

Critical Success Factors and Effective Pedagogy for e-learning in Tertiary Education

Background paper for ITP New Zealand

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Executive summary

This background paper was commissioned by ITPNZ to provide information about effective teaching and learning practices for e-learning in tertiary education, that would assist the wider ITPNZ project to enhance learning outcomes for Māori e-learners. It complements a separate report analysing 2004 Ministry of Education data on tertiary students and their participation in courses using ICT. What we have aimed to do is to distil the main messages coming from recent thinking on effective teaching and learning, and the main messages coming from recent evidence on the use of e-learning in blended tertiary courses. These show consistencies. These messages are presented in the context of the data on e-learning in New Zealand tertiary institutions, and material related to indigenous learning in overseas countries, and Māori e-learning. There are three useful examples of the latter; but we found very little material related to indigenous e-learning overseas. We conclude with an overview of some issues and challenges related to teaching and learning in tertiary environments.

Trends from data analysis

Analysis of 2004 Ministry of Education data on tertiary students to establish the current extent of participation in e-learning finds:

- Forty-nine percent of all tertiary students now have some degree of web use in their course, though it is only required for 17 percent.
- Courses which expect significant web use are mainly in universities.
- Overall, Māori participation in courses where there is a significant degree of web use is very low. Sixty-three percent of Māori students are enrolled in courses that have no web access.
- Māori students are more likely to be studying part-time and extramurally.
- Most wānanga programmes have no significant web use and only 5 percent of polytechnic students are in programmes involving significant web use.
- In order to increase Māori involvement in e-learning, the main focus would need to be on increasing e-learning in wānanga and polytechnics which are the main providers of tertiary education to Māori, and to use it in courses that Māori can take part-time while remaining in their current locations (and employment).

Trends from recent thinking on effective learning

- E-learning should not be a mass of online material for individual access without guidance on how to learn from it effectively.
- Courses involving e-learning need to be planned for, and grounded in an understanding of the roles of teachers and learners, of learning, and of how students learn.
- The role of prior knowledge in learning is critical and must be taken into account in e-learning design. Ongoing formative assessment is part of this.
- The brain is a dynamic organ shaped by experiences. Conceptual links are reorganised through active engagement with information in various contexts.
- Learning is an active process. It is the result of carrying out particular activities in a scaffolded environment where one activity provides the step up to the next level of development.
- Learning needs to be meaningful to learners and they should be supported in developing the skill of relating new material to what is meaningful to them.
- Learners should be enabled to become adaptable and flexible experts in their own current and future learning.
- Learning takes time and effective learning practices enable learners to work with materials from a variety of perspectives while they become fully conversant with it.
- Weaving e-learning into existing teaching and learning practices adds more ways for students to be actively and deeply involved with subject area materials.

Main messages from evidence on effective e-learning

Most of the evidence related to e-learning is available in case studies of individual courses. There is more evidence related to university than to polytechnic courses. Case studies cover a wide range of subjects, including both skill-based and conceptual. We have focused on blended learning, where e-learning complements some class-based interaction, since that appears more popular with students and teachers, is easier to introduce, and appears to offer some advantages over fully online learning.

Studies comparing student outcomes for e-learning and conventional courses show comparable results in terms of achievement, with indications that student outcomes can be broader if e-learning is used well. Student retention shows mixed patterns, and is dependent on a number of factors. Students value the flexibility of e-learning, but it is different from classroom learning, and can demand more.

The main messages from a survey of the available evidence are consistent with the messages from recent thinking on effective teaching and learning.

They are:

- E-learning can improve understanding and encourage deeper learning, if there is careful course design and choice of technology in relation to learning objectives that aim to encourage deeper learning.
- It can free up face-to-face teacher:student time for discussion, rather than using it to cover information or provide skill practice, depending on the use made of technology.
- It can improve and sustain motivation by offering interesting tasks and material.
- Students need formative feedback throughout the course. This requires careful structuring and the development of channels and projects encouraging student-student interaction as well as strategic use of teacher time to provide feedback; online tasks, tests, and quizzes are also useful in giving students a picture of their learning progress.
- Student-student interaction can also be enhanced through careful structuring, creating additional support for learning, and even a “learning community”. Participation in discussion groups, etc. is supported by linking it to assessment or tasks and measures that “matter”.
- It is important that students have a clear picture of the learning objectives for the course, and that assessment methods reflect and support the learning objectives.
- Students need very clear course information, and if accessing the course externally, initial face-to-face sessions are valuable to ensure understanding and skills needed to access the web material, to lay the ground for student-student interaction, particularly if some collaborative work is to be done, and for teacher-student web interaction.
- While asynchronous formats offer students more flexibility, they may also spend more time on a course using the web.
- The technology used has to be reliable, simple, and easily accessed by students.
- E-learning is easier for students who are self-managing, which may mean it is easier for mature students.
- Barriers to making the most of e-learning can arise from students’ familiarity with classroom-based methods and assumptions that this is how learning occurs, and from a greater interest in superficial learning to pass a course, than in increasing understanding.
- However, increasingly attention is focusing on the creation of tasks, material, and feedback mechanisms and channels that will increase motivation and hence encourage self-management, and on course structures, processes, and requirements that provide some additional frameworks for those who need them.

Three courses that have successfully engaged Māori learners are outlined. Blended courses that incorporate *kanohi ki te kanohi* (face-to-face) interaction and recognition, and the building of *whakawhanaungatanga* are more likely to meet Māori student needs than fully online courses.

Issues and challenges

The issues and challenges related to introducing and sustaining e-learning in tertiary settings can be summarised as:

- identifying and meeting the needs of learners;
- designing experiences that efficiently meet objectives;
- choosing appropriate technologies and creating motivating learning designs; and
- measuring learning outcomes.

Engaging students, minimising technical problems, providing sufficient interaction while not overtaxing teachers, and framing interaction so that it enriches learning and creates a sense of group or learning community are fundamental to effective e-learning and need to be the top priorities in setting up and reviewing e-learning provision in tertiary settings.

1. Introduction and context

The New Zealand Council for Educational Research (NZCER) was commissioned by the Institutes of Technology and Polytechnics of New Zealand (ITPNZ) to write a background paper on critical success factors in e-learning. This paper is one of four parts of a wider ITPNZ project designed to (i) provide information on the critical success factors for Māori e-learners, and (ii) to disseminate the findings to educators within the tertiary education sector. The wider project's aim is to enable tertiary educators to develop effective e-learning programmes for Māori. It has been funded by the Tertiary Education Commission's e-Learning Collaborative Development Fund (eCDF).¹

Key points in this chapter

- Recently there have been some significant e-learning developments in the tertiary sector. These include: the establishment of an e-learning Advisory Group, an e-learning strategy, the establishment of an e-learning portal, and the funding of collaborative e-learning development projects.
- Forty-nine percent of all tertiary students now have some degree of web use in their course, though it is only required for 17 percent.
- Courses which expect significant web use are mainly in universities.
- Overall, Māori participation in courses where there is a significant degree of web use is very low. Sixty-three percent of Māori students are enrolled in courses that have no web access.
- Most wānanga programmes have no significant web use and only 5 percent of polytechnic students are in programmes involving significant web use.
- In order to increase Māori involvement in e-learning, the main focus would need to be on increasing e-learning in wānanga and polytechnics which are the main providers of tertiary education to Māori.

¹ The eCDF is a contestable fund designed as a strategic initiative to support the implementation of the government's Tertiary Education Strategy. Further information is available from: <http://www.tec.govt.nz/funding/strategic/ecdf/ecdf.htm>

Context for this report

The wider ITPNZ project aims to develop effective e-learning programmes for Māori students. Three linked pieces of research have been commissioned. These are:

1. a report on current participation rates of Māori students in tertiary courses with e-learning components (undertaken by NZCER);
2. this report—which describes critical success factors and effective pedagogy for e-learning as identified in the literature on e-learning (undertaken by NZCER);
3. a review of literature on critical success factors for Māori learners in all modes of learning (to be developed by the International Research Institute for Māori and Indigenous Education at the University of Auckland).

These three pieces of research will inform the ITPNZ project *Critical success factors for Māori e-learners*. Later developments will include a hui, a further report, focus groups, the development of website material, and professional development for tertiary educators.

Objectives of the report

This report has three main objectives:

1. to identify critical success factors and effective teaching and learning practices for e-learning in tertiary education;
2. to provide some background on the issues involved in e-learning that is useful to tertiary educators interested in using these approaches; and
3. to provide a report which will assist the wider ITPNZ project to enhance learning outcomes for Māori e-learners.

Scope of this report

There are at least four levels where changes can be made which will affect the national picture of e-learning. These are:

1. the national level—here policy, funding, and sector-wide initiatives are undertaken;
2. the organisational level—where policies and strategic direction are established, decisions about resourcing are made, and initiatives are put in place;
3. the faculty/college/branch level, where initiatives are implemented; and
4. the teaching team and individual teachers, who have some scope to plan their courses and their day-to-day teaching practices in order to make more or less use of e-learning possibilities.

This report is not intended to address all of these levels. While the successful development of e-learning is dependent on organisational and national factors, the focus here is on the levels where individual teachers can readily effect change—i.e. levels 3 and 4 above.

This report is less concerned with wholly online courses (and teachers with e-learning expertise) than it is with the contribution e-learning approaches can make to conventional courses and to teachers who are novices in terms of their e-learning expertise. The current challenge is to move e-learning developments from the early adopters and pioneers to the “mainstream teacher” (Darby, 2002). Many mainstream teachers will need further information and support before they are confident in integrating e-learning effectively into their repertoire of teaching and learning strategies. Much of the literature reviewed in this report has been selected on the basis that it addresses e-learning in mixed modes (e.g. e-learning combined with existing face-to-face classroom teaching), and addresses factors that a teacher can influence or control.

New Zealand’s tertiary education sector

Learning for life (Ministry of Education, 1989) set the direction for reforming post-compulsory school education to make it accessible, student-centred, with nationally recognised standards, and integrated through “seamless” transitions from compulsory schooling to post-compulsory education and training.

The term “tertiary education” now encompasses all post-compulsory education and training, and new institutional structures reflect this. These include the Tertiary Education Commission (TEC), the New Zealand Qualifications Authority (NZQA), New Zealand Qualifications Framework (NQF), and the National Register of Quality Assured Qualifications.

One organisation, the TEC, is now responsible for funding education and training in universities, wānanga, colleges of education, polytechnics, private training establishments (PTEs), industry training organisations, and adult and community education providers. It is responsible for implementing the government’s Tertiary Education Strategy (TES) and its associated priorities to provide all New Zealanders with lifelong learning.

The Tertiary Education Strategy (TES)

Over the next 5 years the New Zealand tertiary education sector will be shaped by the Tertiary Education Strategy (TES). The expressed intention of the TES is to develop a more collaborative and co-operative tertiary education system that contributes to national goals and closely connects to enterprise and local communities. The TES has identified some key features in the current system that need to change if the strategy is to be successful. These include:

- greater alignment of the system with national goals;

- stronger links with business and other external stakeholders;
- effective partnership with Māori communities;
- increased responsiveness to the needs of, and wider access for, learners;
- more future-focused strategies;
- improved global links;
- greater collaboration and rationalisation in the system;
- increased quality, performance, effectiveness, efficiency, and transparency; and
- a culture of optimism and creativity.

Tertiary education organisations

In 2004, New Zealand tertiary education organisations (TEOs) include eight universities, four colleges of education, 20 institutes of technology and polytechnics (ITPs), three wānanga, approximately 500 registered Private Training Establishments (PTEs), nine Government Training Organisations, and 45 Industry Training Organisations (ITOs). Approximately 150 PTEs identify themselves as Māori PTEs, with a focus on one or all of the following—Māori learners, providing a Māori learning environment, or offering qualifications or courses designed for Māori including Te Reo or Mātauranga Māori.

The three wānanga are recognised as public tertiary education institutions, and each has a distinct character while providing a Māori pathway for tertiary education. They are Te Wānanga o Aotearoa (based in Te Awamutu but with a number of other campuses); Te Whare Wānanga o Awanuiarangi (based in Whakatane); and Te Wānanga o Raukawa (based in Otaki).

Developments to support e-learning in the tertiary sector

This section briefly reviews recent national strategies and projects that focus on e-learning in the tertiary sector.

The E-learning Advisory Group

The E-learning Advisory Group was set up in 2001 to provide strategic advice on e-learning in the tertiary sector. Its report *Highways and pathways: Exploring New Zealand's e-learning opportunities*² was released in 2002. The National Library of New Zealand has been leading the development of a strategy for tertiary sector e-learning for 2004–2007.

² See <http://www.executive.govt.nz/minister/maharey/highways/>

The E-learning Advisory Group sought information from universities, institutes of technology, colleges of education, and wānanga³ about their use of e-learning. It found that most had a strategy to develop e-learning capability (74 percent), most were providing online delivery of some courses or programmes (76 percent), and most had programmes in place to upgrade the IT literacy skills of staff (77 percent). This is in keeping with overseas trends. For example, a 2003 study of 990 educational institutions in the United States of America found that nearly all offered some form of online learning.⁴

The report observed the transformation that electronic media and the Internet had already brought to the learning environment. It also noted the need for further development to serve the needs of learners, saying that:

New Zealand needs an e-learning vision that fits within the overall vision for learning in the tertiary sector and is underpinned by a learner-centred approach. Technology alone will not achieve our goals (e-Learning Advisory Group, p. 5).

The Advisory Group placed professional development for academic staff in the “must have” category and considered that the success of e-learning was dependent on it being based on sound pedagogical approaches. All aspects of the teaching and learning process were expected to be affected by e-learning. Here the Advisory Group identified three fundamental requirements:

- effective leadership;
- high standards of quality assurance; and
- sufficient capability (systems, people, and infrastructure).

The Advisory Group called for a coherent national e-learning strategy and greater collaboration in the sector in order to meet diverse learning needs. To achieve this, the Advisory Group suggested, the government needed to use incentives to foster collaboration while still allowing space for innovation and the autonomy of individual institutions. Some of the mechanisms they proposed were:

- a national consortium of providers to co-ordinate the development of e-learning for the sector;
- the establishment of a tertiary education portal; and
- a collaborative development fund.⁵

Attention was paid to the unique identity of New Zealand, and to the Treaty of Waitangi:

It is a priority to develop Internet resources and other digital material that reflects both Māori culture and values and supports Māori aspirations into the 21st century (e-Learning Advisory Group, 2002, p.5).

³ Eighty-eight percent of them responded.

⁴ <http://.sloan-c.org/publications/view/v2n4/datav2n4.htm>

⁵ This resulted in the establishment of the e-Learning Collaborative Development Fund (eCDF).

E-learning projects

The tertiary portal recommended by the Advisory Group has recently been launched at <http://www.elearn.govt.nz/elearn/elearn.portal>. As yet there is no specific provision for te reo Māori or Māori students and teachers but the tertiary portal may develop in a similar way to the Ministry of Education's bilingual portal for New Zealand schools—Te Kete Ipurangi—The Online Learning Centre (TKI) which includes a specific area with resources for Māori education.⁶

In 2003 the TEC selected 24 projects to be funded for a total of \$34 million from two funds: the e-Learning Collaboration Development Fund (eCDF) and the Innovation and Development Fund (IDF). The fund commissioners noted that successful projects were those that had a focus on:

- improving Māori access and participation in e-learning;
- the need to upskill teachers;
- regional initiatives; and
- collaboration.

Two eCDF-funded projects which have a research component are this project (*Critical success factors for Māori e-learners*), and *Te Ako Hikohiko Wānanga e-Learning Research Capacity Building*. The latter involves Te Taihū o nga Wānanga, Te Wānanga o Aotearoa, Te Whare Wānanga o Awanuiārangi, and Te Wānanga o Raukawa, and aims to develop the ability of Māori communities to investigate the kinds of e-learning that work best for them, and to encourage the learning of te reo Māori through electronic means.

The FLLinNZ (Flexible Learning Leaders in New Zealand) project is also funded from the TEC's eCDF fund, and is modelled on the Australian Flexible Learning Leaders Network.

FLLinNZ will support Flexible Learning Leaders who can make a difference within their organisation and, through sharing knowledge and experience, make a difference to the uptake of flexible learning nationally. The Leaders will contribute to the FLLinNZ online community and networks, and share their learning from the project workshop.⁷

The online community website for FLLinNZ was developed by another of the eCDF projects.

Interim tertiary e-learning framework

The Ministry of Education worked with the National Library to develop the Interim tertiary e-learning framework, which was released in 2004. This framework is intended to be the basis for a pan-sector framework covering the early childhood, school, and tertiary sectors.

The purpose of the framework is to ensure that e-learning developments advance the overall national strategy for tertiary education. The vision for tertiary e-learning is:

⁶ <http://www.tki.org.nz/e/community/maorieducation/>

⁷ www.FLLinNZ.ac.nz. Fifteen Leaders were selected in 2004.

