

E-Primer Series

No. 1: E-Learning in Context

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1.0 E-Learning in Context

Before considering how e-learning might work, we need to establish just what it *is*. E-learning's greatest barrier is neither unreliable technology nor technical complexity. The greatest barrier to e-learning in tertiary education is a *lack of context*. E-learning is opposed mainly by those who know least about it. It is still common to find educators who perceive e-learning as internet-only education that encourages a static and content-focused series of text pages on screen. Others envisage the shallow and random online messages that are typical of a social real-time chat session, and wonder how that type of communication could add any value to academic discourse. Still others see no reason for using e-learning: isn't the status quo good enough? Some may have experienced e-learning done *poorly*, and extrapolate their experience into a negative impression of all e-learning.

Of course e-learning can be done poorly. But it can also be done *well*. This introduction provides a framework for understanding what e-learning is, and why it is significant for education – and educators – today.

1.1 Conceptualising e-learning

Part of the difficulty in conceptualising e-learning can be traced to confusing or technical definitions. Most of these definitions assume a particular understanding of education and technology. Further, definitions tend to be based on terms that are themselves poorly defined. Consider the definition used by New Zealand's Ministry of Education (Ministry of Education 2004:1):

E-learning is learning that is enabled or supported by the use of digital tools and content. It typically involves some form of interactivity, which may include online interaction between the learner and their teacher or peers. E-learning opportunities are usually accessed via the internet, though other technologies such as CD-ROM are also used.

The meaning of this definition is obvious to those already experienced in e-learning. But for those without any prior knowledge of the contribution digital technologies can make in education it may be enigmatic. What are *digital tools*? What does *interactivity* look like? How does *online interaction* work? What is an *e-learning opportunity*? These questions are more complex than they may seem. The term *interactivity* can be singled out for particular attention because it is a frequently abused term in any discussion about technology in education. To some it simply means any action taken by a learner – such as clicking to the next webpage. To others it implies interpersonal communication and reciprocity.

I don't intend to explore abstract terminological issues, but to start an exposition of e-learning based on terms that are accessible to tertiary educators who are, for whatever reason, suspicious of e-learning. For the purposes of this introduction, here's my definition:

E-learning is pedagogy empowered by digital technology.

E-learning is a combination of the *e* (electronic) and *learning*, but is always directed by pedagogy. Technology (understood as *digital* technology in particular in e-learning contexts) sometimes enables new pedagogies, but even so, the pedagogy ought to be well defined first, and then give direction to the technology. For e-learning to occur, effective pedagogy must be combined with reliable, easy-to-use technology. It follows, then, that e-learning is *dependent*

on the pedagogy. If there is little or no pedagogy, the tools will be ineffective. If the technology is unreliable or too complex to use, e-learning will be an exercise in frustration. Table 1 summarises this dependence.

	Sound pedagogy	Unsound pedagogy
Reliable, easy-to-use technology	Effective e-learning	Technocentrism
Unreliable, complex-to-use technology	Frustration	Disaster

Table 1 – e-learning as a dependent function

If we think of e-learning this way, we can see that e-learning is as varied as the pedagogies and technologies that facilitate it. *Technocentrism* is a term popularised by Papert (1990) to describe the tendency of some computer enthusiasts to assume that technology is itself educational, in that better technology will bring better education. But sound pedagogy coupled with unreliable or complex technology results in frustration, and unsound pedagogy that uses such technology is educationally disastrous. Ineffective e-learning is often the result of naivety or too much enthusiasm on the part of an instructor or decision-maker.

This E-Primer Series will show you how sound pedagogy can work with reliable and easy-to-use technology. Some of the pedagogy is already familiar to educators in traditional on-campus or distance education settings. However, technologies are sometimes sufficiently open-ended to permit new pedagogies.

1.1.1 An e-learning vocabulary

The term *e-learning* may be a temporary one. It is already common to see the e in brackets – (e)learning – to indicate that, as technology becomes an everyday part of education, the e will disappear.

E-learning's substantial specialised vocabulary is often poorly defined, causing significant problems for theorists and practitioners (Garrison 2000). In fact, to those starting in e-learning the terminology can be as confusing as the new technologies. Terms such as *flexible learning*, *blended learning*, and *mixed-mode delivery* are frequently used as synonyms, while *virtual*, *online* and even *pedagogy* are often sprinkled throughout e-learning conversations with little constraint. An introduction to some of the basic and more contentious terms used in e-learning is provided here.

- **Distance learning:** education provided through learning resources such as articles, learning guides and supplementary media. In distance learning the educator and student are separated by space and/or time. Distance education is extremely diverse, ranging from classic correspondence study to collaborative, internet-enhanced multimedia education.

- **E-learning, eLearning, (e)learning:** the use of technological tools (primarily those that can be made available over networks such as the internet) for education. E-learning is pedagogy that is empowered by digital technology. It may be offline (and non-networked) technologies on CD-Rom or DVD. E-learning usually includes digital resources and computer-interfaced communications as tools for learning.
- **Interactive:** can mean anything from the ability to click on a link to another webpage, through to full interpersonal discourse. This term must always be considered in context.
- **Learning Management System (LMS), or Virtual Learning Environment (VLE):** a collection of e-learning tools available through a shared administrative interface, such as Blackboard, WebCT, or Moodle. An LMS or VLE is the platform on which online courses or online components of courses are assembled and made available.
- **Learning object:** digital resources that can be reused in e-learning contexts.
- **Flexible/mixed-mode/blended/resource-based learning:** these terms all describe education that combines on-campus and distance approaches. Such education usually involves an instructor or tutor meeting with students (either on campus or using technology), coupled with a resource base of content materials and learning activities. Some e-learning approaches might be used as part of this mix. It includes conventional on-campus courses supplemented by some e-learning.
- **Online learning:** pure online learning uses e-learning tools in a distance education mode. It uses technology (usually the internet) as the sole medium for all student learning and contact. The term is often used synonymously with the terms immediately above; however, it is best to reserve it to describe education facilitated *only through digital technology*, usually the internet. An online course typically lacks both physical learning materials and physical meetings, but the term is also used to describe the online component of an on-campus or distance education course. The term is sometimes used to refer to CD-Rom- or DVD-based courses as well as web-based ones.
- **Pedagogy:** the art and science of effective teaching. Pedagogy is traditionally understood to refer to the instruction of children but it is increasingly used in a more general sense that encapsulates Knowles's (1990) concepts of andragogy. In this E-Primer Series, the term is used in the latter, broader sense.

Figure 1 illustrates the relationship between on-campus and distance education, highlighting the emergence of flexible/mixed/blended/resource-based learning that is given impetus by the introduction of e-learning.



