

The institutional approach highlighted in this chapter partly focuses on dealing with this issue by providing more pre-enrolment information and the flexibility to change if it is found that the student is in the wrong course. Having a focus on achieving the right course at the right time for the right student is a good start, but more pre-enrolment screening might be a useful tool to help learners through to successful (and appropriate) course completion. However, adaptation to distance learning can be difficult, and without an appropriate introduction students may find the challenge too great. Building on best-practice learning design is a good start, and associating this with good learning support is likely to provide some increased success. For some, distance learning may prove too demanding, but with the right support most appear to reach their required outcome.

There are several areas where there appears to be dissonance in perceptions relating to retention, and the most important one is the emphasis on the institutional perception rather than a more holistic approach. The learner may have a different outcome in mind when they set out to study, and successful completion for them may involve something other than simply finishing the course or qualification. For successful completions from an institutional perspective, there may be issues in terms of students' consideration of their own abilities. According to self theory, students who believe that they have an 'entitlement' to success might not be prepared for the work involved in achieving this (Simpson, 2008).

There is still much work to do to gain a full understanding of how distance learning can be a successful contributor to improved educational achievement. With increasing access being provided through distance options, it is important for those involved to gain a better understanding so that the costs and benefits of the distance options can be appropriately managed. There is also room to consider the implications from the point of view of the learner, leading to greater understanding of learner needs and readiness to learn, and an understanding of the requirements implicit in distance provision.

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Appendix: Specific learner interventions in *Taxation*

Make the course requirements clear

The course requirements are communicated in such a way that students know what is expected of them. This involves constant improvement to the course materials and course page as a result of student feedback, and new initiatives. Students are provided with a study timetable, which sets out the work to be completed each week of the trimester.

Problem-based approach to learning

Since taxation is best learned by applying the tax rules to real world scenarios, a problem-based approach is adopted. Each topic consists of set readings and a series of questions for the students to answer. Students learn by working through the questions and comparing their answers with suggested ones. They can enhance their understanding by working through the activities on the course page, and check how well they have achieved the learning objectives by attempting the online quizzes. If they have a problem, students have the option of asking a question on an online forum or contacting the lecturer by phone or email.

Weekly newsletters

A weekly newsletter is sent to students by email. This key communication tool reminds students of the study activities for the coming week, provides a summary of key points from the previous week, gives encouragement, and reminds them how they can contact the lecturer if they have any problems. Newsletters may also refer to current events that are relevant to the course, provide additional questions for review, and remind students of upcoming due assignments. An effort is made to keep the newsletters friendly through the inclusion of humour, the use of informal language, and general 'chatter'.

Synchronous chat room sessions

One of the options offered by the Online Campus is real-time chat sessions. Weekly chat rooms were trialled for *Taxation* in 2010 and attracted a small but keen following. Chat rooms enable both teacher and student to ask questions and receive an immediate answer, but they become difficult to manage when there are more than 10 participants. Postings are of necessity short, and therefore chat rooms are not suitable for discussing complex issues such as case

law. Their usefulness is mainly in encouraging participation and clearing up minor problems that students have with their studies. Although only a small percentage (about 10 per cent) of students participate in the chat room sessions, all students in the course are able to read the chat room logs.

Online forums

Asynchronous online forums enable students to engage in discussions with each other, ask questions, seek clarification, and generally feel part of a student community. Different forums are set up for different purposes. For example, there are forums for asking the lecturer questions, and for social chit-chat, for each major topic area. The advantage of forums is that they don't require participants to be available at the same time – students can read and post to the forums at times that suit them.

Audio files

A number of audio files were created and uploaded on the course page in 2010. Each sound clip consists of a short spoken summary of a specific taxation topic. The purpose of the audio files is to add to the variety of learning resources, so that students can pick and choose which resources suit them best according to their personal learning style.

Activities, with links to PowerPoint presentations

Online activities allow students to work through a series of structured questions on a topic and receive detailed feedback on their answers. Each activity has an associated PowerPoint presentation, which provides a summary of the main points of the topic. Typically, students view the PowerPoint presentation and then work through the questions. The activities are intended to reinforce what students have learnt through completing the readings and study questions in the course materials.

Quizzes

The course page includes 32 quizzes, covering all of the topics in the course. The quizzes enable students to check their understanding of the main concepts. There is no limit to the number of times students can attempt the quizzes, so they can be used to aid learning and for later revision.

Additional online resources and links to useful websites

Some students have difficulty researching, structuring and writing answers to assignment questions. To assist these students, links are provided on the course page to websites providing information on academic writing. Links are also

provided to taxation websites where students can find useful supplementary information.

Respond promptly to student enquiries

Student enquiries, whether by telephone or email, are responded to as quickly as possible to ensure that students' learning is not stalled. Most enquiries are dealt with on the same day.

Give friendly, constructive and timely feedback on student assessments

One of the best opportunities for teaching is when giving of feedback on student assessments. Prompt feedback is vital, as is giving feedback that helps the student to understand the subject and improve their performance in future assessments. In *Taxation*, feedback includes the following aspects:

- Assessments are normally graded and returned to students within 2 weeks of submission.
- Constructive, written comments are provided on the students' answers. The emphasis is on explaining to the students how their answer could have been improved, rather than focusing on what they did wrong.
- After marking is completed students are provided with a copy of the marking schedule, setting out an outline answer for each question and how the marks were allocated.
- A detailed assignment report is also provided to students. This report sets out the grade distribution for each question and for the assignment as a whole, so that students can see how well they performed relative to the rest of the class. It also explains common errors made in each question and makes suggestions as to how students' answers to each question could have been improved.

Student Use of Sources: A Collaborative Investigation of Resource Use in Psychology Assignments

Estelle Barnard and Nancy Evans Weaver

Abstract

Successful online and distance learning relies on the skills of professionals within many units of a tertiary institution. Academic staff provide content expertise and student guidance, but must be supported by technical editors and designers, learning advisors, librarians, an online help desk, and other staff. This research is a cooperative undertaking between academic staff and library professionals. It is designed to help answer this question: What types of scholarly sources do tertiary-level psychology students in an online course use in completing their required assignments? The method is citation analysis. The references pages from submitted laboratory reports were collected, and the type and frequency of sources cited, as well as student variables, analysed. The aim was to apply these data on source use to answer both practical questions (for example: Does the library supply the type/quantity of materials students actually use? Are there implications for access and acquisition?) and pedagogical questions (for example: Do introductory psychology students use appropriate types and quantities of scholarly resources? Do they use more books or journal articles? Do they use the sources supplied/recommended?). We also examined whether source use is related to student characteristics, such as level of previous study and number of concurrent courses. Results from pilot studies and initial analyses of an entire trimester's submissions suggest higher than expected levels of source use. Most students used instructor-provided journal articles and background summaries at least to some extent, but very few library-provided sources. There may be some differences between print and online submissions, and some variables may be related to the mark received for the assignment.

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Some of the information in this chapter was presented at the National Tertiary Learning and Teaching Conference, held in October 2011 in Nelson, New Zealand. That presentation will also be included in an e-publication based on conference proceedings, and it is being considered for inclusion in the journal *Scope: Learning and Teaching*, administered by Otago Polytechnic.

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Introduction

According to Watson (2010), in a climate of budget cuts and the need to justify spending, libraries must look critically at how information resources are actually being used and therefore how collections should be managed. In academic settings, the teaching faculty also has a need to examine how scholarly resources are used by their students, because lecturers want to encourage scholarly work. To accomplish these goals, librarians and faculty must understand which types of sources students use and which they do not.

The authors, one a librarian and the other a psychology lecturer at a tertiary-level online and distance learning (ODL) institution, share this interest in measuring the use of scholarly resources. In particular, they set out to determine what types of resources undergraduate psychology students make use of in completing assignments in an introductory course and whether these resources match this institution's library collections and faculty expectations. The results can then be used to address how faculty and libraries can help students use sources more successfully.

The method chosen for this research is citation analysis. Citation analysis involves studying in-text citations (brief acknowledgements of sources placed within an assignment where a source is used) and more complete source information placed at the end of the assignment – either bibliographies (a list of all sources consulted) or references (a list of all sources cited) (see Burton, 2010, for these definitions). The purpose of these parts of an assignment is twofold: to acknowledge the theories or results of other researchers that the author has mentioned, and to provide the reader with information on how to find the original work if needed (Burton, 2010). (Note: In citation analysis, the word 'citation' is usually used to cover either or both in-text and end-of-report acknowledgements of sources.)

Citation analysis has taken a wide variety of forms. It has been used, for example, to study preferences for print versus online materials (for example, Knight-Davis & Sung, 2008; De Groote, 2008); to examine the differences between student use of sources in their writing assignments and faculty use of sources in their own professional writing (see Watson, 2010, for an overview); and to examine the effectiveness of library instruction on student use of sources (for example, Clark & Chinburg, 2010).

How is a citation analysis conducted? Because of the diversity of applications there are differences in methods, but here is a typical example of its use with undergraduate written assignments (Knight-Davis & Sung, 2008). Samples of

assignments are collected, and from each assignment information about the use of scholarly sources is extracted. Researchers examine in-text citations and/or references, bibliographies, or some combination of these. For each source mentioned in the assignment the researcher then tabulates various source variables. These often include how many sources were used, what types of sources were used (for example, books, journal articles, web sites), and the origin of such sources (for example, held by the institution's library or not, supplied by the instructor or of student origin, and online or print based). Demographic variables about the student are also often recorded (for example, year of study, discipline in which the student is enrolled). These data are then analysed with descriptive statistics and/or statistical testing.

In the present study this general research method was followed. The references pages from submitted laboratory reports were collected and analysed as to type and frequency of sources cited, as well as student variables, whether the assignment was submitted online or in print, and the mark the assignment received.

The first aim was to address practical questions that would help library decision making. For example, distance education students typically use online library information, especially subject guides, as an alternative to face-to-face library instruction (Grays, Del Bosque, & Costello, 2008). (See the key to Table 1 for a definition of 'subject guide'.) At the Open Polytechnic of New Zealand students are encouraged through phone calls, emails and online posts to use subject guides and other library resources. As all students study from a distance, these are the librarians' means of promoting library usage and supporting information literacy. In this research we hoped to establish the extent to which students actually cite sources obtained from subject guides or other library resources. It was expected, for example, that students would make use of journal articles that appear in subject guides and also journal articles supplied or recommended by lecturers, because Keene (2004) found that many students know they are expected to use journal articles and do so. From a practical viewpoint, if material from subject guides, for example, is heavily cited, it would make sense to continue allocating funding for their development.

The second aim was to address pedagogical questions. For example, what types and quantity of scholarly resources do introductory psychology students use? Do most of them use journal articles? Books? Do they use sources provided and recommended by their lecturers? From a practical viewpoint, such data could provide background information that could be used to devise and test methods to better teach students about scholarly writing. Information about student variables, such as level of previous study and number of concurrent courses, was also collected. It was hoped these data would allow measurement of any

effects of student background and current workload on sources used. It could be predicted that less prepared students or students with a heavy course load may have less time to find, read and incorporate sources into their assignment. Also to be examined was whether students who choose to submit online differ in characteristics from students who choose to submit in print. If so, do those differences relate to the sources they use? Finally, does source use predict success in the assignment? Is there a relationship between number and/or type of sources referenced and the mark the assignment received? Past research suggests hypotheses about many of these variables (for example, Keene's (2004) finding about frequent use of journal articles).

There were two parts to the research reported here. First, patterns of source use were examined to tabulate what types of sources students used in this assignment and how frequently they used them. Second, three specific hypotheses were tested:

1. It was hypothesised that the mark received on the assignment would be related to the number of sources used. We expected that assignments using more sources would receive higher marks.
2. It was hypothesised that the mark received would be related to the use of the instructor-provided journal articles. We expected that assignments using more of these journal articles would receive higher marks.
3. Based on pilot research it was also hypothesised that there would be a relationship between type of submission (print or online) and other variables. We began by testing the relationship between type of submission and use of the instructor-provided journal articles: it was hypothesised that there would indeed be a relationship between submission type and the number of journal articles used.

Method

Participants

Participants were students enrolled in course 73195 *General and Applied Psychology* at the Open Polytechnic of New Zealand in Trimester 1, 2010 (February–June 2010). This is a Level 5 course (beginning tertiary/university level) that is one of a pair of introductory psychology courses at the Open Polytechnic. It was expected that almost all students who enrol would be at or near the beginning of their study of psychology.

Data from all students who submitted Assignment 1 were collected. Several student variables were tabulated using the Open Polytechnic's records – namely, highest level of study before enrolling in 73195, whether this was their first time enrolled with the Open Polytechnic, and how many (if any) other courses they were taking along with 73195 in Trimester 1, 2010.

Data were collected from a total of 124 students.

Materials

Materials consisted of a set of data sheets gathered from these 124 students when completing Assignment 1. The following is a brief background to the course to explain the origin of the data sheets and what was measured.

Course 73195 is taught entirely by distance. Students purchase a textbook and an American Psychological Association (APA) writing guide, and they also receive a printed learning guide from the Open Polytechnic. Study is heavily supported by the Open Polytechnic's Online Campus, where the 73195 course page provides discussion forums, links to the library, advice on assignments, and other resources for students. Extensive lecturer support is provided online and by telephone and email.

Part of what students are specifically taught is APA citing and referencing, and they apply that developing skill to complete two in-course assignments. Each assignment is a laboratory report (named Lab 1 and Lab 2). Students conduct a psychological experiment, collect data, analyse the data, and write a report in the style of a professional journal article. They are taught to cite sources within their report if they use information from them and to include an APA-formatted

references page at the end of the report. Students are not specifically required to use any sources (other than their own data) in the first assignment, although they are encouraged to do so and taught how to cite and reference.

It was the references pages from the Lab 1 assignments that were collected.

Procedure

The proposed research was reviewed and approved by the Open Polytechnic's Ethics Committee. At the start, a research assistant coded all data sheets to remove student identity. She copied the references page(s) and removed all identifying information from each page, replacing it with a code to represent the participant and whether the report was submitted in print or online. Analysis then proceeded using only these codes. The researchers did not know any student information until the later stages of data analysis. (At that point one of the researchers had to read a sample of entire lab reports, as reported below, from which names had not been removed. Therefore she then knew the identities of the sampled students.)

Procedures were also put in place to minimise some perceived weaknesses of citation analysis. First, references were used, not bibliographies. This is because students had been specifically taught in the course that references must include only and all cited sources – that is, only and all the sources they actually made use of in their reports. They were told they would be marked on this. It seems reasonable, therefore, to assume students do their best to include only those sources they actually used and all sources they actually used. (In the opinion of the authors, references pages may often be a better data source than bibliographies, because there is no requirement to cite all sources listed in a bibliography – so students may be tempted to 'pad' that list, giving a less accurate estimate of sources actually used if only the bibliography is analysed.)

Second, to be more rigorous in evaluating whether data sheets included only and all cited sources, a stratified random sample of the Lab 1 reports was pulled and the entire report, not just the references page, examined. The sample consisted of 10% of the total collected data sheets ($n=12$), stratified by mark received on the report (since it was expected that there might be a relation between the mark received and the number/type of sources used). Details of this sampling are provided in Appendix A.

To summarise the results of the random sampling, the collected references pages can be considered a fairly accurate representation of cited sources. While students do make errors in what they report, especially if the requirement is an

entirely correct references page, almost all (96.97%) cited sources do appear on this page, and most (88.89%) of the sources appearing here have indeed been cited within the report. (Note: Correct **format** in citing or referencing was not evaluated – that is, we didn't examine for errors in APA style. Only **content** in citing and referencing was examined. For instance, did the report cite some information about the source within the text at point of use? Did it place some information about that source on the references page? If it did, it was counted as correct citing and/or correct referencing for our purposes.)

