

# **e-learning: emerging issues and key trends**

**A discussion paper**

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## **Abstract**

The purpose of this short paper is to provide a view of the state of e-learning, issues and implications for the use of technology mediated and delivered instruction in the vocational education and training (VET) sector in particular. The paper was developed in a short time frame to inform the planning cycle for initiatives within the Australian Flexible Learning Framework (Framework) in June 2003. It aims to integrate a review of literature to provide a high level comparative view of the current and future directions for e-learning, and possible implications for policy and practice. The paper does not seek to inform on a technical level and it assumes knowledge of terminology and issues in using technologies in teaching and learning. The authors comment on current and possible events in other sectors that may influence the shape of e-learning in VET. The paper considers issues and developments of a technical, organisational and pedagogical nature that are likely to generate change in the use of technologies in education and training. The paper offers a view of the driving forces for e-learning, an historical context for its development, and a vision for the future with recommendations for the Australian Flexible Learning Framework.

## Executive summary

The purpose of the paper is to provide a high-level briefing on e-learning directions, both nationally and internationally, in order to inform strategy and policy-making by the Flexible Learning Advisory Group (FLAG) for the Australian Flexible Learning Framework (Framework). The paper examines a range of issues covering technology, teaching and learning and organisational issues and makes general recommendations for priorities that will promote the successful use of Information and Communication Technologies (ICT) in VET for the future.

E-learning is a wide set of applications and processes which use all available electronic media to deliver vocational education and training. The term covers computer-based learning, web-based learning, and the use of mobile technologies; it includes virtual classrooms and digital collaboration and uses. There are many identifiable drivers for ICT-enabled instruction, and these may be classified as technical innovation, organisational and business developments, or characteristics of the needs and demands of the individual learner. Often it is a combination of these three components that brings about change. Drivers for e-learning continue to be a mixture of the advent of new technologies; the expectations of users growing up with new technologies and increasingly using them for productivity and pleasure; the quest for efficiencies in the delivery of training; organisational initiatives to maintain currency with developments in technology; and policy initiatives.

The e-learning market place has been expanding and is predicted to grow significantly over the coming years. Australia is in a position of leadership in the deployment of new technologies, especially in the VET sector. The advances made are now being brought into a phase of consolidation, with a focus on quality and standards that ensure access to effective learning experiences. The creation of technical specifications and the development and adoption of technical standards are key activities ultimately underpinning the success of e-learning globally.

Within the multimedia and web development industry there is clear evidence of a gradual maturing of practices, such as the adoption of appropriate and sound process models for development, the inclusion of quality goals and testing through defining requirements, and the recognition of the critical role of the Instructional Designer in e-learning development. There is an increasing recognition that successful learning requires not just quality instructional content but an appropriate context that includes its facilitation and an understanding of the learner.

Educational Theory has also had an impact on using ICT, as content design practitioners search for a theoretical basis to justify their designs, and as technology is seen increasingly as an enabler of learning. The rise of

cognitivism as the predominant 'post-modern/post-behaviourist' learning theory and the recognition of the importance of the social context for learning are changing curricula and teaching practice. The growing trend to blended learning recognises the use of ICT in the instructional process as one that augments rather than replaces face to face delivery, and provides unique experiences that assist in achieving desired learning goals. Continually changing demographic profiles for consumers of e-learning imply the need to adopt a user centred design process for development projects, rather than use an off-the-shelf or templated solution, and underscore the importance of developing processes and skills rather than product.

Access to and the ability to effectively use ICTs to obtain information and services are becoming increasingly important requirements necessary to fully participate in contemporary Australian economic, political and social life. Improved access is achieved through transforming workplace practices and removing significant barriers to organisations adopting e-learning, as well as targeting policies to increase information literacy.

Dramatic changes in hardware and software and 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. The energy in the e-learning debate surrounding standards will undoubtedly subside and be replaced by broader concerns relating to quality of learning experience. Learning for life requires knowledge to be personally, socioeconomically and culturally integrated.

E-learning is becoming an integrated and critical component of corporate knowledge management and performance enhancement, and return on investment is measured in that context. The success of e-learning can be electronically related to business successes and more businesses will recognize e-learning's ability to build knowledge and develop skills while reducing training-related costs. Within corporate training, there is a sound understanding of how to exploit these linkages.

As constructivism is eventually recognised as a philosophy about curriculum design rather than a learning theory, VET and schools will gradually reform their curriculum and learning structures. For the VET sector to effect e-learning changes, 'policy must be advanced which supports likely future scenarios, including pervasive, virtual delivery of learning materials' (Hill et al, 2003). The VET sector will continue to be a leader in providing a balance of professional development for teachers in the use of ICT, and in developing quality new content for online delivery.

The Framework can claim significant achievements in promoting the use of ICT in VET representing the clearest and most co-ordinated approach of any sector, and has proved itself a world-class initiative. It has led to the development of an important body of resources, a significant community of practice, which is supported by professional development initiatives, and a changing focus towards demand driven approaches to learning. The Framework is continually being refined and has a clear direction, moving to impact the next level of teaching practitioners underneath the early adopters.

The future vision for the Framework includes continuous benchmarking and networking of activities into other educational technology communities, particularly the corporate training sector. Consolidation of its achievements across policy and individual practitioner development will mean that its impact can be broadened and sustained into the future. Ultimately the framework will become more attuned to industry needs, aligning VET offerings with business goals. The Framework will have an increasing influence on organisational behaviour, policy and business and community sectors, enlightening them on the benefits of e-learning. Future projects under the Framework will be less focused on products and more on engaging people to adopt a learner centred approach.

# Introduction

## Purpose

This document is an independent discussion paper commissioned by the Policy and Research Program of the Australian Flexible Learning Framework (Framework). The purpose of the paper is to provide a high-level briefing on e-learning directions, both nationally and internationally, in order to inform strategy and policy-making for the Australian Flexible Learning Framework (Framework) by the Flexible Learning Advisory Group (FLAG).

## Approach

The paper has been written following a review of literature and interviews with key senior persons involved in flexible learning in Vocational Education and Training (VET). Authors of the paper also have substantial experience and understanding of issues in using Information and Communication Technologies (ICT) in VET and other sectors, including Primary, Secondary and Tertiary education and in corporate training. Consequently the paper aims to provide a balanced view of directions and issues in e-learning, benchmarking its status in the VET sector and the activities under the Framework against a broad background of developments. The paper examines a range of issues covering technology, teaching and learning and organisational issues and makes general recommendations for priorities that will promote the successful use of new technologies for teaching and learning in VET for the future.

## The meaning of e-learning

The Framework identifies flexible learning as a learner-centred and client-focused approach that makes use of delivery methods most useful to clients. It includes but is not confined to online learning. E-learning as a component of flexible learning is a wide set of applications and processes, which use all available electronic media to deliver vocational education and training. It includes computer-based learning, web-based learning, virtual classrooms and digital collaboration and uses.

Online or web-based learning (learning via the Internet, intranets and extranets) is increasingly understood to be a subset of e-learning (technology supported learning). Over the past few years, the VET community has developed a much sharper understanding of how online learning fits into the wider flexible learning strategy. For this reason, the Framework documents distinguish between the umbrella term e-learning and the more specific term online learning, so as to capture better the general intent of the Framework to support a range of electronic media (Internet, intranets, extranets, satellite broadcast, audio/video

tape, interactive TV and CD-ROM) to make vocational learning more flexible for clients.

In this paper e-learning is discussed with particular emphasis and relevance to online learning and web-based technologies, as these represent the area where most of the effort and data is available. This includes the use of ICT to support face to face delivery, blended learning, and fully online implementations, and covers a variety of technologies from e-mail to Integrated Learning Systems (ILS), stand-alone or networked. The paper does not focus in detail on emerging technologies for instruction, such as mobile technologies, as the aim is to provide a broad view of issues as they relate to the VET sector.

