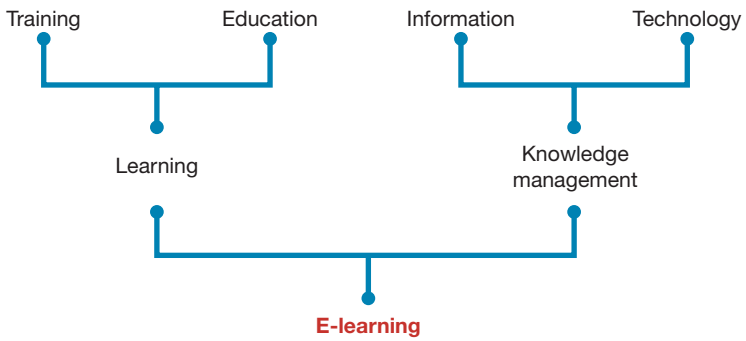
What is Electronic Learning?

When the World Wide Web was launched in 1991, there was a surge of interest in the possibilities of electronic learning (or e-learning). The use of the Web as an educational medium was hailed as a harbinger of profound changes for communities, organisations and markets. By now, well over a decade later, one might expect that the concept of e-learning would be well defined and clearly differentiated from other forms of learning. Yet there is still a lack of consensus about what e-learning represents. For all the publicity it has received in recent years, e-learning remains something of an enigma, and its boundaries are far from clear.

E-learning intersects numerous fields of thought and practice, and cannot be trivialised into a simple formula for success. As Figure 1.1 suggests, writings on the 'theory' of e-learning encompass an array of academic perspectives: training and education, learning and knowledge, technology and the investigation of individual market segments. In this new industry, key concepts and understandings are still emerging. Any study of the effectiveness and efficiency of e-learning therefore has to engage with multiple issues, including the role of e-learning in knowledge and learning, its contribution to competent performance, its relationship to organisational transformation and strategies for embedding e-learning into other forms of electronic interaction.

Figure 1.1 Merging language and fields of study



This chapter sets out to isolate the fundamental components that can be used to define e-learning. Here, it is important to separate 'technology-driven' perspectives from views centred on the learning process. Many of the definitional difficulties that have beset e-learning have arisen from an overemphasis on the mechanics at the expense of a commitment to improving the experience and outcomes of learning.

E-learning processes and systems

Although the focus of e-learning should be on delivering learning outcomes for people and organisations, much of the popular literature on the subject is preoccupied with the deployment of specific technologies. This section adopts a different tack. It begins by focusing on the crucial issue of how people communicate and learn in an electronic environment. This leads into an appraisal of some widely held ideas about the potential for creating modular 'learning objects', which in turn serves as background for a discussion of the terms used to describe the technologies that have been developed to implement and manage e-learning.

E-learning processes

Like any learning process, e-learning depends on effective communication of human knowledge, whether this occurs in a face-to-face classroom or across the Internet. Electronic technologies can no more guarantee effective communication than they can transform 'jxiqwop' into a meaningful word. The medium alone does not create the message.

The effectiveness of e-learning also depends on establishing two-way communication between teachers and learners, and among learners themselves. Unfortunately, when e-learning was first popularised, it was widely promoted as a means of minimising costs by delivering pre-packaged content to large populations of learners by means of electronic networks or CD-ROMs. Such an approach relies on one-way communication from teacher to learner, attenuating the learning experience. It views learners as atomised individuals and fails to take into account the social context in which learning occurs. Above all, it does not engage learners actively in the process of learning.

On the other hand, online technologies can also be used to foster interactive and collaborative engagement. This can be either synchronous or asynchronous: learners and instructors may either have regular, scheduled sessions whether they all 'meet' simultaneously online, or (more commonly) use electronic forums to exchange ideas in their own time.

The most familiar form of synchronous electronic communication is real-time two way text-based online chat, which is widely used in e-learning. More sophisticated forms of synchronous instruction include virtual classrooms, which use information and communication technologies to mimic a traditional classroom environment. This may involve video-conferencing or the use of shared electronic whiteboards, which allow learning materials to be created and modified in real time, either by the instructor or the learners.

In many cases, exchanges during synchronous instruction can be archived so that learners can review them later.

The use of virtual classrooms has considerable cost advantages for many organisations. The logistics of organising face-to-face classroom training can account for as much as 40 per cent of corporate training budgets (Koolen 2001: 5). On the other hand, virtual classrooms have several drawbacks. They require learners to have access to fast, reliable networks and reasonably sophisticated computing facilities. Learning in a virtual classroom also tends to be instructor-led rather than based on participatory, two-way communication. Above all, virtual classrooms share many of the limitations of the conventional classroom in that they require learners to be online at a particular time. This negates one of the major advantages of electronic communication, which is its ability to offer flexible access.