Figure 1 – Types of education (Bullen & Janes, 2006, p.ix)

Online distance education uses only digital technology to facilitate learning. Pure on-campus and paper-based distance education could be said to use only lecture (or on-campus experiences) and paper-based resources respectively (the latter with some analogue technologies such as audiotapes as well). As Fig. 1 suggests, pure on-campus and distance education are extremes. E-learning provides significant opportunities between these extremes.

1.1.2 A series of defining statements

In 2003 I suggested a series of 10 statements about e-learning (see <http://ifets.ieee.org/periodical/6-2/1.html>). These statements attracted significant online debate amongst international experts. They appear here in an adapted form.

Statement 1: *E-learning is a means of implementing education that can be applied within varying education models (for example, on-campus or distance education) and educational philosophies of practice (for example behaviourism and constructivism).*

This statement establishes e-learning as a *means* rather than a *mode* of education. E-learning cannot be *compared* with on-campus delivery or distance education because it can be used within either of these modes. In other words, e-learning uses technological tools that can be applied in various contexts; it is not a distinct educational system in itself. It is also possible to apply different education philosophies of practice using e-learning. Students can construct their own knowledge using technology tools, and those same tools can also be used to present materials that lead students to pre-determined conclusions in highly structured ways.

Technology in education has a significant history. Computers were initially applied in behaviourist modes in accordance with Skinner's work (Ravenscroft 2001), which emphasised the teacher's control over what is learned and how it is to be learned. More recent emphasis has been on using technology within constructivist learning models, which enable students to construct their own understanding. Skinner's behaviourism, Piaget's cognitive constructivism, and Vygotsky's and Bruner's social constructivism can all be facilitated through e-learning. Tam (2000) provides an excellent overview of how we can use technology for constructivist purposes. However, it is also true that e-learning enables a form of educational convergence.

This leads us to the next statement:

Statement 2: *E-learning enables unique forms of education that combine the existing paradigms of on-campus and distance education.*

This is one of the more exciting aspects of e-learning – it enables new expressions of education that have the potential to combine the strengths of

on-campus and distance forms of education in various ways and using various technologies – such as bulletin boards, which permit online discussion, and wikis, which promote collaborative writing. Dillon and Greene (2003) suggest that individualistic *distance* education can become collaborative *distributed* education, although students are physically separated. E-learning and flexible/mixed mode/blended/resource-based courses draw on the same theoretical principles that underpin face-to-face and distance courses. Newer forms of learning can be thought of as new species, not new domains; they are the result of evolution, not revolution (see Nipper 1989; Garrison 2000; Peters 2000; Guri-Rosenblit 2005).

Statement 3: *Whenever possible, the choice of e-learning tools should reflect rather than determine the pedagogy of a course. However, as a general rule **how** technology is used is more important than **which** technology is used.*

If e-learning is a means to education, it can be applied to varying pedagogies (Thorpe 2002). Weller (2002) lists the following pedagogies:

- constructivism
- resource-based learning
- collaborative learning
- problem-based learning
- narrative-based teaching
- situated learning.

Technology is pedagogically neutral because it can support any and all of the pedagogies listed above. Even simple technologies can be very useful if effective pedagogical decisions are made. Many examples illustrate this – such as the Open University’s use of the simple online discussion forum CoSy documented by Mason (1989). ‘The reintroduction of the wolf’ scenario described by Jonassen et al (1997) makes use of nothing more complicated than linked webpages, and many communities of practice throughout the globe collaborate and communicate effectively through simple text-only listservs. These examples testify to the fact that *how* technology is used is more important than *which* technology is used.

Statement 4: *E-learning advances primarily through the successful implementation of pedagogical innovation.*

As a general rule, breakthroughs in teaching practice will make e-learning more useful than breakthroughs in technology, though the latter can provide opportunities for the former. As noted by Laurillard (2002), instructional designers – not technologists – should drive e-learning. Innovative educators will add value to e-learning and ensure its further development. Reeves (2002) suggests that, in the main, technology is not being used innovatively in education. On the one hand, technology sits quite comfortably within current approaches to education; on the other, it can move beyond the bounds of traditional on-campus and distance education practices.

It follows, then, that e-learning practitioners should stay in touch with both technological developments *and* educational psychology and pedagogy.

Statement 5: *E-learning can be applied in two major ways: presenting education content, and facilitating education processes.*

The fundamental applications of e-learning include storing and distributing digital materials (readings, websites, and multimedia) as *presentation* elements, and using interpersonal communication and activities as *process* elements. Presentation and process can both be applied in many ways. It is likely that advances in technology will eventually challenge the parameters of this statement. Until then, thinking about e-learning in terms of presentation and process is useful for instructional design purposes (see E-Primer 3, *Designing for e-learning*).

Statement 6: *E-learning tools are best made to operate within a carefully selected and optimally integrated course design model.*

As an example of this statement, literature is very clear that the 'build it and they will come' approach does not work with online discussion (Zemsky & Massy 2004). The activity's design is more important than the tool's availability (Statement 3). It is not sufficient to simply add e-learning tools *onto* an existing course; e-learning should be implemented as a seamless component of course design and delivery. Assessment, a major component of learning, should also be integrated in both formative and summative forms. Clear design is a feature of successful online learning (Swan 2001), and a responsive instructor who facilitates learning and encourages students to explore their learning at a conceptual level is a must for effective conceptual change (Ramsden 2003). Oliver (1999) lists content, learner support and learning activities as the three critical design elements for online teaching and learning. There is general agreement across existing education literature that collaborative dialogue and communication with instructors are major contributors toward successful learning.

Statement 7: *E-learning tools and techniques should be used only after consideration has been given to online versus offline trade-offs.*

Internet access in New Zealand is still constrained by slow uptake of broadband and the predominance of desktop computers. For most students, therefore, access to the internet requires sitting at a desk and using the family phone line for a dial-up connection. With this constraint in mind, it might be more appropriate to provide some material on paper or CD-Rom than over the internet, and to limit the need to be online as much as possible. In general, the web is best used for communications such as notices, updates, asynchronous and synchronous discussion, and for content that is frequently updated or only becomes available during the actual course. It is prudent to provide other materials such as Word documents, video and audio materials, slideshows and relatively static content offline, either on CD-Rom, DVD, or paper as appropriate. Even if an environment has universal wireless broadband access and portable computing, this statement stands; only its practice changes.