# The State of e-learning

## Driving forces

There are many identifiable drivers for ICT-enabled instruction, and these may be classified as technical innovation, organisational and business developments, and the needs and demands of the individual learner. Often it is a combination of these three components that brings about change. Although the rate of development in each of the areas differs, they are clearly not mutually exclusive, and developments are invariably led by the advent of new technologies. The capabilities of hardware, and the technical infrastructure to support it move ahead rapidly and often lead to development in other areas. For example, technologies such as wireless access to high bandwidth and web-enabled mobile phones are released to a market and initially adopted by enthusiasts. Business then experiments with possible viable models for the efficient use of the technologies and methods for integrating them into organisational practices and culture. Finally, as end users become accustomed to the technology and the demographic profile shifts, they will more readily recognise its benefit and the technology becomes a part of their lives, and the cycle is complete.

A similar cycle exists within educational technologies. Educational applications leverage off base technologies and tend to lag significantly behind in their maturity cycles, not least because of the complexity of integrating them into organisational practices and culture, and in gaining broad acceptance from their users. For an educational technology to be mature, it must be firstly a stable technology, secondly it must be integrated into the business and provide a Return On Investment (ROI), and thirdly it must conform to workflow and practices of its core users, namely teachers and learners. They are the ultimate consumers of e-learning, and the clients of the VET sector.

In terms of the broader uses of IT, organizations are well on the way in harnessing developments to more effectively meet organisational goals. Businesses are realising efficiencies through the introduction of integrated knowledge management systems to handle business processes. At present, e-learning is still an add-on to the business' fundamental usage of IT; in many instances e-learning has not yet become an integrated part of the knowledge management and HR functions of businesses. The knowledge economy places a premium on innovation, customisation, new business models, and new ways of organising work. In order to succeed and survive in this new environment, individuals and organisations must continually acquire new skills and new ways of managing knowledge and information (Coleman & Laplace, 2002). As technology drives many of the revolutionary changes that are occurring in the work world, it also holds the potential of helping people and organisations keep pace with change. Kay (2002) categorises business perspectives on incentives to invest in e-learning as providing market penetration, respectability, and

synergy. In other words, there is a range of complex incentives for business to invest in e-learning beyond the immediate desire to create efficiencies in training.

E-learning is efficient because it shortens the time required to update workers on new products, methods, and processes. Proponents of e-learning suggest that it provides real-time learning of critical or just-in-time knowledge. With state-of-the-art e-learning management systems, training costs can be traced to individual learners and costs can then be measured against results. Advocates believe that online training is better, faster, and cheaper than conventional training. E-learning is becoming an integral part of organisational training. E-learning may be delivered via numerous electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/videotape, interactive television, and CD-ROM.

Learner needs are also driving forces in e-learning. In today's new economy characterised by industrial change, globalisation, increased intensive competition, knowledge sharing and transfer, and information technology revolution, traditional classroom education or training does not always satisfy all the needs of the new world of lifelong learning (Zhang & Nunamaker, 2003).

Learner-centred learning is replacing instructor centered learning. Such learning is initiated in homes offices, shops and factories as well as classrooms. E-learning provides people with a flexible and personalised way to learn. It offers learning-on-demand opportunities and reduces learning cost. At its best, e-learning is individual, customised learning that allows learners to choose and review material at their own pace. At its worst, it can disempower and demotivate learners by leaving them lost and unsupported in an immensely confusing electronic realm.

Technology has been a strong catalyst for educational innovation and improvement, especially when the World Wide Web is involved. Drivers for e-learning continue to be a mixture of the advent of new technologies; the expectations of users growing up with new technologies and increasingly using them for productivity; the quest for efficiencies in the delivery of training; organisational initiatives to maintain currency with developments in technology; and policy initiatives. Best practices that enhance the business ROI for e-learning by improving its effectiveness will gradually overtake the passion for new technology for its own sake (Brodsky, 2003).

## The size of the e-learning marketplace

The e-learning market place has been expanding and is predicted to grow significantly over the coming years. While the discussion of e-learning is not exclusive to any particular technology such as the Web, it is there that most of the activity and interest is centred. It is worthwhile remembering that the Web as an underpinning technology for enabling communication, and as a means of delivering learning, has been with us for only ten years. In that time, there have been multiple enhancements of the fundamental concept of the Web.

A survey of the European e-learning market completed in 2002 through the European Training Village web site at CEDEFOP (European Centre for the Development of Vocational Training), found that pure e-learning and blended learning accounted for a quarter of the time users spent in training (Massey, Harrison & Ward, 2002, p.2). Further the report found that e-learning accounted for 30 % of training capital expenditure and just over 22% of expenditure on content and services (Massey, Harrison & Ward, 2002, p.4). A benchmarking survey of e-learning within business organisations in Canada and the USA in 2001 found that 43% of businesses involved in the survey were in the process of implementing e-learning or had already done. 33% of businesses were planning to implement e-learning within the next three years (Sofres, 2001, p.3). A report on the e-learning training market by Screen Digest estimates the corporate market in the US at \$3.5 billion, and \$5 billion globally pointing to a \$50 billion market by 2010 (Levis, 2002).

A survey by IDA Singapore covering Singapore, India, Hong Kong, Korea, China, Taiwan, and Australia with snapshots of Malaysia and Japan, examining revenues and expenditure from e-learning by individuals, governments, corporations and academic institutions, estimates that the e-learning revenue of Singapore in content, services and technology provision will grow from \$46.4 million USD to \$106.4 million by 2005 (Infocomm Development Authority, 2003, p.3). Growth in Korea and Taiwan is expected to catch up quickly. The largest growth is predicted to be in provision of content for e-learning.

Statistics for the Australian market are difficult to find, but IDC (as cited in Payne, 2002) anticipates that the e-learning market in Australia will be worth US\$65 million by 2005, growing at an annual compounded rate of 22%.

The reasons behind the relative maturity of the Australian e-learning market include the standardisation of language with relatively few language barriers within the country, a top-quality infrastructure, national as well as state governmental support, a conducive sociological culture that supports all types of learning, and a widely-dispersed population. While IT e-learning dominates the Australian e-learning market at present, non-IT e-learning, which may be vertical-industry-specific, function-specific or soft-skills-related, may grow to be on par with IT e-learning in the next 5 years (Payne, 2002).

## International benchmarks

One area of confidence and certainty in the e-learning debate is the relative position of Australia when compared with other technically advanced cultures. There is a general acceptance that in terms of actual technologies, the US is six to twelve months ahead of Australia, but this does not translate into a similar position in the use of ICT for learning. An educational technologist undertaking research or surveying best practice does not need to focus on US-based literature. Refereed papers, particularly those describing practice and issues in using ICT, at any of the Australian ASCILITE or AUSWEB series of conferences, will match the US-based international series of AACE in terms of the depth of understanding of the issues in ICT and implementations leading to successful use. The Australian literature on standards is a particular example, as there appears to be a greater breadth of understanding of standards among developers and practitioners in Australia than internationally.

The relative position of Australia to other countries can also be clearly seen in the statistics for online training in the corporate sector. The American Society of Training and Development (ASTD) director of research Mark Van Buren (cited in 'Corporate E-learning...', 2003) using the latest International Comparisons report says that Australian and New Zealand corporate training via technology despite falling from 13.3% of training in 1999-2000 to 10.3% in 2000-01, is forecast to more than double in 2003. This online expansion will be driven by Australia's high level of employer-funded education. With e-learning ratios of 15.9% in Canada and 11.8% in the UK, the prospects for e-learning in Australia are improving dramatically. 'Australia and New Zealand are at the high end of the spectrum for projected use of learning technologies at 26.3% of training time in 2003' (Mark Van Buren cited in 'Corporate E-learning...', 2003). The ASTD survey puts Australia second only to the United States in employer-provided training according to the ASTD survey, with Australian companies spending an average of \$671 per employee across all training types in 2000-01, and providing training to 90.5% of all employees.