By contrast, asynchronous instruction allows participants to control their own timetables and fit learning around their other commitments. This is a major bonus, especially for adult learners who lead complicated lives. Many of the technologies used in asynchronous e-learning also permit two-way communication between learners and instructors, or multi-directional, collaborative communication among learners themselves. These are some of the communication technologies most commonly used in asynchronous e-learning:

- **Email** is the most common form of electronic information exchange.
- **Collaborative learning forums** promote learner interaction through **message boards**, where students can post questions and answers; **text chat or forums**, where learners can communicate outside the main classroom; and **threaded discussions**, where facilitators and students can discuss a given topic and review each other's responses.
- **E-boards** allow learners and instructors to create images, text and information and present them to other participants.
- **Application sharing** allows instructors and learners to work collaboratively on the same learning materials, either simultaneously or in sequence. Participants can see what is happening at all times.
- **Simulations or virtual laboratories** permit learners to work in teams to construct projects and complete them at their preferred pace.
- **Library/learning session cache access** provides access to archived text, presentations, video, audio and data files. This is especially useful for revision or for reviewing synchronous learning sessions a student may have missed.
- **Real-time tests and evaluation** can be triggered at agreed times or completed at the learner's own pace.
- **Video and audio streaming** can be used to disseminate information to learners, and can also enable learners to see and speak with the facilitator via the Internet rather than by telephone.

From the instructor's point of view, e-learning also offers classroom management technologies that permit instructors to log students into 'classes', establish work groups, manage interaction between students and receive feedback in real time. Other support services include real-time

reporting on learners' progress, timetabling, tracking student and teacher activities, and authoring tools for generating content.

Asynchronous learning can be designed to develop both cognitive and performance skills, engaging learners in a 'cognitive apprenticeship' (Collins, Brown & Newman, cited in Brown, Collins & Duguid 1989b: 32–42). This supports an educational philosophy in which learners are active players in the process of learning.

Learner surveys consistently suggest that four benefits are seen as the critical deliverables when designing online learning as compared with other forms of technology-based learning. These are summarised in Table 1.1.

Table 1.1 Top four online learning benefits compared to other learning technologies

Online learning benefits	Computer/ CD-ROM	Electronic simulation	Tele-conference	Television broadcast	Video/ television/ radio
Learner control	Learner control of pace but not content	Reduced learner control; good learning retention	Reduced learner control	Reduced learner control	Reduced learner control
Accessible from anywhere, provided learner has Internet access	Reliably accessible, irrespective of bandwidth, but hardware-dependent	Consistent delivery, but may require high bandwidth	Consistent delivery, but requires high bandwidth	Consistent delivery; compatible with existing networks	Consistent delivery; compatible with existing networks
Available on demand	Available on demand	Just-in-time learning	Availability is time-dependent; affordable for groups	Availability is time-dependent; affordable for groups	Availability is time-dependent; affordable for groups
Personalised learning	Limited customisation	Customised to individual/ group context	Limited customisation	Limited customisation	Limited customisation

Based on Education Lifelong Learning Group 2001: 12

Learning content and learning objects

The major sectors that use e-learning — academic institutions, government, the corporate sector and the community and general consumer sector — approach it with different types of end use in mind. The approach to e-learning in corporate contexts is very different from that in formal educational institutions. Historically, learning in educational settings has been organised around self-contained subjects or course units. In contrast, many proponents of e-learning in corporate settings envisage systems based on much smaller units of content, known as learning objects.

The purpose of adopting this paradigm is to encourage the reuse of common elements, thereby decreasing costs, streamlining content creation and improving quality. The idea is to structure learning content into common

building blocks that can be quickly found, reassembled and customised according to particular contexts and learner needs. Fast retrieval is achieved by tagging each object with metadata, including descriptive information on authorship, content and composition, as well as subsidiary information such as any prerequisite knowledge or special access conditions (Brennan, Funke & Anderson 2001: 4). Metadata can also be subjective, providing evaluative information such as how well an object works in particular learning situations. Hodgins has suggested that 'as personalization becomes the key element of learning, subjective metadata [will] become increasingly important' (2001: 15).

The assumption of this model is that e-learning systems enable effective reuse of content without compromising the context and themes of objects as they travel over various modules or courses. But as Table 1.2 indicates, the disaggregation of learning objects will affect what e-learning can achieve. Some kinds of knowledge lend themselves to being broken down and reassembled in ways that can promote the creation of e-learning content in short 'chunks'. Such content can be reused and accessed very flexibly. However, reducing *all* knowledge to bite-sized chunks that anyone can reassemble has risks, most especially in losing the integrity of instructional design and the situated meaning that some knowledge only possesses when packaged with other chunks of knowledge.