Having described the sampling procedures, we now turn to the general content analysis of the 124 data sheets. Each data sheet was analysed on a set of variables (determined to be useful from a pilot study run the previous year and originating from authors' interests and the literature on citation analysis). These variables are explained and data analysed in the next section.

Results

Besides the participant variables mentioned earlier (highest level of study before enrolling in course 73195, whether this was their first time enrolled with the Open Polytechnic, and how many (if any) other courses they were taking concurrently), a set of source variables was examined. Analyses of these source variables are the main focus of this research at this time.

Source variables analysed were: (1) total number of references; (2) whether or not students referenced their course textbook, a set of journal articles supplied and recommended by the instructors, or background information also supplied; and (3) how many sources students used from the library resources. It was also noted whether students submitted the assignment in print or online, and what mark they received for it.

To analyse these variables, a set of descriptive statistics was calculated to summarise the data. In addition, several statistical tests have now been run to determine the significance of the data. The following is a summary of both types of statistics.

As descriptive statistics, three measures of central tendency (mean, median, mode), as well as a measure of variability (range), are reported. These values for the major source types are shown in Table 1.

Table 1: Source type and use summed across participants (n=124)

Variable name	Mean or percentage	Range	Median	Mode and other frequencies
Number of sources used	3.62	0 to 11	4	4 (n=36) 3 (n=28)
Textbook	59%	0 or 1 (No or Yes)	1	1 (n=73) 0 (n=51)
Instructor-provided journal articles: B & T	83%	0 or 1 (No or Yes)	1	1 (n=103) 0 (n=21)
Instructor-provided journal articles: L & Z	53%	0 or 1 (No or Yes)	1	1 (n=66) 0 (n=58)
Instructor-provided journal articles: P et al.	57%	0 or 1 (No or Yes)	1	1 (n=71) 0 (n=53)
Instructor-provided background	45%	0 or 1 (No or Yes)	0	1 (n=56) 0 (n=68)
From library: Subject guide	6%	0 to 2	0	0 (n=117)
From library: RR & AR	2%	0 to 4	0	0 (n=121)
Other sources	21%	0 to 7	0	0 (n=98)

Note: The following is a key to the definitions and technical term used in Table 1:

B&T	Brewer and Treyens, authors of one of the instructor-provided journal articles
L&Z	Loftus and Zanni, authors of one of the instructor-provided journal articles
P et al.	Pezdek et al., authors of one of the instructor-provided journal articles
Subject guide	Online library resource containing 73 materials relevant to this assignment
RR & AR	Recommended resources and additional resources – 17 library materials generally relevant to psychology

The mean number of sources used was 3.62 sources per assignment. This is very similar to the results of the earlier pilot study (students from 2009, $n=95$), where the mean number of sources used was 3.46. In the present study the mode (most frequently occurring number of sources used) was 4, with 36 students using that number of sources. The next most frequent number of sources used was 3, with 28 students using that number of sources. The median score (the score at the middle (position 62) when the 124 scores are arranged in numeric order) was 4. One student used 11 sources. Three students used no sources.

Looking at types of sources on the references pages, the most frequently used source in this assignment was one of the instructor-provided journal articles (coded as B&T to indicate its authors). These journal articles were chosen by the lecturers as being especially relevant to this assignment. Copies are printed and inserted with the assignment information in the students' printed study materials, and the articles are also available online on the course page. Students are encouraged to use these articles. The B&T article, which was the one most used, was included on the references page by 83% of students. The other two instructor-provided journal articles were also fairly well used, at 57% (P et al.) and 53% (L&Z) respectively. Not shown in Table 1, but also examined, was how often students used none of these articles, one of them, two of them, or all three of them. We found that 12 students (just under 10%) used none, 29 students (23%) used one, 38 students (31%) used two, and 45 students (36%) used all three of the instructor-provided articles. The journal articles supplied by lecturers were also well used by the students in the 2009 pilot study.

The textbook, which contains a chapter that is very relevant to this assignment, was cited by 59% of the students. This again mirrors the pilot study, where 61% of students included their textbook in the references page.

A multi-page summary of the theoretical background and past research for this assignment, written by one of the instructors and inserted with the assignment information in the students' printed study materials, was referenced by 45% of students. In the pilot study, 37% of students used it.

Library resources of all types measured were infrequently used by students. Sources from the subject guide, which is an online resource showing 73 items of library-held material that are relevant for this assignment in this course (as chosen by the lecturers and the psychology librarian), were used by only 6% of students. Similarly, 'recommended resources' (RR) and 'additional resources' (AR) were also used by very few students (2%). These RR and AR materials are 17 sources held by our library as general psychology resources (for example, other psychology textbooks), not geared particularly to this course or this assignment. To summarise, a few students do use resources of library origin, but they are exceptions.

Finally, any source listed on a references page that did not clearly come from the textbook, the instructor-provided sources, or the library-provided sources, was listed as 'Other'. In all, 21% of references pages contained this type of source. These sources are probably of student origin, although they may have come to the student from a librarian at the student's local library or from some other person. Of the 26 students who used this type of source, most of them (n=16) used only one source.

The study also tabulated which students submitted online and which by print. Ninety-nine students (80%) chose to submit the assignment online, while 25 (20%) chose to submit it in print. (A variety of factors may influence the way in which students submit, including ease of access to the internet, familiarity with online submission, and personal preference.)

The overall mean mark on this assignment was 64.47 out of 100 marks, the mode was 75, and the median was 67. The highest mark obtained was 91 and the lowest 18. Looking at letter grades, 27% of students received a grade in the A range, including A-, A and A+ (marks of 75–100), 40% received a grade in the B range (marks of 60–74), 20% received a grade in the C range (marks of 50–59), and 13% received a D or a Failure grade (marks of 0–49).

Descriptive statistics were also collected on three student variables, chosen because it was expected that they might affect student use of sources. These three variables were highest level of previous education, whether or not this was the student's first enrolment at the Open Polytechnic, and number of other courses being taken concurrently with this course in this trimester.

The highest levels of previous education were categorised and then summed within the categories. It was found that 55% of students had achieved NCEA Levels 2 or 3, 31% had achieved NCEA Level 1 or no New Zealand secondary qualification, and 15% had some other type of previous education (for example, an overseas qualification). As to whether or not this course was their first enrolment with the Open Polytechnic, this was fairly evenly split. For 47% this was their first enrolment, while 53% had previously enrolled with the institution for at least one course. On the measure of how many other courses the students were taking concurrently with this course, 67% had no other courses this trimester, 17% had one other course, and 16% had two or more other courses. Overall, then, more than half of the students whose assignment was analysed in this research had achieved NCEA Levels 2 or 3 previously, slightly less than half of them were enrolled with the Open Polytechnic for the first time, and about two-thirds of them were taking only this course this trimester.

With those descriptive statistics completed, statistical tests began. The aim was to determine which source variables and which student variables, if any, were significantly related to measures such as number of sources used and mark obtained for the assignment. This testing is only now beginning. So far, some differences have been found between print and online submissions, and some variables have been shown to significantly affect marks. These test results are summarised in Table 2 and variables are explained in Appendix B.

Table 2: Summary of chi-square tests of hypotheses

Variables tested	X ²	df	P-value
Instructor-provided articles; type of submission	7.44	3	0.059
Number of sources; Assignment 1 marks	12.59	6	0.050
Instructor-provided articles; Assignment 1 marks	24.78	9	0.003

Note: The null hypothesis for all three tests above states that there is no relationship between the two tested variables. If the P-value is less than 0.05 the null hypotheses should be rejected and the conclusion accepted that there is a relationship between the variables, significant at the P level of probability.

As shown, chi-square testing suggests first that there may be a relationship between use of the journal articles provided by the instructors and whether the assignment was submitted in print or online. The instructor-provided articles were grouped (no articles used, one article used, two articles used, or all three articles used) and a weak relationship (chi-square = 7.44, df = 3, p = .059) with type of submission was found. In general, online submitters tended to use more of the instructor-provided journal articles than did print submitters.

Some variables were also found to relate to mark. There is a weakly significant relationship between the number of sources used and the mark achieved (chi-square = 12.59, df = 6, p = .05). Assignments with more sources tended to get higher marks. For example, when grouping together assignments using four or more sources (the median and mode – see Table 1), it was found that 53 out of a total of 69 of these (77%) received a mark in the A or B range. But of the grouped assignments using no sources or one source, only 3 out of 10 (30%) got an A or a B.

There was also a strongly significant relation between mark and use of the instructor-provided articles (chi-square = 24.78, df = 9, p < .01). Grouping use into four categories (no articles used, one article used, two articles used, or all three articles used) and merging D and Failure grades, assignments using more of the articles achieved better grades. Of the assignments that contained all

three sources, for example, 39 out of 45 (87%) were marked as either A or B, but only 4 out of 12 (33%) of the assignments that used no sources were marked that highly.

To summarise results so far, means, medians, modes, and range information has been collected on the use of a variety of academic resources by students submitting the first assignment in an introductory psychology course offered through online/distance education. On average, students included three or four sources in their references page. The most frequently used sources were instructor-provided journal articles, the course textbook and instructor-provided background information. Library resources were infrequently used, even those resources specifically relevant to the course and assignment. Statistical testing has begun. So far there is a suggestion that there may be differences between print and online submissions, and that several source variables (number of sources used and use of the instructor-provided journal articles) are related to the mark achieved for the assignment.

Discussion

The overall plan of this research was to examine the pattern, if any, of source use by tertiary-level students in an introductory psychology course who were completing their first assignment. The method chosen was citation analysis, which collects information about the sources used by the author of the document through examining in-text citations, reference pages and/or bibliographies. Based on the literature, experience with students in this course and an earlier pilot study, it was expected that students would use a variety of scholarly sources and that patterns of source use could be tabulated and analysed by examining the references pages of their assignments.

To summarise the findings, patterns of use emerged, and three specific hypotheses were tested. The hypotheses that the mark received would be related to both the number of sources used and the use of the instructor-provided journal articles were both supported – assignments using more sources received higher marks, and assignments using more of the provided articles also received higher marks. In addition, it was hypothesised that there would be a relation between type of submission (print or online) and other variables. Of those relationships tested so far, online submissions may have used more of the instructor-provided articles than did print submissions.

In the descriptive statistics about source use, a number of source variables were measured, including the overall number of sources used on the references page, whether the textbook was used, and whether two types of library-origin sources were used. Most students showed three or four sources on the references page in this first assignment. The set of journal articles provided and recommended by course instructors were the most heavily used resources, followed by the textbook and background information written by one of the instructors. Library resources, even those specifically chosen as the most relevant for this course and this assignment, were infrequently used. Most assignments were submitted online (80%), rather than in print (20%). The most frequently given mark was in the B range.

A set of student variables, chosen because it was expected that they might affect the pattern of source use, was also tabulated. The most frequent level of past education for these students was completion of NCEA Level 2 or Level 3. Slightly less than half of the students were enrolled for the first time at the Open Polytechnic when taking this course, and two-thirds of them were studying only this course in the trimester tested.

This study relates to a body of research using citation analysis. As summarised by Heller-Ross (2002), citation analysis is widely used in library research, and even small studies have been helpful in setting library budgets and policies. Academics can also benefit from using this method to examine how their students seek and use scholarly sources. For example, past research (Leiding, 2005; Kraus, 2002) suggests that journal articles are a favourite type of resource in student writing. Kraus (2002) also suggests that advice from teaching faculty may have a pronounced effect on what types of sources students look for and cite.

In agreement with this literature, frequent use of journal articles, in particular those articles provided and recommended by the course's teachers, was found in this study. The overall number of sources cited (on average, nearly four per student) was higher than expected, given that this assignment does not specify that students must use outside sources at all. On the other hand, it had been expected that more students would cite their textbook, given that secondary sources are allowed and this assignment is specifically linked to a chapter in that textbook. In reviewing the instructions given to students for this assignment, one possible explanation is that the use of the textbook may not have been stressed as much as was the use of articles, particularly the three instructor-recommended articles.

The most surprising result is the very low use of library resources. The psychology librarian has a forum on the course page and strongly advocates the use of these sources, and the lecturers frequently encourage students to use this forum or contact the librarian directly. Yet few students used library resources in this assignment. It may be that there needs to be more encouragement for students to use these resources, or there may be factors in the way students access or interpret these resources that should be considered.

From the initial statistical testing it was found, as expected, that there does seem to be some relation between the number of sources used – and especially the use of the recommended journal articles – and the mark received for the assignment. It is also interesting that there may be some differences between assignments submitted electronically and those that students printed and sent in by post.

There are limitations in this research, of course. The two most important involve the participants and the materials. First, source use was examined only for one set of students in one course in one trimester in one discipline at one distance-based institution. Second, data came from the references page of assignments.

Although measures were taken to test that this page did indeed accurately reflect sources used, the competency of students to report sources and their honesty in listing them are major assumptions. In addition, some analyses were based on categories with relatively few cases, which may have affected results.

Plans for continuing this research begin with further statistical tests to be run on these data. For example, possible differences between assignments submitted online and those submitted in print have only briefly been considered.

Relationships to student variables, such as level of previous education and whether the student is newly enrolled, also need more analysis. For example, do more experienced students use more sources?

The next step is to go beyond this first assignment. The references pages from the second assignment in this course (73195 in Trimester 1, 2010) are available. By analysing them, whether or not students change their pattern of source use, as compared with how they use them in the first assignment, can be tested. With these additional data a larger number of cases in each category can be included in testing as well. Finally, student use of sources in higher-level courses should be examined. In particular, this course is the prerequisite for a Level 6 course, 73212 *Thought, Memory and Language*, in which students also submit two laboratory reports with references pages. How do students who have already completed 73195 and gone on to 73212 use sources in this higher level of study? That will form the next major stage of the research.

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Appendix A: Details of analysis of stratified random sample

Of the 124 references pages collected, two were dropped because at that time their marks could not be obtained. (These marks were later found and so these two data sheets are included in the general analyses described in this paper.) Another 25 could not be included for this test because those assignments were submitted in print and so had been returned to students and were not accessible. That left 97 reports from which to sample 12. A representative number (based on their frequency in the total population of reports) was sampled. Randomly chosen were two reports with marks between 0 and 49, two reports with marks of 50–59, three reports with marks of 60–69, three reports with marks of 70–79, and two reports with marks of 80–100.

One of the researchers then read these 12 assignments in their entirety, noting for each whether: (1) all cited sources were included on the references page; and (2) only cited sources were included on the references page. These data were then analysed in three ways: by entire page, by citations and by references.

By **entire page**, of the 12 references pages collected, eight were found to be completely correct – that is, all sources cited within that report were included on the references page and only cited sources were included on the references page. Of the four reports with some type of error, three did include all cited sources, but also either one or two sources on the references page that had not been cited. The remaining report had only cited sources on the references page, but omitted one cited source from this page. In analysis by entire report, therefore, eight of the 12 (66.67%) were entirely correct.

By **citations**, there were 33 cited sources over the 12 reports. Of the 33, 32 were included (as they should be) on the references page and one was omitted (an error), for an accuracy level of 96.97% (32 sources out of 33).

By **references**, there were 36 sources listed on the references pages of the 12 reports. Of these, 32 were cited within the report (as they should be) and four were on the page but not cited within the report (an error). The accuracy according to this type of analysis is, therefore, 88.89% (32 sources out of 36).