## A phase of consolidation

It is common in the literature to characterise the current state of e-learning as being in a phase of consolidation. Just as business was forced to re-examine business models for software development following the dot-com boom and bust, it is now no longer popular for futurists to make outrageous claims about the proliferation and transformation that e-learning will bring. In the last three years, Educational Technology conference keynotes (Prometeus, 2002) have replaced their rising graphs predicting the impact of e-learning with more humble reminders of the importance of pedagogical principles. Others (Brabazon, 2002) have adopted a stronger reaction to the failures of e-learning and maintain that at the classroom level technologies have provided little benefit, and that such initiatives are commonly driven by a misplaced desire on the part of educational administrators to be a part of the movement. The reality is that the present is more a time of reflection and refinement based on an

uneven march to maturity. As Viviane Reding, Member of the European Commission responsible for Education and Culture, noted in her speech at the opening of the Learned Forum Karlsruhe, on 4 February 2003.

Our attention is moving from the technology and the infrastructure, towards the practice, the pedagogy, the content ... We are now concerned with issues of: context, effectiveness, efficiency, standards and quality. And we are examining the wider implications for curricula, for training and technical support, and for organisational change within the educational establishments (Reding, 2002).

This re-examination of priorities and tendency for skepticism reflects both the growing maturity of the industry and an acknowledgement of the failures of e-learning, or at least its past failures to deliver on a set of unrealistic expectations. Many organisations are hesitant about the use of e-learning due to failures, either real or perceived, within other organisations; and also because of a lack of knowledge and understanding of the possibilities. Martyn Sloman and Mark Van Buren refer to recent research into e-learning in Fortune 500 companies both in the US and the UK. The survey showed that 62% of Learning Technology initiatives were not successful: only 1 out of 4 learners were satisfied (ASTD, 2003).

Early initiatives and expectations have been largely driven by a market that has been too keen to adopt technologies for their own sake, an acceptance of the hype surrounding the potential benefits and the need for organisations to be seen as technologically progressive to gain market advantage. However, for many the experimental phase has come at a high cost and small return, as the failure of e-learning to provide multiple examples of success, both in student learning and efficiency of delivery, has been evident (Imel, 2002).

Consolidation is also shown through a recent set of sub-trends such as the development of technical standards for interoperability of e-learning content, and the rationalisation of the tool market through the emergence of larger, fewer providers. There is no evidence that this cycle of rationalisation is nearing an end just yet. These initiatives to standardise e-learning development are characteristic of a technology reaching a level of some maturity, rationalising earlier experimental approaches and seeking sound business models to move forward.

Within education and training, deployment of new technologies has not completed a full cycle in terms of instructional applications. Willingness to adopt e-learning is still the domain of the ICT-enthusiast teachers, or the well-supported novice, with the benefit of a well-coordinated funding framework. Consolidation of ICT knowledge within the body of teachers in VET is gradually occurring. It is a slow but accelerating process. That it takes time for an initiative to penetrate a market is commonly recognised in educational technology. This was seen in VET in the usage of the Flexible Learning Toolboxes. In 2002, these had not significantly penetrated the mainstream VET

teaching and learning. A survey of Toolbox purchasers was conducted during the review of Series 3 Toolboxes in mid-2002 (Eklund & Kay, 2003) and found that of those registered training organisations (RTOs) responding, less than half had used Toolboxes with students. Time constraints on teachers and issues with integrating them into the curriculum were cited as the main reasons for not using them. There is some recent encouraging evidence that take-up has accelerated during the last twelve months, and this is likely to be due to factors such as improved quality of product, professional development initiatives such as the Toolbox Champions and a better understanding among mainstream practitioners of the value of these products as teaching and learning resources. Practitioners are now identifying Toolboxes as a major influence in motivating novice teachers to get started with e-learning, and case studies of Toolbox use are now being located with ease.

During a survey conducted in 2002 for the Series 3 Toolbox evaluation, it was found that success models tended to be founded on the extraordinary energy of the teacher-advocate, who is likely to have driven the success of any initiative. Harnessing this energy will consolidate the significant advances in approaches to ICT delivered instruction seen in education and training. Professional development initiatives that build up skills in those with less experience, and closer examination of regulatory and legal barriers will further consolidate the place of e-learning as something belonging to the mainstream. Again, recent evidence indicates that the strategies of the Framework, arguably the most coordinated effort seen in supporting large-scale adoption of new technologies, is beginning to have influence beyond the early adopters. Nonetheless, there is still much ground to be covered before e-learning is fully contextualised into the culture and practices in teaching and learning in VET.

## **Building on successes**

There are a number of principles of 'pedagogical effectiveness' (Brennan, 2003) that are generally accepted in e-learning development, and derived from both theory and practice in teaching and teaching materials development. These heuristics include those centred on the materials, and the environment created by the teacher/facilitator to enable learners to effectively engage with these materials to achieve learning goals. The literature in all sectors is growing and consolidating to the extent that there is a generally accepted view of what is best practice or good practice, in designing instruction, creating usable environments to deliver it, and facilitating it.

Common in the literature across all sectors is the practice to report on an e-learning implementation in terms of its aims, format and outcomes, and identify elements of it that are considered best practice. Case studies in e-learning are popular, indicating the newness of the field and the tendency for action research as a methodology. There are numerous studies, and while it is sometimes difficult to generalise the results, there is some evidence that the role of the teacher is more important than the instructional designs of the content. For

example, as a part of the Series 3 Toolbox Evaluation (Eklund & Kay, 2003) conducted across 34 implementations some 'successful' trial sites for online delivery were identified. Success included criteria such as the size of the implementation both in numbers of students and teachers; technical complexity; considerable positive feedback from teachers; and evidence of some innovation in deployment and teaching practice. At each best practice site, the key success factors were identified. These were:

- An enthusiastic teacher(s)
- Local support from, and direct access to, an ICT-experienced teacher/mentor
- Significant institutional support in the form of relief time and/or encouragement
- An implementation appropriate to the local environment, often a sensible or conservative implementation that allowed the teacher(s) the opportunity to review the Toolbox and discover its value as a learning aid
- Positive initial experiences with the Toolbox at the installation phase.

It is clear that a successful implementation of e-learning depends on the competence of the practitioner to access and select quality content and then integrate it into the teaching context. This hypothesis assumes that teachers mediate ICT applications when they are successful, and that ICT's academic value relates positively to teacher competence (Kirk, 2002). This conforms well with the current trend to blended learning approaches – those that recognise facilitation is a key component for success. Other writers (Coleman & Laplace, 2002) have identified a range of key success factors that include ensuring executive and upper management sponsorship of the project, visibility of the project within the organisation, the structure and accountability of the development/implementation team, and a careful deployment strategy that includes training.

Best practice models provide us with a set of basic pre-conditions for success of an e-learning venture. Building on these factors, e-learning will mature. The balance of practical implementations and research activities undertaken under the Framework enable positive expansion to our knowledge of how ICTs can facilitate and enhance learning.

# Technical and Design

## Learning Object standards

One of the clearest directions that e-learning has taken in the last few years is in the development, promulgation, and adoption of a range of technical specifications and standards for e-learning. The creation of technical specifications and the development and adoption of technical standards are key activities ultimately underpinning the success of e-learning globally. If organisations are to protect and maximise the return on their investment in learning technology, content and services the systems they use must be interoperable, usable, manageable, and durable (as characterised by Norman & Da Costa, 2003, p.4).

Technical specifications or standards are a way of ensuring that the technology content and services developed for e-learning meet these criteria. A range of standards, originating in the emergence of low-level technical protocols such as SGML and XML, has been developed. They are based on a desire to rationalise a growing collection of developed resources into interoperable, sharable content, higher level standards such as the Shareable Content Object Resource Model (SCORM).

Higher level standards aim to provide a consistent and useful means to describe, catalogue and share instructional resources. As a consequence, a layer of technical quality in them, as well as in the tools used to generate them is created. Specifications and standards developed, tested and tracked by the IMS Consortium, W3C, EdNA, Prometheus, EduSpecs and other bodies include descriptors of content, user profile, intellectual property, instructional goals, interactions and outcomes in a Learning Object Model (LOM). Organisations such as The Learning Federation (TLF) have developed specifications for educational soundness, accessibility, and use these to aid the development process and maintain quality from multiple perspectives.