Table 1.2 highlights the spectrum of outcomes that e-learning can support. Disaggregating learning objects to their smallest form can greatly facilitate the reuse of one learning object for multiple learning activities. However, by definition, a learning object holds value because it supports learning that can enable knowledge transfer. If a learning object is disaggregated and dispersed to the extent that it loses its relationship to the instructional purpose or the applied outcome that can be assessed as a stand-alone outcome, then its real value is only as a form of data or information transfer.

Wiley has been one of the key critics of what has become known as the LEGO block analogy, suggesting that it threatens to 'control and limit the way people think about learning objects'. Unlike LEGO blocks, Wiley points out, learning objects cannot be combined indiscriminately, they cannot be assembled in any old manner, and it requires skill to put them together (2001: 15–16).

Wiley's alternative proposal is to regard learning objects as atoms, noting that:

- Not every atom is combinable with every other atom.
- Atoms can be assembled only in certain structures prescribed by their own internal structure.
- Some training is required in order to assemble them.

Furthermore, only experts can split or recombine atoms; in the case of learning objects, this role would fall to instructional designers and multimedia developers. An awareness of the advantages and disadvantages outlined in Table 1.2 should thus determine both the design of e-learning and the technologies required to complete it.

Table 1.2 Advantages and disadvantages of disaggregating learning objects to their smallest components

Activity	Information	Learning	Knowledge
Ease of design and reuse	Maximises ease of use and repackaging for multiple purposes	More difficult to maintain instructional integrity because as the technology, context or person changes the pedagogy needs to be reviewed	Very difficult to achieve reuse because as technology, context or person changes so should the knowledge outcome
Ease of use	Maximises portability and accessibility as anyone can 'grab and go' as required	Can be easier to access but integrity of relationship to learning outcomes in the given situation can rapidly be lost	Easier to access but without situated meaning and relevance to individual's needs it is just information
Ease of management	Once on a central database and meta-tagged it is easy to move, manage and track	Clustering into learning components (courses, curriculum etc.) can ease maintenance but it is hard to manage learning outcomes for one learning object that may relate to multiple learning components	Can use templates and database to store, retrieve and maintain objects but to hold knowledge value it has to demonstrate an applied outcome

The concept of learning objects underpins many of the advanced e-learning systems, and is now commonly seen as being central to the benefits e-learning systems confer. The concept's popularity has probably been fuelled by the promotional activities of the large vendors of IT and e-learning systems.

E-learning technologies

At present, e-learning technologies encompass three main areas of activity:

- **Content creation and management:** the sourcing, creation, storage and management of e-learning content — functions typically addressed by a learning content management system (LCMS);
- **Learning management:** the capture and application of information about learning resources, existing skills and learning activities to measure and manage learning outcomes at the organisational level — functions typically addressed by a learning management system (LMS); and
- **Learning activity:** the delivery of e-learning content, facilitating interaction and learning assessment — functions typically performed by instructors or trainers (Brennan, Funke & Anderson 2001: 10).

The three do not necessarily exist as discrete, identifiable systems. There is overlap and ambiguity in their functions and definitions. The term 'virtual learning environments' is also sometimes used to promote systems that have characteristics of all three. Put simply, an LCMS generates, stores, structures and delivers e-learning content (Brennan, Funke & Anderson 2001: 4), whereas an LMS is more an administrative tool that handles enrolment or registration, tracks students' progress, and records assessment scores and course completions.

Learning content is created through authoring tools (see, for example, Chapman & Hall 2001), which are generally part of the functions of the LCMS.

Brennan, Funke and Anderson (2001) identify the following key building blocks that a good LCMS will provide:

- easy-to-use content creation tools and support for reusable learning objects;
- flexible course design and delivery;
- administrative functions and assessment tools;
- open interface with an LMS or other enterprise system;
- communication and collaboration functions;
- security functions;
- facilities for content migration; and
- automated implementation processes.

By contrast, LMSs operate at the other end of the learning trajectory, supporting and analysing the learning transaction; their focus is on assessing learning outcomes and appraising the relationship of outcomes to investment. While LMSs have become a standard component of e-learning technology, Aldrich (2001) regards them as 'empty highways', and suggests that organisations often make costly investments in technologies that deliver little functionality. Ultimately, he claims, 'while we need learning management, we may not need learning management systems' (Aldrich 2001:1).

Aldrich also points out that as of 2001 the LMS market has had no clear leader. He believes that the competitive state of the market has increased buyers' frustration because different vendors promote such different approaches to managing e-learning. In a competitive market, e-learning technology providers are driven to differentiate and value-add their systems by offering unique features. This produces problems in establishing comparability, and therefore compounds buyer confusion. Aldrich summarises the problem as follows:

> As with most rapidly evolving industries, there's an inverse correlation between the suppliers with the largest customer bases and those with the best architecture. In other words, [clients] usually have to choose between stability and sophistication, or compromise their needs (Aldrich 2001: 1).