Appendix B: Statistical variables tested and their range of possible values

Mark	Numerical variable showing mark received on Assignment 1. Range = 0–100.
Mark grouped	Categorical variable obtained by grouping the mark variable. Categories = 0–49, 50–59, 60–74, 75–100.
Instructor-provided articles	Categorical variable recording whether or not each of the three instructor-provided articles was included on references page. Categories = 0 or 1.
Instructor-provided articles grouped	Categorical variable obtained by grouping the instructor-provided articles variable. Categories = used all three articles (coded as 3), used two articles (2), used one article (1), used no articles (0).
Number of sources	Numerical variable showing total number of sources on references page. Range = 0–infinity.
Number of sources grouped	Categorical variable obtained by grouping the number of sources variable. Categories = 0–1 (coded as 1), 2–3 (2), 4 or more (4).

Student Engagement and Library Use

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Job function: Co-managing the Library Reference and Liaison team.

Example/problem

Is the library at the heart of tertiary study? If a student is fully engaged in learning, are they using library services? In a face-to-face institution the library has a real physical presence on campus – it's a destination, a refuge and a place to go to study. In a distance learning environment, such as the Open Polytechnic, the library is not a physical presence for students. The library wanted to see if the efforts we have put into developing online services, focusing on meeting the information needs of students in the students learning environment, was having an effect. In particular, what library services were being used and was there a relationship between library use and successful study? The Open Polytechnic's library is able to measure library use by individual students in terms of borrowing physical items from the collection, making requests electronically for items, using pdf files on the library server, using electronic books, and student requests for assistance (reference enquiries). It can also view general patterns in the use of the library website and external databases.

Reflection on example/problem

In the last 5 years the library has significantly updated its online presence. A new library catalogue that focused on providing students with easy access to material specifically related to their study, web subject guides, course-specific web assignment guides, and the addition of librarians to course forums have all raised the profile of the library for students. Web analytics software and web server log files have also been deployed during this time to measure the use of library-specific web pages and resources. Now that we can measure library use that includes more of the electronic resources, does this show any relationship to overall student engagement, and could a lack of library use indicate student disengagement?

Theoretical underpinning

Internationally, academic libraries have been investigating links between student library use and engagement and academic success. Eight universities in the United Kingdom are testing the hypothesis that: 'There is a statistically significant correlation across a number of universities between library activity

data and student attainment' (Stone, Ramsden, & Pattern, 2011). Similar projects have been undertaken by Hong Kong Baptist University (Wong & Webb, 2011) and Curtin University Library in Australia (Joseph & Haddow, 2011).

Action

Statistics on library use for 2010 by individual students were compared with programme completions and with course completions and re-enrolments.

Results/expectation of results

Preliminary results suggest that students who use the library are more likely to complete their programme than non-users. The same is also true for students that complete courses and re-enrol. The results also show that the intensity of library use increases as the course level rises. There is relatively low use of the library by students in courses at Levels 1 to 4, but much higher use by students in degree-level courses (Levels 5 to 7). This is not surprising, given that most courses at Levels 1 to 4 are self-contained and library use is not expected.

Future possibilities – general application

The results bear out our assumption that at Levels 5 to 7 a student that is fully engaged in their study will be making use of the library services available to them. These results need to be more rigorously analysed and extended for more years to show a trend. That, along with adding individual use of external databases, is a focus of future work. An exciting possibility, that should interest staff beyond the library, is that failure to make use of the library could be evidence that a student is not engaged. The library could perhaps provide this information for use in intervention programmes with these students.

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Open and Flexible Technical and Vocational Education and Training in Commonwealth Pacific Countries

Terry Neal

What is technical and vocational education and training and why is it important in the Pacific?

This chapter, which has been adapted from a report prepared for the Commonwealth of Learning (COL) (Neal, 2011), provides an overview of technical and vocational education and training (TVET) among New Zealand's Pacific neighbours (Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu).

What is TVET?

TVET is concerned with the acquisition of knowledge and skills for the world of work. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2002, p. 7) concludes that TVET is:

used as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Technical and vocational education is further understood to be:

- (a) an integral part of general education;
- (b) a means of preparing for occupational fields and for effective participation in the world of work;
- (c) an aspect of lifelong learning and a preparation for responsible citizenship;
- (d) an instrument for promoting environmentally sound sustainable development;
- (e) a method of facilitating poverty alleviation.

In a report focused on Pacific countries it is also important to consider Pacific cultural understandings of the term **education**, and similarities and differences across Pacific nations.

One could argue that the Tongan researcher Konai Helu-Thaman's definition of the term education is closer to the concept of TVET than more academic studies (cited in Koloto, Katoanga, & Tatila, 2006, p. 21). Helu-Thaman defines education as 'worthwhile learning', and breaks it down into three interlinked concepts:

- *ako* (learning and searching) – also used to mean teaching; when schools

were introduced in Tonga, the term *faiako* (making learning) was used to refer to the schoolteacher

- *'ilo* (knowledge) – denotes knowing, knowledge, or information; and implies learning or searching
- *poto* (wisdom) – before the introduction of schooling simply meant knowing what to do and doing it well. In today's world a person is considered *poto* if they use *'ilo* gained through *ako* for the benefit of their group. Although the meaning of *poto* has changed, the underlying value for learning remains: it is purposeful – one is considered a *poto* if they use the *'ilo* to become useful to their family and country.

Helu-Thaman also recognised both formal education (organised, institutionalised learning such as schools, colleges and universities) and non-formal education (organised but not institutionalised learning). Samoan, Tuvaluan and indigenous Fijian cultures also view education as something the learner acquires that is of value and uses in a beneficial way, although the benefits may not be economic (Koloto et al., 2006).

This 'worthwhile learning' is largely informal, contextualised, task-specific, practical, interactive, interpersonal and lifelong. To survive and develop individuals and their communities need traditional basic education, including the lifelong learning of essential values, knowledge, life skills and cultural literacy (Taufe'ulungaki, cited in Koloto et al., 2006). Again, this resonates with TVET approaches.

This report, therefore, defines TVET as worthwhile learning through which learners acquire knowledge and skills for employment and citizenship.

Models of TVET

TVET comprises three main models (Hartl, 2009):

1. Technical or vocational subjects offered at junior or secondary school level through the formal education system.
2. Technical or vocational qualifications awarded through post-secondary training institutes and vocational schools.
3. Informal training, such as non-accredited short courses and traditional apprenticeship training, often provided on the basis of family ties.

A worldwide statistical analysis of formal TVET programmes (UNESCO, 2006) showed that 84% of the countries for whom data was available offered TVET at upper secondary level, 50% at post-secondary non-tertiary level, and 70% at tertiary level. The same study showed a correlation between the gross enrolment ratio in secondary schools and the percentage in upper secondary TVET. However, the nine Pacific countries that are the focus of this report tended to be countries for which little or no data was available.

Many developing countries are focusing on the first model, because their number of learners attending secondary schools increases and they can use the existing infrastructure. However, this model carries a number of risks. For example, the TVET may be reduced to theory only, because schools cannot afford, or do not prioritise, the necessary equipment, and the vocational subjects may be devalued next to the academic options also available. Some research suggests that specialised vocational, rather than vocationalised, schools are more effective in helping students find employment (Joo, 2011).

Public specialist vocational training centres (the second model) tend to work well if they have close links to industry, which may also be helping fund them. However, they tend to be less accessible, financially and physically, than secondary schools. They also tend to not meet the needs of the informal deregistered industries well. In developing countries, the institutes struggle to maintain industry-relevant equipment (Department for International Development, 2007).

Traditional apprenticeships and informal training approaches (the third model) vary considerably. This training tends to be most relevant to the world of work, and more accessible financially and physically. Trainees tend to be more mature, more motivated and capable of building up skills gradually, including soft skills. However, the master craftspersons may not be up to date with recent developments and often lack teaching skills, so the quality varies considerably

and skills may not be portable. It has proved difficult to formalise the informal sector, so informalising it appears a more successful approach (Department for International Development, 2007).

The three different TVET models make decision making more complex than for other levels of education, even before tackling the challenge of being open and flexible.

A further level of complexity is the involvement of public, private and non-governmental organisations. Private provision reduces the demand on public funding and can be of high quality. However, it is limited to those who can afford and access it, and is variable in quality. Non-governmental organisations and community programmes reach those who may not otherwise be able to participate, and can trial new approaches, but tend to be hard to scale up or transfer to other contexts in which staff may not be so committed (Department for International Development, 2007).

The economy of the country in which the TVET skills are being developed has a major influence upon the likelihood of students being able to get jobs and makes it more difficult to assess the relative merits of different TVET delivery models (Department for International Development, 2007).

Why is TVET important?

TVET is increasingly important in times of rapid economic, social and technological change. Workers need more skills to participate in the knowledge economy, and the skills they have become outdated more quickly. There is a need for more learning and lifelong learning, and TVET skills fill the gap (UNESCO, 2001).

Johanson, Brady, Gorham, and Voigt-Graf (2008, p. 2) give seven reasons why TVET is important from an economic perspective:

1. Productivity – at individual, enterprise and country level, whether waged or self-employed.
2. Skills and poverty reduction – greater skills ‘are essential for the poor to access decent work or add value to existing subsistence employment’, and help make informal economic activities more sustainable – for example, by increasing awareness of the impact on the environment.
3. Skills – physical capital complementarities – greater human productivity raises the rate of return on investment in physical infrastructure, so it becomes worth making the investment. This then enables economic growth.
4. Technological and structural change – ‘acceleration of technological change requires higher skilled workers’, and workers with these skills enable enterprises to then respond to further technological changes.
5. Changes in work organisation – a move from assembly lines, with each individual needing only minimal skills and experience for their one role to ‘self-managed work teams, multiskilling, job rotation, and cross training with devolution of decision-making’.
6. Trade openness, competition and foreign direct investment – a skilled workforce encourages foreign investment. ‘Thus, the skill level and quality of the workforce will increasingly provide the cutting edge for successful international competition.’
7. Effect of skills shortages on productivity and wages – an enterprise is less productive if it is difficult to fill vacancies or needs to use an unskilled worker, and it is more likely to lose skilled workers.

However, a focus in the 1980s on basic education, especially at primary level, resulted in a decreased focus on TVET by donor agencies, although not necessarily by policy makers or the private sector. The United Nations

Millennium Development Goals exemplify this emphasis on the exclusion of TVET (Department for International Development, 2007). This in turn led to general neglect of TVET in many countries, and to short-term uncoordinated training solutions that are well intentioned but do not produce the desired results (Hartl, 2009).

Since the early 2000s TVET has become a priority again, as policy makers have rethought what people need in order to be able to work and live in the twenty-first century. As more people achieve basic education, they then need to achieve employment skills beyond basic literacy and numeracy to be able to work and live in their communities, as well as to adapt to ongoing changes. TVET is also increasingly recognised as a key to a nation's success in the global economy. Countries are developing TVET plans, but they still have limited resources. The challenge is to develop new affordable TVET solutions to achieve the desired outcomes (UNESCO, 2008).

Why is TVET important in the Pacific?

The Asian Development Bank funded a review of the TVET status of 13 Pacific countries, including the nine countries that are the focus of this report. The six publicly available individual country reports (Boeha, Brady, Gorham, & Johanson, 2007; Brady, Ereata, & Gorham, 2007; Brady, Gorham, Johanson, & Naisele, 2007; Brady, Gorham, Johanson, & Vira, 2007; Grundler, 2007; and Lene, 2007) and the overall Pacific report (Johanson et al., 2008) have provided valuable information for this study.

Johanson et al. (2008) classify the Pacific countries into three categories and describe their TVET status within those categories:

- land-rich, low-income countries (Papua New Guinea, Solomon Islands and Vanuatu) that have low social and economic indices but positive agricultural potential
- small, vulnerable island states (Kiribati, Nauru, Tuvalu) that face severe economic constraints, and have few economic prospects, and issues of sustainability
- 'advanced' island states (Fiji, Samoa, Tonga) that have relatively good prospects from tourism, remittances from overseas and emigration.

Generally, the nine Pacific countries have limited jobs available in the formal economy and those entering the workforce are more likely to find jobs in the informal economy. This is:

largely limited to the processing and merchandising of primary produce; providing services such as carpentry and mechanical repair, transport and small scale vending; and producing and selling handicraft and sewn materials. Skills gaps occur in all these activities. (Johanson et al., 2008, p. 19)

The opportunities are primarily small-scale fishing and primary production in the vulnerable island states, and larger-scale agricultural production in the land-rich states. Also, there are pockets of skills shortages in the formal economies. In all nine countries, TVET is essential for closing these skill gaps. At present the system is not producing enough graduates for the formal and informal sectors, and those they are producing may not have the necessary skills when they graduate. Industry has adjusted by employing less-skilled staff and providing internal training. Two other factors also contribute to the skills shortages – emigration, and sector-specific economic growth, such as mining (Papua New Guinea) and tourism, especially hospitality and construction (Fiji, Samoa, Tonga and Vanuatu). Emigration exacerbates the skills shortages, because skilled workers can more easily find jobs elsewhere, but the remittances resulting from that emigration support economies (Johanson et al., 2008).

The *Pacific Association of Technical and Vocational Education and Training (PATVET) 2007–2011 Strategic Plan* (PATVET, 2007) identifies key areas where it is important to strengthen TVET delivery in the Pacific. First, the changing global economic environment has created a ‘brawn drain’ (p. 4). Historically, remote Pacific islands have experienced a brain drain as those who seek formal academic education have needed to move to study and not returned. Now the value of vocational skills internationally means this is happening for TVET learners.

Second, growing health threats (HIV in Papua New Guinea and non-communicable diseases across the region) are leading to an increase in households that are headed by females, with the resulting changes to household economies. A TVET solution:

feeds the household economy by reducing community reliance on a cash economy for essential works, decreasing the unemployment levels via entrepreneurialism, and increasing potential levels of remittance (a major contributor to household economies in the Pacific) by providing emigrants with in-demand vocational skills. (PATVET, 2007, p. 4)

Third, TVET offers more hope than higher education for Pacific youth who have disengaged from learning, often because of lack of local opportunities for learning linked to employment:

Unfortunately, TVET infrastructure does not have the capacity to manage the host of social problems, let alone the sheer volume, of its entrants. NGOs, churches and private providers share the responsibility and the burden of remedial education for school drop-outs and push-outs with the government, as they enter the TVET system. In comparison to the secure and well-funded academic education being provided at primary, secondary and university level, TVET providers offer to transform the lives of **all** Pacific youth by offering them an entry to employment. (PATVET, 2007, p. 5).

The strategy concludes on a positive note by noting that TVET has moved to becoming a priority for the Pacific and that government ministers recognise the need to work regionally to design and implement formal and informal TVET solutions to meet the specific challenges the Pacific faces.

What is open and flexible TVET and how does it add value?

What is open and flexible TVET?

Any attempt to define the terms **open** and **flexible** can lead to long and interesting discussions. The COL defines the two terms as below:

Open education – policies and practices that permit entry to learning with no or minimum barriers with respect to age, gender, or time constraints and with recognition of prior learning. These policies need not be part of a distance education system but are complementary to it.

Flexible education – the provision of learning opportunities that can be accessed at any place and time. Flexible learning relates more to the scheduling of activities than to any particular delivery mode. (Commonwealth of Learning, n.d.)