Standards development is necessarily a complex process of international cooperation and collaboration supported globally by Government and Industry. Three main organisations contribute to standards development internationally: the IMS, IEEE LTSC, and the ISO/IEC (Frieson, 2003, p.1) but the activities of these organisations are supplemented by organisations who have roles such as specification development: EdNA (Australia), ARIADNE (Europe), Tracking: ALIC (Japan), CETIS (United Kingdom), EduSpecs (Canada), and Implementation: USOeC (United States), ADL SCORM (United States) and CanCore (Canada). Examples of areas in which specifications and standards are being developed are Enterprise, a specification for transferring data about people and groups; Learner Information Package, a specification for a standard means of recording information about learners; Content Packaging, a

specification for sending learning resources or objects from one program to another, making it easier to deliver, reuse and share materials, and QTIIMS Question and Test Interoperability for transferring information such as questions, tests and results between different software applications.

Initiatives such as COLIS, which aims to build an integrated learning and information retrieval environment based on a set of explicit standards, is really the first holistic attempt to represent the LOM in an interface and assess its usefulness with real users. In some ways, COLIS demonstrates how far we have to go to realise the vision of accessing a database of meaningful learning objects and sequencing them to accomplish a particular instructional goal. When the COLIS demonstrator was launched late in 2002, the debate in educational technology circles showed a concern with very fundamental elements of the design: How can learning resources be catalogued and accessed and sequenced in a meaningful fashion, what is an appropriate granularity for describing digital assets, and how will teachers in the higher education sector change work practices to adopt the use of them?

The use of online materials in the VET sector has allowed it to advance in the implementation of Learning Objects because:

...there is a willingness to cooperate and collaborate across state boundaries; a culture of modularising content already exists; a national curriculum is already established; and, assessment requirements and performance criteria are specified (Higgs, Meredith & Hand, 2002).

The LO model is excellent as a set of standards for technical development but needs to be moderated with actual user contexts. The authors conducted a survey of the news and events items for the last 12 months from the website of key organisations (IMS, IEEE, Cancore). It showed that the future development of technical specifications and standards in e-learning could be characterised as:

- Continual development and refinement of specifications and standards. An increasing dissemination and embedding of e-learning standards and specifications
- Outreach to academic, business, industry or government professionals to promote the value and use of specifications and standards and enhance their development
- Work on extension of specifications and standards into areas of new technology and applications and application linking such as interactive content and runtime systems.

It is also worth remembering that standards for e-learning are not a recent invention, but are the result of considered and considerable effort on the part of a number of groups such as W3C working parties over the last six years or so.

As yet, however, there is no definitive and agreed standard, but a recognised set of emerging standards that are adapted to suit a particular organisational need or development goal. The development of technical standards is not a process that is 'half way complete' as the advent of new technologies and applications to e-learning necessitates that they emerge and develop with ongoing usage.

## **Maturing software development practices**

Within the multimedia and web development industry there is clear evidence of a gradual maturing of practices, through the adoption of more formal methods derived from software engineering, and the recognition of standards. Just a few years ago it was common for the development of a large website not to include any user profiling or requirements gathering, for accessibility standards to be completely overlooked, or for testing to be ad-hoc. Many of these providers have left the market, defeated by a lack of process, and business sponsors are becoming far more demanding of providers to demonstrate quality of process in development. There is also a much greater acknowledgement and understanding of User Centred Design (UCD) standards and the importance of usability in design, and these improved processes are assisting to create better quality e-learning resources – those that are more efficiently produced and better meet the needs of the target market. Again it should be recognised that the principles of UCD are not new, but are being rediscovered by an industry that is gradually recognising that success in a project and quality of a product can only be achieved by sound development practices.

Integral to the maturing of educational software is the recognition that the needs of target groups must be incorporated into online learning so that their needs are considered at the initial stage of the development of learning materials and when buying equipment and making software decisions (Daniells, 2001).

Improved development practices combined with standards has resulted in the rapid improvement in quality of educational software being developed, with many implementations changing focus towards a user centred process and on achieving sound learning outcomes. Content providers for The Learning Federation initiative have recently stated that their development processes have improved dramatically as a result of following TLF's LO model standards and guidelines, with a consequent change in the quality of their output. Similar feedback is coming from providers of learning materials from ANTA's Toolbox initiative, with the capabilities of successful tenderers becoming so high as a result of a won contract that it is difficult for other providers to compete. The contribution of TLF and the Toolbox project to maturing the multimedia industry through the promotion of their standards and development principles should not be underestimated.

## **Instructional Design as an emerging discipline**

Instructional Design using technology or Instructional Systems Design (ISD) is a newly rediscovered discipline. Currently in the software development industry, there is a lack of understanding of the role of the instructional designer as a participant in a multi-disciplinary development team, or even where instructional designers may be found or trained. It combines knowledge of educational theory and practice with appropriate technologies to enable learning, and encompasses the whole of the development and evaluation lifecycle. One of the foundations of instructional design is that it is a component of a user centred development process. It is based on knowledge of the application of learning theory to designing experiences that promote learning and leverages from a significant literature associated with designing good learning – an activity taught in teacher training courses for hundreds of years. It involves choosing appropriate technologies and designing interactions that promote effective and efficient knowledge transfer.

A tenet of UCD and a practice of instructional design as a discipline is to view the development of the product (website, e-learning environment, cognitive tool) as only part of the process. Just as software requires documentation, a deployment strategy including training and a help-desk facility for ongoing support, so too do the outputs of the educational technology development process require facilitation and deployment. The role of the teacher, to interpret the educational artifacts and customise their delivery into the teaching and learning environment, must be supported.

## **E-learning as a product in a context**

There is an increasing recognition that successful learning requires not just quality instructional content but an appropriate context that includes facilitation and an understanding of the learner. The teacher, who supervises the successful deployment and integration of the content into the teaching and learning environment, facilitates this context. The teacher's role is to find, adapt and deliver knowledge using a variety of techniques appropriate to a knowledge domain and the needs of the learner. In terms of e-learning, this suggests a move away from self-paced instruction and fully online implementation models, toward what is being termed a blended learning approach.

E-learning should not be viewed as just a product, an identifiable artifact of learning objectives, content and interactions. E-learning as a product is of uncertain value until it is deployed in a context that includes its users, technical and organisational attributes. The artifact itself has a limited shelf-life and needs to be modifiable, or it will succumb to the pressures of new curricula, changing demographics, and favoured learning styles and be discarded or completely reworked. The implications for the concept of a repository of learning objects are that the database will need constant renewal.

The fact that learning content is almost certain to be used in very different ways and even modified by teachers underscores the importance of flexibility in its design. New authoring tools that allow teaching practitioners to modify selected materials and sequence these materials are becoming increasingly important. New Series of Toolboxes recognise the need for customisability that is growing along with teachers' expertise to optimise it.

# Teaching and Learning

## Trends in educational theory and practice

Educational Theory has also had an impact on using ICT, as content creators search for a theoretical basis to justify their designs, and as technology is seen increasingly as an enabler of learning. The rise of cognitivism as the dominant 'post-modern/post-behaviourist' learning theory and the recognition of the importance of the social context for learning is changing curricula and teaching practice. Significant trends in linking pedagogy and educational technology are emerging worldwide as learners; trainers and teachers evaluate the capacity of e-learning to improve learning for different types of skills and competencies (Reding, 2003; Straub, 2003). Effort is being directed at determining the factors that create effective electronic learning environments (Khan, 2002), and the broader factors that create successful e-learning programs (Frydenberg, 2002). This includes establishing a basic framework for Web-based or electronic learning covering dimensions as diverse as the pedagogical; technological; interface design; evaluation; management; resource support; and ethical considerations and establishing standards to cover domains such as executive commitment, student services and instruction and instructor services that support the delivery of e-learning programs by institutions.

Further, studies are being made of how students use ICT to support learning delivered by conventional methods (Rourke, 2002), and to create a social climate equivalent to that found in the classroom (Oren et al, 2002). There is also a great interest in the literature in cognitive and other forms of learner profiling to ensure the fit between student's learning needs and skills and the product offered via educational technology.