Even though some time has elapsed since Aldrich made these observations, it should not be assumed that the issues have been resolved (Egan 2002). It seems that although there is emerging agreement on what an effective LMS should do, there are still gaps between market expectations and the technologies on offer.

E-learning and communication technologies

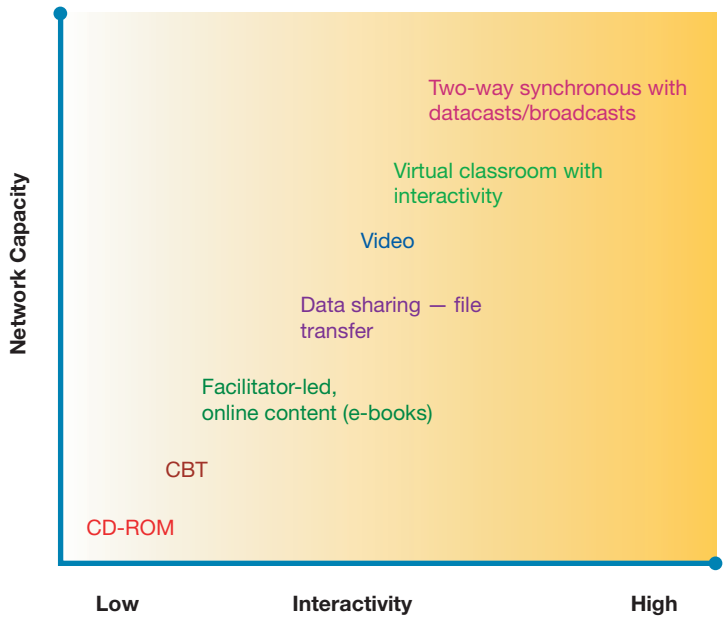
Most forms of e-learning depend on access to electronic communication technologies. In general, the more interactive the approach, the greater the demands on the communication network, although the transmission of text is less demanding than the transmission of visual images and sound. Various e-learning technologies and their network capacity requirements are shown in Figure 1.2.

Many of the recent advances in e-learning have been driven by the expansion of fixed-line network capacity and the growth in Internet use. Of

particular interest to many in the e-learning field has been the emergence of the World Wide Web, which offers a user-friendly graphical interface through which learners can gain access to a huge range of information, including images, data files and sound as well as text. More recently, there has been a rapid growth of new mobile communications technologies that offer Internet access while bypassing both the fixed-line network and the Web.

Any assessment of the potential of e-learning must accommodate all these technologies. To state the obvious, some countries will have 'emerging' technologies that other countries consider 'old'. At the same time, some of these slow adopters will 'leapfrog' current technologies and adopt newer ones. The following sections outline the current state of play, looking at the changing global and regional patterns of Internet use and the emergence of new mobile technologies. While we have used Australian examples as case studies in several instances, our primary focus is on global trends.

Figure 1.2 Advancing network capacity and learning interactivity



Global and regional trends in Internet use

The Internet is a major driver of e-learning advancement. Early estimates that some 300 million people would access e-learning over the Internet by the end of 2002 have since been revised upwards (see Kitchen 2002, slide 10). Various estimates placed the global online population (i.e. people possessing Internet connections and accounts) at a little over 600 million in late 2002 (Nua.com 30 January 2003; UNCTAD 2002). Based on growth trends, it seems that more than 60 per cent of Internet users had connected in the previous eighteen months. This saw worldwide Internet traffic double between 1998 and 2002.

There was sustained growth of more than 40 per cent in Asia and Africa over 2001–02, and of more than 30 per cent in Latin America and Europe. Table 1.3 shows Nua.com's figures for the geographical distribution of Internet users in September 2002.

Table 1.3 Online population by region, September 2002

Region	Internet connections (millions)
Europe	190.91
Asia–Pacific	187.24
North America	182.67
Latin America	33.35
Africa	6.31
Middle East	5.12
Total	605.6

Source: http://www.nua.ie/surveys/how_many_online/index.html (accessed 25 September 2003)

With the growth of the online population, there has been a corresponding shift away from English as the leading language used on the Internet. In 2000, SunTrust reported that English was used by 92 per cent of the global Internet community (Close, Humphrey & Ruttenbur 2000). In March 2003, Global Reach reported that English was the primary language of only 35.2 per cent of the online population. Chinese came second with 11.9 per cent, followed by Japanese at 10.3 per cent (Global Reach, 31 October 2002, sourced 30 January 2003 at http://www.glreach.com/globstats/index.php3).

The Asia–Pacific region has led the global growth in Internet connections since 2000. Within this region, Australia occupies a key position, with 58 per cent of the adult population having access to the Internet in mid-2002. Table 1.4 provides a granular view of the Internet-using population, comparing the Australian, Asian, US and world markets. A crucial feature of the recent growth in Internet use is that it is increasingly being led by mobile devices that do not rely on the fixed terrestrial network.