The development of New Zealand's e-learning capabilities will contribute to "A networked, flexible tertiary education system offering increasingly accessible, relevant, high quality learning opportunities for all New Zealanders".(Ministry of Education, 2004, p. 7)

The framework is underpinned by five principles and seven action areas. The five principles which set out the vision for the e-learning framework are that it will:

- take a learner centred approach;
- follow and share good practice;
- exploit opportunities for collaboration;
- be innovative; and
- develop models for financial affordability/sustainability.

The seven action areas identified for the short to medium term are:

- The development of a "community of practice" in which e-learning information and practices are shared;
- Reliable research into e-learning in the New Zealand context;
- Professional development for tertiary education staff;
- Adoption of e-learning technical and design standards;
- Development of legal and policy frameworks for electronic rights management;
- The recognition of flexible learning pathways; and
- E-learning opportunities for marginalised learners.

Māori participation in tertiary education, and e-learning

There has been major growth in the number of Māori students participating in tertiary education over the past decade. Māori participation rates are now higher than non-Māori as a percentage of the respective populations. Much of the growth is a result of increased participation in the three wānanga. In 2002, Te Wānanga o Aotearoa grew by over 73 percent and the other two wānanga grew by 29 percent (Ministry of Education, 2003, pp. 80–81).

While Māori make up almost 13 percent of the population aged 15 and over, they make up almost 20 percent of the tertiary education enrolments. Interestingly there is a distinct difference in the age profile for Māori students when compared to non-Māori students. Whereas Māori are younger in the general population they are older in the student population. Women make up 68 percent of the Māori tertiary student population, and 57 percent of the non-Māori student population.

Over a third of all Māori in tertiary education (38 percent) are attending one of the three wānanga—more than twice the number of Māori enrolled in universities (17 percent)—and more than the 28 percent enrolled in polytechnics. The huge increase in numbers attending wānanga suggests that they cater particularly well for the preferences and needs of Māori students.

In terms of this review, other important characteristics of Māori enrolment in tertiary education include the following:

- Māori students are more likely than non-Māori to be studying part-time and to be studying extramurally;
- sixty percent of Māori students are studying part-time, and 35 percent of Māori EFTs are for part-time enrolments; and
- in 2002, a higher percentage of Māori women than Māori men were studying part-time (53.1 percent compared to 41.4 percent).

These characteristics are of interest because e-learning is one way of providing more flexible learning options for learners who study part-time or extramurally. However, part-time and extramural study for both Māori and non-Māori students varies by institution, and the differences between Māori and non-Māori part-time enrolments are much less than the differences between types of institution.

University students, both Māori and non-Māori, are mostly full-time students (71 percent), whereas polytechnic students are mostly part-time (65 percent). Māori wānanga students are mostly part-time (66 percent) and half are extramural but the non-Māori students (who make up 43 percent of wānanga enrolments) are nearly all part-time (86 percent) and 65 percent are extramural.

Statistics on tertiary e-learning

Tertiary education organisations provide enrolment information to the Ministry of Education as part of the Single Data Return (SDR). In April 2004, new items were added to the SDR in order to collect information on e-learning. Institutions are now asked to identify whether courses:

1. have **no access** for e-learning (no part of the course or paper is accessible online);
2. are web-supported (web access is provided to a limited extent, but is **optional** for learners and a minor part of the course);
3. are web-enhanced (students are **expected** to access online materials and resources); or
4. are Web-based (web access is **required** for the course, and online participation is required).⁸

This information is designed to assist in monitoring New Zealand tertiary students' participation, retention, and completion in e-learning courses.

⁸ See Single Data Return: A manual for tertiary providers and student management system developers: Version 6.5 – 29 January 2004 (Wellington; Ministry of Education, p. 83).

SDR data for 2004 show that a little over half (51 percent) of all students in standard tertiary education courses are in courses where **no** part of the course is made available online. Nearly a third (32 percent) have optional web components. Thirteen percent of students are in courses where some web access is required, and 4 percent are studying courses where web use is a major, and required, aspect of the course.

The comparable figures for EFTS give a clearer indication of the quantity of tertiary learning (rather than individual students) taking place through the various web access categories. The table below shows student and EFTS percentages for the four categories of web access.

Table 1 **Internet use in tertiary courses by ethnicity—EFTs & students**

Internet use	Ethnicity					
	Māori		Non-Māori		Māori & non-Māori	
	EFTS %	Students %	EFTS %	Students %	EFTS %	Students %
Web-based	2	3	3	4	2	4
Web-enhanced	4	5	17	15	15	13
Web-supported	20	30	31	33	29	32
No web use	74	63	50	48	54	51
Total	100	100	100	100	100	100

Note: Percentage in tables do not always add up to 100 due to rounding.

This information tells us that Māori students are considerably more likely than non-Māori to be in courses where no web access is involved. In addition, they are less likely to be in web-enhanced courses where online access is expected of students and makes a major contribution to study. Nearly all (89 percent) of students in web-enhanced courses are in universities, where Māori student participation is lower than in other major tertiary providers. However, Māori student participation in university Web-based and web-enhanced courses is 8 percent of all students and is very close to their overall representation in the university student population.

The comparatively large difference between Māori student percentages and Māori EFTS reflects the fact that Māori students are more likely to be enrolled in part-time courses.

Taken overall, Māori participation in courses where there is a significant degree of web use (Web-based and web-enhanced) is very low. The wānanga report no students with these types of access in their programmes, and the polytechnics report only 5 percent over the two categories. Thus it seems that, if Māori involvement in e-learning is to be increased, the main focus would need to be on increasing e-learning opportunities in wānanga and polytechnics—as the two types of institutions which are the main providers of tertiary education to Māori students.

This chapter has looked at the wider context in which this report is designed to sit and identified some key issues affecting the provision of effective e-learning programmes for Māori. The next chapter describes some key concepts that are widely used in discussions of e-learning.

2. Key concepts

This chapter explains some key terms and concepts used in the literature on e-learning.⁹ These key terms are:

- E-learning
- Online learning
- Distance education
- Blended learning
- Flexible learning

It also looks at:

- Critical success factors.

The degree to which courses use e-learning media for delivery of content and for interactivity varies considerably. In an e-learning context interactivity refers to interaction between teacher (s) and learners, learner to learner(s), and learner (s) with course materials. At one end of the continuum e-learning is supplementary to conventional classroom delivery of content with additional information being posted on a ‘bulletin board’, or lecture notes for a conventional lecture based course may be made available on the web to assist students prepare for a lecture, or for revision purposes. The other end of the continuum is where a course is fully online.

In online e-learning the delivery of the course and interaction is through the Internet. This may be for all or part of a course. In a fully online setting content is delivered online using an array of media such as power-point, video-clips, hyperlinks supported by both asynchronous and synchronous interaction, and so on. Asynchronous interaction (not at the same time) would include FAQs (frequently asked questions), discussion forums with threads, peer review of assignments, and individuals setting up blogs to share information on special topics. Synchronous interaction (at the same time) could include the teacher holding set online office hours, fixed time online forums or tutorials, small teams collaborating on projects and making use of private chat-rooms to design and carry out work.

E-learning

This report uses the definition outlined in the E-learning Advisory Group’s report:

⁹ Refer glossary on page 73 for further terms related to e-learning.

E-learning is learning that takes place in the context of using the Internet and associated Web-based applications as the delivery medium for the learning experience (E-learning Advisory Group, 2002, p. 11).

The term e-learning is also widely used to include electronic information and learning objects (such as CDs), and other digital learning resources. For example, an Australian guide to usage defines e-learning as:

...a component of flexible learning describ[ing] a wide set of applications and processes which use any available electronic media in the pursuit of vocational education and training. It includes computer-based learning, Web-based learning, virtual classrooms and digital collaboration. [Source: *Australian Flexible Learning Framework for the National Vocational Education and Training System 2005–7*, <http://flexiblelearning.net.au/>]

Another definition of e-learning is that it is “learning facilitated and supported through the use of information and communications technology (ICT).”¹⁰

Distance and online education

Discussions about e-learning sometimes focus on fully online environments and the idea of virtual institutions, as if all e-learners are distance students. While online education and distance education share many commonalities, there are also some important differences between the two.

Online learning is when the student uses their computer to access their course. This might (but does not have to) mean that the student does not need to be physically present on campus to participate in the course. They might work with course materials at their own convenience, or they might work collaboratively on class projects using tools like chat and discussion groups.

However, online learning need not occur at a distance, and distance learning need not utilise any e-learning approaches. Both are different from conventional campus-based instructional design. Online learning, like distance education, requires detailed specification of learner needs, learning objectives, learning materials, activities, delivery methods, and resources required. The matching and integration of pedagogical approaches with the information technologies is a complex process that requires a team approach. It also takes significantly more time than the pre-course preparation required for face-to-face delivery.

The literature suggests that there are three common reasons students choose distance education. They are convenience, flexibility, and adaptability to individual needs. All of these may also be reasons for choosing online learning.

In a conventional classroom environment the “teacher” is often reasonably autonomous. In New Zealand the programme documentation approved for a tertiary course or programme will be fairly

¹⁰ See: http://www.jisc.ac.uk/uploaded_documents/3_frameworks_knight_porter.doc

skeletal. Typically, classroom teachers, either alone or in teams, carry out a wide combination of roles such as being the programme's project manager, subject matter expert, technical expert, illustrator, instructional designer, tutor, assessor, evaluator, and desktop publisher. Each cycle of the course can be modified to address feedback from the previous cycle, and adjustments can be made to meet the needs of current learners.

By contrast, in a distance or an online environment a high degree of consultation and collaboration is required of a team which carries out the roles described. There are fewer opportunities to make modifications during a learning cycle.

Distance education was developed to provide education for those unable to attend a conventional classroom-based programme (de Wolf, 1996; Garrison, 1989; Verduin & Clark, 1991). Distance education may overcome the barriers of geography; location (hospital, prison); social responsibilities (child-care, employment); and disability. It may also enable the learner to choose study times which personally suit them, and can be adjusted to fit in with employment and other commitments (Garrison, 1989; Verduin & Clark, 1991). Verduin and Clark cite studies which identified minimal travel and lack of conflict with work schedules as significant reasons for enrolling in a distance education programme.

Traditional tertiary education organisations have been slow to change structures, timetables, and attitudes to meet the needs of older and part-time students. Internationally, the evidence is that distance education provision has expanded to meet needs not met by traditional provision. For many students the choice was (and still is) distance education or nothing, as they lacked the option of a conventional programme. This is a situation that Garrison (1989, p. 225) suggests renders many comparative studies of distance and conventional methods meaningless.

Online education is seen by many as being different to distance education because of its potential for interaction (Campbell, cited in Nixon, 2004). Online interaction can be **synchronous** (involve real time interaction) through chat rooms and video-conferencing, or it can be **asynchronous** (interaction that takes place at different times for different students as they access material by email, websites, and voicemail). Such technologies, while not standard in distance education, are also sometimes used to support print-based distance courses and classroom-based courses.

So: While e-learning *can* be used as part of distance learning programmes, it does not necessarily have to involve distance learning. It is important to note here that in conventional classroom settings the relationship between the teacher and learner is regarded by many as critical to the success of the learner. This relationship has been highlighted as a significant factor in the education of Māori students in the schools sector (*see* for example, Bishop et al., 2001). The physical separation of teacher and learner in distance education (whether or not it is fully online) is obviously a significant feature of such courses. This, combined with the fact that the teacher role can be shared among a large number of people in a team, could be a disadvantaging factor for

Māori learners if steps are not taken to build up relationships. However, distance education can also be focused more on the individual.¹¹

Similarly, fully online organisations or programmes differ profoundly from conventional educational contexts. There is no “natural” progression from conventional to online forms of delivery. The two environments are quite different—for learners and for teachers.

In the literature on e-learning a number of other important distinctions are made, some of which are outlined below.

Blended or hybrid learning

Blended or hybrid learning is a term that means a combination of online and conventional face-to-face classroom-based teaching and learning (*see*, for example, Darby, 2003; or Proctor, 2003).

For example, lectures could be replaced by online learning materials and activities which the students worked through in their own time, at their own pace, but continued to take part in regular face-to-face tutorials or workshops with their teacher.

Flexible learning

The term “flexible learning” is commonly used in Australia to refer to learner choice, learners being able to make decisions about when, how, in what order, for how long, and where they will study (*see* for example, Collis & Moonen, 2001). According to the definition on the Australian Flexible Learning Frameworks website:

Flexible learning expands choice on what, when, where and how people learn. It supports different styles of learning, including e-learning (<http://flexiblelearning.net.au/>).

The ultimate intention of flexible learning is to provide learners with choice as to what they learn, where they learn it, how they learn it, and at what pace they learn. Recognition will be made of diverse pathways including work in other educational institutions. There are few examples of fully flexible learning programmes, but many examples of programmes with flexible components.

The use of e-learning enables learners to access ‘lectures’ and ‘tutorials’ asynchronously, at times that suit them and that allow them to pursue learning while remaining employed, in locations without tertiary institutions, or being responsible for family. E-learning can also open up different

¹¹ Daniels, for example, argues that, in distance education the institution, not an individual, is the teacher. Instead of, as in traditional classrooms, where an individual teaches a group of learners, in distance education a group teaches an individual, and teaching needs to be directed at that individual (Daniels, 1999).

avenues for formative assessment, for example, the use of online quizzes linked to further review material, that can be taken by learners when they feel ready, or want further practice. Students can move quickly through modules they are comfortable with, and spend longer with areas of difficulty.

Examples and activities, and links to further information and resources can be given (and shared between students, and between students and teachers) that cover a range of student interests and prior knowledge.

Other terms

Some other terms that are used to refer to e-learning include computer mediated learning, distributed learning, online learning, net-worked learning, virtual learning, Web-based learning, and digital learning. These terms are often used interchangeably or with partly overlapping meanings.¹²

Critical success factors

Some of the literature on the effectiveness of e-learning programmes uses the term “critical success factors” (CSF). This term critical success factors originated in the field of management. It refers to the personal and individual factors that are essential if an organisation is to be successful in achieving its goals (Daniel, 1961; Rockart, 1982). CSFs are defined as those areas that an organisation **must get right** or it will not succeed.

The concept of CSFs has been adapted to a variety of settings, and there are a number of reports of CSF approaches in change management projects, and “best practice” studies particularly in relation to information and communications technology. CSF approaches seek to identify a small number of factors that are in the “**must get right**” category. Rockart (1982) developed a CSF methodology to define the crucial elements required for the successful performance of an information specialist. This methodology involves a three-stage process involving focus groups or interviews with the target audience. The three stages are:

Stage 1: Identification of goals and objectives of the organisation/department/unit/individual.

Stage 2: Identification of the CSFs required to achieve the goals and objectives.

Stage 3: Determination of how achievement would be measured.

¹² See the *Highways and Pathways* report (E-learning Advisory Group, 2002). This report provides a glossary of a number of important e-learning terms.

CSFs can be considered at a range of levels, such as organisational, departmental or unit, or at the level of an individual's role. The strength of the CSF approach lies in focusing attention on the tasks and activities which must be right if goals and objectives are to be achieved (Bullen, 1995).

Adopting this process for educational settings might take the following form:

Stage 1: Identify the learners' goals through a process of needs analysis.

Stage 2: i. assess what the learners are currently able to do;
ii. analyse what has to be achieved to move them from their current position to their identified goals; and
iii. specify what is necessary to make this happen.

Stage 3: Decide how to identify and measure whether or not learners' goals are achieved.

Stage 2 (iii) is the point at which the critical success factors need to be identified and built into the teaching and learning environment. This process can take place at the level of a teacher and the class of students, and at various levels up through the institution, where community needs are identified. At the sector level, learner goals are considered from a national perspective.

In 2002 an International Conference on Computers in Education (ICCE) workshop held in Auckland focused on identifying the critical factors for success in implementing e-learning in higher education (McPherson, 2002b) through a process of change management. A small number of experts were asked to present position papers on critical success factors in relation to one of five components of an e-learning framework (McPherson, 2002a; McPherson & Nunes, 2002). The papers covered:

- organisational infrastructure (McPherson, 2002b);
- enabling technology (Currier & Campbell, 2002; Riddy & Fill, 2002);
- curriculum development (Brook Hall & Concannon, 2002);
- instructional design (Nunes, 2002); and
- delivery (Coman, 2002; Nunes & Mackey, 2002)

The workshop participants then established CSFs for each of the listed components. For example; their critical success factors for course delivery were:

- pedagogical concerns;
- appropriateness of e-learning for the students concerned;
- contact issues;
- tutor/teacher advice and support; and
- technical advice and support.

These CSFs have much in common with other e-learning research (*see* for example, Alexander et al., 1998; Robinson, 2001).