Discussion of cognitivism and constructivism in learning focuses on achieving higher-level learning (Hung & Nichani, 2001) in engendering independent, self-reliant learners who can employ a range of strategies to construct their own knowledge. ICT is seen as an enabler, a means of acquiring knowledge, a metacognitive tool. The attainment of higher-order knowledge, attitudes and approaches embedded in a social context and made all the more possible through technology is an aim of education in the post-modern society. Early education is undertaken in preparation for further, lifelong learning and multiple careers through an ability to undertake training and professional development that furthers both individual and organisational growth.

In terms of the impact of learning theory on instructional design practices, a significant literature demonstrates how theory informs design. For example, cognitivism is based on a cognitive model of the human mind and the premise of a limited working memory, and the importance of relating new knowledge to existing knowledge structures within the brain. The instructional design

approaches that are derived from this imply a scaffolded sequencing of material, limiting the number of concepts and interacting threads on a page, and providing a recognisable context for learning. Many of these design heuristics are, however, derived from grounded theory, that is, the practice of building on experience using online materials. The cognitivist/constructivist debate has impacted and informed learning designs, favouring strategies and an emphasis on processes rather than content, and initiatives that enable e-learning such as the use of templates and the notion of the learner as designer.

Collaborative activities, sites where students can use e-mail, forums, bulletin boards and share and edit documents online arise as alternatives to the more rigid Learner Management Systems, like WebCT. Jasinski (2001) argues that collaboration with students renews the teacher/learner relationship, while maintaining immediacy and minimising the need for technical expertise.

Blended learning allows for a range of teaching and learning practices to be combined into a custom made learning experience for each individual learner. The term has come to describe a well thought-out combination of e-learning and other training methods - the future trend will use the concept of blended learning more effectively - proactive blending, which means 'taking into consideration the strengths and weaknesses of technology-mediated learning' (Brodsky, 2003).

## **The acceptance of blended learning**

A number of sources have recently cited the growing trend to blended learning that is, incorporating the use of ICT into the instructional process to augment rather than replace face to face delivery. In Smith (2001) blended learning is described as 'a method of educating at a distance that uses technology (high-tech, such as television and the Internet or low-tech, such as voice mail or conference calls) combined with traditional (or, stand-up) education or training.' It is likely that this is not actually a measurable trend away from online delivery and towards a blended mode, but more of a recognition that this mode is commonplace, meets the needs of larger numbers of students and teachers, and seems to be a key component of the more successful uses of ICT.

Some writers (Morrison, 2003) have described blended learning as the strategic use of learning delivery channels. These channels are a physical classroom, a virtual classroom, print, email, message boards, the telephone, coaching and mentoring systems, EPSS, software simulations, online collaboration, self-paced e-learning, and knowledge management channels and increasingly, mobile or wireless channels.

The usage evaluation of Toolbox Series 2 and 3 (Eklund & Kay, 2001, 2003) showed that teachers were often not willing to move from a face to face model

of delivery to fully online, even when it had clear advantages in terms of market reach. This is because they regarded Toolboxes as alternative sources of content, which were useful to augment their existing materials and delivery. Using the Toolbox as a secondary resource allowed the teacher to become accustomed to the content of the Toolbox and gradually introduce it into their delivery. In other words, the ICT-experience of the teacher and their confidence with using new technologies were factors in choosing the delivery approach. This is one of the key reasons that blended approaches are emerging – they arise naturally from a consideration of context in the adoption of new learning technologies. A range of industry-based case studies (Valiathan, 2003) covering Dow Chemicals, Royal Bank of Scotland, PcW consulting have shown the advantages of blended learning approaches as meeting both institutional requirements, in the allocation of expertise and resources to create a learning design, and the needs of learners, by offering appropriate and sometimes multiple learning styles in the one subject.

Blended learning has been successful because it commonly emerges as a delivery technique from a process of planning and analysis, that has been described as ‘bulletproof’ (Troha, 2002). There is also evidence to show that it is a learning design implicit in many success models. In an analysis of a two-year empirical study, Barbian (2002) concludes that blended learning methods ‘boost employee productivity over single-delivery options’. Advocates of blended learning maintain its success is due to it combining successful elements of traditional and technology-enhanced delivery (Zenger & Uehlein, 2001) and this is leading to a heightened awareness of its value.

## **Expectations of learners and teacher training**

With the increased penetration of the computer and its applications to e-commerce, a generation of young users is growing up with the computer having always been a part of their life. Continually changing demographic profiles for consumers of e-learning imply the need to adopt a user centred design process, rather than use an off-the-shelf, templated solution. There are also implications for the kinds of technologies that we can expect to be commonplace and accepted among the user community. As the IT-literacy of students increases, skills based courses will be replaced with those that focus on information gathering and analysis, and a higher level of base technologies may be assumed.

Teacher training and the ICT competencies of beginning teachers are improving as older teachers are retiring, making way for those who have undertaken training and are more familiar with new technology. There is evidence that this is not occurring rapidly enough in the school sector to meet the demands of young learners. An example can be found in a survey on the impact of information technology initiatives on Scottish schools, which assessed the extent to which the outcomes resemble those that have already been reported in Silicon Valley. Scottish teachers and school students mostly have access to

computers in their homes and classrooms. The home computer is used often. 'Students, however, encounter the classroom computers only seldom and when students do use computers in the classroom the activity is often peripheral to the learning process, such as word processing of essays' (Conlon & Simpson, 2003). Such evidence underscores the need to provide appropriate professional development opportunities for mainstream school teachers.

Similarly, a review of teacher ICT skills in the US found that although most teachers are familiar with computers, many do not integrate computer skills into classroom teaching (Loneragan, 2001). Educational technology, when used to develop higher-order thinking skills, can positively impact learning. However, teachers in low-income schools often teach about the computer itself and use computers for drill and practice, thus denying students the opportunity to progress to higher-order problem solving. Overall, teacher training was found not to provide future teachers with the kinds of experiences necessary to prepare them to use technology effectively in the classroom. Researchers recommend integrating technology training into the entire teacher education program rather than offering formal, stand-alone technology courses.

A similar situation exists in Australian Schools, with many students now more capable of using computers than their teachers. Newhouse (2001), found that teacher characteristics inhibit the development of computer supported learning environments: many teachers lack sufficient computer literacy and experience in using computers to support learning. Teachers want to help students use computers, but are looking for instructions on how to do so in their classes, often seeking examples of computer use in their specific curriculum area.

Where teachers employ an instructivist pedagogy, students are either required to use computers for only limited roles or are rarely required to use the computers at all. Computers are not perceived as a necessary or even critically useful by most teachers (Newhouse, 2001).

## Equity issues

Access to and the ability to effectively use information and communications technologies (ICTs) to obtain information and services are becoming increasingly important skills necessary to fully participate in contemporary Australian economic, political and social life. The term *digital divide* is common in the literature, with many writers agreeing that:

...without careful management of the learning process, application of best principles and practices in e-learning design strategies, effective attention to staff development, provision of extensive learner support services, and careful focus on a range of socio-educational issues, the promise may lead to a widening gap in access between rich and poor, young and old, employed and unemployed, and computer literate and illiterate persons. Access to e-learning may actually be made more difficult by the wider use of technology claimed to be able to improve it (Fathaigh, 2002).

A level of ICT confidence and competence needs to exist before the benefits of e-learning can be reaped. Social inequities exist irrespective of the technology or innovation, and policy and practice is put in place underneath the appropriate legislation to address it. In the past few years there have been significant advances in accessibility compliance for digital assets through the World Wide Web Consortium and subgroups such as the Web Accessibility Initiative. There is a growing understanding of accessibility in the development community. As the definition of accessibility is expanded to include technical and social aspects of disadvantage, educational technology must become better able to meet the needs of specific target groups such as Indigenous learners, learners with literacy needs, learners with a disability, women, rural and remote rural learners and isolated metropolitan learners.

Europe and the US have implemented legislative frameworks for facilitating access for disadvantaged students. On a much more detailed level, the Access and Equity provisions of the Framework aim to ensure all aspects of online delivery including policy making, infrastructure, program development and support services address access and equity issues. The embedding of these principles has nurtured a system that provides e-learning opportunities for all (Daniells, 2001). The continuation of this thrust should ensure that the digital divide would become less marked as the adoption of e-learning increases.