Table 1.4 Internet use and household computer access by region, 2001/02–2002/03

	Australia		Asia		USA		Rest of World	
	2001–02	2002–03	2001–02	2002–03	2001–02	2002–03	2001–02	2002–03
Internet users	7.2m	9.3m	150.5m	201.1m	142.8m	155.0m	192.5m	227.1m
House-hold PCs	10.0m	11.0m	132.2m	140.4m	178.0m	190.0m	201.7m	215.4m

All 2003 figures are to May 2003. Source: International Telecommunications Union (ITU) 2002 and 2003 figures at http://www.itu.int/ITU-D/ict/statistics (accessed June 2003); CIA Factbook, http://www.cia.gov/cia/publications/factbook/index.html (accessed 4 September 2003)

Accommodating emerging technologies

The emergence of mobile, wireless and satellite technologies is already impacting on e-learning. New Internet technologies are being used to support small-screen mobile and wireless devices. Satellites and mobile wireless devices can use TCP/IP (Transmission Control Protocol and Internet Protocol) to communicate on the Internet. In a field marked by such rapid evolution, we cannot assume that the Web as we know it today will remain the primary conduit for Internet-based e-learning.

Technologies such as telephone, television, the Internet and computing devices are increasingly converging. Given the speed of this convergence and the increase in the number of users, even the most conservative forecasters predict that massive changes will occur over the next decade. It took a century, from 1900 to 2000, to create a fixed terrestrial network connecting some 850 million telephone users globally. Yet it is expected that at least as many connections again will be required by 2015. By the end of 2003, the Asia–Pacific region alone is expected to have some 165 million Internet users, 400 million mobile phone users and 25 million mobile Internet users (reported in http://www.news.com from IDC 2003 Report, 6 January 2003).

By contrast with terrestrial phone connections to the Internet, which require a large social investment in infrastructure, mobile and wireless networks offer rapid connectivity and accelerated access. Around the world in 2002 there were estimated to be more than 790 million connections to mobile cellular networks and some 700 million wireless subscribers (Sabnani 2002: 3). Trends and forecasts for mobile and fixed network connections are summarised in Figure 1.3.

Figure 1.3 World subscriber forecasts and the impact of mobile communications

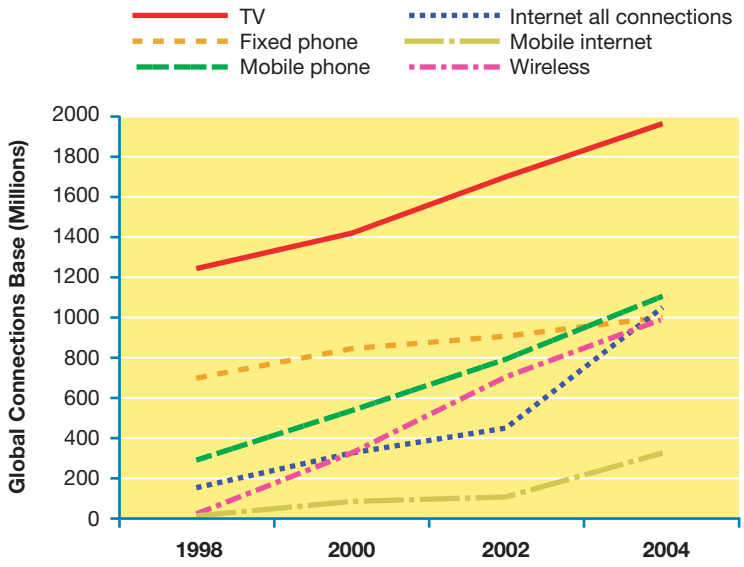


Chart derived from © Ericsson 2001, from Boston Consulting Group, Ovum presented in Kitchen 2002, slide 10; ITU 2002: 9; Lucent Technologies cited in Sabnani 2002

The advent of mobile and wireless connections has fostered a shift in how people and businesses can communicate and learn. Until the late 1990s, access to the Internet was dominated by those using fixed terrestrial phone connections, but now some 30 per cent of global users access the Internet by cable, satellite, wireless or mobile devices. As the use of mobile and wireless devices has expanded, their capabilities have converged with those of older network technologies.

Handheld devices

Handheld devices and personal digital assistants (PDAs) have been rapidly adopted by businesses in many countries. PDAs are basically small, handheld devices with computing, data storage and retrieval capacity. While PDAs were originally used for keeping schedules and address book information that could be synchronised with a computer, the newer devices have powerful scanning capabilities and can also record, transfer and interrogate data. They can scan bar codes, use scaled-down applications previously found only on more powerful computers, use wireless transmission to communicate and update central databases, and sort data required for immediate decision making. These devices are now capable of many functions once performed only by computers.