In most institutions different people will have responsibilities for the various components of the learning context. Teachers are responsible for course delivery, but are not always involved in organisational infrastructure or technology. Some teachers have little involvement with curriculum development or instructional design. In this case, teachers are dependent on the CSFs for other components having been well addressed by others. They are affected in their course delivery by CSFs from the Instructional Design component such as the technical environment and attention to matching the e-learning to the pedagogical context of the course, but they may have no input into addressing these issues.

Critical success factors, as described above, are essentially tools for planning the context and input for learning which have been generated intuitively on the basis of experience. The rest of this report backgrounds the extent to which research establishes that these factors are in fact critical to success in various contexts.

3. Effective e-learning

This chapter draws on recent thinking about effective learning and teaching to identify factors that need to be taken into account when designing and implementing effective e-learning programmes.

Key points in Chapter 3

- E-learning should not be a mass of online material for individual access without guidance on how to learn from it effectively.
- Courses involving e-learning need to be planned for, and grounded in an understanding of the roles of teachers and learners, of learning, and of how students learn.
- The role of prior knowledge in learning is critical and must be taken into account in e-learning design. Ongoing formative assessment is part of this.
- The brain is a dynamic organ shaped by experiences. Conceptual links are reorganised through active engagement with information in various contexts.
- Learning is an active process. It is the result of carrying out particular activities in a scaffolded environment where one activity provides the step up to the next level of development.
- Learning needs to be meaningful to learners and they should be supported in developing the skill of relating new material to what is meaningful to them.
- Learners should be enabled to become adaptable and flexible experts in their own current and future learning.
- Learning takes time and effective learning practices enable learners to work with materials from a variety of perspectives while they become fully conversant with it.
- Weaving e-learning into existing teaching and learning practices adds more ways for students to be actively and deeply involved with subject area materials.

Effective teaching and effective learning do not happen automatically. Darby (2002) refers to a “shovelware approach” where course resources are placed online, but with no access to interaction with a teacher. Such courses have high drop-out rates because the electronic transfer of information to learners, while efficient in some respects, does *not* give adequate support for their learning. Rather, e-learning courses need to be planned for, and grounded in an understanding of the roles of teachers and learners, of learning, and of how students learn.

This chapter draws on an influential recent review that put together research on the mind, the brain, and learning processes and the subsequently expanded full report.¹³ These researchers argue that effective learning environments are:

- learner-centred;
- assessment-centred;
- knowledge-centred; and
- community-centred.

These features of effective learning environments are closely interrelated. The discussion that follows weaves all four features together by exploring what being “learner-centred” might actually mean.

Learner-centred e-learning

An e-learning environment that is learner-centred would be shaped to meet the circumstances and needs of the learners. It would be designed to provide learners with choice, interactivity with peers, teachers, and appropriate support (Higgins, 2000). It would also take account of what is known about how people learn in general, and in the specific subject area in particular. According to Bransford et al.:

Overall, learner-centred environments include teachers who are aware that learners construct their own meanings, beginning with beliefs, understandings and cultural practices they bring to the classroom. If teaching is conceived as constructing a bridge between the subject and student, learner-centred teachers keep a constant eye on both ends of the bridge (2000, p. 136).

A learner-centred approach requires an understanding of student learning processes. Bransford et al. suggest that there are six linked factors to consider in understanding student learning processes. These are:

1. the role of prior knowledge in learning;
2. the brain as a dynamic organ shaped by experience;
3. learning as an active process;
4. learning for understanding;
5. adaptive expertise; and
6. learning as a time-consuming activity.

¹³ Bransford, Brown, and Cocking (1999) and Donovan, Bransford, Brown, and Pellegrino (1999). These reviews were published in the United States by the National Research Council, and have since been heavily cited. *See*, for example, the Teaching and Learning Research Programme http://www.tlrp.org/pub/newslet/oct_compulsory.pdf, and the Learning Skills Development Agency <http://www.lsd.org.uk/files/PDF/1378.pdf> in the United Kingdom.

Here we briefly consider each of these factors—in general and then with respect to e-learning. Each factor has important assessment implications for course design and for teaching. Learning needs to be assessment-centred, and teaching and assessment need to be “constructively aligned” with the curriculum objectives (Biggs, 2003).

Many educational researchers who write on e-learning have been influenced by constructivist theories of learning (Biggs, 2003; Bransford et al., 2000; Marton & Saljo, 1984; Weigel, 2002). Constructivists argue that all learners bring pre-existing understandings, resources, and interests to learning situations. What is already known influences what can be learnt next. So integral are constructivist principles to the design of e-learning tasks that one group of researchers has recently claimed that in the digital age constructivism will be “eventually recognised as a philosophy about curriculum design rather than a learning theory” (Eklund, Kay, & Lynch, 2003). The following sections outline the key features of a constructivist approach to teaching and learning in online contexts.

1. The role of prior knowledge in learning

Teachers and instructional designers need to pay attention to, and work with, what learners bring to the learning environment, including cultural knowledge and preferred ways of working. The challenge for designers of online courses is to decide *how* to find out about the prior learning of individuals, and how that information could be used by the teacher to guide the design of subsequent learning activities.

Learning usually requires the *transformation* of existing understanding, particularly when the learner encounters a new situation. Existing knowledge and understanding can help or hinder this process. The role of the teacher is to help the learner to understand the new situation, to identify what previous learning the learner is bringing to the new situation, to build on that understanding, to correct misconceptions, and to both observe and engage with the learner as they learn. The challenge for instructional designers is to plan activities that provide appropriate cognitive challenges so that students’ existing conceptions can actually be revealed.

Ongoing *formative assessment* should be undertaken during the course or programme. The challenge for online tutors is to find ways to actively clarify and then challenge learners’ ideas, providing them with feedback on progress, whilst also leading them to the next learning step. The learner can use the formative feedback to revise and correct learning gaps and misconceptions. The teacher is able to use the results of formative assessment to adjust content and activities to better meet the learning needs of the students.

Learning should also be connected to the wider social context of the learners. In designing learning environments teachers need to take into account the other learning environments in which learners are concurrently engaged. For most adults this includes home, work, and the community. These settings each have their own types of knowledge, ways of learning, and learning resources. There are challenges in e-learning approaches to recognise and build on the

diverse social and cultural experiences that learners bring to the learning experience. Designing “culturally relevant” materials is a particular challenge if teachers are not aware of their own cultural biases (Australian Flexible Learning Framework, 2003). Bransford et al. (1999; 2000) suggest that such approaches are consistent with “diagnostic teaching”. In these approaches the teachers recognise and find out about knowledge, skills, and attitudes, including cultural practices that the learners bring to the classroom, and build on them. They connect what is being learned in a course to the learner’s community and culture, and they connect what the learner’s cultural and community aspirations are to what is being taught. Put simply, Bransford et al. suggest the need to connect the everyday experiences of students with what is being taught, and how it is being taught.

2. The brain as a dynamic organ shaped by experience

Recent neurocognitive research shows that new learning structurally alters the brain by creating new links between brain cells. The brain is a dynamic organ that organises and reorganises itself in response to interactions with the physical, social, and cultural environment. In light of these discoveries, learning needs to be thought about as more than “the mere accretion of information” (Bransford et al., 2000, p. 234). To achieve this type of transformative conceptual reorganisation learning needs to be an *active* process for both learner and teacher.

Designers need to plan for learning activities that require the learner to relate information and concepts to diverse situations. At least some of these activities need to engage the learner in higher order thinking tasks such as inferring, categorising, comparing, and contrasting because such activities are likely to be helpful to the organisation and reorganisation of the brain.

It is also important to build ample practice opportunities into learning experiences, because practice also facilitates the growth of connections between brain cells (Zull, 2004). Teachers need to provide specific feedback about the connections learners are making between their existing knowledge and the new ideas and skills they are developing. In designing and introducing e-learning components of programmes, teachers will need to consider what, when, and how formative assessment will take place, and how they will use information from formative assessment to guide their teaching.

Zull (2004) notes a second challenge if recent findings from neuroscience are to be applied to learning. The growth of connections between brain cells is stimulated by hormones released when our emotions are excited:

The thinking part of our brain evolved through entanglement with older parts that we now know are involved in emotion and feelings. Emotion and thought are entangled—immensely so. This brings our body into the story because we feel our emotions in our body, and the way we feel always influences the brain (Zull, 2004, p. 70).

For Zull, this suggests that learning should be “intrinsically rewarding” so that students feel good and consciously link those feelings to their mastery of the intended learning. He suggests that learning in contexts that have appeal to students will enhance this process, as will supporting students to build their own explanations rather than being made reliant on those of the teacher. Ways he has worked on effecting such a shift in his own teaching include reducing explanations by making more use of demonstrations, stories, and metaphors.

3. Learning as an active process

The recent understandings of how the brain works underscore the critical importance of active learning in which learners take control of their own learning. This does not happen automatically. It involves teachers scaffolding or supporting learners to actively engage in learning. Vygotsky’s notion of the “zone of proximal development” provides one way of conceiving this that is built around readiness for learning. The zone of proximal development is the difference between the actual (or initial) development level and the potential development level of the learner. Starting from the actual development level the learner is supported—or scaffolded—from performing with assistance to independent performance.

If learning is to be an active process, students need to be doing more than listening or reading; they need to be writing, discussing, problem solving, and engaged in higher order thinking activities—such as analysing, synthesising, and evaluating. In the e-learning context writing, in particular, should be thought of as a process for shaping meaning, rather than just a process of reporting ready-made thoughts. A challenge for teachers is to find ways to support learners to craft and refine their thoughts as they work and rework ideas in writing. E-learning capacity to facilitate synchronous and asynchronous interactions lends itself to increased feedback opportunities through students’ interactions with each other, with teachers, and with other experts (Bransford et al., 2000). Websites can provide mechanisms for students to “post up” assignments for peer review. E-portfolios and e-journals are other options that can be used. Providing a respectful learning climate is set, e-learning boards can allow peers to share the feedback process, so that the burden of commentary does not always fall on the tutor. Self-assessment and peer assessment are useful approaches to use in assessing for learning.

Active learning should also foster learning at a metacognitive level: that is, where the learners are aware of their own processes of learning, and can recognise personal strengths and weaknesses in how they go about learning, understanding learning objectives, and being able to monitor progress towards those objectives. Bransford et al. (2000) suggest that activities which foster sense-making, self-assessment, and reflection with a view to improvement are aspects of a metacognitive approach to teaching and learning.

Learners can be actively involved in learning tasks whilst still very reliant on the tutor. While the challenges of supporting students to become self-directed learners are considerable, this is widely seen as a desirable outcome of tertiary education. One group of educators in the UK found that a process they call “collaborative assessment” was an effective way to use e-learning to help students take more responsibility for judging the quality of their own learning efforts (McConnell, 2002). At certain predetermined course points, students post their assignments to a Web-CT where a small group of their peers and their tutor have shared access. Using the asynchronous Web-CT technology the group takes joint responsibility for providing each contributor with feedback on the quality of the work posted. Self- and tutor-developed assessment criteria are used as the basis for the judgements made. In this way, students can share ideas for resources likely to be helpful to their peers, and work on improving drafts of their assignments before final submission.

McConnell reports that the asynchronous communication via Web-CT supports reflective learning because students have time to ponder feedback, and the comments they will post, as well as the facility to review all the comments made in a threaded discussion. In fact, he suggests the collaborative assessment actually becomes a learning event in itself. Feedback from student surveys suggests they learned a great deal from having the opportunity to view other students’ work in progress, and they are motivated to complete their own work by the knowledge that it has a waiting audience. The issue of students who read other students’ work but do not otherwise participate is solved by having each member of a group self-assess their own participation via the same collaborative forum. They use tutor-provided criteria to do this. McConnell asserts that all students benefit from this process. Many adult learners must complete their work in difficult learning conditions. By reading other students’ comments about their challenges in continuing with participation, wider understanding of these issues is an additional outcome for all members of the group.

4. Learning for understanding

Active learning lends itself to learning for understanding. If learning is to result in understanding, then it needs to have meaning for the learner, but also be based on clearly identified underlying principles and concepts. From a teaching point of view, the learner needs to be assisted to identify the relevance of the learning to goals of the wider course, and to their learning goals.

Learners need to be encouraged to understand, and to take responsibility for seeking the information that they need. The role of the teacher is to help the learner identify the strategies they might use to assess whether they understand someone else’s meaning, the kinds of evidence they need in order to believe particular claims, and how to build their own theories of phenomena and test them effectively (Bransford et al., 2000). Learning how to frame questions which lead to deep learning is a crucial part of learning for understanding, and one which should be modelled in course design, and in tutor feedback.

Too often, summative assessment has been the only assessment provided in a programme. Students complete a unit of study, submit their “assessment”, and move on to a new and different unit with the feedback from the assessment becoming redundant in terms of their learning. As for active learning, the challenge for tutors is to find ways to provide ongoing assessment throughout the learning programme.

5. Adaptive expertise

The development of adaptive expertise is widely seen as a desirable outcome of tertiary learning. Such expertise involves metacognitive awareness, recognition of current knowledge, questioning of current knowledge, and attempts to move beyond that knowledge. It involves the disposition to be flexible and open to new learning. E-learning approaches may present teachers with opportunities to model such adaptability and flexibility.

In tertiary education, learners are adults, and for many, education is related to current or future work. Education is also about bringing people into a professional community or into a community of practice (Collis & Moonen, 2001; Wenger, 1998). Teachers could consider involving learners as emergent professionals in the field of study. Weigel (2002) refers to “conditionalized knowledge” in which the student learns the contexts for which knowledge is relevant. Collis and Moonen (2001) suggest teachers move from conceptions of the learner as a student, to one of the learner as a professional who needs both to gain knowledge and be prepared for contribution to their field. In e-learning settings this could be done through providing students with authentic and diverse examples, and using approaches such as problem-based learning.

Weigel (2002) thinks that the best approach for nurturing deep learning is the cognitive apprenticeship model. This concept adapts the traditional craft apprenticeship model to one based on the development of cognitive skills. The cognitive apprenticeship approach is a staged approach in which the “apprentice” develops from being a dependent observer to becoming an independent practitioner, with initially high and then decreasing levels of teacher support (Beven, 1994; Brown & Palincsar, 1989; Brown et al., 1989; Collins et al., 1989). Cognitive apprenticeship also provides a model for thinking about the teacher as a learner. Professional development in this model provides teachers with the opportunity to observe e-learning innovations in practice (modelled), the opportunity to team-teach and be mentored in trying out new approaches (coaching), with the new practices being scaffolded and support faded out until the teacher is working independently.

6. Learning as a time-consuming activity

Learning takes time, and complex subject matter takes considerable time to learn. Time is needed to process new information, integrate that information into existing knowledge, and work with the new knowledge both in practice situations and to achieve fluency in application (Bransford et al., (2000). Use as an example the estimate that it takes between 50,000–100,000 hours of practice to

reach the level of a world-class chess master. Over time, an expert comes to be fluent in recognising patterns and their implications. Within a course, attention needs to be paid to providing the learners with the time to explore the underlying concepts and principles, and to connect them with their own experiences or prior learning. If students lack relevant prior experiences or learning they will find it harder to make sense of the concepts and principles being introduced.

Where they are under a learner's control, e-learning approaches provide options for learners in terms of the speed with which they progress through examples and information. For example, web-streaming of lectures has particular advantages for international students struggling to keep up with concepts presented in a language other than their home language. The student can pause the lecture, take notes, replay questions and answers, and look up relevant material to enhance understanding. The ability for online students to practise, self-assess, and to repeat difficult material has been credited with reduction in failure rates (Sun Microsystems, 2003).

Effective learning environments are knowledge-centred

In tertiary learning environments the goal is usually for students to acquire a deep foundation of factual knowledge in their subject area, and to understand that knowledge within an appropriate conceptual framework. They also need to be able to use that knowledge. This requires an environment that is knowledge-centred as well as learner- and assessment-centred (Bransford et al., 2000).

In designing such environments the expertise of the subject matter specialist(s) is crucial, as is the expertise of those who can provide appropriate ideas for the development of a learner-centred pedagogy for learning and assessment. Weaving e-learning into existing teaching and learning practices adds more ways for students to be actively and deeply involved with subject area materials.

Used in this way, e-learning can be a very important tool for increasing students' learning opportunities, and for increasing the overall quality of their learning.

Effective learning environments are community centred

Community carries with it the notion of connectedness which has additional meanings in an e-learning context. In the previous sections in this chapter, we have noted the potential of e-learning to provide interactivity between learners, and between learners and teachers. This potential for interactivity can be used to provide both knowledge-based experiences, and affective support. Teachers can create an environment where learners share what they bring with them to the course, their learning experiences through the course, and work in progress and commenting on it.

Feedback (and encouragement) are important parts of the development of a shared community of learning.

Shared project work can also be supported through e-learning. Such project work can also focus on problems that are identified or agreed upon by students and teachers, providing a further common focus, and sense of shared community.