As home computers and networking capabilities grow, the rise of blended learning as a preferred approach allows for students to find a learning experience that meets their budgets and level of skill. With the increased possibility of cross-accreditation of courses between organisations with courses offered in different delivery modes, the opportunities for access to e-learning will expand and equity considerations more easily addressed. The Access and Equity in Online Learning Project recommended that the provision of suitable material for equity groups be regarded as integral to best practice in teaching and learning, rather than as extra work for facilitators or managers (Daniells, 2001). The Vocational Education and Training sector must aspire to a culture of universal design and access that will create a climate where attention to access and equity is an accepted part of the development of online vocational education and training.

There is another approach to addressing the digital divide that focuses less on the gaps and more on positive actions for social inclusion. This kind of integration can only be achieved by attention to the wide range of physical, digital, human, and social resources that meaningful access to ICT entails. As one author states ...'It is now time to deepen public understanding of this issue through a more thorough appraisal of what access to ICT entails and of the ends that such access serves' (Warschauer, 2002, as cited in 'Defining the Digital Divide', 2002).

# Organisational Considerations

## Transforming the workplace

There is a range of significant barriers to organisations adopting e-learning. In the context of schools and VET, workplace practices and awards do not easily fit with the flexible learning concept. In business, e-learning is only beginning to be recognised as an investment in human potential and thought of in those terms. For schools, teaching and learning still takes place in physical classrooms, based on same-time same-place delivery methods, and teacher-centred approaches are the norm. Teachers work with a highly rigid curriculum that must be methodically delivered in a step-by step fashion, as they work toward strict assessment requirements. There is often little time for teachers to develop their ICT skills, no time to vary the delivery of content, and no time to implement new teaching methods.

Many teachers who have experimented with online forms of delivery have experienced an additional workload in responding to student emails. This raises industrial and workplace issues with respect to the time required to deliver teaching, particularly for casual staff that are paid hourly. VET and university teaching allocations are still based on lecture hours/contact hours or equivalents, and some administrators believe that if the students are not physically present for class the time is not a real part of the teaching allocation.

Today's workplace must employ knowledgeable, flexible, efficient, and adaptable workers who need to be updated on the latest changes in the structure and work skills requirements of their business environment (Whiteman, 2001). Business programs must respond to corporate and personal development needs by designing curriculum that embraces the management skills required by a changing business world. People and corporations are undergoing paradigm shifts, where the accepted reality of their world is changing. Businesses are recognising innovative ways to increase productivity by redesigning entire critical business processes and using technology to support the new designs.

## E-learning as a component of corporate knowledge management

The need for organisations to promote and capture learning at the individual, team, and organisational levels has fuelled considerable interest in the concept of the learning organisation. With the increasing sophistication of IT and the acknowledgement that institutional goals may be efficiently achieved through it, there is a gradual alignment of organisational goals with core IT infrastructure. As a result, e-learning becomes a component of performance enhancement,

and the convergence of e-business and online learning in the 'information age' is achieved (Mitchell, 2003). E-learning can also build on other knowledge management systems existing in a business environment.

In the mid-to-late-1990s the spread of telecommunications technologies and electronically networked business strategies provided the context for the growth of e-business. The information age also created the preconditions for online learning to develop within a framework whereby learning is one of many online customer services available to students, delivered by flexible, customer-centric providers. Business systems such as sales, accounting and records provide a base of infrastructure for learning modules, where student tracking and accreditation becomes part of the organisation's knowledge. The core functions at the client end of communication and authentication are built into the operating system of the common PC.

In terms of VET, as Mitchell notes (2003), the utilisation of electronic technology to provide more than just online learning is growing. Other services for students, such as on line information, marketing, and enrolment are also emerging. Multiple providers of Integrated Learning Systems or Learner Management Systems have rationalised into a few very large players that span school, VET, university and corporate sectors. Their role is largely one of integration, customising system modules to meet individual organisational requirements and knowledge management systems. Although much research in VET focuses on online learning, e-business is having, and will always have, more impact on the economy, jobs and enterprises than online learning. Alignment of e-learning in VET with corporate directions and market forces is crucial to strengthening the impact of policies such as the Framework in the economy as a whole.

## **Return on investment**

There are a number of models for determining the value of training experiences or measuring Return on Investment (ROI) of e-learning, and these cover both human and business performance perspectives (Kirkpatrick, 1994; Phillips, 1996). They describe four levels of measurement that input to ROI, namely Reaction, Learning, Behaviour and Results. These are often cited and well known principles in the corporate training sector. The concept that returns from training are tied to, or determined by, organisational goals is not new (Tobin, 1998). More recently, Bersin (2002) singled out e-learning as different from other forms of training because the link to organisational goals could be more readily established, through electronically tracking learning outcomes and business successes. There is thus a history of the argument that '...the ultimate purpose of e-learning is not to reduce the cost of training, but to drive business results' (Shiu, 2003).

Demonstrated examples of ROI in e-learning are the most significant means of gaining acceptance in the corporate sector and impacting on the maturing of

industry processes. Once business models for e-learning investment can be established and validated through experience, the full weight of business support for e-learning will be seen. This is likely to lead to very different approaches for the way in which VET engages business. Courses are likely to emerge that are delivered by the IT infrastructure of a business and embedded within that business' knowledge management system.

# The Future

## Shaping the future

Forces that are aligning to shape the future for e-learning may be categorised as technical, teaching and development practices or organisational initiatives. Dramatic changes in hardware and software and 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. A new generation of learners is growing up with technology and will increasingly expect it to be deployed in undertaking training. Organisations, including schools, are developing better IT infrastructure and systems for efficient business and will be seeking to leverage off those efficiencies for the delivery of training. Businesses are seeking more skilled and flexible workers who can 'hit the ground running' and already possess some of those attributes thought once only achieved through experience.

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

## Software and hardware

The cycle of new technologies entering an initial experimental and euphoric phase followed by a period of consolidation and adjustment is certain to continue into the future. However, the groundwork currently being laid in standards and maturing software development practices will ensure a more metered and phased rollout of any new technology, avoiding the disappointments in educational technology characteristic of the year 2000. The rapid growth in hardware and network capability will transform the capabilities of current systems for learning from the relatively flat and modestly interactive environments currently found on the web, into highly interactive, visual and immersive systems where simulations are common.

E-mail gaming can be a counterweight to static HTML content. Inter-person collaboration and knowledge building is seen as the most effective way for adults to learn.

Participants bring a variety of diverse experiences and previous knowledge to the task and the facilitator selects and implements appropriate structures for different rounds of the game that encourage the construction and sharing of

new perspectives, knowledge, understandings and insights as suggested by Zhu (1998) (Jasinski & Thiagarajan, 2000, p. 3).

As for hardware, in ten years time laptops will enjoy a far greater market share as portability of access to the internet becomes commonplace via wireless access to high bandwidth. They will commonly be coupled with large flat screens in the home, the 3.5 inch drive will disappear, wireless network adaptors will be prevalent, and a read/write CD/DVD format drive will become a standard feature. With the integration of email and the mobile phone networks and the advent of voice-to-text recognition and translation, phones may be increasingly used to participate and monitor online discussions for learning. Mobile Learning (M-learning) extends the anytime-anyplace advantage that new technologies bring to information access, and provide a means to engage users via a familiar and fundamentally useful communications device. M-learning will increasingly provide high level information about learning, orienting the learner to learning tasks and information, and includes the provision of learning elements such as daily tips, feedback on quizzes, reminders and access to tutors.

The key to the world of educational technology is that it is not advanced technologies that will be making the impact on education and training. In fact it is the mainstream technologies of the day that will be belatedly adopted and integrated into teaching and learning, once they have become accepted by the demographic of the day in so many other areas of their lives. It makes sense then that tomorrow's e-learning technology successes will be based on adaptations of successful technologies and their uses in business, and in the home. These will include business IT systems, the rise of internet commerce and home game systems.

Some commentators predict that 'training technologies will become so smart and intuitive that technology will no longer be the focus. It will be replaced by the application and how it serves their business needs' (Brodsky, 2003). The future of lifelong learning depends on reducing the gap between concept and implementation. The use of games and simulations in learning will help develop collaborative communication and strategic thinking (Fannon, 2003).