Statement 8: *Effective e-learning practice considers the ways in which end-users will engage with the learning opportunities provided to them.*

Anticipating end-user behaviour is an important step toward effective e-learning. For example, some institutions no longer provide printed materials, preferring instead to make all things available online or on CD-Rom. Those students (still the majority) who don't like to read from a screen or can't take their desktop computers away on holiday with them for the weekend (or to bed at night), will print their digital notes. Consider also the type of internet access that most students have. Dial-up users can't yet enjoy the full benefits of real-

time or streaming multimedia, unless it is optimised to the extent that all quality is lost. Encourage students with dial-up access to prepare online discussion contributions offline in a word processor so that they can be quickly copied and pasted into proceedings. Think also about students for whom the online world is foreign territory. Early online exercises might be highly structured, or consist of a brief personal introduction. Considering the student experience does much to ensure effective course design and delivery, and gives important clues about how they might be supported in their learning activity.

Statement 9: *The essential process of education (that is, enabling the learner to achieve instructional goals and performance objectives) doesn't change when e-learning is applied.*

In other words, the curriculum is still king. Statement 1 establishes e-learning as a means; the development of the learner toward specified learning outcomes is still the end. E-learning tools can certainly be used to encourage students to further explore topics on their own and take ownership of their learning, but this must take place within the context of a formally approved curriculum. For example, it is often desirable to assess discussion participation to encourage interaction in the online environment, but you need to be careful (as discussed in E-Primer 4, *Online Discourse*). The curriculum must still be the point of reference for the education experience. Online discussion should measure how well a student has engaged with the topic in accordance with performance objectives. If participation in online discussion is not relevant to the curriculum, then you should question its use as an assessment tool. The curriculum, not your students' use of technology, is the standard.

Statement 10: *Only pedagogical advantages will provide a lasting rationale for implementing e-learning approaches.*

As educators we can take no other position. Institutional, societal and political changes do not automatically lead to better student learning. Eisenstadt and Vincent (2000: xi) reserve the advantages of technology for those applications built on sound pedagogy:

Evidence continues to confirm that the Web, as with other technologies and media, can be successfully exploited provided that the educational need to which it is applied is identified first.

Institutional, social, and political expediencies may help to justify e-learning investment, but they are not enough on their own. If there is to be long-term commitment to e-learning, faculty must also believe that technological tools improve teaching and learning. Technical interventions that are introduced to solve particular education problems are frequently successful, whereas supply-driven technologies such as those introduced with LMSs tend to languish unless their use is educationally driven.

These statements are not universally endorsed by e-learning theorists and practitioners; during the online debate the major objectors came from those who believe e-learning has the potential to emancipate learners from formal education contexts. The statements are presented here as an orientation toward implementing e-learning within tertiary education institutions (TEIs). In E-Primer 3, *Designing for E-Learning*, we will also see that e-learning is best practised in the context of instructional design.

1.2 Pedagogies for e-learning

E-learning is incredibly open-ended, ranging from online discussion to webpage links, to digital video, to adaptive learning. You can apply the e-learning option that best suits the type of outcome you want. The following five learning outcomes, or their variants, are representative of taxonomies typically used in instructional design literature (Gagne et al 1992).

1. **intellectual skill:** how to do something; procedural knowledge
2. **cognitive strategy:** the ability to link one thing to another
3. **verbal information:** declarative knowledge
4. **motor skills:** the ability to perform physical tasks
5. **attitude:** the affective domain, the realm of choices.

E-learning options can be applied in different ways to suit each type of learning outcome. For example, you might use digital video for a question and answer session with an expert to provide verbal information. Video might also be used to demonstrate a motor skill or to distribute footage of a practitioner interview – in this case it would link to an intellectual skill. Online discussion can be structured in different ways depending on the desired learning outcome. Online quizzes or self-marking tests have different roles for intellectual skill and verbal information outcomes. Some technologies might be irrelevant for particular learning outcomes; for example, blogs (or online journals) have good application for outcomes associated with attitude or cognitive strategy but are generally unsuitable for motor skills unless they are related to IT skill acquisition.

The core tenets of education do not change when e-learning is applied, and e-learning practitioners must be careful to base their practice on identifiable learning theories. Mason (2006), an experienced e-learning theorist and practitioner, bases her e-learning practice on the theories of Knowles's andragogy, Kolb's experiential learning, and Wenger's communities of practice – all of which are education or social interaction theories. Rather than trying to replace theories of education, e-learning creates new possibilities for applying *established* educational and interpersonal theories. Consider the seven good practice principles of Chickering and Gamson (in Keeton 2004):

1. Good practice encourages student–faculty contact.
2. Good practice encourages cooperation between students.
3. Good practice encourages active learning.
4. Good practice gives prompt feedback.
5. Good practice emphasises time on task.
6. Good practice communicates high expectations.
7. Good practice respects diverse talents and ways of learning.

Good practice is good practice. Chickering and Gamson's principles apply to e-learning just as they do to classroom and distance education. Keeton, Sheckley, and Krejci-Griggs's set of principles also provide some direction to e-learning pedagogy (Keeton 2004):

- Make learning goals and one or more paths to them clear.
- Use extensive and deliberate practise.
- Provide prompt and extensive feedback.
- Provide an optimal balance of challenge and support that is tailored to the individual student's readiness and potential.

- Elicit active and critical reflection by learners on their growing experience base.
- Link inquiries to genuine problems or issues of high interest to the learners (thus enhancing motivation and accelerating their learning).
- Develop learners' effectiveness as learners early in their education.
- Create an institutional environment that supports and encourages inquiry.

The Chickering and Gamson, and Keeton, Sheckley, and Krejci-Griggs frameworks provide many opportunities for e-learning. E-learning can improve the educator's ability to provide prompt feedback and elicit reflection from learners. Active and collaborative learning and critical inquiry can be encouraged through creative use of online discussion, and student-faculty contact can be successfully achieved through email. I'm not suggesting that these can be achieved without e-learning, just that e-learning is highly adaptive and has broad potential.

E-learning does not change what it means to teach well. It does provide more choice for achieving good education. Most of the pedagogies that educators use in more traditional settings have an online or virtual equivalent, and flexible computer applications provide still more opportunities for pedagogical innovation. For example, as a part of a secondary mathematics methods course, Li (2005) required students to prepare a PowerPoint slideshow demonstrating geometry in the real world. Using digital cameras, students photographed examples of geometry in everyday settings. Li found that student attitudes toward geometry changed as a direct result of that assignment and subsequent online discussion. This illustrates how technology can be applied to Keeton, Sheckley, and Krejci-Griggs's principle of 'linking learning to genuine problems or issues of high interest to the learners'.