The next chapter looks in more detail at how e-learning can enhance outcomes for learners.

4. Can e-learning enhance student learning?

In this chapter, we focus on the evidence that e-learning can enhance student learning. Most of the available evidence is limited to case studies of individual courses, often using student evaluations or assessments, or observations of those who have developed or taken the courses. Some of the evidence is focused on student achievement; some focuses on the learning process.

There are few studies that directly compare online and face-to-face learning. These studies show comparable overall outcomes, with some indications that some online learning can improve outcomes. Some of these outcomes are wider than traditional performance measures. Other studies have focused on e-learning as an alternative to traditional distance education rather than face-to-face, offering flexibility in learning which is particularly important to those whose access to tertiary education is limited by their employment, location, and personal and family responsibilities.

We start with an outline of the main consistencies in a range of recent case studies, focusing particularly on evidence related to blended learning, rather than solely Web-based learning. ITPNZ has indicated its interest in blended learning. Blended learning is also more popular with teachers and students than entirely online learning. Then we provide summaries of key research and evidence-based examples which illustrate the main messages that can be drawn from the research.

Much of the evidence available is about university courses, which have so far been more likely to use e-learning. However, the content of some of these courses does not appear too dissimilar from what may be offered in New Zealand polytechnics. The case studies span a range of subject areas, including both skill-based and conceptual. There is more evidence on ICT-related courses than others.

Main messages about e-learning effects for learners

- It can improve understanding and encourage deeper learning, if there is careful course design and choice of technology in relation to learning objectives that aim to encourage deeper learning.
- It can free up face-to-face teacher:student time for discussion, rather than using it to cover information or provide skill practice, depending on the use made of technology.
- It can improve and sustain motivation by offering interesting tasks and material.
- Students need formative feedback throughout the course. This requires careful structuring and the development of channels and projects encouraging student-student interaction as well as strategic use of teacher time to provide feedback; online tasks, tests, and quizzes are also useful in giving students a picture of their learning progress.
- Student-student interaction can also be enhanced through careful structuring, creating additional support for learning, and even a “learning community”. Participation in discussion groups etc. is supported by linking it to assessment or tasks and measures that “matter”.
- It is important that students have a clear picture of the learning objectives for the course, and that assessment methods reflect and support the learning objectives.
- Students need very clear course information, and if accessing the course externally, initial face-to-face sessions are valuable to ensure understanding and skills needed to access the web material, to lay the ground for student-student interaction, particularly if some collaborative work is to be done, and for teacher-student web interaction.
- While asynchronous formats offer students more flexibility, they may also spend more time on a course using the web.
- The technology used has to be reliable, simple, and easily accessed by students.
- E-learning is easier for students who are self-managing, which may mean it is easier for mature students.
- Barriers to making the most of e-learning can arise from students’ familiarity with classroom-based methods and assumptions that this is how learning occurs, and from a greater interest in superficial learning to pass a course, than in increasing understanding.
- However, increasingly attention is focusing on the creation of tasks, material, and feedback mechanisms and channels that will increase motivation and hence encourage self-management, and on course structures, processes, and requirements that provide some additional frameworks for those who need them.

Overviews

Lewis and Goodison (2004) undertook a study of 12 English tertiary institutions identified through Quality Assurance Agency (QAA) subject reviews as providing good pedagogic practice in ICT development in use between 1998–2001. The subjects covered a wide range, including academic and professional. They found a number of institutional factors were important for sustained use and impact, particularly the support given to teachers, the simplicity of Web-based platforms, and whether the ICT use was a central initiative with good funding. Staff training tended to focus on technology rather than on pedagogy. The time needed to develop “bespoke” teaching materials was a barrier to teachers moving into offering blended courses, especially given the emphasis on the need to produce research publications because of research-based funding for institutions.

At six universities, substantial VLE use was made in individual subjects, and this encouraged a greater mix of learning and communication activities, and more interactivity. It was thought to be particularly useful for teaching “complex or traditionally ‘dry’ subjects”. There was more use of online tutorials, and more use of monitoring student online activity, both at the individual and group level, as a source of information for teachers on the need to provide more support. Most Web-based assessment was formative.

Student access to lecture notes in advance did not, however, decrease student attendance at lectures; instead they came better prepared and were more engaged, and teachers thought they could concentrate more on important concepts or issues within the content they were covering. VLE use gave more flexibility to students, of particular note in institutions recruiting a diverse student group, including those who needed to study part-time while they remained in employment. Some staff felt that VLE use was particularly useful for students with learning difficulties or disabilities, who could feel more confident in a “safer” environment for them. Students rated access to up-to-date information particularly highly.

Few institutions had evaluated the impact of their blended approaches. Given that other changes had also taken place at the time, staff in these courses thought it would be problematic to ascribe any changes to e-learning alone. Teachers did cite improvements in student attitudes, and communication skills. The study authors thought that students could benefit from being taught how to make the most of e-learning, and appropriate rules, responsibilities, and protocols for web use.

Harris, Hall, and Muirhead (2004) found in their scoping study for research into the impact of e-learning in the UK that key informants involved in e-teaching were positive about its ability to improve participation, retention, and achievement, but that it would be difficult to isolate its unique contribution to student outcomes. E-learning itself encompasses a wide range of practices. They conclude that research into the effects of e-learning should focus on some of the aspects that those involved in e-teaching have reported: such as increased motivation and engagement, and the development of skills such as interpersonal communication.

Sun Microsystems (2003) provides a brief overview of 17 successful e-learning initiatives in universities in a range of countries, most using blended approaches. This overview is based on interviews; some of these initiatives have also conducted ongoing evaluations. The initiatives are judged successful in that student numbers taking blended courses have increased; some institutions have also gathered evidence that student achievement has improved; others have found that e-learning is as successful in terms of student retention and achievement as conventional classes (and some show that both are more successful than their wholly online classes); and some institutions have been able to make savings through the reduced need for additional classrooms and staff.

However, Palloff and Pratt (2001) provide clear accounts of their own work designing and delivering blended courses, including a more open-ended one than Boyd and Baafi's (2001), on systems theory. This book would be a particularly useful source for tertiary teachers:

In our experience, a well-constructed course is one that is logical in its design, easy to navigate, and inviting to the user.

They recommend against course sites that rely on audio, video, chat, or which have extensive graphics that are slow to download.

Palloff and Pratt suggest that some subjects may not transfer well to total online delivery ("webcentric"), citing "lab sciences, applied art, counselling skills, and speech", but also note that "creative faculty have found ways to deliver them online". For their own subject areas, they emphasise the increased student-student interaction that is made possible by online technology, particularly through asynchronous discussion:

When we ask students to evaluate the effectiveness of their online learning experience, it is the ability to engage in asynchronous discussion with their peers that they most value. Consequently, the choice of technology that enhances students' ability to connect with one another, enabling them to form a learning community, is critical (p. 10).

They cite a 1999 review of outcomes of online learning (Phipps & Merisotis) which concludes that the outcomes are similar to those of conventional institutions, but also notes the thinness of much of the research. The conclusion of this review noted that these outcomes may have been achieved by factors other than the technology itself: particularly the nature of learning tasks, learner characteristics, student motivation, and the instructor.

They also cite a study undertaken by the American Association for History and Computing in 1999 that "suggests that the most successful course outcomes are being seen in classes that are small and combine face-to-face with online interaction—that is web-enhanced classes". (While this seems plausible, and is consistent with themes coming through the case studies we found in the literature, we were unable to track down this study ourselves, and do not know how robust it is.)

Blended learning—courses with modest changes

Ali & Elfessi (2004) cite two studies comparing online and class-based courses that found that Web-based learning courses improved student understanding of course content, attributing this to the greater diversity of resources that can be used through the web (including text, audio, video, simulations, graphics, and animations), a better collaborative learning environment, and convenience. Their own study compared the learning experience in an educational media and technology course for American preservice teachers of those whose learning was classroom-based, and those whose learning was through the web, with face-to-face classroom experience only three times over one semester (at the start, a middle-course discussion of progress and experience, and a final session to complete online exams and course evaluation). The aim of the course was to both give students skills in essential features of software that teachers use, and to integrate these skills in the students' content areas. The course followed the same structure for both groups, at the same pace, but with different delivery formats, other than for assessment. Blackboard was chosen for both groups for its convenience and immediate feedback.

Conventional classroom	Online class
Lecture	PowerPoint, Word, video
Face-to-face	Virtual discussion
- discussion	- chat, forums, email
- collaboration	
Blackboard for assessment only	Blackboard for access, communication, & assessment

The two groups were self-selected. The ratio of male:female (in a predominantly female profession) was 1:2 in the conventional course, and 1:22 in the online course. All but one of the students was aged less than 30. The outcomes were the same for both groups. However, the online group's comfort level in using technology decreased over the period, which the authors ascribe to the technical problems they had in using Blackboard. The authors thought both groups had modified their initially overhigh expectations of technology, and ended the course regarding it as a tool, "as an instructional medium, and not a key determinant of learning".

The use of Blackboard as a course management tool has spread, particularly in ICT-related courses. Asgarkhani's (2003) survey of Christchurch Polytechnic Institute of Technology's ICT and E-commerce students showed that most used Blackboard in at least half their courses. Most had good remote access, and were full-time students; they mostly spent 30 minutes or less learning to use Blackboard. This group of students could be expected to support the use of ICT in learning, and they did: half would like all their courses to be Blackboard supported. However, around 20 percent would not like any online courses. The main use of Blackboard was for course materials, course information, and email. Twenty-eight percent had used it to submit assignments, or to chat. Only 14 percent had used it for exercises. (It is not clear from the paper whether these

were offered in all courses.) Active participation and response from teachers was identified as an important factor in a good web-assisted course.

Campton (2003) describes e-learning using WebCT in a first year business information systems course at the University of Tasmania, which is taught over five campuses through two semesters. Students could view PowerPoint presentations, hear recorded lectures, and access and submit assessment tasks. They could receive summative test results. Online multiple choice tests that could be used formatively were optional. Lecture attendance was optional. Group discussion and email were available, but synchronous communication was not greatly used by students. Campton describes this as the use of technology to support a traditional mode of delivery: “Each component tended to be discrete rather than a world in which learners could explore, integrate and learn using linked objects.” It did not provide students with the feedback and communication they needed about their learning and assessment, and did not address individual differences. It provided flexibility for students in their time-use, but not interaction.

Nichols and Chohan (2004) describe the use of WebCT to offer IT key skills classes to campus students at Leeds College of Technology, using web materials and formative assessments, and timetabled classes in computer labs. The course aims appear to be simple, with limited use of discussion fora. On the whole, the experience has been positive, particularly student access to work at their own pace and in their own time, and the opportunities for regular self-assessment (and gauging of progress). The authors note that teachers need to acquire some new skills, including pedagogical, and that “the time taken in development should not be overlooked. As well as creating or obtaining learning materials, structuring the course involves a great deal of work.”

Proctor (2003) notes Liber’s argument that “virtual learning environments (VLEs)” such as WebCT and Blackboard “are strongest at supporting the delivery of course materials and weaker at supporting social construction”. He describes the development of a part-time BSc in information technology at the University of Salford designed for people in employment that provides a blended approach to make the most of both VLE and face-to-face strengths. It includes a requirement for an evening’s attendance each week, with a focus on student-staff and student-student dialogue during the evening, with teaching assistants available by email or phone for the rest of the time.

Boyd and Baafi (2001) analyse student responses to a stage one course on engineering computing, which is mainly focused on skill development in software, at the University of Wollongong. This course is “completely Web-based”, but students are also required to attend scheduled PC laboratory sessions of 4 hours, once a week, with class sizes of 30, and two teachers. At these sessions, they use the skills they are developing to work on “real life” problems, which they can access from the web ahead of time. Notes, tutorials, and assignments are on the web; as are student questions and feedback from teachers. Assignments are submitted via the web, and the authors feel they have more control over their marking and feedback. The authors feel this creates a “very flexible learning environment in which students can learn at their own pace, but can seek immediate assistance from tutors when required”. However, there are continuing technical issues,

e.g. incompatibility between software. The course is highly rated by students, and the authors say that it has “significantly enhanced learning outcomes”. They feel it can be extended to some other subjects:

Subjects which we feel lend themselves to this approach are those with a relatively well defined structure and content. We are not yet convinced that this is the best approach for more open ended subjects which require continuing interchange of views between teachers and students.

Blended approaches aiming for deeper learning

Hegarty (2004) provides information about the use of online technology in a bioscience course at Otago Polytechnic. Online technology was used to motivate students to learn, by offering interesting tasks including online quizzes and Web-based interactive tutorials and discussion board activities. The online quizzes accompanied each module, and were marked online, providing immediate feedback. Students found these “very helpful in guiding their learning and liked the immediacy of feedback” (p. 22).

These students were assessed through portfolio assessment, and “spent more time exploring topics and doing activities that helped them understand the subject as well as in reflective learning, rather than rote learning for an exam” (p. 32). She notes the importance of structured assessment. Some of the discussion board participation was limited to information exchange, but encouragement to post their thoughts about a clinical scenario exercise, with the lecturer facilitating the discussion “not through providing the correct answers, but by leading them to different ways of thinking about each other’s answers” led to some deeper knowledge construction. Prompt feedback from the lecturer appears to have been important for the students. Hegarty also notes the usefulness of learners posting accounts of their use of bioscience in their own practice areas on the discussion board (DB):

While the members of the group posted their stories on the DB and others read them and wrote replies (story expanding), surface learning was occurring, but as the stories were processed and reconstructed as the group gained insight through the DB interactions, deep learning (transformative and reflective) was achieved (p. 29).

Hegarty also cites two other Otago Polytechnic case studies that bring out the importance of “the design of online tasks pitched at the appropriate level... to promote optimal learning and to socialise students”. Penman (2001) analysed the online communication in a course on “occupational therapy and the Internet” at Otago Polytechnic, a distance course whose students had met each other during face-to-face study for their first qualification. This group was unusual in favouring the chatroom rather than the mailing list, which was used primarily for information seeking or giving (rather than indepth discussion of content) and seen as providing “information overload”. The most active participants were those who could type competently—but these were also active communicators in face-to-face environments. Terry Marler’s course for veterinary

nursing students focuses on authentic problems, using audiotapes of interviews with farmers, and real life video clips of animal treatments, forming the basis for student and tutor problem-solving interactions via an online DB.

Hegarty cites a 2002 study of flexible learning in the Australian VET sector which found that technological access problems were the “main turn-off” for students using online learning:

Other factors that prevented quality online experiences for students were lack of motivation and interaction, poor assessment methods and feedback, unresponsive and unskilled teachers, inadequate and poorly designed instructions and materials and lack of student support services (p. 38).

Damoense (2003) emphasises the potential of e-learning to improve student engagement in learning, citing three case studies of individual courses. First year economic students at a US university whose course included online tutorials, links to course-related material on the Internet, and bulletin boards, tools that “facilitate collaboration and project based learning, and provide an external or authentic environment” showed improved attitudes to and interest in economics. She gives a more detailed example of structured project-based learning with first year BCom students in South Africa which showed similar success in engaging students in learning. She concludes that it is not the web *per se* which improves learning outcomes: but it does provide the means to create learning environments that “will enhance learning processes, encompassing activities involving interactivity and flexibility, motivation and confidence, collaboration, construction of knowledge and active learning, that are noted to have delivered quality e-learning experiences”.

The “ability to engage undergraduate finance students in critical analysis” is identified as a key outcome in Vos and Grant’s (2001) case study of the evolution of a compulsory Introduction to Finance stage 2 paper at the University of Waikato. They cite Tulloch’s advice that “choices in technology introduced to the learning process should be based on content matter, learning objectives, and availability to students”. They decided on videostreaming technology, accessed by campus students through university computer laboratories, and allowing self-paced instruction, because a key component of the content matter was “complex theoretical concepts and technique oriented applications”. Both core lectures and lectures on related finance topics were available on videostream, as was a video of the course lecturer working through practice problems that were available on the course website. Old tests, exams, answers, and sample tests to allow students to test their progress were also placed on the website. Relevant Internet links were also included. The first session of the class was face-to-face, students were given passwords etc., and shown how to navigate the class website. There were no more formal face-to-face sessions other than two paper-based tests: but 25 hours of tutorial time was available in the computer labs that students could access without having to sign up for a definite time. Email was also used. The authors note that “in practice, this level of support structure actually offered more person to person support than had been provided previously”.

This course received higher student evaluations over the 5 years from 1998 to 2001 than other compulsory Bachelor of Management Studies courses. Comparison of the first two iterations with face-to-face delivery previously showed a similar average and spread of marks.