## **Learner engagement**

Much of learning design in the future will be based on learner engagement via active simulation (web based role play), the use of microworlds (rule based simulation) for personalised construction of knowledge, and collaborative problem-based learning, where learning activities centre on generating a solution in an authentic setting. These designs will be enabled by more interactive technologies but also led by a desire to lure customers to courses. The distinction between multimedia authoring and delivery and production for web-based delivery will dissolve. As development standards and practices mature, there will be far greater interoperability of content. Content presentation

will become more interactive but no more expensive to produce, and there will be a natural collaboration between the game industry and e-learning development, as instructional designers create systems for a generation of learners who have grown up with gaming systems at home. The days of e-learning designs with a predominance of text will disappear, and blended designs using paper-based textual information and interactive web-based content will be popular. Typical learning designs will include face to face presentations, group discussions online, the provision of a set of learning resources for problem solving, and individual interactive sequences engaging and exciting the learner. Much of the assessment will be formative with the teacher as mentor.

## Quality

The energy in the e-learning debate surrounding standards will undoubtedly subside and be replaced by broader concerns relating to quality of learning experience. Standards will have their greatest successes at the lowest level of granularity, in the adoption of common formats for metadata, which will be embedded into authoring and information retrieval tools. Educationalists and instructional designers will not be discussing standards any more than they now have an interest in file formats of common applications. Their interest will remain in educational quality and design principles and methods of production. Higher level standards which sequence digital assets into larger learning objects will lose favour as they find limited applicability in authentic teaching and learning contexts, and as rapid development tools for interactive multimedia sequences will defeat the importance of the reusability of these learning objects.

The Learning Object Model will have its greatest impact in the development of materials for Primary and Secondary education, but will find limited applicability in VET, where the materials are in specific domains and are efficiently custom-built and readily disposable.

Much of the work done on standards leads to a set of tools for organising content at higher levels of granularity, and these take the form of e-learning authoring and knowledge management tools. This intelligent sequencing of higher-order granular content is built on a set of templates to select and sequence low-level information into a coherent document for research or for learning. Digital repositories will be sometimes used by developers but rarely by teachers. The resources they contain will soon date through curriculum change, teaching emphasis, the changing needs of the learner, and the use of new technologies for developing learning content.

## Deconstructing learning

As constructivism is eventually recognised as a philosophy about curriculum design rather than a learning theory, VET and schools will gradually reform their curriculum and learning structures. Eventually it will be recognised that a significant part of learning will not necessarily take place in formal classrooms at discrete periods of time, and students will enjoy more freedom to manage their own time to work on projects centred on a theoretical aspect of content. Problem-based learning using ICT where students access a variety of resources and collaborate to solve problems, now commonplace in VET and university teaching, will find its way into Secondary and Primary Schools. The teacher role as a guide, mentor and facilitator will continue to develop, with workplace reforms slowly offering more flexible working arrangements for teachers.

A key goal of early education will be to prepare students for a wide variety of work contexts, for lifelong learning, and for a number of career changes. Much of a student's program will focus on the development of personal qualities and information management skills, often relating to authentic workplace settings. The bell sounding the beginning of the lesson will be replaced by a schedule of lectures, learning experiences and consultations with teacher-mentors. The role and expertise of the classroom teacher will change and grow, with teachers being better paid and more qualified, and more able to shift to alternate careers. Many teachers will be seconded from industry.

Curriculum reform will de-emphasise declarative knowledge in specific subject areas, and subjects such as knowledge management for learning will be taught and closely integrated with other subjects. The rise of globalism will reform the social sciences curriculum, and online collaboration with other countries via WebQuests and other ICT-based projects will be common. Information retrieval will have undergone a significant leap with the successful development of search engines that are adaptive to the needs of the individual, accept queries in natural language and are based on the science of conceptual structures, now possible to realise with better quality metadata. Libraries will lead an information retrieval reform as well as the development of digital repositories, and the distinction between information for research and information that is sequenced to achieve an instructional goal will be less relevant than it is today.

The transition from school to VET or higher education will become more seamless than it is at present, as students embark on lifelong learning. Their individual learning styles will be identified through an induction process. Some e-learning experts see students increasingly 'self-service' their education and training needs, checking on their grades electronically, maintaining their portfolio in a digital repository, and holding continuous accounts with one or more providers. The computer will be a tool for transformative education (Jonassen, 1998), accessing, manipulating and representing information using increasingly larger elements of knowledge to solve problems and achieve goals.

Within the VET sector, this will emerge as an emphasis on flexibility and heightened skills to select and exploit knowledge. Accompanying these skills will be increased expertise in design and delivery of scenario based learning and collaborative tasks, which encompass a range of communication tools and modes to foster strategic thinking (Fannon, 2003).

## **The market power of e-learning**

In the future more businesses will recognise e-learning's ability to build knowledge and develop skills while reducing training-related costs. E-learning will become more influential both for internal and customer training purposes. In the future more of a company's customers will go online to learn how to make the best use of its services and products (Brodsky, 2003). E-learning is increasingly converging with other management tools, providing managers with a unified view of all financial, customer and employee information. E-learning will be integrated into the knowledge management of an organisation, and its ROI will be found in more traditional Human Resource models that focus on employee knowledge growth being a means of attaining organisational goals.

There is a growing literature on how e-learning is one component in improving business performance, and a recognition that training is often addressing the symptoms of performance and not the cause. There is no point organising a course of time-management for employees if the root cause of inefficiency in productivity is business processes or workplace culture. Staff training is just one component in the enhancement of business performance through organisational change. An integrated approach to organisational knowledge management and performance improvement is providing new ways to examine ROI on e-learning.

The corporate sector's recognition of the benefits of e-learning extends beyond their investment in their employees. E-learning is becoming seen as a means to modify or influence the behaviour of clients and hence to achieve corporate goals within the market. Business may see that developing e-learning resources that can be accessed by schools provides an opportunity for them to educate and influence how their future clients may act. Melbourne Water, for example, recently developed an e-learning site to educate children on water conservation, believing that educating users online will help increase waste-water recycling to 20 per cent by 2010 (Wilson, May, 2003). Developing materials directly related to the state school curriculum in a number of subjects, the Utility is aiming to attract teachers and students to its site.

## **Policy**

The impact of e-learning in Australia is fairly restricted to the education and training sector, and to a limited degree schools and universities. The Framework is not a truly 'national' strategy because of this limitation – it has little if any impact on health, finance and most of industry. At a strategic policy

level, the Framework's objectives need to become whole of government objectives for significant change to occur. The European Union has e-learning embedded into its cultural and business processes, adopting a multi-annual program (2004-2006) for the effective integration of Information and Communication Technologies (ICT) in education and training systems (Commission of the European Communities, 2002). At this level of strategy, it is able to influence all lower level strategies in a way that will maximise its impact on the economy. Canada too has invested in partnerships of federal and provincial governments, telecommunications industries, colleges and universities with the purpose of advancing both economic and social prosperity (OECD, 2001).

Partnerships developed via such national strategies, between business and governments can have a significant impact on the costs and complexity of e-learning. The OECD report on e-learning (2001) looks at the impact of information and computer technology on the education and training in OECD countries. It argues that public-private partnerships have become an important form of development in education and training needed, in a competitive environment, 'to manage the sheer costs, scale and complexity, of e-learning' (OECD, 2001).

The eEurope2002 and eEurope2005 Action Plans adopted by Lisbon and Stockholm Councils identify e-learning as a top priority, and set goals for the development of infrastructure, equipment and basic training, which are viewed preconditions for its integration. The e-learning initiative further develops these objectives educationally, emphasising the need for innovative pedagogical approaches and objectives for learning quality and easier access to e-learning resources and services. It also stresses the need for removing other structural obstacles to innovation, such as organisational and legal barriers, and the way knowledge and competencies are evaluated and certified (Commission of the European Communities, 2002). The evaluation of the Framework 2000-2001 also identified the need to address the legal and regulatory barriers hindering the Framework. Privacy, copyright and workplace regulations all require significant consideration within the context of the Framework.