Mobile phone technology

Mobile technology is rapidly evolving to support data applications. Mobile phones can be used to send and receive short message services (SMS), take and send pictures, send and receive data files (music, text files, video), and browse the Internet. Third-generation (3G) mobile technologies such as CDMA-2000 and wideband CDMA (W-CDMA) can transmit data at speeds of up to two megabytes per second. At such speeds, mobile phones will be able to offer a vast array of new services.

Wireless technologies

Wireless technologies are also expanding their range of functions. Wireless communications are particularly useful for supplying data services to remote communities (and some urban areas) that do not have access to high-speed fixed-line connections. The use of wireless technologies to support networks has been hampered by differences in standards, which have hindered interoperability across networks by different devices. Increasingly, however, hardware manufacturers are producing devices that can adapt to either of the two major standards that utilise spectrums 802.11a and 802.11b (WiFi). While systems able to operate on these spectrums are certainly not the only or most likely long term options (i.e. 802.11g and 802.16 offer important alternatives), high speed, broadband connectivity between different wireless technologies is now possible. Wireless local loops (WLLs) centred on very small aperture terminals (VSATs) and satellite technologies now permit wireless and satellite connectivity at speeds of more than two megabytes per second both ways (upload and download). Within the network, data can be distributed at rates of up to fifty- four megabytes per second. Wireless technologies are now competitive with other mobile technologies, particularly 3G technologies.

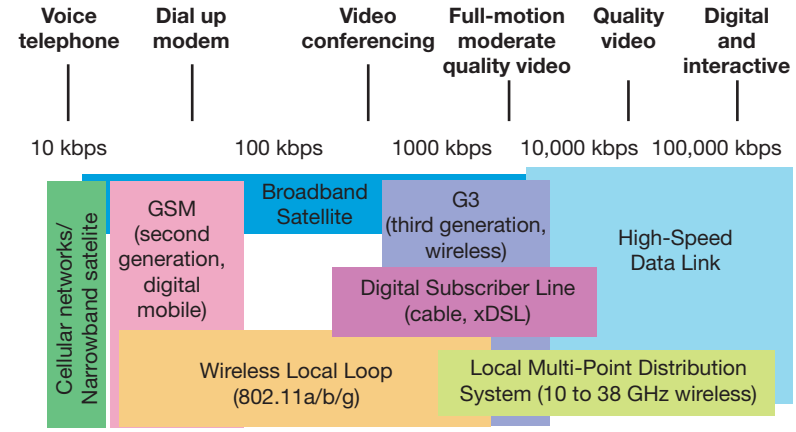
The combined effect of all these changes will present huge new opportunities for communication. To take the Australian case, 3G infrastructure at present is still embryonic, but the deployment of CDMA-2000 is under way, and Telstra expects to offer W-CDMA by about 2005. At a cost of $1 billion, this will radically alter the types of applications available.

Bandwidth and access to e-learning

Bandwidth refers to the amount of information that can be sent or received at a point on a computer network: the greater the bandwidth, the greater the carrying capacity and speed of transmission. Bandwidth is a major issue in the deployment of e-learning. The higher the quality and quantity of audio, video, interaction and processing tasks, the more sophisticated the communications technology required. The bandwidths of various communications technologies are depicted in Figure 1.4.

Bandwidth also costs money, so there is a financial imperative to manage the amount of bandwidth used for e-learning, particularly where it is used to support remote and distance users who may not have access to fast data connections. The most common way of dealing with bandwidth constraints is to minimise the amount of information that is to be communicated, usually at a considerable cost to learning quality; strategies such as data compression and caching files are also used.

Figure 1.4 Bandwidths of different communications technologies



Modified from Sabnani 2002: 18

For users of the Internet, the content and services that can be accessed are dictated by the bandwidth available. Ideally, the connection should be broadband (high-speed data transmission), which is considerably faster than the standard 56.6 kbps dial-up modem speed. Table 1.5 depicts the range of communications available across different bandwidths, from mobile cellular-network voice connections at 9.5 kbps to the much larger 2400 kbps.

Table 1.5 Bandwidth and e-learning applications

	Bandwidth — speed kbps							
Application	9.6	14.4	28	64	144	384	2000	2400
Transaction processing								
Messaging/text								
Voice/SMS								
Text chats								
Still images								
Internet/virtual private network								
Database access								
Applications sharing								
Low-quality video								
High-quality video								

Key Indication of application performance
Nil capability Uncertain Preferred

At present, only the densely settled regions of affluent nations have access to fixed-line systems that will support the full range of functions outlined in Table 1.5. Delivery in rural areas is costly, difficult or impossible. Even in some affluent economies, the modernisation of fixed-line networks has proceeded more slowly than early projections suggested. In Australia, for example, the take-up of broadband connections has been slow. In 2002, only 10 per cent of homes had high-speed broadband connections over 56.6 kbps (NOIE 2002: 19).