1.2.1 E-learning and interaction

Garrison et al (2003) suggest that e-learning has one unique benefit that more traditional forms of distance education (and possibly on-campus education) have not been able to create – the development of a critical community of inquiry. Collaborative exchange and reflective critical discourse can be facilitated through computer mediated communication (CMC) in ways that are 'qualitatively different' (Kaye, in Garrison & Anderson 2003:114) from those that have been possible until now. This area will be further explored in E-Primer 4, *Online Discourse*, but I mention it here because it's a good example of how e-learning expands possibilities for teaching and learning in higher education.

Garrison and Anderson, eminent distance education and e-learning theorists, suggest that interaction is 'a defining feature of education (Garrison & Anderson 2003:41). Moore and Kearsley (1996) suggest that learner-content, learner-instructor and learner-learner interaction are central to distance education. Their thinking translates smoothly into e-learning application because you can enhance each of these three interactions by using technology (Garrison & Anderson 2003). Again, you can see that e-learning tends to extend existing educational frameworks rather than replace them.

1.3 Technologies for e-learning

We can't separate e-learning from the pedagogy that underpins it, or the technology that enables it. Most tertiary education institutions now have LMSs and they often complement these with other technologies.

1.3.1 Learning management systems

Learning management systems (or virtual learning environments) have already been described as platforms in which online courses or online components of courses are assembled and made available. An LMS usually has course and administrative tools that create course spaces specifically for enrolled students and their instructors.

Hundreds of LMS applications have been developed since the late 1990s. Of those that have endured, the major systems used in New Zealand at the time of writing are Blackboard, WebCT, and Moodle. The former two are commercial platforms based in the United States – the two companies merged recently. Moodle is an open-source application with no license fees. It began as a university project, but its ease of use, license-free nature, and open architecture quickly made it the darling of institutions not able or willing to invest heavily in e-learning infrastructure. More recently, Moodle has been adopted by several large international distance education providers including the Open University (United Kingdom) and Athabasca University in Canada.

Most LMSs provide similar e-learning tools for course designers. The following list is reasonably representative of the basic tools available:

- webpages for presenting course content and notices
- links to other internet sites
- discussion or bulletin boards with rich text editing for threaded discussions (E-Primer 4, *Online Discourse*)
- chat clients for same-time text-only communication
- quizzes (usually multiple choice and other self-marking formats, though open-ended responses can also be captured)
- grade storage
- student tracking, ranging from login records to individual page views.

Learning management systems continue to evolve. Moodle, which enjoys significant input from developers around the world, develops quickly because of its open source nature. This LMS has a number of features such as automatic forwarding of new discussion board posts to participant's email, wiki and glossary tools, and student profile features (including automated image association with messages – profile images of authors appear next to any message they post) that are yet to appear in commercial LMS packages.

Despite some notable differences, LMSs tend to be largely generic. They also tend to lag behind the technical requirements of e-learning innovation. Blogs, for example, are a rapidly maturing e-learning technology (proven pedagogies for their use are emerging), but they are not yet standard features in LMSs. Institutions often need to look beyond the LMS to make use of particular e-learning approaches.

1.3.2 Beyond the LMS

Many internet tools that are used in the commercial and educational world are not yet established in LMSs and, just as there are multiple LMSs, there are usually multiple vendors for such tools.

Synchronous (same time) video is a good case in point. Applications such as Adobe Acrobat Connect (previously known as Macromedia Breeze) are popular in the commercial world, and that application also has educational users. Elluminate is a competitor. They are based on different technologies but have the same function (real-time communication) but Connect is arguably the more flexible of the two. Until recently, e-portfolio platforms have been outside LMSs, but are now being brought within them. Commercial e-portfolio platforms include ePortaro and Nuventive's iWebfolio, and open source platforms include Open Source Portfolio Initiative (OSPI) and Elgg. E-portfolios enable students to store electronic files and their own reflections for various purposes. Their use ranges from CV-type presentations to reflective learning repositories. There is significant interest in e-portfolios across the world at the moment (see, for example, <http://www.eife-l.org/>).

Lectopia (<http://ilectures.uwa.edu.au/>) is an interesting technology that aims to make the classroom accessible to distance students and those with flexible learning needs. Lectopia records and digitises lectures, making them available as podcasts (digital audio) and digital video formats over the internet. Academics find the Lectopia system easy to use because most of its processes are automated. Other options for recording lectures digitally include Media Site (http://www.sonicfoundry.com/main.aspx?dir=solutions&subpage=higher_education), Adobe Acrobat Connect and Elluminate (both of which permit live sessions), Camtasia (screen recording software), and PowerPoint with embedded audio commentary. Audacity (<http://audacity.sourceforge.net/>) or Castblaster (www.castblaster.com) can be used for creating podcasts. Each of these applications can be used on a standard multimedia computer, and Mac users can use Garageband.

Blog accounts can be created for free from Blogger (www.blogger.com) and Edublogs (www.edublogs.org), and you can subscribe to multiple blogs through a Bloglines account (www.bloglines.com). Applications such as the e-learning XHTML editor (eXe) (<http://exelearning.org/>) can be used to create web-based content. Problem-based Learning (PBL) Interactive (<http://www.pblinteractive.org/>) can be used to create online scenarios for problem-based learning. Writeboard (www.writeboard.com) offers a free wiki service; more comprehensive wiki tools can be freely accessed through Wikispaces (<http://www.wikispaces.com/>). There are hundreds of other technologies that could be used for e-learning, and many of them are free of charge. The issues of use lie in the areas of providing student support, orientation, and guaranteeing continuity of service. Online services such as Turnitin (<http://www.turnitin.com>) check student work for plagiarism, drawing on an impressive database of websites and previous assignment work. Library databases now provide convenient online access to catalogues and full text articles. There are also countless animations, simulations and additional information freely available through the internet (some through repositories such as <http://www.merlot.org>, <http://www.intute.ac.uk/>, <http://www.tryscience.org/> and <http://www.iknowthat.com>). Though not all are educationally useful, you can find some real gold in the mountain of resources.

So there is much more to e-learning than the tools available in a typical LMS. Because there are many possible software combinations, most institutions choose to use and support only a few technologies – usually an LMS and one or two additional applications that meet well-defined needs.

As technology continues to evolve, so will the tools that can be used for e-learning. However, uptake of technology and the contextual dynamics within which education is offered seem to be the dominant variables to consider when predicting where e-learning might take us. In 2004, a framework for considering the future of e-learning was developed under the title *The Edinburgh Scenarios* (<http://www.internetime.com/lcmt/archives/001121.html>). According to the scenario group, the future of e-learning depends on two variables: the acceptance and adoption of technology in society (on a continuum from 'patchy' to 'widespread'), and the sources of power, influence and new ideas ('conventional' to 'emergent'). E-learning could result in four distinct futures based on changes to the two variables over time. It is not yet clear whether the established systems of power, influence and new ideas will shift beyond the conventional, but it is clear that there are commercial, professional and social shifts in mainstream internet use.