Another understanding of flexible education is **education approaches that increase choice for learners** (that is, choice of who they learn with, as well as where, when and what they learn). The term **education** is used to recognise the role of teacher and learner in the process, rather than imply a focus on the role of learner, as the term **learning** may.

In the TVET literature, the term **flexible** is primarily used to describe **responsiveness to the changing needs of industry**. This flexibility requires tertiary providers to understand industry needs and modify their curricula and their delivery approaches. Two examples of this type of flexibility are short modular courses in which one part can be more easily changed without affecting the rest of the programme, and using work-based assessment to benefit from changes within the workplace, such as updating equipment or technology.

Various information and communication technology (ICT) tools have become available, each supporting different potential activities, and each with associated benefits for education. To meet the needs of their diverse learners, educators now need the skill to select a range of activities from the online and face-to-face options, while also considering the specific learning objectives in their programmes. The options continue to increase, and it is a challenge for involved educators to keep up with what tools are available, as well as understand how they might add value to learning experiences. Many are

yet to actively participate. To provide the wide range of skills necessary to respond to these ICT opportunities, tertiary institutions are creating specialist roles in learning design, multimedia development, learning management system administration and project management. ICT offers some benefits to all learning, such as:

- access to a wealth of online resources, including multimedia resources that can explain some concepts better than text or a person
- automated feedback that allows students to learn through as much practice as they determine is necessary for them to master something
- embedded upskilling in the use of technology within the learning experience, to better prepare all learners for work and citizenship.

However, other benefits from ICT are different if the starting point is classroom-based learning or open and distance learning (ODL). For the former, using ICT offers increased flexibility, especially when choosing when and where to learn. For ODL, the benefit is an increased connection to other learners and tutors, but this may decrease flexibility if activities are synchronous or rely on cohorts of students moving through together. As educators design blended approaches to try and get the best of both worlds, the boundaries are blurring between the two models.

Technology can improve learning and decrease costs where the overall design considers how technology can add value in these ways and there are large enough numbers of learners (Twigg, 2005). In the Pacific, reducing costs through careful use of technology would require cross-country solutions.

According to the Department for International Development (DFID), using ICT to enhance TVET relies on adequate infrastructure, but 'the cost of developing this infrastructure would inhibit its use in supporting programme delivery in many developing countries (and especially in rural areas) in the short term' (2007, p. 11). However, the DFID also notes the rapid spread of mobile phones with internet access and low-cost computers. It concludes that the 'new ICT systems may provide a valuable supplement for the theoretical aspects of the particular competency, but not for its hands-on implementation and assessment'(p. 11).

Elements of an effective TVET system

As discussed above, TVET systems are complex. Systems include TVET in the school sector, TVET in specialised vocational institutes and informal TVET. The learning involved can range from initial training through to long-term career development for the workforce. Responsibility for formal and informal TVET systems is often shared by education, labour, and social government agencies. Public, private or non-government organisations may offer TVET, and may use one of a diverse range of delivery methods. The aim is to reliably produce work-ready graduates who can continue to learn in a changing environment. Generally, each option achieves part of the aim well, but sacrifices other parts in doing so.

In discussing the strengths and weaknesses of the various TVET systems in the Pacific, Johanson et al. (2008) assess them against the five criteria below. Analysing their comments, we can describe sub-elements for each criterion as being integral to an effective TVET system:

1. Economic relevance:
 - (a) employer involvement:
 - (i) apex governing organisations, with appropriate industry representation and influence
 - (ii) workplace attachments, on-the-job training
 - (b) evidence based decision-making, through information such as:
 - (i) labour market information that links training with supply and demand
 - (ii) TVET graduate tracer studies that identify approaches that achieve formal or informal employment
 - (c) training system responsiveness:
 - (i) work with industry to understand demand
 - (ii) delivery driven by demand – for example, up-to-date curricula, competency-based, short and long courses, modular, full time and part time.
2. Quality:
 - (a) defined occupational standards – focused on outputs (for instance, competencies), not inputs (for instance, courses)
 - (b) clear and attainable objectives
 - (c) adequately prepared students on entry

- (d) trained instructors
 - (e) appropriate training content with definition of associated learning outcomes
 - (f) availability of tools, equipment and supplies
 - (g) assessment of performance against training objectives and standards
 - (h) strong management of the training process
 - (i) continuous improvement systems.
3. Accessibility:
- (a) raised status of TVET
 - (b) affordability
 - (c) wide coverage geographically
 - (d) gender equality.
4. Organisational and management effectiveness:
- (a) recognition of the complexity and resulting challenges within TVET
 - (b) clear mandate, within and between government agencies
 - (c) coordinated approach
 - (d) adequate resources
 - (e) accountability
 - (f) informed decision making.
5. Finance and internal efficiency:
- (a) diversified revenue (for instance, between public, private, donor and parent sources)
 - (b) increased internal efficiency
 - (c) use of financial transfer mechanisms.

Where open and flexible TVET adds value

Within the above framework, open and flexible TVET can add value to the following subelements:

1. Enabling greater employer involvement through workplace attachments and on-the-job training. Flexible delivery methods can supplement work-based training by covering theoretical components through learning materials and distance support or block courses. Also, open and flexible approaches can include formative and summative assessment methods that use real work settings as much as possible. Programme design that assumes resource-based learning can ask trainees to use the materials for just-in-time learning to solve real work problems.
2. Enabling greater delivery driven by demand – for example, up-to-date curricula, competency-based, short and long courses, modular, full time and part time. Open TVET can increase learner and employer choice in terms of delivery options, through offering full-time and part-time options, and also lends itself to modular options. However, resource-based learning risks being less responsive in a changing marketplace because of the lead time required to develop materials.
3. Defined occupational standards are relevant to resource-based open and flexible methods. Embedding the standards in learning materials ensures consistency across various learning experiences, and so can contribute to quality assurance. However, the cost of the design and development of learning materials can only be recouped if the materials are used by enough learners.
4. Trained instructors. Open and flexible learning may be useful for training the necessary number of instructors – in particular, allowing them to learn where they are based, and as they are working. It is essential to train instructors using open and flexible learning if they will be teaching using open and flexible methods themselves. Resource-based approaches can decrease the dependence on a subject-matter expert facilitating a learning experience, or can fill gaps in a trainer's skill level if they lack the full range of experience.
5. Appropriate training content with definition of associated learning outcomes. Well-designed learning materials ensure consistency across programmes and reduce variability due to the human element. Instructional designers begin with the learning outcomes and use them to select appropriate activities, tools and content. ICT-based delivery offers the benefit of developing digital literacy as part of the learning experience.

6. Availability of tools, equipment and supplies. Video demonstrations and online simulations cannot fully replace the benefits of working with actual equipment and tools. However, they can show how to do something and provide cost-effective practise with feedback, and thus decrease the time required to work with the real thing. Distance learning also supports learning in workplaces where the equipment is being used, and ICT can enable learners and workplace assessors to demonstrate competence using various techniques, such as online interviews, audio or video recordings, and scanned signed checklists.
7. Accessibility. Distance TVET can take learning to where the learners are, rather than insisting that they move to a different city or island. Modular options support learning part time while working or caring for families. Both of these situations make learning more affordable.
8. Increased internal efficiency. Resource-based learning offers increased efficiency when the number of learners warrants the fixed costs of developing the materials, especially if this includes automated assessment. Use of open education resources or other existing material could provide some efficiency gains. However, this is likely to cut across the ability to respond to changing industry demands and meet specific communal or national needs.

Open and flexible TVET in the Pacific

Pan-Pacific open and flexible TVET activity

PATVET

PATVET's mandate is to advocate for the overall development of the TVET sector in the Pacific and, as such, influence TVET policy formulation and resource mobilisation. COL was instrumental in establishing PATVET, providing external expertise for the development of the constitution and initial secretarial support. PATVET has a regular slot at Education Ministers' meetings, raising the profile of ODL and TVET, which in turn informs national education policy development (Jenny Williams, personal communication).

One of the six outcomes in the *Pacific Association of Technical and Vocational Education and Training (PATVET) 2007–2011 Strategic Plan* (PATVET, 2007) focuses on open and flexible TVET. The focus is on building awareness of the potential of ICT and ODL to support TVET in remote locations, communicating existing good practice across their network, and finding potential partners to help develop ICT and ODL solutions.

TVET is mode of learning that values traditional skills transferral, and promotes learning through seeing and doing. Remote areas and people of the Pacific do not need to be educationally disadvantaged by a lack of access to formal resources. An important role of the Association will be to highlight and prompt creativity and a marriage of the traditional and modern in an attempt to bridge this divide. Publicising opportunities and facilitating partnerships in ICT and ODL will be a priority for remote TVET development in the coming years. The PATVET forum will provide examples of and opportunities for outreach/mobile training in remote areas. Pacific experts will be promoted to international stakeholders as people with local knowledge of the TVET sector, and a responsibility to engage remote people and areas in development work.

To achieve this output, PATVET will use its communications strategy to raise awareness of the use of enabling technology to make TVET accessible, and the responsibility of the sector to meet remote needs. PATVET will develop its inventory resource to better reflect remote TVET provision; and supplement this with web-based illustrations of remote training. Network members will be surveyed and promoted to external stakeholders as resources and representatives of the region. (PATVET, 2007, pp. 7–8)

PATVET is currently working on a range of activities, including:

- draft generic TVET provisions for potential inclusion in Pacific Education Acts
- ensuring they are an inclusive and representative organisation with an effective communication strategy
- setting standards for the delivery and recognition of TVET – that is, progressing with an operational Pacific TVET qualification register, in partnership with the Secretariat of the Pacific Board for Educational Assessment
- data collection – a reverse tracer study on a sample of TVET providers in each country
- promotion of TVET career opportunities for the Pacific
- sharing of TVET good practice.

However, there is no evidence of open and flexible or ICT-focused activity at this stage.

The Pacific Plan for Strengthening Regional Cooperation and Integration

The Pacific Plan for Strengthening Regional Cooperation and Integration (Pacific Islands Forum Secretariat, 2007a) includes in its steps for immediate implementation:

- a digital strategy that recognises the potential of an improved ICT infrastructure to support distance learning
- investigation of the potential to expand TVET regionally. However, the focus of the expansion seems to be campus delivery, including establishing an Australian Pacific Islands Technical College in the Pacific region.

However, the greater detail in the *Pacific Regional Digital Strategy* (Pacific Islands Forum Secretariat, 2007b) states that TVET will be a focus for ‘a regional study on the needs and mechanisms to satisfy the huge and increasing gap in Human Resources available to support ICTs in the Pacific’, and aims to identify common solutions such as ‘distance education over the internet’ (p. 10). The strategy suggests that the private sector has an important role to play in ensuring a reliable ICT infrastructure. The strategy also recognises the existing

ICT infrastructure, including the Japan International Cooperation Agency-funded ICT centre at the University of the South Pacific (USP), the recent appointment of a Pacific Islands Telecommunications Association regional training coordinator, and various donor agency and commercial initiatives in ICT.

Skilling the Pacific Study

After analysing the TVET systems and the needs of 13 Pacific countries, as part of the *Skilling the Pacific Study* Johanson et al. (2008) put forward five project proposals:

1. Strengthen TVET organisation and management.
2. Create a capital development and innovation fund.
3. Expand service delivery through ODL using ICT.
4. Strengthen TVET programmes in rural areas.
5. Develop outreach training in atoll economies.

In discussing the third project, the authors point out that TVET is increasingly taught using ICT in 'advanced regions'. They recognise the existing capability in Fiji Institute of Technology's Learning Centre and the sustainability of the Fiji Institute of Technology's franchise programmes in contrast to other ODL pilot initiatives in the region. They therefore propose using this centre, working closely with PATVET, as the implementation base. The proposed project would focus on extending the existing Fiji Institute of Technology programmes to other countries, using a similar model to that already being used in Fiji. They identify the following challenges in implementing the project:

- high development and maintenance costs
- language differences
- communication difficulties
- lack of design specialists
- lack of ICT infrastructure.

Suggestions for dealing with some of these challenges are:

- assess demand for such programmes
- tap into existing ODL expertise, including that of COL
- explore collaboration with USP, particularly its existing network
- train tutorial staff
- include quality-assurance procedures
- evaluate pilot delivery.

The 2009 Forum Education Ministers' Meeting tasked the Secretariat of the Pacific Community with seeking funding from the 10th European Development Fund to be able to act upon the recommendations from the *Skilling the Pacific Study* (Pacific Islands Forum Secretariat, 2009a). The Secretariat is presently scoping a project to map all of the formal and informal TVET offered across the Pacific, identify the priority gaps to fill, and recommend priority actions. This project, starting in 2012, is expected to take 3 to 4 years (Lia Maka, personal communication).

Pacific Education Development Framework

The Pacific Education Development Framework (PEDF) 2009–2015 (Pacific Islands Forum Secretariat, 2009b) includes TVET under its mandate, acknowledging historical neglect of this sector, but also recognising its importance in contributing to economic growth and its significance in relation to the large number of young people across the Pacific. It acknowledges and seeks to build upon the TVET analysis in the various *Skilling the Pacific* reports. The PEDF stresses the importance of ODL for those who have not been able to access formal schooling in the past. The PEDF also recognises the potential for ICT and ODL to support innovative teacher training to address the present teacher capability gap and provide lifelong learning for teachers. It goes on to highlight specific benefits that others have observed from ICT:

Research conducted by development partners in other regions in utilisation of ICTs in education has produced encouraging results with students more interested and motivated, absenteeism reduced, learning as measured on test scores improved, collaboration and teamwork enhanced, and communication and computational skills improved. Some preliminary results of trials of the OLPC [one laptop per child] initiative are also consistent with this research. There is now a potential for Pacific countries to move beyond incrementalism and with assistance of ICTs make a quantum leap forward in realising goals of access, quality and equity in education. (p. 19)

PRIDE

A number of the publications developed through the Pacific Regional Initiatives for the Delivery of Basic Education (PRIDE) project identified that ICT offers potential to add value to TVET in Pacific secondary schools. For example:

ICT is for all, not just for developed countries. The challenge is to use the internet, computers and satellite communications in cost-effective ways. UNESCO-UNIVOC is constantly seeking ways to assist disadvantaged communities to access ICTs. For example, a remote village in Bangladesh has been equipped with a shared satellite phone and a Botswana village has been given a computer through which students can log on and undertake distance learning. In the south of Africa, even the poorest countries can share TVET best practices via ICT. (Maclean, 2009, p. 38)

However, this will require Pacific nations to develop new models to overcome specific distance challenges:

It is vital that all students seeking vocational education do not have to come to the urban areas to receive training about urban contexts. Rural locations, villages and remote islands need vocational training programmes that suit their needs and that are, ideally, provided on site. Vocational educators may need to be mobile to provide appropriate training for Pacific Islanders who are often disadvantaged by distance. (Edmond, Logha, Thomas, & Hageleisa, 2009, p. 121)

Natau, Borja, Pangelinan, and Lafolua (2009) suggest ICT as part of the solution to inadequate access, building on existing Pacific-wide open and flexible systems:

For students in remote islands and those unable to access the urban-based TVET learning opportunities, modern technology through the distance-learning mode can be utilised. Already there are Pacific-wide systems in place that enable students to access distance and flexible learning, open distance learning and interactive distance learning. Improvements to this already existing system would certainly improve TVET access. (p. 159).

Country-specific open and flexible TVET policy

Our analysis of national education strategies in order to understand their open and flexible TVET policies uncovered a range of combinations, as shown in Table 1. The four countries in the right-hand column clearly linked mention of openness and flexibility to TVET.