This use of the Internet enabled students to work at their own pace, in their own time, which resulted in them learning more, and at a deeper level. The lecturer thought he had thus “challenged the top end of the class better than ever before without leaving the bottom end behind”. What was problematic included the technology itself: reliance on a single videosever, and then campus-only access; the difficulty some students had in managing their own time; and the desire of some students for home-Internet access to summarised material and additional practice on problems. The authors’ comment on the last is instructive in terms of the importance of the learning objectives of any course in deciding what technology to use, and what use to make of it:

To provide indicators such as those requested by students would facilitate what Biggs (1999) describes as a ‘surface approach to learning’—whereby students skate over the surface of the subject, remembering lists of disjointed facts without fully comprehending the point being made. We did not.

Changes made by 2001 were the use of spreadsheet-based tutorials, and quick online tests that assess both knowledge and the ability to use real life financial tools, in weekly tutorial classes that contribute to coursework assessment. A weekly face-to-face class was included to provide critical analysis and discussion of class readings.

The authors do note an increase in course attrition rates from 8 percent in 1998 to 16 percent in 2000; however this is a lower attrition rate than found in overseas studies of finance courses that were entirely Web-based. As the authors suggest, some comparison with trends in attrition rates for a range of courses over the same period would be useful in interpreting this increase. They provide some analysis in terms of student composition: most of their students are aged 25 or less (and may lack the self-discipline of older students), and the proportion of non-New Zealanders rose from 17 percent in 1998 to 32 percent in 2001.

Constructivist approaches to technology use in a Belgian initial teacher education course showed positive student ratings, and in an American poultry production course, showed a significant increase in student knowledge (Van Petegem, De Loght, & Shortridge, 2004).

Gibbs (1999) focuses on the use of a VLE to support deeper learning in a philosophy course at the University of Huddersfield, using that university’s coMentor system. This provides individual and group work areas, and a resources area, with an open access notice board. Students could control who they shared work and ideas with; and were “encouraged to learn from each other by seeing each other’s work and to consult the online resources”, in order to ensure that tutors were not overworked. Face-to-face classes continued much as before, through lectures and seminars. Assessment could be either a final examination, or through six short contributions made to coMentor in each of six different weeks. Those who chose the latter tended to have more strategic and deep learning styles than those who chose the exam. The higher the score on these two

learning styles, the more frequent the student's use of coMentor. As Gibbs notes, he cannot tell from his data whether students' learning styles were changed or developed by coMentor, or were pre-existing and encouraged their use of it. (One hopes he undertook subsequent research looking at learning styles pre and post the course to analyse this relationship further.)

Average marks were much the same for the two forms of final assessment, and were not related to frequency of use of the coMentor system. However, compared to the previous year of the course, the author noted that "the level of philosophical debate and discussion was considerably improved". The contributions tended to be individual work, with few discussion threads. Students felt that writing the contributions helped them clarify their thinking and understanding, and they gained knowledge and insight from each other's postings.

Talay-Ongan provides a thoughtful account of the changes made to two early childhood education courses at the Institute of Early Childhood, Macquarie University, Sydney over 1998–2002. In the first year, all learning was Web-based. While students were appreciative of being able to access lecture notes online before lectures (which they could attend face-to-face or have through audiotapes), only half were satisfied with their learning experience. Satisfaction jumped the following year when face-to-face tutorials were restored, though these were not compulsory. In the third year, the course on teachers as researchers was redesigned, with more emphasis on collaborative teamwork to undertake a research project, which meant use of the bulletin board as well as face-to-face meetings (which was less easy for the distance students). The students particularly valued the collaborative work. The unit was fine-tuned in 2001 to better calibrate the unit outline and assessment tasks, and provide external students with an on-campus day in the first week of the course, and further fine-tuned in 2002. Talay-Ongan notes that while this ongoing review increases workload, it has also added to job satisfaction.

Analysis of the website messages showed student-student and student-teacher emotional support and "encouragement for perseverance in the challenges presented by the unit", the development of reflection and confidence in finding information and in learning that students found useful in other courses they were doing.

Talay-Ongan notes the "constructive alignment" sought by the two courses through alignment of objectives and assessment tasks, some frequent, e.g. quizzes, some progressive, e.g. iterations of reports with feedback on each stage "so as to maintain a constant level of student engagement", and learning by doing. Lectures have shifted to more problem-based learning. Weekly online postings responded to and mediated by the teachers encourage "interactive reflections and arguments amongst students towards constructing shared meanings". Teachers and students meet at the start of the course, and share the results of their work at the end of the course in face-to-face sessions. She concludes that this blended approach fosters the construction of a learning community and shared meanings, both of which are "significant assets in obtaining the desired learning and teaching outcomes".

Young and McSporrán also focus on building a community of learners in their report of their experiences with blended computing courses between 1999–2001 at UNITEC Institute of

Technology. They note the value of online conferences for student learning, but also the need for strategies to get student participation. They gained participation in postings by linking them with assessments, and providing a variety of tasks, some individual, and some in response to other students' analysis. Some involved peer-grading. They conclude that teachers need to actively participate, and that participation needs to be structured. They provide strategies that allow for a quick response without demanding overmuch of teachers (including reusing existing material) and encouraging student leaders. They found that one course had much higher levels of participation, and attribute this to a course aim to improve communication skills, the receipt of teacher help for industry placement if they displayed a given level of communication skills, real world tasks and peer grading, and personal relationships developed in class during the first 6 weeks of the course.

Beasley and Smyth (2004) provide a useful analysis of why online learning environments (OLEs) do not always work as well as hoped in terms of active learning. Online modules for masters-level, workplace-based students of petroleum engineering offered the complete materials and student activities online, leaving it to students to decide whether they would use them in the traditional "linear" fashion (reading each chapter of material and using the activities to test and consolidate knowledge)—which is the way that most of the "constructivist" approaches described in the case studies for this report have worked in fact; or starting with the activities, and using them "in a more problem-based manner, accessing material when required to complete an activity". None of the students chose the latter option. The authors note that this preference could simply reflect lack of prior experience and comfort in working in a nonlinear fashion. But they also suggest that the course did not provide any support or guidance in how to work this way effectively. The students also requested paper versions of the material: this in fact allowed them more flexibility, rather than being computer-dependent. Students used the graphics on the web to understand processes; the authors note that there had not been time in the module development to offer animation and simulation, which they thought students would have found even more helpful, and encourage more online use.

Although students had requested discussion fora for student-teacher and student-student communication, they made little use of the fora; the authors interpret this as their ability to access company mentors face-to-face, and the teachers' lack of training in how to use the fora effectively, and their waiting for students to initiate its use. The fora had no clear purpose, with no tasks or activities for students, and thus the potential use of these fora to develop interaction and a sense of course community was limited.

Ladyshevsky (2004) provides a useful overview of the research comparing online and face-to-face learning which brings out some of the contextual aspects that may make online learning more, or less effective, and issues of how effectiveness is to be judged. For example, in one study comparing student preferences in a group of students who were largely aged 25 or less, Web-based approaches were seen as more enjoyable, collaborative, and to have a greater sense of sharing and equality; but face-to-face tutorials were seen as more effective, because of the greater opportunity for interaction with the tutor, and the possibility of getting direct information on "right and wrong" answers. Here there are different views of effectiveness: a mismatch between

student desires to pass a course, and teacher desires for deeper learning to occur, as with the University of Waikato example cited above.

Another study he cites found that student perceptions of the amount they had learnt were positively correlated to course requirements for student participation in online discussion, and the use of their participation in course assessment (a finding that is consistent with other studies). Other studies have focused on learner characteristics: those who chose online learning tend to be more self-directed. They were also more open to a new mode of learning.

His own study of post graduate student performance in units at the Graduate School of Business, Curtin University of Technology, compares class-based and fully online units. The online units followed constructivist principles, and included lecture notes, figures/diagrams, readings, Internet links, practical activities and self-assessments, quizzes, and online discussion activities, in 12 modules. Class sizes ranged from 10–40 for the online mode, and 14–40 for class-based. Most students in the 2 years of the study took face-to-face classes. Gender and age distributions were comparable for the two modes. Overall, students in the online units did better, but with a small effect size (0.11). Students under 33 did better in the online units than face-to-face, but again the effect size was relatively small. What is particularly interesting in this study is that students who took both forms of units did better on their online studies. This may be due to self-selection, particularly if those who take online studies are more autonomous and motivated. There was more individual work in these online courses.

Ladyshevsky suggests that one reason why the online learning matched or did better than conventional learning was that discussion rooms were kept small (10–15 students, managed by an instructor), and cites another study that also suggests the importance of small class size to develop an online learning community.

Student situations and expectations

Jones, Packham, Miller, and Jones (2004) note that “studies conducted alongside e-learning initiatives have often recorded varying levels of success in retention, identifying student motivation and satisfaction as reasons as to why a significant number of students ultimately withdraw.” Factors associated with withdrawal include individual motivation, personal circumstances, and technology, student experiences, lack of tutor feedback, and online miscommunication. The authors note recent British studies also pointing to lack of study skills, particularly for the wider range of students now being admitted into higher education, financial difficulties, lack of time, lack of IT experience and skills, and lack of information about online courses, including what is different about them from traditional classroom-based instruction. Their own study focused on withdrawals from a BA Enterprise programme, which uses Blackboard to provide course materials online, and interaction with module tutors through virtual classrooms, chatrooms, and discussion rooms. The students who were most likely to withdraw were more likely to be male, and either aged over 60, or under 30. The students who succeeded

were likely not to be in employment, without prior higher education experience. Personal reasons were the main reasons for withdrawal, particularly job-related reasons—lack of time.

Choy, McNickle, and Clayton (2001) surveyed online learners enrolled in VET (vocational education and training) courses in Australia to find out more about their expectations. Regular contact with, and quick feedback from, teachers were identified as essential, as much for continued motivation as for direction. It was important that they had clear statements of what they were expected to learn, and clear information about the course before they began. Regular discussions initiated by teachers through chat rooms were seen as useful. Online courses were chosen for “the flexibility in pace, time, and place of learning”. A majority of the learners who responded were over 40 and in full-time employment, with a higher proportion of women.

Bate, Robertson, and Smart (2003) undertook a set of case studies of e-learning in eight Australian VET sites, to understand better why, despite policy focus on e-learning and substantial investment in online learning materials, less than 2.5 percent of VET students in a 2002 survey were undertaking programmes that included some online learning, though they note that if e-learning is seen as including “access to electronic learning materials and/or electronic forms of communication like email, chat and discussion boards”, the proportion may be higher. They note that blended learning is more attractive than fully online courses for most teachers and students, and can take a range of forms. Examples of the range of blended learning they found are included in the next chapter.

Their review of the Australian research brings out two important points:

- VET learners comprise a wide range, with different preferences and needs in relation to ways in which learning activities, learning resources, and learning supports are used.
- Face-to-face delivery is still the “norm” for adult learners [this is what they have experienced in schooling], and continues to shape their expectations and response to e-learning.

Learners who take most rapidly to flexible learning were described in Ho’s survey-based study as career changers, skill improvers, and self-employed. Bate et al. (2003) also identify the corporate sector as enthusiastic about flexible learning using the web; e-learning in this context meshes well with the use of the web for knowledge management. They also note some tension between this latter need and “pursuing more idealistic goals providing a strong constructivist foundation to e-learning”.

The authors use Oliver’s (2001) framework for online learning settings, which we reproduce also, since it seems very useful in thinking about what could be provided, and why, in relation to a course’s learning outcomes, along three connected dimensions.

Table 2 Framework for describing critical elements of online learning settings

Learning design elements	Description	Examples
Learning activities	The tasks, problems, interactions used to engage the learners and upon which learning is based.	Reading activities, computer based interactions, simulations, inquiry tasks, projects, open ended problems, collaborative tasks.
Learning resources	The content, information and resources with which the learners interact in completing the tasks.	Web pages, readers, text books; computer based tools, Web links, notes, documents, workplace manuals, case studies, databases.
Learning supports	The scaffolds, structures, motivations, assistances and connections used to support learning.	Learning guides, discussions, chats, suggested learning pathways, mentors, buddies, workplace trainers.

Source: Oliver (2001). *Australian Journal of Educational Technology*. 17(2), p. 209.

Oliver's notion of learning activities, resources and support all operating in tandem to optimise student learning is compelling. The way in which the teacher configures this mix seems to be of critical importance. For instance, in corporate and small business training contexts, resources may be of most value; in a VET in Schools class, it may be activities that promote higher levels of learner engagement; in a TAFE distance education context, collaboration may be the key (Bate et al., 2003, (p. 10).

Their own study was limited to eight sites and a small number of learners, and this is recognised by the authors. Nonetheless, their conclusion is consistent with other research in this area—and in studies of conventional classroom-based teaching:

...the role of the teacher in each of the eight case studies appeared to be *the* critical success factor in determining levels of learner satisfaction. The skills of the teacher in putting together environments with appropriate combinations of engaging activities, resources and learner support mechanisms, would seem to outweigh the importance of the educational design of learning materials. For instance, designs that were set in authentic contexts with engaging activity-based content were sometimes used in quite structured settings. Conversely, designs that were heavily structured were sometimes used in innovative ways.

...the impact of learner-to-learner communication and collaborative problem solving seemed to be associated with high levels of learner motivation.

There are two other findings which are consistent with other research supporting student interest in engaging learning (e.g. authentic tasks rather than “small chunks of just-in-time information”) at all qualification levels; the authors conclude that “constructivist pedagogy appears to be the best way of achieving this”.

Brennan (2003) in her study of e-learning pedagogy in online VET courses in Australia—aptly entitled *One size doesn't fit all*—documents some tensions in the current situation for (fully) online courses:

- E-learning is often spoken of as enabling a more individual focus, but may not be able to do so.

Learning is social activity as well as a cognitive one, and unless this “sociability” is guaranteed by online materials, only the most motivated students will persist.

- While teachers and learners are approaching e-learning in terms of what are identified in research about learning as sound pedagogical principles, including communication, interactivity, and the development of social cohesion, the environment in which online learning takes place may not support these, particularly if based on learning as the transmission of information.
- Fully online learning does seem to ask that learners are independent learners, with high literacy skills, and technological confidence. This may leave indigenous and non-English speakers behind.

She concludes that blended learning approaches are more likely to succeed because they offer both flexibility and social interactions.

5. Examples of blended tertiary courses

This chapter describes five New Zealand and international examples of blended e-learning in tertiary education courses and programmes. Each example illustrates different reasons for using e-learning, and different blends of e-learning and conventional teaching and learning modes. The five examples are:

1. the Mixed Media Programme (MMP) Teacher Education—at Waikato University;
2. Biochemistry 111—Flexible course development—at Otago University;
3. a course designed to develop first-year students' e-learning skills—at the University of Wollongong;
4. an e-learning tutorial support programme for conventional university courses—at the University of Southampton; and
5. a group of case studies of e-learning in vocational education and training (VET) in Australia.

Example 1: The Mixed Media Programme (MMP) Teacher Education at Waikato University

In 1996 Waikato University launched its Mixed Media Programme (MMP) for Teacher Education. This programme integrates face-to-face learning and e-learning, and was developed to meet the needs of an area with a significant Māori population (Campbell & Hawkesworth, 1999). One in five students in the first intake for the MMP programme were Māori.

The MMP was designed for rural and remote communities on the East Coast. These communities have had major difficulties recruiting and retaining teachers. The MMP is designed to allow students to remain living in their communities while also completing a teacher education qualification. An anticipated outcome of the MMP is that graduates will take up teaching positions in their local areas.

Structure and features of the programme

The 3-year MMP programme is structured to include online components, teaching placements in local schools, and on-campus attendance at Waikato University for three 1-week periods each year. Students are required to either have access to the Internet at home, or through their local school. They are expected to have basic computer skills before they start the course, including knowing how to use the Internet.

The MMP aims to create an environment that is learner-centred and community-centred, both of which are deemed to be features of an effective learning environment (*see* Bransford et al., 2000). The multiple communities students live and work in are recognised in the course. These include the community of practice of “teaching”, the community of the schools the student teachers work in, their geographical communities, and their cultural communities. From the time of recruitment through to graduation the programme acknowledges tikanga Māori. As an example, at the start of their programme a pōwhiri is held at the university marae to welcome the students to the university, and students have the option of staying on the marae during their on-campus times. According to Campbell and Hawkesworth there were a number of features of the MMP online experience that were valuable for Māori. For example, the courses in te reo and tikanga recognised and valued Māori students’ knowledge. For those who were second language learners of Māori, there was support in using te reo to communicate.

Teachers’ experiences of teaching in the MMP programme

One of the strengths of the MMP for teachers is that a team teaching approach is used in the courses. This provides a vehicle for mentoring or scaffolding those new to online teaching in gaining skills and experience, while ensuring that the students have access to teachers. According to Campbell, McGee, and Yates (2000), teaching staff who volunteered to be involved in the first years of MMP underwent a process of change as they became more confident and familiar with online teaching. Initially, staff tried to keep the structure and content of online papers broadly similar to their on-campus equivalents, but, as they gained confidence and experience using the new information and communication technologies, they began to explore alternatives and modifications to their online teaching. Teachers reported receiving intrinsic rewards during this process as they discovered new ways of enhancing student learning, which also benefited their on-campus teaching (Campbell et al., 2000; Wolcott & Betts, 1999).