At the same time, although the 'mobile Internet' is widely seen as offering an alternative avenue of opportunity for e-learning, it has several barriers to overcome. Not only are most mobile Internet devices unable to access the same amount of bandwidth as fixed devices, but they are smaller and tend to have less usable screens and keypads. As yet, no 'killer application' has emerged to define how mobile devices could be used for e-learning. The prospect of having mobile access to learning materials — in the 'right here, right now' context — is appealing, but it will require a substantial investment in applications to make use of the new technologies. On the other hand, given the astonishing pace of innovation in the past two decades, it would be rash to adopt an approach to e-learning that excluded developments in this area.

Setting the parameters for a study of e-learning

With communication technologies in a state of flux, it is important to adopt an inclusive definition of e-learning that can accommodate the widest possible range of technologies. Debate on this issue has not moved far since the late 1990s, when there was a spate of published works about e-learning markets in the corporate sector.[1] From the outset, e-learning was defined in relation to technology: as early as the 1980s it was used as a shorthand term for learning delivered using any electronic means, especially computers. This emphasis remains pervasive. For instance, the report of the US Commission on Technology and Adult Learning, *A Vision of E-learning for America's Workforce*, defined e-learning as 'instructional content or learning experiences delivered or enabled by electronic technology' (2001: 4). In July 2003, the Department for Education and Skills in the UK stated in its consultative document *Towards a Unified E-learning Strategy*, 'If someone is learning in a way that uses information and communication technologies (ICTs), they are using e-learning' (2003: 4). This broad definition, however, has not been accepted by all practitioners.

Some writers have specifically focused on the use of Internet technologies. Marc Rosenberg, for example, defines e-learning as 'the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance' (2001: 28). He argues that there are three fundamental criteria for e-learning:

- It is networked, which makes it capable of instant updating, storage/retrieval, distribution and sharing of instruction and information.
- It is delivered to the end user via a computer using standard Internet and intranet technology.
- It focuses on the broadest view of learning — learning that goes beyond traditional paradigms of training.

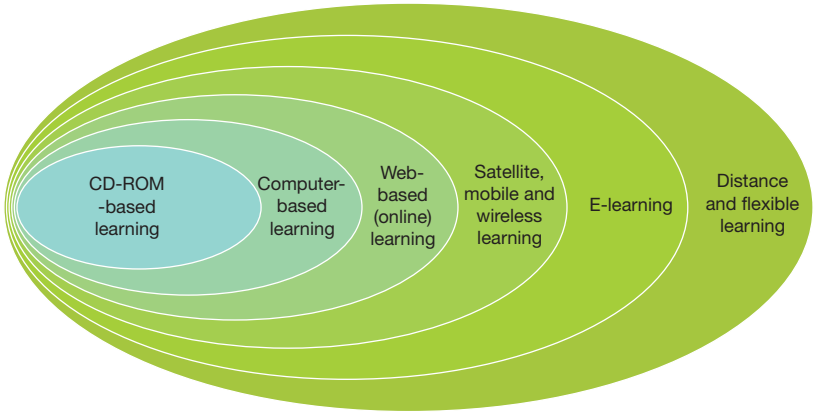
The term 'e-learning' has thus come to encompass both the learning transaction and the technology used for producing and transmitting knowledge, with the emphasis on the latter. Discussion of the parameters of e-learning has also been confounded by the somewhat vexed relationship between e-learning and distance education or flexible learning.

E-learning, distance education and flexible learning

E-learning has historically been linked with distance education and flexible learning. In distance education, various technologies can be used to link learners, instructors and resources that are removed in time or space. The hallmark of flexible learning, as its name suggests, is its adaptability to learners' needs and circumstances. Burns, Williams and Barnett define flexible learning in terms of its flexible 'entry, course components, modes of learning and points of exit', which offer the learner 'control and choice regarding the content, sequence, time, place and method of learning', including flexible assessment processes (1997: 16). While e-learning may be seen as a form of flexible and distance learning, not all flexible and distance learning necessarily involves e-learning (Rosenberg 2001: 29). As shown in Figure 1.5, e-learning

exists in a wider field of endeavour and has relationships that overlap with many different approaches.

Figure 1.5 Learning technologies, modes and relationships



Based on Urdan & Weggen 2000: 9

E-learning has also been defined in terms of its social context and its ability to offer learners the option of working outside structured educational environments. In Canada, Doug Hum and Anne Ladouceur define it very broadly, suggesting it is 'using an electronic means to access information and learn about a topic, be it for personal interest, job at hand or career advancement' (2001: ii). Later, however, they refine their definition to 'training that takes place over a network, the Internet or an Intranet' (2001: 3). It seems unfortunate that self-limiting words such as 'training', 'network' and 'Internet' are introduced, though Hum and Ladouceur do acknowledge that e-learning must be adapted to the individual's situation, schedule and learning style.