Table 1: Categorisation of open and flexible and TVET emphases within national education strategies

Country	TVET emphasis	Open and flexible emphasis	Open and flexible TVET emphasis
Fiji	Strong	Some	
Kiribati	Limited	Some	
Nauru	Strong	Some	
Papua New Guinea			Detailed
Samoa			General
Solomon Islands			Detailed
Tonga			General
Tuvalu	Strong	Some	
Vanuatu		Detailed	

Eight of the nine countries, Kiribati being the exception, identified TVET as an important part of their most recent education strategies. All countries included open or flexible education in some way, with most mentioning ICT as a way to support this.

Kiribati, Tuvalu, Nauru and Fiji do not have clear open and flexible TVET policies, even though Fiji has an established distance education infrastructure through which it supports other Pacific countries. The plans of Tonga and Samoa included general open and flexible TVET elements. Vanuatu's plan did not include open and flexible TVET. However, as part of the PRIDE project, a clear, thought-through ODL policy had been developed at a similar time. Papua New Guinea and Solomon Islands have more detailed open and flexible TVET plans. However, Papua New Guinea faces the challenge of how to move a traditional print-based distance provider to become the flexible innovator that the system needs and the plan outlined. Solomon Islands seems better placed through being able to build on three factors: earlier innovative projects using ICT to deliver distance learning; some relatively new coordinating mechanisms; and consultancy in 2009 from which a detailed and informed distance and flexible learning policy was developed.

Relevant themes from implementation of all TVET

Before focusing on open and flexible TVET initiatives in the nine countries, it is helpful to understand the wider TVET context. An overview of all TVET activity in the nine countries (Neal, 2011) identified the following themes (relevant to consideration of open and flexible delivery):

- In each of the nine countries, the present TVET system is inadequate to meet the country's workforce and economic needs.
- TVET tends to be focused on youth, rather than retraining adults or second-chance learners.
- Small numbers of learners – with concentrated numbers in a few places and the rest spread over large geographical areas, usually with water in between – make it difficult to offer cost-effective TVET. Pacific countries face major logistical challenges in getting the equipment necessary for quality TVET to remote locations. It is enough of a challenge to get learning materials to many of these locations.
- TVET courses need to be continually reviewed and updated to respond to changes in the workplace, especially technology developments. Most of the nine countries are in the process of establishing effective mechanisms to involve industry to define their changing requirements. However, even when the new competencies are defined, the costs of updating equipment, reviewing curricula, redeveloping materials, and recruiting and training skilled teaching staff discourage providers from responding. Providers are often struggling to stay financially viable themselves. The Pacific needs different TVET approaches to those that may be cost-effective in larger, less widely distributed, land-based systems.
- Many of the countries have more than one language – in some cases large numbers of languages – in which they seek to offer education and training, particularly to better engage less able or less motivated learners. This makes it challenging to find skilled staff and translate learning materials.
- Tracer studies indicate that TVET students who have moved to capital cities to study tend to stay in urban areas once they graduate.
- Effective rural training programmes recognise that learners are not unemployed as previously assumed, but are busy doing multiple activities to contribute to household incomes, and therefore use part-time, flexible approaches (Lene, 2007).

- Funding of TVET is 4 to 6 per cent of countries' overall education budgets, much of which are focused on universal basic education. Funding tends to be spread across multiple government ministries and donor agencies, making it hard to coordinate a cost-effective approach.
- Pacific practitioners support a focus on strengthening TVET in secondary schools (Teasdale, 2009). However, Johanson et al. (2008) suggest that finite resources are better invested into specialist, informal TVET delivery linked directly to employment.
- There is a tension between the opportunity to use existing curricula and learning materials developed in another country or region to decrease costs and increase responsiveness to change, and the benefits of developing local curricula, materials and teaching methods.
- All nine countries exhibit strengths and weaknesses in their present TVET systems, and thus can benefit from sharing their knowledge and experiences through the PATVET.
- Female participation in TVET is lower overall than for males, sometimes significantly so (see Table 2). Attitudes are changing, but gender stereotypes still drive many TVET choices: for example, females tend to study home economics, secretarial work and hospitality, and males tend to study fishing, agriculture, carpentry, metalwork and automotive.

Table 2: Female TVET participation

Country	TVET formal (%)	TVET informal (%)	Detail
Fiji		5	Training and Productivity Authority of Fiji (carpentry, automotive, metalwork)
		46	Vocational centres
	37		Fiji Institute of Technology
Kiribati	55		Tarawa Technical Institute
Nauru			No information from source
Papua New Guinea		26	Vocational centres
	50		Business colleges
	19		Training centres
Samoa	31		Institute of Technology
Solomon Islands		26	Vocational rural training centres
	32		Solomon Islands College of Higher Education
Tonga	1		Tonga Institute of Science and Technology
		61	Community development and training centres
Tuvalu			No information from source
Vanuatu		20	Rural training centres
	42		Vanuatu Institute of Technology

Note: The table is limited to the TVET statistics available from Johanson et al. (2008). However, it gives an indication of participation by gender.

Examples of open and flexible TVET

The countries studied tend to offer TVET through face-to-face programmes that assume classroom attendance and full-time study, and use traditional assessment. Distance learning methods, including the use of ICT to support them, appear to be frequently mentioned in policies and workshops, but not yet consistently implemented. There are, however, some examples of open and flexible TVET.

Formal

Specialist institutions

The Fiji Institute of Technology offers two flexible options that allow learners to choose to begin study towards a trade qualification in their home location, and then move to complete it at the Institute.

In 2007, the Learning Centre at the Fiji Institute of Technology had established capability in technical training via distance learning and appeared to be increasing its distance options. The Institute was offering a fully distant diploma in business, and some distance courses in business, engineering, mathematics and applied sciences (Brady, Gorham, Johanson, & Naisele, 2007). COL established the Learning Centre and hoped it would play a key role in enabling open and flexible TVET in the region. However, the author was unable to find out details of its present activity for this chapter.

Kiribati Institute of Technology experimented with offering an online diploma in business from Box Hill College in Melbourne, Australia, and a second online Australian course funded by the Australian Agency for International Development. However, the telecommunications charges made this option too expensive. In 2007, with decreasing telecommunication charges, the Institute was seeking aid support to pilot such an approach again (Brady, Ereata, & Gorham, 2007).

Maritime colleges play an important part in TVET in the Pacific. Maritime colleges in Fiji, Papua New Guinea, Kiribati, Samoa, Tonga and Vanuatu operate to an international curriculum and offer advanced training from the Australian Maritime College via ODL.

COL and the United Kingdom Department for International Development sponsored the conversion of a face-to-face programme for supervisors at the then Tarawa Technical Institute. This meant it could be delivered by distance to the 33 atolls of Kiribati, rather than the more expensive and disruptive approach of bringing the trainees to Tarawa for months of study. A Kiribati instructional designer spent 1 month in New Zealand, where he was teamed up with an instructional designer at the Open Polytechnic to do the conversion. He then returned to Kiribati and the New Zealand instructional designer travelled to Kiribati to ensure the training was suitable for local conditions and to further develop the local capability. The supervision course was later adapted for use by the Fiji Institute of Technology Learning Centre, which has since franchised it (Jenny Williams, personal communication).

Secondary schools

The Samoa School Net and Community Access project, due for completion in 2012, aims to connect all secondary schools to a high-speed network, provide each school with a computer centre, develop digital learning materials, and train teachers in using ICT in teaching (Hutak & Thomson, 2010).

In Tuvalu, the Department of Education obtains one hard copy version of learning materials, such as COL material, copies them at the central office, and then sends sets to the single secondary school by boat. DVDs are less useful, because of the possibility of transmitting or catching computer viruses. COL piloted secondary school mathematics and English by ODL from the Open Polytechnic in New Zealand. However, this was stopped due to lack of funding (Jenny Williams, personal communication).

Since 2009 Tuvalu has worked to strengthen TVET through the re-establishment of community learning. Secondary school vocational streams use local experts to offer skills-based training, such as sewing, cooking, language and enterprise. The Department of Education is working with the local governments of each island to facilitate this, and the local governments are now looking at paying the local deliverers for their contact hours.

Informal

Solomon Islands PFNet

The People First Network (PFNet) began in Solomon Islands 2001, as an activity of the Rural Development Volunteers Association, a partner agency of the Department of Provincial Government and Constituency Development. It was a community-based, non-profit network of some 30 or more rural 'email stations' run by the communities, using shortwave (HF) radios with modems to exchange emails with the base station in Honiara and outward to the internet. Various information-sharing services operated over the network (Lemming, 2007). The University of the South Pacific piloted the use of PFNet to offer distance programmes in 2002. However, in 2011 the project appears to have ceased, as the PFNet website is no longer operational.

Solomon Islands Distance Learning Centre Project

The Solomon Islands Distance Learning Centre Project began in 2004 as part of the Education Sector Investment and Reform Programme funded by the European Union and NZAid. The overall programme had TVET, including literacy and livelihoods training, as its third priority. The centres were seen as being able to support rural TVET provision (Lemming, 2007). The project built on successful PFNet trials in 2002 with 10 students and their two supervisors, using email to support university study. The distance learning centres (nine by 2007) were special buildings attached to schools. Each had the necessary hardware to generate electricity using solar panels, access the internet using very small aperture terminals (VSATs), pick up radio signals, print out materials sent from city-based education providers, and scan materials. A supervisor maintained the equipment and supported learners with their use of technologies, including online communication tools.

An evaluation (Day, 2008) concluded that the project had been well set up and was adding value. However, the report recommended that use of the centres move beyond its present focus on distance learning to include other services, in the hope of making the centres sustainable. Day noted that sustainability would require identification of each community's needs that a centre might meet, a relevant business model and strategy, capacity building in management and ICT, and an integrated national information society strategy.

Centres struggled to be commercially viable, even though they were also operating as internet cafes and seeking partnerships that contributed to their educational operations. For example, a bank branch in a distance learning centre would perform electronic funds transfers over the internet (thereby

avoiding electronic funds transfers using phone calls) and also be involved in financial training. Another barrier to sustainability was the uncertain commitment from the monopoly provider of the telecommunications, which realised the centres may erode its distance phone call business (ICT Regulation Toolkit, 2011).

Day (2008) and Hutak and Thomson (2010) noted that the Ministry of Education and Human Resources Development had not developed distance learning programmes to make good use of the centres, which meant they did not attract enough students to make them sustainable. At present, the centres have been unable to prove sustainable and require funding from the Ministry of Education and Human Resources Development to continue.

Mobile training

Kiribati Institute of Technology, Vanuatu Institute of Technology, and Vanuatu Maritime College offer mobile training opportunities in the outlying islands. In this context, the term mobile does not mean use of mobile technologies. Rather, it is going to the remote islands to offer training, instead of relying on potential learners coming to the main centres for training. These are short courses and supply does not tend to meet demand. Across the Pacific, informal TVET providers and government departments offering training tend to use similar models. Offering such TVET presents challenges, such as finding skilled teachers and appropriate equipment.

Vanuatu Institute of Technology uses a train-the-trainer approach for rural outreach programmes in solar installation and repair, small business management, and hospitality. Institute staff run workshops to train the trainers, who then run 5-day workshops. Ministry of Co-operatives and Ni-Vanuatu Business used a similar train-the-trainers approach with 262 village cooperative societies to offer 2-week courses in business management subjects. However, the per-person costs (Vt1000) for such programmes need to cover central staff and attendees' travel and accommodation, and are quite high. They also still only offer limited coverage (Brady, Gorham, Johanson, & Vira, 2007).

Vanuatu Maritime College ensured appropriate equipment was available by taking a specially outfitted boat from island to island to offer a mobile 2-week training programme for rural fishermen. This meant they could still use institute equipment, but reach remote coastal villages. This was also expensive, costing Vt2000 per person (Brady, Gorham, Johanson, & Vira, 2007).

Community radio

Don Bosco is an international Catholic aid agency specialising in TVET in the Pacific, including Fiji, Samoa, Solomon Islands and Tonga. In Honiara, the Don Bosco school offers a community radio programme that delivers community TVET in subjects such as how to treat your goat and what is the best taro to plant, and through public health messages.

Move to resource-based learning

In Papua New Guinea, an informal TVET model proved successful in helping subsistence farmers to develop technical, business and livelihood skills. It was essentially a traditional model that used face-to-face delivery of 12 two-day workshops, with supporting workbooks to achieve 12 training modules, while tapping into local groups for ongoing support during training. It proved successful, but recommendations to improve the programme acknowledged the limitations of what can be achieved in a 2-day workshop and recommended improving the supporting resources by using the local language in the workbook and creating visual aids, such as pictures and posters with key messages, for participants to take home (Boeha et al., 2007). This case study illustrates both the challenges and opportunities when considering moving to a more resource-based learning approach such as ODL.

COL open education resources

Lene (2007) described five projects in which COL had funded development of materials that could be used by PATVET members across the Pacific:

1. Supervisory skills certificate.
2. Learning about small business.
3. Tourism.
4. Basic trades for small islands.
5. Literacy and numeracy within basic trades.

Other COL-funded activities to build the ODL capacity of the Pacific included workshops, sponsored attachment to the Open Polytechnic, staff development by distance, and establishing multimedia centres in Kiribati, Samoa, Fiji and Vanuatu, through funding equipment and training staff (Lene, 2007).

Conclusion

In her keynote speech at the Sixth Pan-Commonwealth Forum on Open Learning in Kochi, India, Open Polytechnic Chief Executive Caroline Seelig highlighted the value flexible and distance learning can bring to developing nations in helping them ease skills shortages. She observed: 'Meeting the skills challenges of the future will require new ways of collaborating among all of the relevant players involved in TVET'. This chapter has provided an overview of TVET developments and collaboration in the south Pacific region. The Open Polytechnic is committed to playing a leading role in this exciting and important area of education and training.

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Sustainability in Education: Is Distance Learning an Answer?

Josephine Bourke and Ormond Simpson

Introduction

The concept of sustainability is gaining acceptance in society and in business, but as this awareness has grown with available information, there are still some issues to address. One of these is gaining agreement on the effective responses to maintaining business today while also minimising the impact on the future (Bester, 2009). Providing ways of understanding the conceptual nature of sustainability may be where tertiary educational providers and researchers can make the greatest contribution to sustainability (Nicolaidis, 2006). This could come through embedding the concepts in educational programmes (Nicolaidis, 2006), undertaking research into the broad areas of sustainability, and contributing to wider adoption of sustainability within professional organisations (Stephens, Hernandez, Roman, Graham, & Scholz, 2008). While there has been some progress in the latter area, there appear to be delays in embedding sustainability into curricula. To assist progress, the first step is to gain acceptable definitions of what sustainability actually means for tertiary education and for educational providers.

There are a number of existing definitions of sustainability (Stephens, et al., 2008), many reflecting the United Nations report *Our Common Future* (World Commission on Environment and Development, 1987), which highlights the understanding of cross-generational fairness. The definition proposed by the Ministry for the Environment (New Zealand) is used in this report, as (despite some criticism as to its broadness) this definition reflects the concepts espoused by the United Nations:

... sustainability is about meeting the needs of today without adversely impacting on the needs of tomorrow. As a term it can be applied across a range of areas, such as the environment, society and the economy. (Ministry for the Environment, 2009)

The concepts of sustainability affect how education providers do business, and they are also influential in the design of curricula and how learning is delivered (Stephens, et al., 2008). If education providers wish to achieve an acceptable profile in the area of sustainability, they first need to address how they do business as an organisation (Baumgartner, 2009). Defining the organisation's

own position when it comes to sustainability is an important step to providing sustainable education. As part of this, the method of delivery needs to be considered (Roy, Potter, & Yarrow, 2007). This is particularly important with regard to distance learning (particularly e-learning), which appears to have sustainability implications that have not yet been fully explored (Roy, et al., 2007).