Hawkesworth shared her experience of teaching te reo and tikanga to the MMP students online. Like many of the students, and many teachers, Hawkesworth was frightened of the technology, and needed to develop the skills for teaching online. She felt that one reason the MMP programme worked was because of the sense of whānau built up among the students from their time spent together on campus. Though widely dispersed, the students supported each other with technology and content difficulties. They also provided help to Hawkesworth in learning the mechanics of teaching online. Like Hawkesworth, the other teachers in the MMP programme reported that they found they got to know their students at a deeper level than students they taught in face-to-face courses.¹⁴

¹⁴ Personal communication with Nola Campbell, October, 2004.

Students' experiences of learning in the MMP programme

Campbell and Hawkesworth (1999) conducted an email survey of 10 MMP students who were Māori or who identified with Māori culture. The aim was to understand the issues and challenges for Māori studying through the Internet. The survey responses highlighted the role tradition and cultural identity place in learning. The responses reflected the preference of Māori students for group and co-operative learning activities rather than for individualised activities based on personal experiences. As one student commented:

Lecturers could provide help by incorporating more relevant or real situations where Māori students can bring the reality of their community into the virtual classroom—i.e. collecting information about their community, important ancestors, marae and making a presentation like a web-site (Campbell & Hawkesworth, 1999, p. 37).

Those responding echoed the community or whānau-centred aspect of being Māori, and the importance of belonging to a group. Isolation was seen by some as a possible barrier to Māori students succeeding in an online learning environment. This, they said, could be addressed by nurturing a sense of family within the online group, and working with the learners' own learning objectives. Students in the MMP programme are required to participate in online discussions, and to work in pairs and groups on work in much the same way that students would in a face-to-face setting.

Summary of this example

The MMP programme was designed to meet the needs of remote, rural, and often Māori learners through the use of e-learning. Although most of the coursework is done at a distance, face-to-face meetings are a vital component of the course's success. The MMP programme also builds on principles deemed to be effective and appropriate for supporting Māori learners. Teachers in the MMP programme were initially conservative in their online teaching techniques, but as their confidence grew, they began to explore different ways of teaching. Teachers were surprised to find they got to know their online students better than their on-campus students. Students in the programme valued the strong sense of community that developed within the programme, and felt this was beneficial when learning occurred online.

Example 2: Biochemistry 111—Flexible course development—Otago University

In 1998 the University of Otago adopted its "Flexible Learning Strategic Plan":

Flexible learning is an approach to education that allows for the adoption of a range of learning strategies in a variety of learning environments to cater for a differences in learning styles, learning interests and needs, and for variations in learning opportunities (University of Otago, Flexible Learning Strategic Plan 1998, cited in Higgins, 2000 p. 39).

As an initial step towards integrating flexible learning strategies into workplace practice at Otago, one paper from each of Humanities, Health Sciences, Sciences, and Commerce was selected as suitable for conversion to a flexible learning approach in 1998 (Higgins, 2000). One of these courses was Foundations to Biochemistry (BIOC111), a first year course with over 1000 enrolled students (Norquay, Eastman, Carlisle, & Higgins, 2000).

Structure and features of the course

BIOC111 is a strongly lab-based course which seeks to teach students skills in experimental biochemistry. The conversion to flexible delivery required the development of an educational package which would integrate traditional lecture and lab approaches with multimedia approaches using technology and resources that were readily available to all BIOC111 students. The flexible-delivery course thus consists of lectures, laboratories, instructional videos, clinical relevance videos, written tutorials, Computer-Aided Learning (CAL) tutorials, and a web-site¹⁵ which gives access to information including text, static images, short movies, and animation. The material was selected to support lecture material rather than to repeat or substitute for lectures.

Students' experiences of learning in BIOC111

A preliminary survey of students who took the course in 1998 showed that the flexible teaching strategies and practices seemed to be working in this large science course. Interestingly, only 16 percent of students tried to use the website and the CAL programmes in 1998, and investigations revealed some unexpected technical problems with computer capacity were causing the system to malfunction (Higgins, 2000). These were subsequently corrected. Although these initial difficulties were experienced with the web component of BIOC111, Higgins (2000) and Norquay et al. (2000) declared BIOC 111 a "success", because the flexible learning approach as a whole was considered to be successful. The technological aspects were modifiable:

...it is important to realise that technology is constantly changing and for BIOC111 to remain successful in future years the course and resources must be constantly improved and updated to reflect these changes (Norquay et al., 2000).

This view is entirely consistent with Otago's "Flexible Learning" stance, in which online learning is viewed as one component of a wider commitment to providing learners with multiple and flexible learning opportunities. Evident within this stance is a long-term vision that sees e-learning as, not an alternative form of tertiary teaching, but a standard component of it.

Summary of this example

BIOC111 is a campus-based course that was modified, through the integration of e-learning, to make it more flexible for learners. E-learning features alongside conventional teaching modes.

¹⁵ <http://biocadmin.otago.ac.nz/bioc/>

Although some technical problems were encountered in the early years of flexible delivery of BIO111, overall, the move towards a more flexible approach was considered a success.

Example 3: Developing first-year students' e-learning skills at the University of Wollongong

Boyd & Baafi (2001), describe the use of WebCT (an e-learning system) at the University of Wollongong, in a first-year engineering computing subject for on-campus students. As well as teaching students something about the use of computers in engineering, a major purpose of the course (called CIVL196 Engineering Computing 1) is to upskill the students as e-learners, and familiarise them with the university's learning resources and its student services.

the University of Wollongong has made considerable investments in the development of e-resources for students. Using the university's Student OnLine Services (SOLS), students can access their student information (such as enrolment records, contact details, assessment marks). SOLS also provides students with email and Internet access, information about courses and subjects offered at the university, access to the university's library resources, and access to the university's career guidance service. The university also offers some online courses through WebCT.

Structure and features of the course

The CIVL196 (Engineering Computing 1) course, developed by Boyd and Baafi, is compulsory for all civil, environmental, and mining engineering students in the first semester of their first year. The subject comprises a 4-hour PC lab session in each week of the semester. The subject is completely Web-based. This allows self-paced learning: however it is not intended to be remote learning. Students are required to attend scheduled PC laboratory sessions, where two academic staff are present to provide support, help, and advice. However, students can also access the material from home or other locations. Boyd and Baafi comment that they:

...have found that this approach leads to a very flexible learning environment in which students can learn at their own pace, but can seek immediate assistance from tutors when needed (p. 21).

Content of the CIVL196 course

Each week, students access web pages on the topics to be covered, notes on the topic, problems to be attempted in the PC lab, and an assignment to be submitted for marking. Topics include: how to access and use the university's e-resources, how to use Microsoft Word and Microsoft Excel, and a basic introduction to computer programming languages. Students are also given a series of engineering problems that they can attempt using the computer-based tools and programs they have learned about in the course.

The role of teachers in the course

In WebCT, academics are the “designers” of the course, and can modify the structure and content of the web pages. Students submit their assignments to course tutors and receive comments and feedback on their work through WebCT. Boyd and Baafi note that the shift to a completely Web-based course has meant that fewer academic tutors are needed to provide the same level of assistance to students as would occur in a conventional lecture-based course. They also consider that:

...the class environment has changed from students being lectured at, to one where student self-[paced] learning occurs (Boyd & Baafi, 2001, p. 22).

However, they note that planning and maintaining a Web-based course places a high initial and continuing demand on teachers.

Students’ experiences of learning in CIVL196

Boyd and Baafi report that surveys of students in 2000 and 2001 indicated that students enjoyed the course and the way in which it was taught. Student comments included:

I thoroughly enjoyed this subject (as opposed to the usual boring lecture style) (Student comment, cited in Boyd & Baafi, 2001, p. 24).

The whole layout of this subject is exciting, fun, and easy to follow. I like the fact that there are two lecturers we can contact (Student comment, cited in Boyd & Baafi, 2001, p. 24).

The authors note that the course has been particularly useful for teaching groups of students who enter the university with a wide range of prior skills in the use of computers and familiarity with e-learning.

Summary of this example

This course was completely Web-based *and* completely campus-based. Its two main purposes were to teach students about the use of computing in engineering, and to upskill students in the use of the e-resources available at the university. This would set them up to be capable e-learners for the rest of their time at the university. The switch to a Web-based course was felt to give students more control and direction over the pace of their learning. Teachers/tutors had to put a great deal of time and energy into the design of the course activities, but having the course Web-based reduced the number of teaching staff required to teach the course. Students appeared to respond positively to the way this course was delivered.

Example 4: E-learning tutorial support for conventional university courses at the University of Southampton

Light, Colbourn, and Light (1997) discuss how e-learning has been used at the University of Southampton to add quality and flexibility to the tutorial provision of some conventional undergraduate courses.

A number of undergraduate psychology courses at this university have introduced something they call “skywriting” as a medium for learning support. Email messages from students and tutors are directed to a course email list so that all participants receive them. Both tutors and students can reply to these messages. The course tutor maintains a Web-based archive of threaded discussions that participants can access and search by theme, participant, or date. The “skywriting” component of the courses is additional to the usual lectures and face-to-face tutorial meetings.

Why add skywriting to a conventional course?

Light et al. (1997) suggest that rising student numbers and declining resources are making it harder in tertiary education to provide quality tutorial-based interactions and learning support for students. E-learning in the form of skywriting, they suggest:

...affords a possible means of providing for greater interaction between tutors and students, and between students themselves (p. 229).

Skywriting has the potential to support highly focused “conversational” interaction in an electronic medium.

Students’ experiences with skywriting in three different courses

Light et al. (1997) researched the experiences of students in three courses which were supported by skywriting in the 1995–1996 academic year. These were one large first year and one large second year lecture course (each with over 100 students), and six students in a small third year seminar course. Their study shows some interesting differences in the students’ use of, and attitudes towards, this form of e-learning support:

Skywriting in the first year course

In the first year course, Light et al. noticed that student messages were typically short (about 100 words), and addressed to the course lecturer. All contained questions, while only about half contained any expression of opinion. Interviews with some students suggested they were hesitant to put their opinions up because everyone else would be able to see their message. As one student (quoted by Light et al., p. 231) said, “The thought of trying to express an opinion on something that you don’t know much about anyway can be a bit daunting when the whole world can see you making a real wally [fool] of yourself.” Thus, skywriting messages “tended to be almost obsessively well prepared, spell checked, and were often even read over by friends before being

sent”. The first year students felt the main benefit of skywriting was being able to read other students’ questions, and therefore to find out “what level everyone else was on”, and to read tutors’ responses to questions they also might have asked. Skywriting was seen as particularly beneficial for students who found it difficult to contribute in face-to-face tutorials, either because they were shy, or needed more time to think and process their ideas before offering a view or an opinion.

Skywriting in the second year course

The use of skywriting in the second year course was quite different. In this course, the lecturer did not encourage students to write directly to him, and did not reply directly to students’ contributions in the way that the first year lecturer did. As a consequence:

what emerged was...a discussion between a select group who are computer-proficient, wide reading students (Light et al., 1997, p. 232).

Most skywriters in this course were male. This contrasted to the situation in the face-to-face tutorials where there was no obvious gender bias in terms of contribution to discussion. Male skywriters suggested that the female students were unduly reserved, while female non-participating students suggested that the skywriting medium was best suited to “computer nerds”. Thus, skywriting in the second year course came to function as a conversation among a particular community of learners—but the community in question was small and not representative of all the students in the course.

Skywriting in the third year course

The way students used skywriting in the small seminar-based third year course was different again. The six students were working in a specialist area they had selected for themselves. All six contributed to the email discussion, and most messages took the form of commentaries on papers each student had read. While the students rarely responded to each others’ messages, they felt this was a way to share their work with one another. One student remarked that “We were being asked to comment on various seminars and discuss various issues that had been brought up...we didn’t do all the readings. One person would do one of the readings and then distribute it to everybody else via the skywriting.” Students in the third year course felt that the small group size and the fact that they all knew one another made it easy for them to use the skywriting medium so extensively and co-operatively.

Summary of this example

In these campus-based psychology courses, e-learning was intended to enhance and improve the quality of learning interactions between students and tutors. However, students’ use of e-learning varied in different courses. Factors that influenced the way the students used e-learning included: the way the tutor/lecturer used e-learning, the students’ confidence in their own knowledge and

willingness to “expose” their ideas and opinions to other students, and the degree to which students in the course already knew each other personally.

Example 5: E-learning for vocational education and training in Australia

Bate, Robertson, and Smart (2003) describe eight case studies of the use of e-learning in vocational education and training (VET) in Australia. The eight case studies provide a brief snapshot of different applications of e-learning in VET contexts.

The case studies include several institutes for Technical and Further Education (TAFE) which use e-learning to support learners in business-oriented courses. For example, the Diploma of Business Administration at the South West Institute of TAFE (Victoria) is a distance course, available all year round. Learners can enrol at any time and learn at their own pace, supported by the teacher. Students undertaking the course must be in current employment in a workplace where they can apply skills and knowledge they gain through the course. To assess students’ learning, an e-learning platform (The Business Administration Diploma Toolbox) enables students to provide evidence from their workplace of how they are applying their learning, and improving their work competence.

Box Hill Institute of TAFE (Victoria) used e-learning in a Certificate in Business class that included a number of students from non-English speaking backgrounds. Students undertake their training in a “virtual firm”—that is, a practice business where students are able to take on business roles, and trade with other virtual firms. In this case, the virtual firm was a simulated niche-market airline company called Hamilton Air. Students undertook a learning unit called “deliver and monitor a service to customers”. The Hamilton Air e-learning environment holds activities, self-tests, policies and procedures, and a glossary for students. It also includes a set of print-based learning materials and resources.

The Certificate III Frontline Management offered by Curtin University of Technology in Kalgoorlie uses an e-learning environment with an “innovative” course design. In this course, students are split into groups of six or seven, and these students must work as a virtual and physical team. Learners are provided with a complex task that combines elements of collaborative learning, project-based learning, and role-based learning designs. (Bate et al. do not give further details about the specific kinds of projects students do in the course.) The course uses the WebCT Learning Management System (LMS), with a largely “content-free” design. In other words, the LMS is used to present the project to students, and provide synchronous and asynchronous collaborative environments for the students to work and learn together on their project. The course blends classroom-based learning and learning in the online environment.

A final example is an e-learning business course delivered by ITEC, a small registered training organisation, in partnership with Edith Cowan University in Western Australia. The course,

Business Education Cambridge (BEC), is aimed at migrants for whom English is a second language. Learners work in a simulated e-learning environment called Rosebud Resort, a tool that was originally developed for overseas learners who were looking to use their English language skills for business purposes. In the BEC course, the teacher acts as a facilitator of learning in a classroom context. Activities with Rosebud Resort are set at the beginning of each session, and the teacher provides support for students to complete these activities during the classroom session. Students can also access the website outside the scheduled classroom contact times, although there is no formal support provided for this.

Summary of this example

The case studies above show different ways that e-learning is used in VET in Australia. In some cases, particularly when learners are at a distance, e-learning is the main method for delivering material and resources, and for interactions between teachers and learners. In other cases, e-learning environments are used with on-campus learners to provide a simulated learning environment such as a virtual business. In both cases, the role of the teacher is to design and support the e-learning environment, and to support the learners as they work within these environments to achieve the learning objectives of the course.

The case studies described in this chapter show how e-learning is being used in a number of different ways to enhance students' learning opportunities, both by increasing the range of ways students can approach the learning materials, and by providing access to tertiary education for those who would not otherwise have this opportunity.

6. E-learning and indigenous peoples

Introduction

The results of the literature search on e-learning and indigenous learners suggests that there has been little systematic research in the area. It did, however, identify reports on a number of initiatives that have relevance to the current project and some of these are discussed in this chapter.

The fragility of some initiatives was demonstrated by the identification of a website of interest, ION, the Indigenous Online Network. ION was set up to link indigenous university staff across Australia, and to facilitate collaborative development of teaching methodologies and research paradigms for, and by, Australian indigenous peoples. It is cited in a number of reports as a source of research information and reports. However, there is now a message on the website stating that unless someone came up with a workable suggestion the website would close forever on 15 November 2004.

Indigenous e-learning programmes

Distance education and e-learning programmes that have been developed amongst and for indigenous communities are popular throughout the world. The Warrit Ngulu Indigenous Distance Education Online of Open Learning Australia (OLA) is the framework for all OLA indigenous online programmes in Australia. In Canada and the United States many tribal universities and colleges offer distance education programme online, for example the Salish Kootenai College Distance Education programme.¹⁶ Again, however, similar to Māori e-learning, there has been very little systematic research.