The historical association between e-learning and distance education has had some unfortunate consequences. E-learning programs have sometimes been criticised for being boring, poorly conceived and designed, and unable to provide individuals with the knowledge they need. Distance and flexible learning are open to very similar criticisms; many of these programs have disappointed early hopes or promised more than they have delivered. E-learning seems to have inherited some of that legacy.

There have also been problematic relationships between e-learning and existing distance education and flexible learning programs. In some cases, online learning has been introduced to augment and improve existing practices, but in other cases the intention has clearly been to replace existing pedagogies with one-size-fits-all electronic solutions as a means of saving money. This seldom produces effective learning experiences, and has led some education and training professionals to view e-learning with scepticism.

Web-learning and web-based training

Some authors distinguish e-learning from web-learning (Beer 2000) or web-based training (Horton 2000). These authors emphasise the distinctiveness of the Web as an educational medium that can be used to transfer information and knowledge rapidly without restrictions of time or location, and potentially at a lower cost than alternative educational media or environments (Beer 2000: 4–5). Horton defines web-based training as 'any purposeful, considered application of Web technologies to the task of educating a fellow human being' (2000: 2).

Many authors who promote web-based learning or training seem intent on avoiding any association with e-learning. They tend to differentiate their practice by highlighting how Web technologies can enhance learning (Khan cited in Khan 1997; Beer 2000; Horton 2000). These authors emphasise the power of the Web to transfer information and knowledge rapidly, without restriction of time or location, and often at a lower cost than alternative educational media or environments (Beer 2000: 4–5). Horton describes web-based training as 'the confluence of three social and technical developments: distance learning, computer-conveyed education, and Internet technologies' (2000: 2).

Towards an inclusive definition of e-learning

As we have seen, e-learning is typically defined in relation to its use of specific technologies. The elements of many conventional definitions include:

- information and communication technologies;
- a network, including use of the Internet and the World Wide Web;
- delivery on time, at any time; and
- an electronic exchange of information for the purpose of learning.

This definition, however, is potentially limiting. To take only two of the available technologies, is a CD-ROM or a wireless-enabled learning exchange a form of e-learning?

For many organisations, e-learning simply means a CD-ROM and applications loaded onto single computers for computer-based training or instruction. These organisations do not need to use networks or web-based applications. Some e-learning practitioners and theorists argue that such 'platform'-based arrangements do not amount to e-learning.

Such territorial disputes are unhelpful. They are also increasingly irrelevant to e-learning practice, which is moving towards blending various electronic forms of communication with face-to-face instruction and elements of traditional distance education, as we will see in Chapter 3. Perhaps more significantly, to define e-learning in terms of its use of networks and the Web could be self-defeating, because it risks excluding emerging technologies that are not necessarily web-based.

To derive a foundational definition of e-learning, a set of logical statements can be advanced:

- E-learning encompasses any form of learning transacted by way of digital technologies.

- E-learning delivery systems are subject to the dynamics of socio-technological evolution.
- E-learning may be synchronous or asynchronous, self-paced or instructor-led, a process or a single event, online or offline, or any combination of these modes.

Taking these statements into account, we advance a broad definition of e-learning for the purpose of ongoing research: **Electronic learning** can be defined as a learning experience involving the acquisition or transfer of knowledge delivered or transacted through electronic means.

Conclusion

Even in the late 1990s, the mobile technologies that now carry 30 per cent of all Internet traffic had not been envisaged. Software applications, hardware capabilities and even fixed-line networks are in a state of flux. All these changes will have significant implications for e-learning.

According to both aggressive and conservative forecasts of business opportunities, learning is expected to be a major 'product and service' for many years to come. To restrict the definition of e-learning to Internet connections via networked computers is to ignore mobile devices and emerging forms of networks and wireless technologies. E-learning involves all forms of ICT, across all dimensions of the learning process. Restrictive definitions in terms of specific technologies are of limited long-term relevance to learning transactions in an electronic context. E-learning can be both a distinct area of study and part of the wider mosaic of learning, knowledge management and information exchange within an electronic environment. These interactions are the subject of this book.

Principle 1

E-learning encompasses a wide diversity of practices in a dynamic, rapidly changing field. It must therefore be defined to encompass all learning experiences involving the acquisition or transfer of knowledge.

[1] These works include Schank 1997; Masie 1997; Carpenter-Smith 1999; HRD Canada 1999; Block & Dobell 1999; Peterson et al. 1999; Urdan & Weggen 2000; Wentling et al. 2000a; Wentling et al. 2000b; McRea, Gay & Bacon 2000; Ruttenbur, Spickler & Lurie 2000; Learnframe 2000; Close et al. 2000; and Goldman Sachs 2000.