When looking at sustainability in education, there are several areas that need to be considered. The University of Plymouth in the United Kingdom refers to the main areas in sustainability education as being curriculum, campus, community and culture. They hold that without input from all four areas, sustainability in education is difficult to achieve. For this particular paper, the areas considered reflect and expand upon this approach. They are:

1. Curriculum choices, or what is taught. The curriculum is important to the organisation, as it forms the basis of the product and also indicates organisational direction. The various aspects of sustainability can affect what is taught in a number of ways.
2. Culture of the organisation, or how the organisation is structured to meet sustainability requirements. This also reflects wider cultural implications, as high-level requirements need to be backed up by resourcing to allow for full implementation.
3. Conveyance, or how the educational input is delivered to the student. Research into sustainable delivery often concentrates on distance learning, which is a particular focus of this paper too. Distance delivery has various guises, and there are a number of areas where the concept of sustainability is worth consideration.

Research on sustainability in education has been limited, often focusing on using the Internet as a tool for sustainable education, while omitting the need for social interaction and the difficulties with completions, which are common when distance learning is used. There are also implications for environmental sustainability and Internet use that are only now starting to be understood. This paper explores current research in the area of sustainable education and proposes several areas where there appears to be a need for further investigation.

Curriculum choices

The literature on how curriculum decisions are made in tertiary educational institutions is not extensive, and what is available is largely based on empirical and anecdotal evidence. This evidence suggests that some organisations have expectations that their faculty will keep up to date with industry requirements (although there might not always be a formal process for ensuring this). There may also be requirements to consult externally, perhaps identifying stakeholder needs through discussions, with market research also included in this process if required. Some organisations also have academic research expectations that contribute to the curriculum requirements, but such research is often specific to those areas that interest academic staff members.

In practice, the regular curriculum decisions appear to be made in response to a number of factors, including:

- tradition
- market need
- a good idea
- industry organisation guidelines
- government imperative.

When it comes to tradition, institutions may opt for courses and programmes that have always been offered, or which reflect those commonly offered by other, similar organisations. For example, an Internet search for Bachelor of Business programmes in New Zealand alone indicates at least 10 providers of similarly named programmes, not including those with different naming structures (such as commerce). Core courses within the programmes appear to also reflect similar perceptions of traditional requirements. Anecdotal evidence suggests that some changes might slowly be taking place, although research in this area is limited.

Sometimes a proposal for curriculum changes will come from an idea that stems from research, or fills a perceived gap. Organisations might also respond to market need, but it can be difficult to confirm this need and provide timely educational opportunities to reflect the requirement. Education providers are not always able to respond to market need quickly, and the necessity could come and go while the organisation is still considering the situation. In addition, market need may not allow for the time lapse required by education

– if the need is current, then it is likely that graduates with the required skills should have begun their learning several years earlier. There is always difficulty providing curriculum that reflects the needs of the present, particularly as institutional processes often involve significant lead time for the development of new courses (Stone & Baldoni, 2006).

When looking at their curriculum, organisations need to consider the requirements of stakeholders and reporting entities. It can be helpful when there are guidelines from industry organisations, particularly professional groups that have specific requirements for qualifying for membership (for instance, a requirement to join the New Zealand Institute of Chartered Accountants or become a member of some other professional organisation). In such situations, tertiary education providers need to meet these requirements if they wish graduate accomplishments to gain recognition. Also, industry organisations usually give some notification or moderation to ensure that the institutions are providing appropriate learning opportunities. There is anecdotal evidence that (in New Zealand) some professional organisations are considering sustainability in their requirements, but the move towards this is slow, particularly when dealing with the processes of tertiary education providers in developing curricula. However, it is possible that tertiary education providers will need to take a lead in this area, rather than waiting for the professional institutions (Stephens, et al., 2008).

While understanding their conceptual role as educational institutions, and the needs of external stakeholders, it is also important for organisations to understand their government's reporting requirements. In New Zealand, government policy has a strong impact on education, where much of the funding for tertiary providers comes from government sources. The effect of government policy is particularly interesting when it comes to current information concerning sustainability as a curriculum issue. New Zealand government agencies have published three important documents that New Zealand education providers need to use as part of their sustainability development. These are:

- *See Change: Learning and Education for Sustainability*. This document, published in 2007, notes that tertiary education institutes need a core understanding of sustainability. It also looks at ways in which knowledge might impact upon different disciplines (Parliamentary Commissioner for the Environment, 2004; 2007).

- *Tertiary Education Strategy 2007–12*: This document provides guidance on sustainability to tertiary providers. It also suggests that organisations have a responsibility to promote the sustainable use of natural resources through teaching and learning, research, knowledge transfer and innovation (Office of the Ministry for Tertiary Education, 2007).
- *Evaluative Approach to Quality Assurance Policy Framework*: This document includes key evaluation questions concerning learners, teaching, matching learner and stakeholder needs, and expected outcomes. All of these requirements need to be supported by evidence of achievement (New Zealand Qualifications Authority, 2009).

These documents set the high-level, longer-term aims of government when it comes to tertiary education providers. The process of implementing these requirements is in its early stages at the moment, but there are already issues developing. The most important issue appears to relate to resourcing. In taking leadership roles as required in the *Tertiary Education Strategy 2007–12*, organisations need to have the resources to undertake research. There is also a requirement for organisations to have a core understanding of their sustainability issues, and to provide evidence that they are meeting expected outcomes – all of which will require both research and expertise within particular sustainability areas. Organisations are already experiencing difficulties with recruitment, and the increasing cross-functional requirement of sustainability increases implications for the professional development of teachers in various disciplines, which will impact on provision (Stone & Baldoni, 2006).

There is already evidence that any move towards offering sustainability courses, or embedding sustainability into programmes, is hampered by a lack of resourcing, support and perception of market need (Stone & Baldoni, 2006). But there is recognition that sustainability is also a question of culture and curriculum. For example, in the United Kingdom in 2005 the Higher Education Funding Council for England and Wales (HEFCE) asked universities to integrate sustainable development topics into their courses. However, apparently universities were resistant to what they saw as interference in curricula matters and it remains to be seen how effective this edict will be. It may be equally difficult to change the culture of universities. But there is recognition, at least in some quarters, of how important this will be. Dr Iain Patton of the Environmental Association of Universities and Colleges was recently quoted as saying:

If students leave with a degree but no grasp of the social and ethical environmental context in which they will have to live and work, have we not failed them? No matter how large a university carbon footprint is, it is nothing compared to the impact of

its graduates when they leave and enter homes and workplaces. If we miss this, we really do miss the big picture. When at university, we have the responsibility to ensure learners are exposed to knowledge and values which they can take on with them as informed, responsible citizens. Every aspect of our campuses, buildings, teaching and leadership must be oriented to achieve this. (Shepherd, 2009)

It may be that progress with sustainability in the tertiary education environment will be slow, and progress could be hampered without government funding or commitment from educational organisations.

Culture of the organisation

Achieving commitment from tertiary educational organisations is a step that appears to be taking some time, yet without a change of organisational culture it seems that progress in educational sustainability will be hampered. Higher educational institutions may need to take a lead in defining and developing sustainability (Stephens, et al., 2008), yet despite the government imperative implicit in published documents, progress towards sustainable education in New Zealand appears to be slow.

New Zealand research indicates that when it comes to sustainability in education there are a number of issues that need to be addressed by educational institutions. The first is gaining an overall understanding of what sustainability means to an organisation (Parliamentary Commissioner for the Environment 2004; 2007). This understanding needs to reflect the organisation's business goals as well as its environmental aspirations. The limited research on sustainability in education in New Zealand indicates that the first step towards teaching in these areas is to address the sustainability of the educational provider itself. It is difficult to gain credibility in teaching sustainability if the organisation is not addressing its own contribution to sustainable education, particularly in an environment where corporate social and environmental responsibility is topical (Bester, 2009).

Business sustainability needs to be part of the organisation's core understanding of overall sustainability (Baumgartner, 2009), and in New Zealand it is also a government requirement (Parliamentary Commissioner for the Environment, 2007). Research indicates that the organisational structure is an important challenge to educational institutions wishing to promote sustainable education (Stephens, et al., 2008), and there appears to be a relationship between organisational commitment to sustainability and organisational culture (Baumgartner, 2009).

There are issues concerning organisational culture and structure that may prove challenging to educational providers. These include:

- Being a sustainable business. Current research indicates that organisations need to be careful about how they embrace environmental sustainability if it affects the profitability of the organisation (Soderbaum, 2009). Taking care of the more obvious areas of environmental awareness could be straightforward, but if there is likely to be any business impact there might be broader implications. One of the problems in this area is that there is a

broad understanding of sustainability generally, which may make things quite confusing (Soderbaum, 2009). For educational providers in New Zealand, consideration needs to be given to value and productivity, and also to the requirements of stakeholders (which may include government and students).

- The need to remember that when considering the organisational stakeholders educational providers may also need to take into account societal expectations. These could be emphasised through staff and student expectations of the organisation, and could put more individual responsibility on people to act in a sustainable manner (Natanasabapathy, 2007). If people act sustainably, then organisations might follow (Soderbaum, 2009).
- Curriculum issues, as many institutions try to provide courses and programmes that reflect external market demand. External registration organisations (such as accountants and engineers) have their own educational demands for qualification, with less concern about including sustainability as an extra specification. Cross-functional adoption of sustainability within programmes and courses could also be hampered by the considerable weight of processes that new courses and programmes must conquer.
- The requirement for appropriate research. Academic institutions may need to take leadership in research into sustainable education. However, as Soderbaum (2009) notes, there needs to be discernment in research to avoid politics or rhetoric gaining more importance than proper research.

Research indicates that it is difficult for proponents of sustainability to gain attention within New Zealand educational providers. It appears that most of the current provision has only occurred through the persistence of staff members. Without a supportive and flexible culture surrounding the introduction of sustainability into tertiary education, there are implementation difficulties. Research also indicates that the politics and ideology of sustainability need to be dealt with in the tertiary education environment, with sustainability research and delivery supported (Soderbaum, 2009). To quote Baumgartner (2009, p. 102), in the sustainability environment the 'low hanging fruits can be grabbed', but the issues concerning more difficult sustainability issues still remain unsolved. It might be that having a 'clean image' is more vital than being sustainable (Bester, 2009), and the method of delivery could be part of this image.

The effort to include sustainability in United Kingdom higher education has been focusing to a large extent on global warming and the consequent need to reduce carbon emissions. Earlier this year the University Secretary for the United Kingdom indicated in a letter to the HEFCE that the government wanted universities to reduce their carbon emissions by 80 per cent compared with 1990 levels by 2050, and by 26 per cent by 2024. This request was reinforced by a government statement that from 2011 a proportion of funding will be linked to how well individual institutions are reducing their emissions. In turn, the HEFCE and Universities UK (the vice-chancellors' group) have set up a 'Sustainability Taskforce', which has set equally high standards for carbon reduction. A fund of £30 million (NZ\$100 million) will be offered to universities between now and 2011 to develop emission-reducing projects.

It is interesting to note that much of the sustainability strategy for full-time universities in the United Kingdom rests on increasing the efficiency of their plant. For example, heating and lighting together account for around 70 per cent of universities' energy costs and therefore carbon output. There are examples of universities developing alternative innovative heating systems, such as biomass boilers at Bradford University and the University of East Anglia in Norwich (Bradford University), and electricity generation systems such as 'wave farms' at the universities of Plymouth and Exeter on the southwest coast of England (PRIMaRE, 2009).

Changes to the organisation's culture need to encompass more than just the easiest options, and need to be managed to include the development of an understanding of what sustainability means to educators. While some higher educational institutes are taking the lead in sustainability, there also needs to be more of a core understanding of how sustainability will affect teaching provision. As part of this development, some on-site universities are concentrating on improving their environmental impact. However, research is also moving to consider the value of the different types of provision while also considering sustainability.

Conveyance or delivery

When it comes to delivering sustainability within tertiary education, it is important to consider the nature of the typical tertiary student. Students at this level are mostly adult learners with specific needs. An overview of relevant literature indicates a number of trends, including an understanding that helping adults to learn is different from teaching children (Knowles, 1970). Research indicates that problem-based or enquiry-based learning might provide a more appropriate fit for the adult learner (Carey & Whittaker, 2002; Milligan, 1999). For most adults, this will not be their first learning experience (Corder, 2008). Adult learners can be more self-directing, using their own experience in their approach to learning, and showing a readiness to learn (Forrest & Peterson, 2006; Rogers, 2007). However, this approach needs to be tempered by an understanding that learning support may have an influence on successful outcomes (Robson, Bailey, & Mendick, 2008).

As we move towards further consideration of sustainable education in this context, it is important to look at the sustainability of the method of delivery. Research indicates that benefits may be achieved through greater use of distance education, but there appear to be costs attached to this that are not always fully considered. Distance learning is commonly regarded as important to sustainable education, but there are issues with both the methods used and the results.

Research indicates that there are sustainability issues that need to be further understood, particularly as e-learning is not necessarily proven to be more environmentally sustainable than paper-based distance offerings (Roy, Potter, & Yarrow, 2003). While there seem to be opportunities for new technologies in distance learning, concerns remain (Rutland, 2007). Using mobile technologies for open and distance learning community development may be appropriate (Green, 2007), but thought must still be given to students as important stakeholders. Any approach to distance learning should include a focus on their needs, rather than the method of delivery favoured by the institution (Weaver & Peters, 2007).

Issues that must be considered in respect of sustainability in distance education include:

- There is a low level of understanding of the issues regarding completions for distance students. It is also difficult to come to terms with motivations for distance learning, and the effort required to promote successful student engagement (an important consideration for all aspects of sustainable education).
- There is a general lack of understanding of the resources required for sustainable education encompassing distance delivery.
- The focus of much of the current research is on e-learning, rather than other options for environmentally sustainable distance delivery.

Distance learning is recognised as often being a lonely pursuit, with research indicating that distance learners are often disadvantaged compared with on-site students (Ross, Siepen, & O'Connor, 2003). There is also evidence that the non-completion rate is higher for distance learners generally (Levy, 2007). The issue of higher levels of non-completion among distance students is a strong consideration for sustainable education. Distance education methods are being considered as an important part of the sustainability mix, with research considering the environmental impacts of various modes of educational delivery. While issues surrounding these factors remain, as the environmental impact might simply be moved from institution to student, there has been a major increase in use of the Internet as a delivery method. As this trend seems likely to continue, the rate of non-completion among distance students requires further research (Levy, 2007).

Of course, there could be a question whether completions are the only important result (Zepke, Leach, & Isaacs, 2008), with student expectations perhaps differing from those of their learning institutions. However, business sustainability measures include the use of completions as an important benchmark, and significant non-completion among students can also have a social impact. An apparent high failure rate among distance students is not a particularly strong recommendation for use of the mode of delivery itself. However, studies have indicated that completion rates are not only affected by the mode of delivery, but also by motivation to learn. Personal motivation can strongly affect outcomes, rather than simply the mode of delivery (Klein, Noe, & Wang, 2006). However, the individual nature of distance study might provide a stronger challenge to that motivation.