In Australia the Indigenous Open Learning Steering Committee has been set up to advise on a strategy for Open Learning Australia to deliver online higher education for Aboriginal Peoples and Torres Strait Islanders (Open Learning Australia, 1998, p. i).

¹⁶ Go to: <http://www.skcd.edu/>

Benefits of e-learning

In the Australian context e-learning programmes are being developed to address lower participation rates of indigenous students in higher education (Bourke).¹⁷ E-learning offers the opportunity to make higher education more accessible for indigenous students:

Through the establishment of distributed communities' communication networks, we can break down the tyranny of distance that denies so many of our people the opportunity of education, consultation and participation in the structures which overarch our lives (Page, 2000).

Furthermore, for indigenous students who have work or family commitments a more flexible education programme makes the possibility of pursuing higher education for indigenous students more possible (Bourke).

Page (2000) suggests that the technologies can provide communities with control on their own terms over the dissemination of information, ways to advance the position of indigenous peoples in the wider society, and to strengthen culture and traditions.

Barriers to access and participation

Cultural concerns

ICT and Internet technology create a set of issues for indigenous learners and communities that they must work through. Page suggests that participation in e-learning “must include an explanation of the threats to indigenous Australians as well as the potential benefits” (Page, 2000). Maintaining the integrity of sacred traditions, cultural knowledge, and images has been a major concern for indigenous Australians (Page, 2000).

Interaction with staff was seen as an important ingredient of any distance education programme for indigenous learners. The National Review of Indigenous Education found that distance learning methods were problematic for indigenous students if it was not supported by other support mechanisms such as “site tutors” (Yunupingu, 1995). Distance education programmes were most effective when on-site teaching was built into the programme.

Further barriers

Although e-learning is in a different context from conventional classroom-based learning some of the same principles of teaching still apply. The Indigenous Open Learning Project Information Paper suggests that the inability of educators to adjust their teaching delivery to meet the needs of their students is a barrier to indigenous participation and success (p. 11).

¹⁷ See http://www.unisanet.unisa.edu.au/cccc/papers/non_refereed/bourke.htm

Another barrier to Open Learning programmes included previous educational achievements. Low levels of literacy and numeracy skills may create a barrier to participation (Open Learning Australia, 1998).

Description of examples of indigenous e-learning programmes

In this section, we have used examples that are not taken from the research literature, nor referenced to a print publication.

Batchelor Institute of Indigenous Tertiary Education

Batchelor Institute of Indigenous Tertiary Education is in some ways comparable to a Wānanga in New Zealand. It is a tertiary education institution established by and for indigenous Australians, and has special recognition as a public agency. Batchelor is characterised by a “both ways” approach which seeks to bring together indigenous ways of knowing with western academic ways of knowing. It aspires to university status. Batchelor's vision statement states:

A unique place of knowledge and skills, where Aboriginal and Torres Strait Islander Australians can undertake journeys of learning for empowerment and advancement while strengthening identity (<http://www.batchelor.edu.au/index.html>).

According to its website it has higher numbers of Aboriginal and Torres Strait students than any other Australian higher education institution. The age profile of its students is older, too—the majority are between 30 and 45 years of age.

Open Learning Australia (www.ola.edu.au/)

Open Learning Australia is an initiative started by a number of Australian universities, mainly newer universities or universities which were previously TAFEs, but now supported by a wider range of institutions. OLA is open in terms of a number of characteristics. It allows students to enrol at any time and to study at a distance, students are able to enrol for a single course, and they do not have to register for a degree. The courses it offers have been developed by the partner institutions and may be print-based, fully online, or a combination of both. If a student is enrolled in an online course then it has set time periods. OLA has an indigenous learning centre—Warrit Ngulu—and all the courses designed for indigenous learners are offered as fully online courses, and have set enrolment times (<http://www2.ola.edu.au/warritngulu/>).

A number of courses are offered in Indigenous Studies, e.g. Indigenous ways of working which is an undergraduate course offered online.

Edith Cowan University

Edith Cowan University has developed an online training programme for staff—*Better Teaching and Learning with Indigenous Students*. Although developed for staff at Edith Cowan it is accessible by staff at other institutions. The online tutorial programme is designed to heighten understanding of the experiences and knowledge which Aboriginal and Torres Strait Islander students bring to the university. It was developed by the Centre for Applied Language Research in collaboration with Kurongkurl Katitjin, the School of Indigenous Australian Studies.

<http://www.ecu.edu.au/ses/research/CALLR/TandL97/indigen.htm>

7. Māori and e-learning

Introduction

This chapter focuses on Māori and e-learning in the tertiary sector. It is intended to complement the review of literature on Māori pedagogy being carried out by Dr Leonie Pihama and her team from the International Research Institute for Māori and Indigenous Education (IRI) at Auckland University.

It begins by briefly summarising some recommendations for Māori educational advancement (from the Tertiary Education Strategy and the E-learning Advisory Group report). Then it looks at the framework for Māori educational advancement developed by Mason Durie for the first Hui Taumata Mātauranga. This is followed by an outline of three tertiary-level initiatives incorporating e-learning. These bring out the importance of blended approaches that include *kanohi ki te kanohi* (face-to-face) interaction and recognition, and the building of *whakawhanaungatanga*.

TES priorities and Māori

The Tertiary Education Strategy 2002–2007 is a plan for the future of tertiary education organisations (TEOs) in Aotearoa/New Zealand. An important part of this plan is its goal that tertiary education in New Zealand should contribute to the achievement of Māori aspirations and development (Ministry of Education, 2002). The strategy aims to develop:

- tertiary education leadership that is effectively accountable to Māori communities;
- Strong and balanced Māori staff profiles within the tertiary education system;
- quality programmes that recognise *te ao Māori* perspectives and support the revitalisation of *te reo Māori*;
- robust options for kaupapa Māori tertiary education that reflect Māori aspirations;
- increased participation by Māori in both a broader range of disciplines and in programmes that lead to higher-level qualifications; and
- a tertiary education system that makes an active contribution to regional national Māori/*whānau/hapū/iwi* development.

E-learning Advisory Group recommendations for Māori

At around the same time the E-learning Advisory Group was set up to provide advice to the Ministry of Education on strategic directions for e-learning in the tertiary sector. This group made a number of recommendations in relation to e-learning and Māori. It recommended that the government recognises its responsibilities under the Treaty of Waitangi to ensure that Māori participate equally at all levels of e-learning and, in particular, that it should encourage:

- the establishment of a kaupapa Māori group to work with kaupapa Māori-based programmes using e-learning;
- the development of Internet resources and other digital material for a Māori audience;
- research into key areas of Māori development in the field of e-learning; and
- professional development for Māori tertiary practitioners (E-learning Advisory Group, 2002).

These recommendations signal a strong commitment to Māori educational development in general, and to kaupapa Māori-based programmes in particular. They also signal a strong commitment to developing e-learning programmes that can maximise learning opportunities for Māori.

Interim tertiary e-learning framework and Māori

The interim tertiary e-learning framework was outlined in chapter one. The following table demonstrates the strategic role of e-learning in meeting specific Tertiary Education Strategic objectives relevant to meeting the needs of Māori learner.

Tertiary Education Strategy Objective	Role of e-learning
5. A stronger system focus on teaching capability centred on a reputation for quality teaching and pastoral care	e-learning will offer new and innovative pathways for learning, to complement existing pathways
12. Increased participation by Māori in both a broader range of disciplines and in programmes that lead to higher-level qualifications.	e-learning will help improve pathways for Māori from foundation education into higher levels of education by enhancing the flexibility of the system to meet individual needs
14 Significantly improved adult foundation skills levels, achieved through increased access to foundation education in a range of learning contexts	e-learning will provide both the imperative and opportunity for learners to develop ICT skills, and will increase the accessibility of educational opportunities available to people in the community
20 Equity of access and opportunity for all learners	e-learning will provide learners with a greater choice of options as to where, when and how they learn

Source: Ministry of Education (2004) Interim tertiary e-learning framework: p. 20.

The section of the framework which sets out the key action area of research notes that New Zealand has unique needs in relation to e-learning and Māori and Pasifika. E-learning and kaupapa Māori is flagged as a potential research priority.

Mason Durie’s framework for Māori educational development

In his presentation to the 2001 Hui Taumata Mātauranga, Māori Education Summit, Professor Mason Durie argued that programmes for Māori educational advancement need to be shaped around the following three equally important goals. These goals are:

1. To live as Māori—that is to have access to be grounded in Māori language and culture. Durie argued that if the goal of education was to prepare people for participation in society, then Māori youth needed to be prepared “... for active lives within Māori society, not simply to learn about Māori but to live as Māori” (p. 3).
2. To actively participate as citizens of the world—Māori should also be prepared to actively participate as citizens of the world. The impact of globalisation would impact in New Zealand as much as overseas, and if Māori advancement was to be achieved then Māori needed to be educated to take their place as citizens of the world.
3. To enjoy good health and a high standard of living—good education provided the foundation for well-being enjoying a high standard of living.

In what follows we background some of the issues involved in developing e-learning programmes for Māori that take account of these three goals. We do this via a look at some current programmes that have a Māori e-learning component.

What do Māori think of e-learning?

The E-learning Advisory Group report said that there was anecdotal evidence that a significant number of Māori prefer e-learning options to traditional contact class situations (p. 32). They suggest that behind this might be a preference for convenience and anonymity (particularly in the event of failure). Another reason could be that “mainstream” learning environments can be culturally unsafe for Māori.

However, the Advisory Group’s suggestions are not, thus far, supported by evidence from the Ministry of Education’s Tertiary Single Data Return (*see the Statistics on Tertiary e-Learning* section in Chapter 1). Māori do not enrol in courses with e-learning components at a higher rate than others. This may simply reflect that e-learning possibilities are not the decisive factor in whether to enrol in a given course, or which courses their school qualifications give them access to. Certainly, Māori have been keen participants in courses tailored to meet their particular needs, such as the Mixed Media Programme offered by the School of Education at Waikato University and described in Chapter 5.

The *Digital Divide* report found low participation rates by Māori in Internet activities, and concluded that this was due to a preference for face-to-face contact. However, Māori may also have less access to the Internet because of cost.

Some recent e-learning programmes for Māori

As well as the very successful Mixed Media Programme offered by the School of Education at Waikato University, a recent suite of professional development programmes for secondary Māori teachers, Te Hiringa i Te Mahara, has offered learning blending kanohi-ki-te-kanohi (face-to-face) through hui, and online resources and contact in the ICT programme in this suite.¹⁸ This programme, which provided laptops for participants, led to their extensive use of ICT, particularly for wordprocessing, Internet searches, and communication, with colleagues, students, and whānau. Networks of colleagues in other places were created. Around 30 percent of the group would be interested in doing a degree or diploma online. The kanohi-ki-te-kanohi dimension, Māori-based hui, and the creation of smaller groups that could offer ongoing support, were crucial elements in the success of this programme. While teachers increased their use of laptops and the Web, they made more use of asynchronous than the synchronous aspects of the Web they were offered, indicating the importance of flexibility in time-use for employed learners.

Another programme, the Te Rau Pūāwai programme¹⁹ incorporates an e-learning component into their programme through the use of a secure website. Support staff and students used the website and the Internet to interact through emails, discussion groups, and the sharing of electronic files. This programme, like the others, was complemented by biannual hui, a call centre, peer mentoring through a weekly call centre, and regional visits. The kanohi-ki-te-kanohi dimension, and whakawhanaungatanga (building relationships), was also seen as a key component.

Although the Web is integral to these programmes, Māori students also need to interact with staff and students in other ways which are more in line with cultural preferences:

Māori believe that it is important in communication to have face-to-face (kanohi-ki-te-kanohi) contact with those that you are speaking to. By meeting the students on campus you are able to develop a relationship and get to know them (Campbell and Hawksworth, 1999).

The Rau Pūāwai programme also did not rely solely on the Internet to deliver their learning programme in recognition of cultural preferences:

In recognition of the importance of kanohi-ki-te-kanohi (face-to-face interaction) and whakawhanaungatanga (the importance of relationship building) Te Rau Pūāwai has developed the online support avenue as one aspect of a complete learning support package (E-learning Advisory Group report, 2002, p. 34).

There is, as yet, no empirical evidence to tell us what the best mix of learning formats is for Māori: but it is clear that there must be a blended approach.

¹⁸ See www.thm.ac.nz

¹⁹ Te Rau Pūāwai is a Māori mental health workforce programme. It was referred to in the E-learning Advisory Group's report (see p. 34).

Challenges for the development of Māori e-learning programmes

Many Māori do not have (and cannot afford) Internet access. Programmes with an e-learning component assume that students have access to computers and phone lines. The *Digital Divide* report found that there was a significant gap between Māori and non-Māori in terms of Internet access and participation. It found a range of reasons precluding Māori from Internet access and participation—including financial, educational and cultural reasons.

Access is not, however, the only barrier to developing effective Māori e-learning programmes. As Hond (2004) points out, “it should not be assumed that Māori want widely to utilise the digital environment to the same extent as non-Māori”. Many Māori are resistant to participation in Internet-based activities, including e-learning, for important cultural reasons. Hond (2004) and Campbell and Hawkesworth (1999) say that many Māori are reluctant to use Internet-based technologies that are specifically involved with traditional Māori knowledge. Hond argues that many Māori see the digital environment as incompatible with projects of a traditional nature. Many are concerned about the prospect of teaching traditional knowledge via the Internet (where it would be available to all and easily misunderstood or even abused).

Hond also says that to be successful for Māori, e-learning programmes need to deliver “Māori-friendly” learning environments, and that this is currently a barrier. Pedagogical considerations are important, as are other culturally significant aspects of the learning environment. The availability of digital and Internet resources published in te reo Māori was also seen as an issue, for programmes that focus on the teaching of te reo Māori or that are taught in te reo Māori.

Another possible barrier, according to Hond, is the level of general education of many Māori “second chance” learners. For many of these people e-learning is likely to be more of a hindrance than a help, and it may add to already existing feelings of inadequacy—especially where students “fear” the technology (Campbell & Hawkesworth, 1999).

Conclusion

As we have mentioned there is, as yet, very little systematic research on Māori perceptions and use of e-learning programmes. It is clear that there is now a strong commitment by government and the current tertiary sector to increasing Māori participation in tertiary education, possibly via e-learning programmes. However, while there has recently been a dramatic increase in Māori participation in tertiary programmes, only a fraction of this increase has involved e-learning programmes. From the figures that are currently available, it would appear that e-learning is not, as yet, an attractive option for many Māori. While this could be due to unfamiliarity and affordability issues, there are also clear signals that other factors could be at least as important if not more so. Blended approaches are likely to be more successful than solely online programmes, and e-learning may not be appropriate for Māori content that is traditional, unless site security can be guaranteed.

8. Eight issues and challenges for teaching and learning in e-learning environments

Introduction

This chapter deals with issues for teaching and learning in e-learning contexts. One large American survey found that a wide range of factors influence the uptake and success of e-learning initiatives. Some are practical, some organisational, and some are attitudinal (Wagner & Flannery, 2004). According to these researchers, organisational support, work support, and individual support are all important factors impacting on learner acceptance of computer-based learning.

While organisational support is beyond the scope of this review, it is important to note here because of its implications for long-term infrastructural and faculty development planning (Parker, 2003). Also, e-learning can best deliver on its potential when the expectations and needs of learners, teachers, and administrators are aligned—a simple concept but one that, some say, has yet to be widely applied in online educational delivery (Hase & Ellis, 2001).

A recent Australian Flexible Learning Framework report says:

The only certainty is change, and the only way to effectively accommodate change is through having sound processes. These are processes for identifying the needs of the learner, for designing experiences that efficiently meet objectives, for choosing appropriate technologies and creating motivating learning designs, and for measuring learning outcomes (Eklund, Kay, & Lynch, 2003, p. 28).

This seems to us to be sound advice. We have taken these four broad processes and used them as a framework for organising the many issues and challenges addressed in this section. In practice, of course, many issues are potentially related to several of these processes and we have needed to disentangle the whole to choose a place to include them where they seem to best fit.

Identifying the needs of the learner—challenges and issues

As discussed in Chapter 3, to be effective, e-learning needs to take place in “learner-centred” environments. The challenges of setting up such environments should not be underestimated. Reviewing research on early attempts to deliver e-learning programmes, Hase and Ellis (2001) observe that many of the early programmes were very teacher-centred, and point out that it is not

easy for teachers to move from entrenched models of pedagogy to allow learning to become more self-directed. They also note that the provision of interactive learning environments often has more to do with motivating students than with actually supporting them to be more self-directed in their learning. Nevertheless motivation is an important issue that we turn to below.

One challenge for making e-learning more learner-centred is deciding how to tailor courses to local needs, cultures, and contexts. This challenge requires teachers to have a good understanding of the needs of each and every one of their learners (Eklund et al., 2003; E-learning Advisory Group, 2002).