1.3.3 The evolving internet

As recently as the late 1990s it was a big deal to have bought something over the internet with your credit card. Today such transactions are commonplace. We manage our bank accounts and pay bills, book flights and overseas accommodation, and increasingly share our everyday experiences online. These patterns of internet use differ significantly from 10 or so years ago when 'surfing' was in. There is an established confidence, trust, and social dynamic in our approach to the internet that shows a shift in internet mindedness; these trends may suggest that 'the continued mainstreaming of technologies into our lives through e-commerce and entertainment are providing a powerful and unstoppable force for the growth of e-learning' (Eklund et al 2003:4). Some apply the term *Web 2.0* to describe the services that are making online social networking and participation possible.

There is no broadly accepted, formal definition for Web 2.0. It is easier to describe it than it is to define it, though even descriptions may be misleading. One blog (<http://susanmernit.blogspot.com/>) gives a succinct definition: 'The heart of Web 2.0 is the user... The tools power it, but the people do it.' Table 2 contrasts the internet as we knew it the mid 1990s (characterised by web pages that linked to other webpages) with those of the now established Web 2.0.

Classic or hypertext web	Web 2.0
Static web pages	Dynamic online experiences
Text	Multimedia
Casual access	Community commitment
What you're given	What you give
Providing information	Gaining experience
Publishing	Sharing
Proprietary and commercial	Open source and free
Closed systems	Open communities
Linked pages	Linked people in community
Search engines and browsing	Syndicating and aggregating
Presentation	Conversation
Keyword searches	Word of mouth
HTML pages	Blogs, Wikis, RSS feeds
Author controls content	Community controls content
Hierarchical	Relational
Get something <i>known</i>	Get something <i>done</i>
Presentation and information	Process and activity
<i>Encyclopaedia Britannica</i>	<i>Wikipedia</i>

Table 1 – A comparison of the classic web and Web 2.0

The examples of *Encyclopaedia Britannica* and *Wikipedia* provide a very tangible contrast. The former is edited by scholars; the latter can be changed by anyone, though contributions are vetted by encyclopaedia viewers. *Britannica* has final, authorised editions; *Wikipedia* articles are continuous works in progress. *Wikipedia* is a dynamic article collection that responds to current events and matters of social interest. For example, a search for 'crazy frog' in *Britannica* is fruitless; the same search in *Wikipedia* takes you to a complete history of the fictitious animation – complete with pictures and links to sites of further interest, including other articles in *Wikipedia*. *Wikipedia* contains articles of both academic and social interest. The automated processes and virtual storage of *Wikipedia* make it a very flexible yet increasingly reliable source of information. Indexing and search functions are automatically updated, in contrast to the logistical and editorial concerns of full-volume works. *Wikipedia* has built on, and enhanced, traditional practice. To many, it

symbolises the collaborative and community-centred shift that characterises the world wide web.

Tim O'Reilly, an authority on Web 2.0, describes the phenomenon in more detail at <http://www.oreillynet.com/lpt/a/6228>. O'Reilly contrasts Web 1.0 with Web 2.0, and describes how Web 2.0 changes traditional business models and user experiences. A pictorial summary by Markus Angermeier, found in the 'Web 2.0' *Wikipedia* entry, provides an insight into the terminology of the Web 2.0 phenomenon and is reproduced as Figure 2.



Figure 2 – Web 2.0 mind map

Many of the terms used in Angermeier’s graphic are meaningful only to those with a technical and social investment in internet use; however, some of the terminology is second nature to emerging students. Blogs, social software, wikis and RSS (often called ‘really simple syndication’, or ‘rich site summary’) are becoming common features of the internet, and users increasingly expect audio and video to be stored digitally on computers and portable media players. Unfortunately, such tools are not generally exploited in tertiary education. While many innovative teachers use blogs and wikis, mainstream adoption still seems some time away.

One of the main barriers to using e-learning in education can be traced to internet mindedness, or internet self-efficacy (Eastin & LaRose 2000). Students enter tertiary education with a higher level of internet mindedness than their teachers. While many students are aware of the rich potential of the internet, many academics tend to see the online world as confusing and complex. The discrepancy between those who are internet minded and those who are not is a significant consideration for the future of e-learning.

Looking further ahead, we can speculate that online learning will eventually make use of intelligent agents – computer programmes that search the internet for content that is relevant to their users using the *semantic web*. Intelligent

agents are like personal secretaries who are in touch with their owners' learning needs, personal interests, and daily schedules. Others see technology as eventually being able to provide the level of interactive and individually responsive education that is currently restricted to human professionals (Bork & Gunnarsdottir 2003). These ideas, though intriguing and highly debatable, are beyond the scope of this E-Primer Series.

1.4 Realising the benefits of e-learning

Five significant benefits for higher education can be derived from e-learning (see, for example, Oblinger & Hawkins 2005). They are:

1. The convenience and flexibility of e-learning provides improved access to tertiary education for those who want to participate. This flexibility and convenience extends to both student and instructor.
2. The interpersonal interaction, academic discourse, and rich media enabled by e-learning provide a more effective learning experience than traditional forms of education. E-learning can reduce the transactional distance between educator and student.
3. E-learning has the potential to make education more efficient than traditional forms of education without compromising quality, so releasing academics for further research activity or to enable more flexibility with class numbers.
4. E-learning improves competitiveness in an increasingly national competitive environment. Traditional campus-based institutions are making large-scale forays into distance education, using e-learning as the spearhead.
5. E-learning reflects developments and innovation within wider society. I have suggested that Web 2.0 indicates a shift in commercial, professional and social activity. Technologies such as email are already ubiquitous in tertiary education and it is inevitable that technology will continue to change educational practice.

However, these claims are frequently disputed. Much depends on the actual mix of media offered, and the context in which those media are applied. When reviewing literature on the theme of e-learning and its benefits, it is also important to differentiate between the corporate training sector and the higher education sector, as the former shows more tangible benefits and tends to use a less critical approach to education. Corporate training tends to use web-based courseware and self-paced modules, resulting in savings in employee travel, productivity, and accommodation.

It is certainly possible to realise the five benefits listed above in tertiary education contexts, but examples of e-learning disasters are also not difficult to come by.

1.4.1 Failure – and success – in international online education

In the late 1990s, highly-respected management theorist Peter Drucker suggested that technology would make physical campuses redundant. A few years later, the dot-com bubble burst and the world lost much of its e-euphoria.