With the apparent increased risk of non-completion for distance learners (a risk for distance deliverers seeking business sustainability) (Levy, 2007), understanding the importance of motivation may be vital. For educational providers, completion rates are important for business sustainability. They are also important as a societal factor, with high non-completion rates perhaps contributing to significant educational failure. A better understanding of student needs in distance learning would be helpful, as would a greater understanding of the appropriate methods for successful distance delivery.

As researchers investigate distance learning issues it is becoming clearer that provision of distance education requires specialised knowledge, both of the nature of the provision and the media used. To begin with, assumptions are often made about the skill levels of students, but however their learning materials are provided students usually need guidance on how to study by distance (Poupa, 2001), perhaps including appropriately structured overviews (Dee-Lucas & Larkin, 1995). Designers of distance methodology need to be aware of this. They also need to be able to incorporate delivery improvements and student support to assist in completion (Levy, 2007). Research has recommended that distance learning be entertaining as well as relevant, and that engaging the student requires that methods use creative (and perhaps expensive) methodologies (Ross, et al., 2003). This advice is not always understood by providers, who appear to regard distance learning as a cheaper option rather than one that requires significant upfront expenditure and ongoing support for both teachers and students. Retaining students in distance education is a significant issue, and requiring the provision of relevant, exciting and interesting materials to help with retention is important. However, as the cost and complexity of provision increases, so too may issues of sustainable provision.

While some publicity concerning distance learning presupposes a decreased cost of provision, there remains a need to provide significant resources to support distance students. In addition to the increasing requirements for distance material to be entertaining and creative (indicating increased expenditure on development of the materials) (Ross, et al., 2003), distance students can require more support if they are to successfully complete their studies, again indicating expenditure that may not be acknowledged. Distance teachers cannot support a significant student volume if the individual interaction requirement is high, yet expectations appear to be that teachers can successfully manage virtually unlimited class numbers when using distance delivery.

In terms of the delivery of environmentally sustainable education, current research into distance learning appears to be focusing on provision through electronic media, rather than on broader facilities. However, there are access issues with electronic methods, with many students still indicating difficulties with using the Internet for their studies (Poupa, 2001). Literature suggests that one of the disadvantages of studying by distance is missing out on the social interaction of class work and the intellectual stimulation provided by class discussions, and current attempts to replace the classroom environment with the Internet might be slow to gain acceptance. The provision of online chat tools and other online facilities does not currently appear to have a strong uptake among students, and could be difficult to manage with larger class groups (Ross, et al., 2003). In addition, many students are dealing with learning their coursework, plus learning strategies to manage online learning – an increased workload that might contribute to the high non-completion rate already associated with distance learning (Ross, et al., 2003).

There is also research stating that while it appears more economical to distribute documents through electronic forms than through print, there are indications that the cost of producing electronic information is often underestimated (Poupa, 2001). There is also the cost (both financial and environmental) of printing documents when learners are given electronic copies that they prefer to read in print. Evidence is beginning to emerge that students dislike extensive reading online, and while they manage smaller requirements to read online documents, any increase in this type of reading is not proving popular (Robertson, 2006). The cost could be transferred to learners who use their own printers, but the sustainability of many individual printers being used might not be accounted for. Some research supports the idea that learners will print material that interests them, or which they wish to follow up (Poupa, 2001).

If there is a greater failure rate for learners who adopt a distance learning mode, the social impact of failed educational opportunity should weigh against possible financial and environment benefits, and should be the subject of future research. While the future of open and distance learning might include more use of technology, there might be a return to paper for most distance learning should research into environmental sustainability identify this as a better option. As environmental concerns increase, it is likely that more people will find distance learning to be a more acceptable option. This could lead to increased issues in terms of completions and managing the expectations of stakeholders. We might also be dealing with more demanding students.

Herring and Roy (2002) suggested that in the particular case of the United Kingdom's Open University (OU) distance education was far more sustainable than conventional forms of higher education.

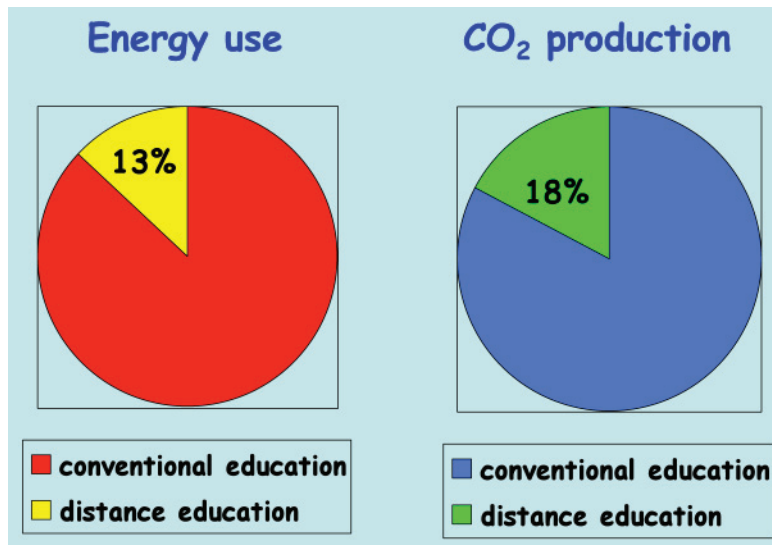


Fig. 1 Sustainability

Their initial analysis indicated that distance-taught courses involve 90 per cent less energy and CO₂ emissions than campus courses, although electronic delivery did not result in a reduction in energy or CO₂ emissions compared with print-based distance learning (Herring & Roy, 2002). However, their analysis failed to take into account the considerably higher levels of dropout from the OU and from distance learning generally.

Average dropout to graduation from conventional United Kingdom universities is around 20 per cent. Research is indicating that the delivery mode has an impact on completion (Frankola, 2009; Klein, et al., 2006), and dropout from the OU to graduation is now thought to be around 80 per cent based on the latest HEFCE figures. However, when measuring the energy use inherent in delivery modes, there appears to be no consideration given to the differences in completion and dropout rates. This lack of comparison in dropout rate has two effects:

1. If instead of comparing the energy per student studying, it is the energy per graduate produced by conventional and distance education that is compared, the energy advantage of the OU is raised to about 50 per cent that of conventional education, instead of Herring and Roy's 10 per cent estimate. This would seem to be a fairer way of comparing conventional and distance

education, as it compares outputs rather than inputs. The result shows much less of an advantage for distance education and may begin to fall within the inevitable errors involved in any such estimates.

2. Equally serious are the possible social effects of dropout mentioned previously. There is some evidence that dropping out of full-time higher education in the United Kingdom has long-term deleterious effects on the dropouts' physical and mental health. In particular, it increases their chances of experiencing depression, unemployment and general indebtedness (Bynner & Egerton, 2001). Depression is thought to be one of the most serious problems facing British society, with costs running into billions of pounds in treatment and social security costs, as well as loss of production. With nearly 50 per cent of the United Kingdom's 18 year-old age cohort entering higher education with a 20 per cent chance of dropping out, this means that around 10 per cent of the cohort may be experiencing the increased chances of depression and unemployment noted above.

There appears to have been very little research into the effects of dropping out of distance education. Since almost every distance education institution produces more dropouts than graduates – sometimes by a large ratio – this lack of interest in its main product is curious and a very clear gap in our understanding of the effects of distance education. We might hope that dropping out of distance education has less deleterious effects than dropping out of full-time education, but the fact that we do not appear to know for certain is alarming. Neither has any estimate ever been made of the effects on sustainability of dropout, but given the effects noted above it must be considerable. We need considerably more research into the effects of dropout from both conventional and full-time education on sustainability before we can safely conclude that distance education has real sustainability advantages.

Future research possibilities

Educational sustainability presents quite a few research possibilities. For example, New Zealand government requirements refer to an organisation's core understanding of sustainability, and with the difficulties in defining the impact of sustainability there needs to be more research into what providing sustainable education actually means. Following on from that, thought also needs to be given to the requirement to identify sustainable use of natural resources through teaching, learning, research, knowledge transfer and innovation.

There are further research possibilities for environmental sustainability in terms of curricula. Once a definition of sustainability in education has been agreed organisationally, there needs to be discussion about the best place for sustainability in the portfolio. It may be that educational providers will decide to embed the concepts of sustainability into current courses or programmes, or they might provide new qualifications. Institutions could also consider taking leadership roles in sustainable education and education on sustainability. However, this would also require research in this area, and could mean significant resourcing requirements in addition to considerable possible gains. All would depend on the organisation's core understanding of sustainability and what it means for the education environment. It would also affect the sustainability of any organisation as a business, particularly where increased resources are needed.

Arising from this area is the sustainability of distance learning. Within this overall theme are a number of issues that could benefit from research. The first is the sustainability of distance learning overall. In today's environment, there appears to be a move towards distance learning as being more economical, but is the cost structure truly understood from a business sustainability point of view?

As a delivery method it would seem to have an advantage over on-campus learning from an environmental point of view, but the development of e-learning is also having an impact. Early research indicates that paper-based distance learning might be better for the environment than the e-learning equivalent, but this requires further research.

Current research has not highlighted the importance of completion rates for distance students. This occurs no matter what technology is used for delivery, and there are issues concerning motivation and engagement. Learning by distance is lonely, and many people do not complete their study. In fact, it is often difficult to reach 50 per cent retention in distance education programmes. Research in this area would be beneficial, particularly when referring to a New Zealand context.

Conclusion

This paper looks at the current research into distance learning as a part of sustainable education. It appears that much research into distance education is assuming two things that need further investigation. The first is the assumption that distance learning will prove a better option for students, while ignoring evidence that suggests that distance learning completions are significantly lower than those in attendance-based tertiary institutions. This may be particularly true when the institutions are offering pre-degree programmes, but this has not yet been fully tested in research. How sustainable is a business that features significant dropout rates?

The second assumption is that e-learning will be more sustainable than paper-based equivalents, an idea that may not be supported by research. While online offerings can diminish the need for paper, the technology itself is not as sustainable, with hardware, software and energy requirements being substantial. Although it might seem heretical in today's e-environment, the return to paper-based learning could be more sustainable with current technology – concepts that need further testing in research.

Distance learning is likely to prove more sustainable – for the economy, the planet and society. However, the way it is provided needs to be examined in the light of both research and student need. The road towards sustainability in education is not likely to be short.

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Articulating E-pedagogy for Education

Mark Nichols

When technology is applied to education, it is commonly held that pedagogy must come before technology. It is also a universal truism that pedagogy consists of far more than providing content. A metastudy of e-learning literature confirms the conventional wisdom – according to the Association of Learning Technologies (2010, p. 18), ‘all the evidence points to success being process led rather than content or technology led’. It would be difficult to find any e-learning advocate who would disagree with this sentiment. However, what constitutes good process or pedagogy is seldom explored or made explicit, unless reference is made to such models as Salmon’s five-stage model (Salmon, 2000), Garrison and Anderson’s community of inquiry framework (Garrison & Anderson, 2003) or, perhaps more in vogue, Siemen’s theory of connectivism (Siemens, 2004). A recent attempt to integrate the latter two (Anderson & Dron, 2011) helps in the pursuit of pedagogy, but an overall educational framework is still missing.

The contention of this chapter is that contributions to e-learning theory have tended to come out of e-learning practice or speculation about the benefits of social networking, and so do not necessarily rest on a sufficiently broad understanding of the educational endeavour. Anderson and Dron (2011) observe that advances in e-learning pedagogy tend to accompany advances in technological efficacy. This has led to a somewhat myopic view of e-learning application, typically limited to notions of interactivity, ‘social’, ‘teaching’ and ‘cognitive’ presence, or informal networking with others. The term ‘education’ is generally missing from e-learning conversation. Rather, the focus is much more on the generic term ‘learning’, which often gives the impression that ‘education’ is some sort of imposter. However, a focus on learning rather than education can be misleading when seeking to apply e-learning in formal education contexts. The key objective of this chapter is to demonstrate how worthy education is as a pursuit, and how education can provide a formal context for e-learning practice that goes beyond the typical goals of interactivity, convenience and engagement usually set for the application of technology to formal learning. Rather than seeking interactivity, convenience and engagement, e-learning should seek to further the worthy goal of **education**.

In this chapter I seek first to provide a definition of e-learning and some observations about its potential. This leads into consideration of what we know about cognitive development, which in turn leads to thought on the value of education as a context and objective for e-learning, as opposed to interactivity, convenience and engagement as focuses. Finally, two education theories are offered as the effective basis for a true e-learning pedagogy. The general tenor of this chapter toward e-learning can also be found in *E-Primer No 5: Extending E-possibilities*, authored for Ako Aotearoa (Nichols, 2009b).

E-learning defined

I have defined e-learning elsewhere as ‘pedagogy empowered by digital technology’ (Nichols, 2008a, p. 2). I have also suggested that e-learning is a dependent term, in that its success or otherwise is determined by how well pedagogy and digital technologies are combined. A synergy between the pedagogy and technology is required for e-learning to be truly effective.

	Sound pedagogy	Unsound pedagogy
Reliable, easy-to-use technology	Effective e-learning	Technocentrism
Unreliable, complex-to-use technology	Frustration	Disaster

If we think of e-learning in this way, we can see that e-learning is as varied as the pedagogies and technologies that facilitate it. We can also see that e-learning is not necessarily beneficial to education. It can result in little more than frustration or disaster. ‘Technocentrism’, a term coined by Papert (1987), is the belief that technology is beneficial in itself, in that better or more ubiquitous technology will in itself bring better education. Technocentrism is a well-intentioned but highly naive expression of e-learning that, I suggest, is actually very common in higher education and e-learning discussion. Technocentrism overestimates the benefits that technology brings – it can often be discerned at the level of an individual course and can also be traced as the reason for large-scale institutional collapse, such as that experienced by the UKeU (see Conole, Carusi, & de Laat, 2005; Garrett, 2004).

As the focus of this chapter is on pedagogy, I would like to put aside the potential for e-learning to use unreliable, complex-to-use technology. My concern here is to do with technocentrism – the subtle tendency to associate interactivity, convenience and engagement through the application of technology with improved education. Each of these is all well and good in its own way. However, they do not necessarily represent sound pedagogy. To be completely clear, I am not suggesting that interactivity, convenience and engagement are necessarily detrimental to education – rather, they do not go sufficiently far to represent sound pedagogy. They tend to have more in common with what technology is capable of than what sound pedagogy requires. My contention is that these terms can be used to disguise a technocentric approach to e-learning.

The internet and learning: Critical voices

There are many who consider the internet to be a positive influence on education by its very nature. However, its real strength lies in the way in which it facilitates sharing of information. Education and sharing of information are very different. In a recent review of literature for the Ako Aotearoa E-Primer series (Nichols 2008a, 2008b, 2009a, 2009b, 2010) I found very little mention of the term 'education' but a fair bit of misunderstanding about its nature. Consider these two quotes, indicative of how some e-learning advocates perceive education:

The latest generation of undergraduates already live in a Web 2.0 world . . . To attract and retain these students, universities will need to rethink their operations. New social technologies mean that universities have the chance to create a new generation of student-centred learning environments, to realize the idea of a University 2.0. (Barnes & Tynan, 2008, p. 189)

The ability to record and retrieve all experiences requires a debate on the purpose and function of education: what is its goal when all information – from facts, to skills advice – is constantly accessible? (Daanen & Facer, 2007, p. 19)

Barnes and Tynan (2008) and Daanen and Facer (2007) are representative of a significant group of bloggers and critics who suggest that education must embrace a 'student-centred' future – one where the very contribution of formal education is questionable given the constant accessibility of information to anyone. Sadly, both pairs of authors miss the point. Education is more about the **subject** than the student, and more about **transformation** than information, as discussed later in this chapter. Rather than indicating the future, Barnes and Tynan and Daanen and Facer betray a technocentrist idealism. There is a convergence of ideas in literature concerning the internet that challenges such thinking.