Motivation

Motivation can be an issue when students need to self-motivate and organise their own learning, including the need to make provision for the necessary time, space, and equipment. This can be particularly challenging for students who are returning to study, and those who need help to structure their learning and to access information (E-learning Advisory Group, 2002).

Technical problems can be very demotivating and it is important that students do not experience these, especially as the time for submitting assignments looms. When students drop the online version of a course and request a print-based version, their confidence in becoming an independent learner is undermined (Hase & Ellis, 2001). These educators say independent learning is supported when students find it easy to access resources such as the Internet and the institution's library databases. Electronic provision of course materials is very frustrating when it is restricted to abstracts and students need to use other means to retrieve the actual items. They recommend that steps be taken to make sure all course materials are easy to access and download online.

Relative IT expertise of teachers and learners

An interesting issue arises when online teachers have less computer expertise than their students (E-learning Advisory Group, 2002)—a situation which is likely to become increasingly common because “mainstream technologies of the day” are “belatedly adopted and integrated into teaching and learning” (Eklund et al., 2003, p. 29). In this situation it is very important to build tutor confidence. Eklund et al. recommend that teachers using new technologies have access to support from an “ICT experienced mentor”, that they need significant institutional support in the form of relief time and encouragement, and that an initially conservative approach to implementation is taken, in order to maximise the chances that tutors' first experiences with new technology will be positive ones.

Designing experiences that *efficiently* meet objectives

Flexible learning options are important for the growing numbers of adult learners, especially as they begin to outnumber school leavers in “life-long learning contexts” (E-learning Advisory Group, 2002). It is important that the design of course materials is such that the teacher can “interpret the educational artifacts and customise their delivery into the teaching and learning environment” (Eklund et al., 2003, p. 18). These researchers note that there are new authoring tools available that allow teachers to modify and re-sequence selected materials to tailor them for their students’ needs. The challenge here is for teachers to keep up with these technological developments (and for the institution in funding them).

Another issue related to flexibility is that many students want a campus-based experience *and* a component of e-learning (E-learning Advisory Group, 2002). As discussed elsewhere in this report, it seems likely that these “blended” forms of e-learning will be the most successful.

Efficiency issues

It is important that students have timely access to help-desk services to deal with any technical issues that arise (E-learning Advisory Group, 2002). One large Australian survey of online learners has found that they also want timely and frequent contact with their tutors (Choy, McNickle, & Clayton, 2002). Indeed they are likely to expect support from their tutors in a shorter time-frame than may have been possible for them when learning on campus, when direct contact with teachers may be limited to questions about assignments, or requests for extensions (Hase & Ellis, 2001). In this circumstance it is important for teachers to be realistic about the amount of support that can be offered to e-learning students (E-learning Advisory Group, 2002).

Many teachers who have experimented with e-learning have found that responding to student emails generates a considerable additional workload, and that this was often not allowed for in their teaching time allocations because the students were not physically present in a class on campus (Eklund et al., 2003). One group of New Zealand tertiary educators solved this dilemma by encouraging students to post questions to a bulletin board rather than using email (Dewstow, McSparran, & Young, 2000). The tutors saw this as a means to avoid duplication of effort, whilst mirroring classroom communications, allowing students to answer each other’s questions and providing students with experience of Web-based discussions. In practice, student use of the bulletin board was lower than expected. Issues contributing to this that were identified by the teachers included that students knew contributions would not be assessed, and the timing of the course in the summer semester (Dewstow et al., 2000).

Communication issues

Hase and Ellis (2001) note that “communicating well in writing is a complex skill” (p. 30), and that there are particular issues when communicating electronically. Because the medium provides disembodied communication, care needs to be taken with content, tone, and length of messages

and students need to learn these skills. Teacher vigilance is needed to ensure the course communication site is not abused in ways that could give offence to some students. They note that “managing online discussion is an important area of skill development for educators” (p. 30). Taking a different line of argument, Garrison and Anderson (2003) discuss the challenges of establishing what they call a “social presence” in an online environment. They say the teacher needs to model appropriate messages and responses, whilst also managing the tendency of responders to be polite and positive, but not sufficiently challenging of each other’s ideas.

Choosing appropriate technologies and creating motivating learning designs

Instructional design is an emerging academic discipline (Eklund et al., 2003). Clearly it is unrealistic to expect that all the tutors who might teach e-learning courses will have expertise in this new discipline. Issues are likely to arise for collaborative working and for achieving quality course designs.

New Zealand’s E-learning Advisory Group has identified a need for the delivery of quality courses that provide “highly-supported interactive learning” and not just “information dumped online” (E-learning Advisory Group, 2002). Eklund et al.’s future-focused review suggests that course designs will allow for more and more interactivity, with learning materials engaging learners via active simulation (Web-based role play), the use of microworlds (rule-based simulation), and collaborative problem-based learning. This has led these researchers to propose a “natural collaboration between the game industry and e-learning development, as instructional designers create systems for a generation of learners who have grown up with gaming systems at home” (Eklund et al., 2003, p. 30). One obvious challenge will be the cost of producing such materials. One potential solution to this dilemma is to design materials that can be used more flexibly. Another suggestion is to provide for collaboration between institutions in order to effectively capitalise on innovative capability (E-learning Advisory Group, 2002). A different issue, as noted above, is that such materials may be highly motivating but do little to support the development of independent learning skills if the learner’s interactions with the material continue to be mediated through strong teacher direction (Hase & Ellis, 2001).

Addressing this issue requires attention to be focused on curriculum as well as on delivery models. Comment on the development of e-learning materials is sometimes accompanied by comment on the need for related curriculum reforms. For example, Eklund et al. (2003) propose a curriculum that de-emphasises declarative knowledge in specific subject areas, instead teaching about knowledge management for learning, integrated with subject-specific materials.

The use of e-learning to model group work can be more problematic than carrying out similar activities face-to-face (Dewstow et al., 2000). These teachers’ experiences have led them to suggest that students first need to be given time and support to get to know each other and to find out each other’s interests and strengths. It seems to us that when students are required to interact

with each other online, they face exactly the same challenges as those faced by tutors when getting to know the needs of their students.

Measuring learning outcomes

The paradigm shift to learner-centred, more tailored, courses requires an equal paradigm shift in evaluation systems. These need to shift from an external-compliance focus toward consistent, comprehensible measurement of clearly defined learning outcomes (Parker, 2003).

There are practical challenges and issues for teachers when learners submit their assignments online. Drawing on their own experiences, Dewstow et al. (2000) identify a wide range of problems that need to be anticipated and addressed. When students email large files to their tutors, email boxes can become clogged and the costs of printing assignments are transferred to the institution. If students email to both home and work, the risk of virus infections to tutors' home computers, which tend to be less well protected, increases. Problems arise when students claim files have been emailed and have gone astray. Dewstow et al. recommend the development of a "confirmation of receipt" system to address this issue.

Making full use of the provided security and identity management is an issue for learners. They need to be aware of security measures and to know how to make their own work more secure (Spicer, DeBlois, & Educause Current Issues Committee, 2004).

This chapter has surveyed some of the many issues and challenges for teachers and learners as they move into online delivery modes. It seems that, if they are to be effective, e-learning environments require teachers to have well-thought-out, high-quality processes for designing and delivering courses, and for managing intra-course communication.

9. Conclusion

E-learning has established itself as an option in tertiary education, and is poised to take a larger role. Its obvious attractions for learners are related to the flexibility it offers them in terms of time, pace, and to some extent location, the access it gives them to course material and related resources, and the feedback on progress using online assessment. It can also offer different activities and ways of gaining understanding to what are available through the printed or spoken word, and can allow more problem-solving, “real-life” activities, including some that involve working with others. It can free teacher-student shared time to focus on understanding, rather than skill-practice or the transmission of information.

Learners largely do not want these gains to occur at the cost of interaction with others, particularly teachers and fellow students. This is particularly clear for Māori students, but is not unique to them. The literature on effective pedagogy and learning underlines the importance of such interactions, and has led to more attention being paid to the nature of interactions that are most productive for student learning. One of the ironies of e-learning is that while there may be fewer face-to-face same-room experiences, there can be more interaction through feedback, and the use of email and shared messages in discussion groups. But these do not supplant the need for some face-to-face contact, particularly at the start of courses. It is interesting to see the gradually more strategic use made of face-to-face contact, email, and discussion groups or bulletin boards in the evidence provided by teachers reflecting on changes they have made over the years in their courses.

The value of thinking about moving into e-learning is that it does require holistic and very careful thinking about the desired outcomes of the course, and the relationships of course structure, resources, activities, and assessments to each other and the outcomes. It also requires strategic thinking about how to use both teaching and learning time so that teachers are not overburdened with student expectations of constant availability, or having to recreate courses each year through making new materials and activities from scratch (rather than simply reviewing and making some changes).

While improvements have been made to software and systems that enable more interaction, the technology cannot be taken for granted, and nor can it be assumed that all students and teachers will be able to access it in ways that are easy, reliable, and not dogged with frustration and wasted time. Ensuring both good platforms and good student access is not cheap. Although there have been substantial improvements in recent years, there will continue to be a tension between keeping course sites and materials simple, so as to make them accessible and quick to use, and wanting to use applications that can lead to problems downloading, or that are not always

compatible between computers. Well-informed technical advice and support are crucial, so long as they serve the pedagogy, and not vice versa.

As with any course, it is essential to be aware of student needs, and to think of ways to engage students in learning—for it is hard work, requiring perseverance. The three examples of successful e-learning for Māori students show not only how to offer a blended course, but also the gains of providing such courses within a Māori framework that emphasises and values being Māori.

The use of e-learning in tertiary courses has reached the stage where the question is not whether it is as good as classroom-based approaches; but which uses are the most engaging for students—and teachers—most likely to motivate and support good learning, and most sustainable.

Glossary of terms

Asynchronous

Asynchronous communication is interaction that does not occur in real time. Communication is asynchronous when students and teachers participate in interactions which are separated by time such as email discussions, posting messages to websites, or using voice mail. Correspondence education is an example of asynchronous teaching and learning.

Bandwidth

Bandwidth is basically the size of the connection from a computer to the communication system, and provides an indication of the amount and speed with which data can be transmitted.

The bandwidth determines the rate at which information can be sent through a channel—the greater the bandwidth, the more information that can be sent in a given amount of time. This is usually measured in bits-per-second. A full page of English text is about 16,000 bits. A 56Kbs modem can easily move 16,000 bits in less than one second.

www.expanded-systems.com/data_communications_glossary.htm

Blackboard

Blackboard is a widely used educational software platform for teaching through the web. It can be used to create a virtual learning environment or to support blended delivery. Further information on Blackboard is available from: <http://www.blackboard.net/>

Blogs

Blogs or weblogs are websites set up by individuals or special interest groups to share ideas and information. Some are like personal diaries or journals in the “Bridget Jones” style, others are more like a freestyle news journal. Usually they include links to other interesting sites relevant to the area of the blog. New words are appearing such as blogger, and blogging. Examples include: www.publicaddress.net Blogs have enormous potential for learning communities. One of the Australian Flexible Learning Leaders is Tanya Wooley of Alice Springs. Tanya has set up a

BLOG²⁰ at <http://remoteindigenous.blogspot.com/>. Tanya set up her BLOG with a view to it being a community of practice for those interested in remote indigenous communities.

Chat room

A chat room provides a space online for people to “meet” with others and “talk” online. Chat is real time. Those in the chat room type up messages to others in the chat room who are free to type in their response. The responses are displayed almost instantly on the screens of others in the chat room. In a course chat rooms can be used to discuss topics of interest, by “teams” working collaboratively online, or they can be used in a café or common room style. For some non-educational examples view: chat.yahoo.com

Convergence

In education convergence is used to refer to the coming together of conventional face-to-face education and distance education. Campus-based educational providers are increasingly offering students online and asynchronous learning activities, at the same time distance providers are building in face-to-face or synchronous discussions and forums. The two modes of delivery are coming together or converging.

Cookie

A cookie is a small piece of textual information, sent to your browser from the website or Web server you are visiting. If a site you visit uses cookies, that site's Web server queries your browser for permission to pass a cookie to your browser's directory. At a minimum, any cookie saved in your browser's directory is stored in RAM during your session. Many sites also store the cookie on your hard drive in a text file after you leave (log off) their site. Cookies are used for many purposes such as website tracking, shopping cart identification, ascertaining information about the machine you are using, personalising your site visit, and storing information like passwords and user IDs for a particular site. The Web server issuing the cookie is the only server that can read that particular cookie. Cookies cannot retrieve information from your hard drive or profile your system.

www.ordersafemall.com/glossary.htm

Course management systems (CMS)

²⁰ A BLOG is a personal website or web-log which people set up for a variety of purposes, including as an e- scrapbook, a project space, to share thoughts, ideas, URLs for other websites. In a course setting groups of students with special interests can set up BLOGs to reflect those interests, sharing resources, ideas and discussion.

CMSs are software packages designed to assist teachers and other educators to develop quality online courses.

Courseware

Software designed specifically for use in a classroom or other educational setting.

www.oit.ohio-state.edu/glossary/

Digital libraries

Digital libraries basically store materials in electronic format and manipulate large collections of those materials effectively.

www.unm.edu/~wguclr/ReadyRef/glossary.html

Discussion boards

Discussion boards are like interactive notice boards. A simple web-based discussion board or forum will consist of messages being “posted” up on the board for others to read. Rules may be used to govern the use of notice boards, e.g. who can post messages (teacher only or any student), and who can edit messages (author or teacher). A board may have “forums” which enable special topics to be discussed. Within the forums there may be “threads” which are sub-topics of the main topic. A guide on using discussion boards in teaching and learning has been developed by Kate Boardman of the University of Durham: <http://www.ukcle.ac.uk/ict/discussions/>

Distributed learning

A student-centered approach to learning that incorporates the use of technology in the learning process and, according to Chris Dede, emphasises four educational characteristics: 1. supports different learning styles by using mixed media; 2. builds on the learner's perspective through interactive educational experiences; 3. builds learning skills and social skills through collaboration among learners and with the community; 4. integrates the learning into daily life by doing authentic tasks.

www.wested.org/tie/dlrn/course/glossary.html

Learning objects

Learning objects are a new way of thinking about learning content. Traditionally, content comes in a several hour chunk. Learning objects are much **smaller units of learning**, typically ranging from 2 minutes to 15 minutes. They are **self-contained**—each learning object can be taken independently. They are **reusable**—a single learning object may be used in multiple contexts for multiple purposes. They **can be aggregated**—learning objects can be grouped into larger

collections of content, including traditional course structures, They are **tagged with metadata**—every learning object has descriptive information allowing it to be easily found by a search.

http://www.uwm.edu/Dept/CIE/AOP/LO_what.html

Open source software

Software which is available for people to download, use, modify and within the terms of general public license to distribute. An example is moodle: <http://moodle.org/>

Streaming media

This is a technical term for digital audio or video transmissions via the Internet. The sound and image data are sent as a data stream to the subscriber, hence the term “streaming”. A variety of deferred data streams can be output from a streaming media server on the Net. Each receiver can thus receive the same content deferred. Normally, a packet-switched or asymmetric transmission method is used.

www.3gnewsroom.com/html/glossary/s.shtml

Synchronous

Synchronous communication is interaction in real time. In an online or distance learning environment synchronous communication occurs through media such as chat-rooms, audio-conferencing, video-conferencing, and fixed time on-line tutorials.

Video streaming

Video streaming media enables educational organisations to provide students with the opportunity to access lectures through standard Web browsers. Some teachers pre-record lectures and make these available to students on their institution’s intranet. Others use video streaming to deliver live interactive lectures which include slides, chat windows, and enable remote students to interact with the lecturer and the rest of the class. Either option provides the students with the ability to revisit the lecturer and spend time on difficult concepts presented.

<http://www.teleconnections.info/streaming.html>

VLE

A virtual learning environment (VLE) can be defined as a standardised, computer-based environment that supports the delivery of Web-based online learning. It might support learners both within an institution and also distance learners, who remotely access course and assessment materials hosted on the institution's VLE. A VLE can support a range of learning contexts, ranging from conventional, classroom delivery to distance learning and online learning.

<http://www.ictadvice.org.uk/index.php?section=tl&rid=77&pagenum=1&NextStart=1>

WebCT

WebCT is a widely used educational software platform for managing and teaching online courses. It can be used to create a virtual learning environment or to support delivery. Further information on WebCT is available from:

http://www.courses.umd.edu/webct_overview.pdf

Wireless technology

Wireless computing is just what the name implies—computing without wires and phone lines using a variety of devices such as laptop and notebook computers, tablets, personal digital assistants (PDAs), email-only devices, handheld computers, and “wearable” technology.

<http://www-106.ibm.com/developerworks/wireless/newto/>

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