Some 10 years after Drucker's prediction, campuses are still standing and there is little indication that they will close. The initial claims of the 1990s – that e-learning would change the shape of teaching and learning and that students would 'take to it' – are now debunked (The Learning Alliance 2004). In their report on *The Weatherstation Project*, which monitored the changing climate of e-learning perception in the United States, Zemsky and Massy (2004) accurately critiqued three of the assumptions that have classically underpinned e-learning thus:

1. If we build it they will come – *not so*.
2. The kids will take to e-learning like ducks to water – *not quite*.
3. E-learning will force a change in the way we teach – *not by a long shot*.

The report, titled *Thwarted innovation*, exposed the rush toward developing e-learning capacity and the inevitable compression of quality loops and evaluation. Zemsky and Massy's report examines the assumptions behind the investment in e-learning. Their work is not directly pedagogically relevant, though it is clear that e-learning has not been the runaway, explosive success that was once expected. More recently, the UKe-University failed in what was termed 'a disgraceful waste of public money'; £60 million was invested in an institution that did not result in a single graduate or a going concern. In the case of the UKe-University and many other large-scale e-learning based ventures, the problem was one of business, not education. The UKeU was supply-driven and tried to use innovative pedagogies and structures that were not proven (Bacsich 2006; Conole et al 2006). Western Governors' University, a United States conglomerate, is another example of a large-scale e-learning initiative that failed dismally to live up to expectations. But again, the major reasons for failure were commercial, not educational. The most successful examples of e-learning are actually within existing tertiary institutions that already have an established demand, robust educational systems, and reputations.

There are also reports of e-learning making a positive difference to student outcomes. It seems from these that it is possible to realise both educational *and* efficiency benefits provided e-learning is implemented strategically (Twigg 2003). Twigg notes that realising the benefits of e-learning requires significant up-front investment; however, she cites examples of substantial gains in student outcomes and efficiency that have resulted directly from e-learning interventions. These interventions have various degrees of six key characteristics:

1. Whole course/programme redesign (to remove duplication of effort and to improve consistency).
2. Active learning (focusing students on doing).
3. Computer-based learning resources (including online exercises and low stakes quizzes).
4. Mastery learning (modular, self-paced course design with clear learning objectives).
5. On-demand help (crucial for student satisfaction).
6. Alternative staffing (through specialisation, freeing academics to concentrate on teaching).

By 'redesign', Twigg does not mean simply placing course materials online. Fraser (1999) introduced the term *shovelware* to describe using the internet to merely transform course notes from paper to webpages – this is not Twigg's idea of e-learning. Instead, 'it is about using technology, where technology makes sense, to reorganize instruction to better achieve goals for student learning in a more cost-effective manner' (Graves & Twigg 2006:np).

The major failures of e-learning in education tend to be due to failure in implementation rather than a fundamental flaw in e-learning itself. While the initial assumptions leading to the explosive interest in e-learning at the turn of the millennium were undoubtedly flawed, subsequent experience has demonstrated the substantial contribution that e-learning can make – and has made – to tertiary education in terms of more flexible access to education, improved learning, and cost-effectiveness. At the time of writing it seems that e-learning's further development relies on institutional investment and effective change strategies that engage the early and late majority of potential users (Rogers 1995; Kotter 1996) – in this case, educators.

1.4.2 E-learning and the student experience

We can't generalise about the student experience with e-learning because so much depends on the pedagogical and technological mix that is used in each study. Indeed, study results tend to be as varied as the settings they represent. But there is at least one consistent pattern to the literature: there is no net significant difference between courses taught with e-learning techniques and those taught by more traditional means (Zhao et al 2005). On his website (<http://www.nosignificantdifference.org/>) Thomas L. Russell compiles study after study comparing online and classroom-based instruction – in almost every case, the online equivalent is at least as good as the on-campus experience in terms of learning. As I have already noted, e-learning can be done well or poorly, and any comparisons between courses are highly contextual. However, the consistency of findings noted by Russell indicates that online and other forms of e-learning compare extremely favourably *on average* with on-campus teaching, even though there are concerns with some of the studies cited and the overall variances between even well-conceived studies are quite high. From the analysis of Zhao et al (2005) we can confidently state that students are not necessarily at an academic disadvantage if their courses are web-based, and that they can actually be advantaged if there is interaction and instructor contact. Further, Rovai (2002) found that the sense of community students experience is not significantly different between online and on-campus settings. It seems that, from the students' perspective, spirit, trust, interaction and learning (the ingredients of community) can be as much a feature of the online classroom as the on-campus one. Rovai notes, though, that developing a sense of community depends on the course design. Research also confirms that students regard IT literacy as less of a barrier than it once was. Indeed, most students now regard a computer as 'important' or 'vital' to their university studies (Gunn et al 2003).

Conclusions about further aspects of student involvement are less certain. Evidence suggests that the reasons for student drop-out in courses that use e-learning are as varied as the individuals themselves (see, for example, Willging & Johnson 2004). A study by Dutton et al (2002) notes that *online* students perform at least as well as on-campus ones, although a higher proportion tend to drop out. If students *do* drop out more frequently from online learning environments, the usual causes are poor support structures and a lack of effective orientation (Simpson 2002). Poor technology or pedagogy could also

be at fault. Simpson's work in open and distance education suggests that a significant proportion of drop-out can be attributed to students' circumstances and backgrounds, and there is evidence that this picture does not change when e-learning is introduced. Dutton et al (2002) found that students aged less than 22 preferred a structured, lecture-based environment over an online one, possibly because older students tend to study part-time and value the flexibility that online and distance learning allows. Balancing part-time study with other responsibilities is challenging. Dutton et al (2002) found that online students had a higher drop-out rate yet achieved significantly higher results in the course exam and higher than average course grades (these statistics were not statistically significant). Diaz and Cartnal (1999) found that students who opted for an online learning experience over an on-campus one tended to be intrinsically motivated, independent learners, who are not collaborative unless directed to be.

Another study (Hoskins & van Hooff 2005) suggested that students who were active in online discussion performed better, and older students are more likely to spend more time in online environments. While Hoskins and van Hooff found that males were more likely to be active online participants than females, others suggest that female students are actually advantaged in online environments (Gunn et al 2003; Anderson & Haddad 2005). The student experience is as mixed as the student body itself, but it's clear that e-learning is conditionally successful for students and has the potential to generate higher levels of student participation overall.