Jeanneney (2007), for example, warns that digitised text encourages a contextual reading, and also urges caution in the use of internet search engines. The Google search engine, which is based on an algorithm of popularity and use rather than scholarly worth, is specifically singled out. More universally, Jeanneney points out that while search engines are useful for addressing factual questions, they cannot provide a useful analysis of qualitative problems. In other words, finding the capital of Yemen is easy; establishing the fairness of capitalism – based on an algorithm of popularity and use – is a more fraught exercise. Another difficulty of the internet is its tendency toward **homophily**, a term used in Shirky's *Here Comes Everybody* (2008). Within this very insightful look at the social and organisational potential of the internet, Shirky describes homophily as the tendency for people involved in online communities to band

together with people just like them. While homophily improves communication between people, it also results in 'groupthink' and a lack of critical engagement with one's own ideas. Keen, in his book *The Cult of the Amateur* (2007), takes a scathing look at Web 2.0 (the so-called 'social web'), arguing that society is ultimately weakened through the loss of the accountability traditional gatekeepers provide in respect of information. While Web 2.0 gives everyone the opportunity to have their say, the lack of accountability and editorial critique can result in an amplified subjectivity. Bauerlein (2008) addresses the issue of reduced performance in standard tests and an increased narcissism of those now entering higher education. Rather than inherently making people smarter, it seems that the internet seems to be having the reverse effect. Bauerlein reveals that children are reading less – an average of four minutes a day, while many are not reading at all. Bauerlein also observes that high school students are less likely to engage with cultural events and less likely to have an appreciation of their overall cultural context. Online, Google users tend to 'power browse' rather than read in depth, and they are easily distracted. Finally, in his book *The Shallows* (2010), Carr talks about the tendency for internet searches and online reading to encourage skimming and overload working memory, both of which make developing mental schema difficult. The context of information is lost in the process. Carr writes: 'We don't see the forest when we search the Web. We don't even see the trees. We see twigs and leaves' (p. 91). Ultimately, however, it is the shallow engagement with ideas that Carr seems most concerned with. At one stage he writes: 'The strip-mining of "relevant content" replaces the slow excavation of meaning' (p. 166). Across these five books we get an alarming picture of how the internet might be shaping education.

While a defence of the incumbent education system is beyond the reach of this chapter, it is contended that the belief that the internet makes possible a laissez-faire or student-centred education system that can displace what our current tertiary institutions provide is naive at best, destructive at worst. The difficulty is that online social interaction and access to online information have the tendency to inhibit education. The internet does not, in itself, have the power to achieve much that is positive for education. In their book *Reinventing Knowledge* (2009), McNeely and Wolverton trace how knowledge has been stored and interacted with throughout history. Toward the end of the book they turn their attention to the contribution of the social web, writing: 'New electronic communities such as wikis and blogs, at the moment collectively dubbed Web 2.0, if anything make the pursuit of reliable, authentic knowledge more, not less, difficult online' (pp. 191–192). It would seem that this concern is well founded, for four key reasons. First, as McNeely and Wolverton conclude, Web 2.0 drowns out traditionally credentialed cultural gatekeepers (citing Keen's

The Cult of the Amateur (2007) here). As Jeanneney (2007) warns, search engines and online social engagement focus on the popular and topical, rather than the enduring and scholarly. Second, as Shirky (2008) suggests, the social web is a hive of homophily – birds of a feather flocking online together. In other words, online social communities are **less** likely to engage critically with one another's ideas, and nor are they likely to seek out those who disagree with them for a respectful dialogue. Third, as almost all of the authors cited earlier make clear, online reading and research isn't reading and research as encouraged by educators. Quick finds displace careful and refined searches. Skimming and power reading replace deliberate, concentrated and focused reading. The slow rumination of ideas is replaced by the urge to click the next link, answer an email or play a game. The online world is a highly distracted one (Carr, 2010). Ultimately, there is potential for loss of depth, reduced critical engagement, shallow thinking and poor perseverance.

It seems a case can be made that using e-learning to make information more palatable or better connect students to one another ultimately misses the point of what education seeks to achieve, because of the dynamics of cognitive development.

Understanding cognitive development

Carr's book *The Shallows* (2010) discusses why online text¹ and skim reading are so poor for the purposes of education. According to Carr (see also Wlodkowski, 2008), our mental development as thinkers depends on a harmonious relationship between sensory memory, working memory and long-term memory. There is a dynamic relationship between each of these. Sensory memory is where we select and receive information into working memory. Working memory is where information is simultaneously processed and stored. It's likened to a person's desk, where tasks are dealt with one by one – it is where the actual activity of learning takes place. Working memory can only really deal with a small number of tasks at once, say two or three. It has a small capacity for storage, but storage is not its function – **processing** information is. The third and final component is the long-term memory, which is huge by comparison with working memory. Carr likens long-term memory to a bathtub, compared with the thimble of working memory. Long-term memory has an enormous storage capacity, based on 'schemas' made up of specific facts and overall impressions. It is made up of both explicit and implicit memories. In other words, it contains information that we may not be able to actually recall and verbalise. The skills of reading, writing, driving and knowing the way home are all examples of implicit memory at work, and are illustrative of how complex schema are not easy for us to describe. Indeed, we tend to take the benefits of our schema for granted.

The concept of the schema is an important one. It is because we store information as part of an overall framework that the metaphor of a mental hard drive or storage device is completely insufficient. Our long-term memory area is **not** a warehouse, but rather a framework of interrelated ideas, facts, processes and impressions. It is the source of our biases, subjectivity and world view. Long-term memory doesn't merely **store** information or facts. Instead, information is a fuel – a raw material for the development of schemata. Information must be adequately processed if it is to be assimilated into our overall mental schemas. This makes the difference between 'information' and 'education' acutely obvious – they are not the same thing.

1 It is important to note that Carr (2010) here refers to text read **while online**, so that his comments are not taken to imply that on-screen or ebook reading overload working memory.

Considering the dynamics of sensory, working and long-term memory provides an interesting means of evaluating the application of e-learning to education. Sensory memory responds to stimulus, and working memory is concerned with information. Clearly, easily accessible and engaging information, perhaps offered in an interactive context, is appealing at these levels. However, if education is our ultimate objective, 'interactivity', 'convenience' and 'engagement' fall short. It is the development of a mental framework – the enrichment of mental schemata characteristic of long-term memory – that is the educator's target. Developing long-term memory cannot be left to chance, and it is not by nature something that technology naturally facilitates. Developing long-term memory requires an educational framework. This is not to suggest that nothing can be learned outside of an educational setting. Rather, it is to make clear that long-term memory development can be – indeed, **is** – greatly enhanced through a well-conceived formal education in ways that cannot easily be attained through informal access to information.

The application of e-learning: An educational approach

In deference to Wolters' (1975) insistence that 'ideas have legs', I will soon invite the reader to participate in a brief period of reflection. Ideas are not just abstract, irrelevant concepts that can be separated from what we do. Ideas 'have a widespread effect on our practical, everyday lives' (Wolters, 1975, p.2). What we say, how we act, and what we involve ourselves with as people are all determined by the ideas we have adopted. Ideas have legs. This means that what you believe about education will influence how you practice it and, more to the point for this chapter, what you believe about education will determine your pursuit of e-learning. If you think education is all about providing information, you will use e-learning tools in a certain way. You will do your best to try to make that information as easy to assimilate as possible. You will probably see animation, hyperlinked web pages, PowerPoint presentations and recorded lectures as the ultimate expressions of what technology can add to education. Alternatively, if you think that all people need to do to be educated is browse the internet and discuss things with the people they meet there, you will apply e-learning in a different way. You will probably emphasise the use of wikis, external blogs, Facebook and other forms of expressive social media. But if you think education is about establishing schemata, you will see different possibilities again for e-learning. You may well make use of the approaches mentioned immediately above, but you will apply them in very different ways. Further, you will be acutely aware that what makes e-learning effective is not so much the technology, but rather a considerable investment in educational

theory and thought. If you think education is about schemata, you will do your best to create ambiguity, encourage reflection, enhance thinking and force deep processing. In fact, if you think education is about establishing schemata, you may not make much use of e-learning at all.

At this point I invite you to consider the following question and write your answer in a concise sentence:

What do you see as your role, as an educator?

My own response to that question required two sentences. The first is somewhat jargonistic and unhelpful if not read in the context of the ideas already expressed in this chapter: 'Developing complex mental schema by means of the concentrated study of a discipline, leading to perspective transformation'. The second is one that has remained with me for many years: 'To enable students to think and do what a (plumber, manager, nurse, theologian, psychiatrist) thinks and does, rather than just know and recall what a (plumber, manager, nurse, theologian, psychiatrist) knows and recalls'. The value of the latter sentence is its applicability to education for any subject at any level.

The value I place on education is not universally shared. Many people's view of education is woefully impoverished. Consider some of these quotations, which are frequently echoed among education's critics:

- I prefer the company of peasants because they have not been educated sufficiently to reason incorrectly (Michel de Montaigne).
- Education is an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught (Oscar Wilde).
- An inventor is simply a fellow who doesn't take his education too seriously (Charles Kettering).
- Education is a method whereby one acquires a higher grade of prejudices (Laurence Peter).

And a personal favourite:

- Bachelor's degrees make pretty good placemats if you get 'em laminated (Jeph Jacques).

It is all too easy to be cynical about the pursuit of education. Education can be considered an irrelevant, stifling, dangerous and limiting hindrance to real learning. However, consider these alternatives:

- It is the mark of an educated mind to be able to entertain a thought without accepting it (Aristotle).
- Education is what survives when what has been learned has been forgotten (B. F. Skinner).
- Education's purpose is to replace an empty mind with an open one (Malcolm Forbes).
- Education is when you read the fine print. Experience is what you get if you don't (Pete Seenger).

Here my favourite is a tie between two classicists:

- Only the educated are free (Epictetus).
- It is only the ignorant who despise education (Publilius Syrus).

I suggest that we need to really understand education before we can apply e-learning to it. The purpose of education is not to provide all of the answers, nor to pass on information. Education is much more ambitious. The goal of education is to change people. It is to deepen them, enrich them, transform them. Graduates of formal education are different people. They think in different ways – ideally ways that are more open yet also more discerning. As Aristotle says, they can entertain a thought without accepting it. As Epictetus and Publilius Syrus would agree, they replace ignorance with freedom. **Real** education is both conversational and transformative, as illustrated by the conversational framework (Laurillard, 2002, 2007, 2009) and the theory of transformative learning (Mezirow, 1990, 1991, 2000; see also King, 2009, and Malinen, 2000).

Laurillard's conversational framework is based on an articulated consideration of best education practice and suggests that technology should be applied to education in a way that:

- enhances iterative dialogue (that is, dialogue that leads to a particular goal)
- is discursive (that is, encourages exploration), adaptive, interactive and reflective
- emphasises descriptions of the topic at the level of actions.

At the heart of the conversational framework is the alignment of conceptual understanding between teacher and learner. In other words, at the successful completion of the course the teacher and learner can have a mutual understanding of the topic using terms in the same way and having similar forms of practice. This involves didactic teaching, the sharing of ideas between

teacher and student, and some discourse between students themselves so that they can share ideas about concepts. Ultimately, however, it is the interaction with the teacher that proves decisive, because it is the teacher's own understanding of the topic that drives the process.

The actual conversational framework emphasises activity and feedback, in recognition of the fact that the learning process is more relational than linear. The framework is best explained in terms of three actors. First there is the teacher, whose conceptualisation or understanding of the subject becomes the norming force across the entire framework. The teacher sets up a task-practice environment to help learners to apply what they are learning, whether it be through an actual practicum or reflective essay, or any range of similar tasks. The teacher provides perspectives, opportunities for practice and feedback, and is constantly involved in adapting these in response to learner performance. The second actor is the learner. He or she is engaged in reflection, activity, dialogue and practice. The learner's conception of the subject area is the focus of development. The framework illustrates the importance of interactions with the teacher – the teacher presents concepts, the student asks questions, and the teacher responds with re-presentations of concepts, hints and comments. The final actor consists of the remaining student body. The 'other learners' in the framework are actually repeats of the learner who appears in the centre. All ultimately engage with the teacher with their individual conceptions, and with one another as well. E-learning can be effectively applied in an educational way by contributing to the processes within the framework.

The theory of transformative learning, based on the work of Jack Mezirow and associates, recognises the life-changing nature of effective education. Learning, according to Kegan (2000), can be differentiated in two ways: **informative** learning, which changes **what** we know, and **transformative** learning, which changes **how** we know. Another way of representing the difference is learning the ability to think **within** problems, and learning the ability to think **transcendently** about problems. Higher education, I contend, has the responsibility to engage its students in transcendent, transformative, liberating and life-changing experiences that see **informing** them mainly as a means of **transforming** them. Graduates should not only think with different information at hand – they should think differently about the situations in which they need to apply that information. They should be able to do more than just know and recall what a (plumber, manager, nurse, theologian, psychiatrist) knows and recalls. Instead, they should be equipped to think and do what a (plumber, manager, nurse, theologian, psychiatrist) thinks and does. This transformation can be deliberately encouraged through a particular educational approach. Mezirow (1990) proposes 10 steps on the journey toward transformation. A briefer list is provided by King (2009), who suggests four steps:

1. Fear and uncertainty – injecting a disorienting dilemma or real-life story that demonstrates the complexity and difficulties associated with knowledge within a discipline. It could be a complex ethical issue, a real-life story with disastrous consequences, or a tragedy that underscores the importance of what will be studied.
2. Testing and exploring – critically assessing assumptions and exploring new roles, relationships and actions.
3. Affirming and connecting – gathering required knowledge, applying new roles and implementing new ways of doing things.
4. New perspectives – integrated into life as the new ways of looking at things become applied to everyday circumstances.

The potential for case-based learning, project-based learning and personal reflection is obvious, and provides overlap with the conversational framework.

Conclusion: Evaluating the contribution of e-learning

E-learning, if it is to achieve more than interactivity, convenience and engagement, must be applied within an educational context. The educational pursuit involves much more than informing students – ultimately the goal is to transform them. Rather than filling minds, education's work is changing realities. The more this is understood, the more likely it is that the subtle temptations and illusory objectives of technocentrism will be displaced in favour of a more enduring and purposeful educentric ones.

Drawing on the work of Laurillard (2003) and Mezirow (2000), I conclude with five principles for e-learning application.

1. Focus on the **end**, not the means. It doesn't really matter to what extent an e-learning initiative offers interactivity, convenience and engagement – what counts is its ultimate contribution to transformational education.
2. Aim to be **conversational**. E-learning should make it more possible for learners to engage with the conceptions of educators, and enable educators to engage with them.
3. Keep the **subject** at the centre. Anything you can do to maintain the subject's integrity and voice in the educational process should be done (see also Palmer, 1998). Student-centredness is a poor substitute.

4. Emphasise **feedback** and **conceptual understanding**. Recall that the objective of education is the development of a discerning mental schema. Understanding rather than recall is the ultimate goal, and engagement with concepts rather than facts is the best means of ensuring understanding.
5. Finally, be shamelessly **transformative**. Create uncertainty. Encourage exploration. Help students to connect new ideas. Require them to adopt new perspectives.

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