1.4.3 E-learning and conditional success

Success in e-learning depends on effective implementation. E-learning has the potential to reduce the transactional distance between instructor and student (Moore & Kearsley 1996), particularly if more consideration is given to the actual development and delivery of a course as a result of introducing technology. The potential of e-learning allows course designers to reevaluate their techniques and explore the potential of new ones. If course revisions are pedagogically sound and use reliable and easy-to-use technology, the net result will be a more effective learning experience. If so designed, e-learning assisted courses can also make learning more accessible to learners who want a flexible study experience. If changes are made in a flexible institutional context, it is also likely that e-learning will result in efficiencies.

It is likely that much of the criticism levelled at e-learning comes from those instances when it is not used well, and these failures usually occur because practitioners don't use effective pedagogies. Hedberg (2006) notes that 53 per cent of students experience e-learning solely as providing information, and sometimes only background or further information at that. About 32 per cent experienced online discussion with further information. The balance experienced e-learning as 'providing information with unmoderated discussions'. Mainstream e-learning is yet to depart from familiar on-campus and distance-style education, despite the emphasis on mixed-mode or blended techniques.

Many institutions may have adopted e-learning for reactive reasons. Cox (2005) suggests that decision-makers in institutions tend to adopt e-learning based on unsubstantiated myths about student demand and competitive pressure. In the subsequent rush to 'get things online' and the impression that once courses are 'online' they are somehow completed, the true opportunities of e-learning may be missed.

1.5 The New Zealand context

In the United Kingdom, the Joint Information Systems committee (JISC) (<http://www.jisc.ac.uk>) is a sector-funded body that provides network infrastructure and institutional consultancy, and funds a number of e-learning projects. While New Zealand has various bodies such as the Institutes of Technology and Polytechnics e-Learning Forum (ITPNZ eLF) and professional organisations such as the Distance Education Association of New Zealand (DEANZ), there is no real sector equivalent to JISC. Instead, the Ministry of Education provides strategic direction to the sector, and has centrally funded a series of particular e-learning projects.

1.5.1 Ministry of Education initiatives

In 2001 the New Zealand government formed the E-Learning Advisory Group (ELAG), which prepared a report 'to explore issues related to the development of e-learning in the tertiary sector' (E-Learning Advisory Group 2002:3). This report contributed to the government's decision to invest \$NZ28 million in contestable funding from 2003 to 2007 'to improve the tertiary education system's capability to deliver e-learning that improves education access and quality for learners' and 'to help achieve the co-operative and strategic implementation of e-learning in tertiary education organizations' (Ministry of Education nd:a). The E-learning Collaborative Development Fund (eCDF) required successful applicants to work with institutions across the tertiary sector. Further funds were allocated to the Tertiary e-Learning Research fund (TeLRF) 'for research into the current context and impact of e-learning on certain groups and aspects of tertiary education organisations in the New Zealand context' (Ministry of Education nd, b).

In 2004 the Ministry of Education released a document called *Taking the Next Step* (Ministry of Education 2004b), which outlined the government's plans for accessible, relevant and high-quality e-learning. Figure 3 is a summary of the government's stated vision, guiding principles and action areas.

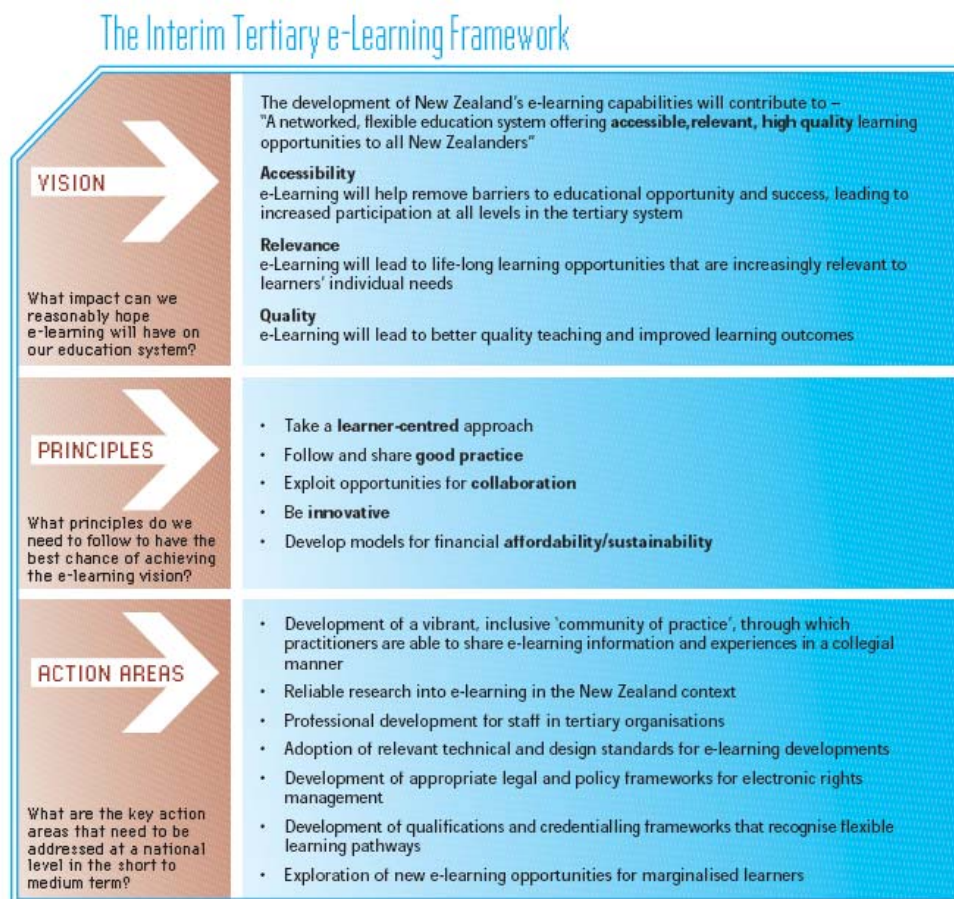


Figure 3 - The interim tertiary e-learning framework (Ministry of Education 2004b:7)

The framework provides a useful point of reference for e-learning practice; however, its influence beyond the eCDF and TeLRF projects is at this stage unclear. For the secondary sector, the Ministry of Education has released a document called *Enabling the 21st Century Learner: An E-learning Action Plan for Schools 2006-2010* (Ministry of Education 2006). This, and similar Ministry documents, make it clear that e-learning has strategic importance to the entire New Zealand education sector.

1.5.2 The New Zealand e-learning scene

Some findings from the TeLRF projects are summarised here to give an indication of e-learning in the New Zealand sector. Full versions of each report are available at <http://cms.steo.govt.nz/eLearning/Projects/Tertiary+eLearning+Research+Fund.htm>.

In a survey of high-level e-learning capability within New Zealand's tertiary sector, Marshall (2005) analysed six of eight universities and three of the twenty institutions in the polytechnic sector. Marshall found that in a number of cases 'very strong performance was seen in isolated projects and this is not being recognized by the institutions concerned and used as a basis for improving performance across the whole institution' (2005:8), and also found 'the absence of a planned intentionality in the way many institutions are engaging in the use of e-learning' (ibid). Marshall suggests that 'much work is still to be done'; his findings suggest that effective e-learning implementation in

New Zealand is patchy, and he highlights the need for institutional systems and processes that support e-learning use. E-learning success is conditional, and it seems that the conditions for e-learning are yet to be optimal in New Zealand institutions.

A report by Mitchell et al (2005) investigated e-learning adoption by academics in the polytechnic sector. The findings of the report indicate that e-learning is growing steadily, with more academics moving into 'embracer' and 'modifier' categories of adoption. The e-learning tools most used are electronic library databases and websites – the use of additional tools is highly variable. The report suggests that this variability 'poses particular challenges to those responsible for formulating and implementing e-learning policies ... while some are advanced exponents of e-learning ... others are barely at the starting line' (2005:10).

Respondents to the research indicated that employers' expectations and the need for their institution to gain a competitive advantage through e-learning were the main influences on their decision to adopt e-learning approaches to teaching and learning. Lack of time was cited as one of the main barriers. The size of the institution was also significant in terms of adoption – larger institutions were able to achieve an economy of scale for e-learning activity. Further, it was found that early adopters of e-learning were more likely to be positive about its pedagogical benefits than were later adopters and non-adopters. While there was no significant gender, age, or ethnic correlation to e-learning uptake, it was found that lecturers who taught extra-mural papers were more likely to make use of e-learning. Overall, the report found that 'a complex array of factors comes into play in influencing the extent to which tutors adopt e-learning and that, depending on various circumstances, a particular factor may be seen as facilitating by some tutors and inhibiting by others' (Mitchell et al 2005:18), and that the majority of e-learning use in the sector does not realise the potential that technology affords.

An Aotearoa Tertiary Students' Association report (Renwick & Owen 2005) examined the effectiveness of student support systems for e-learning in New Zealand. The report concluded that, overall, institutions provide pre-enrolment, orientation, social and personal, and technical support services that match student expectations and requirements. Students rated technical support as the area for which most support was required, and institutions had largely pre-empted this. The need for institutions to respond to student email to provide 'timely and useful responses' was significant (2005:74). The report suggested that education providers establish personal communications with e-learners and provide a sense of social integration, online orientation, effective online navigation, improved access to generic information, and technical support.

Finally, a report by Hegarty and Penman (2005) examined the role of staff development and IT efficacy on e-learning uptake. They found that most professional development activity for e-learning adoption was 'not adequate to assist staff to fully develop their capability and potential for eLearning as they were mainly providing a beginning competency' (2005:2). The report recommended a multi-faceted approach to e-learning that included funding, academic time release for development, and using a team approach to course development.

The activity generated by eCDF has focused on technology and pedagogical development. A small sample of the various projects gives some idea of their scope. They include:

- customising Moodle for the New Zealand sector (Open Source Virtual Learning Environment [OSVLE])
- creating a series of authoring tools for online context (eXe)
- developing a problem-based learning application (PBL-Interactive)
- developing an authoring system for intelligent learning agents (ASPIRE)
- developing an open-source e-portfolio platform
- a number of professional development initiatives including Flexible Learning Leaders in New Zealand (FLLinNZ) and the Certificate in e-Learning Design and Development (CeLDD)
- developing a series of e-learning guidelines
- culturally-focused projects such as Te Ako Hikohiko, Development of Critical Success Factors for Effective Use of E-learning with Maori Learners (and a later project for Pacific learners)
- a series of developments linked with industry partners.

1.5.3 Keeping up to speed

Keeping up with the project outcomes is no easy task.

E-learning is multi-faceted and very dynamic. The following list of organisations, conferences and resources is not comprehensive but provides a starting point for keeping up with developments:

Professional organisations and conferences (Australasia)

- The Distance Education Association of New Zealand (DEANZ) <http://www.deanz.org.nz/>
- Australasian Society for Computers In Learning in Tertiary Education (ASCILITE) <http://www.ascilite.org.au>
- The Open and Distance Learning Association of Australia (ODLAA), <http://www.odlaa.org/>
- eFest (an annual conference run by the ITPNZ e-Learning Forum): <http://www.efest.org.nz/>
- Ministry of Education e-learning portal: <http://www.elearn.govt.nz>

Books – general titles

- Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century*. London: RoutledgeFalmer.
- McVay-Lynch, M. (2003). *The online educator: A guide to creating the virtual classroom*. London: RoutledgeFalmer.
- Naidu, S., ed. (2003). *Learning and teaching with technology: Principles and practices*. London: RoutledgeFalmer.
- Palloff, R. M., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco: Jossey-Bass.
- Salmon, G. (2000). *E-moderating: The key to teaching and learning online*. London: Kogan Page.
- Salmon, G. (2002). *E-tivities: The key to active online learning*. London: Kogan Page.

Journals and online sources

ALT-J – Association for Learning Technology.

Australian Journal of Educational Technology – ASCILITE.

British Journal of Educational Technology – the British Educational Communications and Technology Agency (BECTA).

Distance Education – the Open and Distance Learning Association of Australia.

EduCause Review – EduCause.

Innovate – Nova Southeastern University.

Journal of Asynchronous Learning Networks – the Sloan Consortium.

Journal of Educational Technology and Society – IEEE.

Learning Circuits – the American Society for Training and Development.

Open Learning – the Open University.

The International Review of Research in Open and Distance Learning – Athabasca University.

The Journal of Distance Learning – the Distance Education Association of New Zealand.

The Knowledge Tree – Australian Flexible Learning Framework.

1.6 Summary – e-learning in context

At its most simple, e-learning can be thought of as the sum of technology and pedagogy. While e-learning is open-ended enough to provide many opportunities to explore new forms of teaching and learning, it is also familiar enough to apply to traditional education practices and ways of thinking. Pedagogical principles remain the same for e-learning. As mainstream internet use continues to grow, more complex opportunities for innovation will arise.

Though e-learning has not revolutionised the tertiary education sector, it has made steady progress over the last 10 years and will continue to grow in scope. Deliberate and coordinated implementation by institutions will increase access, effectiveness, efficiency and competition. New Zealand has seen significant Ministry activity in e-learning, and much has been learned about the New Zealand context. The future is still very open and depends on the dynamic development of political, economic, social and technological forces as well as pedagogical possibility.

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