Policy directions embrace quality and access. Enhancing the abilities and skills of educators to create and deliver high-quality e-learning is desirable. However, it is necessary to ensure the privacy of information about individuals' work performance and learning outcomes within a universal and widely accessible electronic system that allows individuals and organisations to document learners' knowledge and skills (National Governors Association & American Association of Training Directors, 2001). Access warrants its own policy thrust aiming at promoting open and equitable entry to e-learning while reducing development costs, eliminating barriers and providing incentives to promote digital literacy.

Policies that provide leadership in demonstrating the power of e-learning for individuals and communities, that create an environment that is conducive to developing quality e-learning content and services, and securing the quality educational outcomes, are needed. The Lisbon Council calls, for example, for the creation of databases on learning opportunities linked to databases on job opportunities. It also calls on the social responsibility of enterprises for collaboration in the fulfilment of these new demands, which result largely in the development of the key asset for them: a well-educated work force.

Similarly, the European Commission program (2002) takes e-learning policy further than the education or training sectors. It aims to:

- explore and to promote ways and means of using e-learning for strengthening social cohesion and personal development, fostering intercultural dialogue, and fighting the digital divide;
- promote and develop the use of e-learning as an enabling factor for the implementation of the lifelong learning paradigm in Europe;
- exploit the potential of e-learning for enhancing the European dimension in education;
- facilitate a more structured co-operation in the field of e-learning between the diverse Community programmes and instruments and Member States actions;
- provide mechanisms for encouraging improvement of quality of products and services as well as for their effective dissemination and for exchange of good practice (Commission of the European Communities, 2002).

Beyond addressing the regulatory barriers, the significant body of expertise and sound collaborative frameworks that have been established under the Framework need the opportunity to be embedded and strengthened within a national policy context. For the VET sector to effect e-learning changes, 'policy must be advanced which supports likely future scenarios, including pervasive, virtual delivery of learning materials' (Hill et al, 2003).

## **Preparing for lifelong learning**

Dynamic individual lifelong learning depends on the personal and cultural integration of knowledge and the fusing of 'pedagogical traditions and progressivism', One of the ways we can respond to our learners' demand for 'dynamic learning' is to use technological advancements (Smart, 2002).

With most learning skills gained in Primary and Secondary school, many students will undertake VET or university as part-time study while working part-time. Education across all sectors is becoming a competitive marketplace for providers. Because it remains commoditised and expensive, especially with the rise of a user-pays system of funding, access will remain an issue. All further education and training will offer some online courses and some blended delivery courses, although many will outsource this component of their offerings through specialist online colleges. This will have been facilitated by content

standards and the integration of e-learning as a component of organisational knowledge management.

Cross-accreditation of subjects between institutions will be commonplace, with many students completing qualifications by taking units at many different universities and registered training organisations. Physical university departments will tend to specialise in certain subject areas, and individual universities will be known for their strengths in those areas. The competency-based approach of the VET sector and the outcomes based approach of school education will permeate the development of e-learning materials and facilitate cross-accreditation and quality assurance in learning standards. These will be integrated into higher-order standards in the learning object model. Standards in intellectual property and privacy continue to be problematic in their administration on a business to consumer basis. A number of private organisations will emerge that collect freeware and purchase individual content, catalogue and on sell the content in bulk to educational institutions in a sort of site license agreement.

# Conclusions and recommendations

## Activities under the Framework

The Framework has had a clearly positive impact on the use of new technologies for teaching and learning. By creating environments through a range of projects that promote and support the individual VET teacher under a co-ordinated policy framework, and combining this with co-ordinated initiatives to develop e-learning content, the VET sector finds itself at the forefront in worldwide developments in e-learning. The various projects within the framework have sought to develop policy and regulation (Advocacy and Issues Management); promote a sharing of ideas (Australian Flexible Learning Community, Networking Annual Conference); develop quality content (Toolboxes); develop standards (Collaborative Interoperability); promote resource sharing (EdNA VET Online); professionally develop teachers (Flexible Learning Leaders); support localised ICT projects (LearnScope); and deal with specific issues in e-learning (Assessment Strategies and Models); share knowledge and conduct research.

The combination of support for e-learning content projects and in professionally developing VET practitioners under a policy and research framework has resulted in a highly skilled body of practitioners who are equipped to assist others in the take up of new technologies. The skills learnt under the framework now need to be embedded into the mainstream VET sector RTOs and workplaces through consolidation and continued professional development. The focus needs to be on engaging people within VET and creating the mindset to optimise the usage of skills acquired under the Framework.

## New emphasis for a recast Framework

During the course of the interviews conducted in researching this paper, which included highly knowledgeable persons from the policy, content development, and training areas of VET, some broad but clear messages emerged that converged with the authors' views on the Framework and its future. Together with a consistent level of support found in the literature and the issues developed in this paper, some conclusions and recommendations can be made.

These may be summarised as:

- The Framework has made significant achievements in promoting the use of ICT in education in VET; it is a world-class initiative and represents the clearest and most co-ordinated approach of any sector.
- It is continually being refined, has a clear direction and its multiple emphases are 'about right'.
- It should continue its work, and move to impact the next level of teaching practitioners underneath the early adopters, as well as middle management.
- It should encourage and allow for projects that use simple and well-understood technologies as well as those emerging.
- There is a greater recognition of e-learning as a business, and as part of a business, and as such the Framework needs to promote initiatives that engage businesses and promote ROI for e-learning so that business can recognise its benefit.
- Future projects under the Framework will be less focused on the development of product, but more on developing processes and strategies that engage people, create an acceptance and understanding of e-learning and learner centred approaches, and empower practitioners.
- Product development needs to continue to recognise the importance of the multiple contexts into which e-learning are delivered. This can be achieved by the development of highly customised materials and the creation of tools that allow teachers to select and alter content or generate new content of their own.
- The VET sector should engage in a continuous benchmarking and networking of activities into other educational technology communities, especially the corporate sector.

Consolidation of the Framework's achievements across policy and individual practitioner development will mean that its impact can be broadened and sustained into the future. Ultimately the Framework will become more attuned to industry needs, aligning VET offerings with business goals. The Framework will have an increasing influence on corporate behaviour, policy and community sectors, enlightening them on the benefits of e-learning, and engaging them in its implementation.

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## Consultant Profiles

### Dr John Eklund

John Eklund, BSc DipEd (Woll) MEd PhD (Syd) is a usability analyst and educational technologist consulting to Smart & Kay Pty Ltd. He is also an Adjunct Senior Lecturer in Education with the University of Sydney, teaching Instructional Technology in the Masters program. He has been a Mathematics and Computing Studies Teacher and University Lecturer and is now Senior Usability Analyst at Access Testing Centre. In this role he works with clients as a usability analyst and instructional technologist.

John's expertise is in the design, implementation and evaluation of interactive media. Most of his work involves consulting to corporate clients on processes to build and evaluate e-learning. He has been involved in large usage analysis for TAFE with Toolbox Series 2 and 3 during 2001 and 2002.

His work is in the area of:

Human-computer interaction

Usability analysis for interactive media

Instructional technology

User centred design

John has acted as senior project manager and instructional designer on a number of large commercial e-learning projects, some of which have won industry awards. He has published widely with over forty publications in national and international peer-reviewed journals and conference proceedings. He is known internationally for his work in adaptive learning environments, and was an early adopter of on-line learning, having taught online since 1995. He acts as an editor to *Australian Journal for Educational Technology* and *Universal Access in the Information Society*, and is on the program committee of international and national web conferences.

### Margaret Kay

Margaret Kay (B.T.P. (Hons 1), M.Comm (Economics) (UNSW) has been a strategic and economic planner in the education field for the past 14 years, specialising in evaluation of education and training programs, resource management, strategic planning and data and financial analysis across School, Vocational Education and Higher Education sectors. She has been consulting as a Director of Smart & Kay Pty Ltd since 1994, with skills in managing projects, designing surveys and analysing results, developing project methodology and reporting to clients and steering committees.

Major projects cover evaluation of programs, user perceptions and data analysis, surveys and policy development, and management and performance measurement.

### **Helen M. Lynch**

Helen M. Lynch has a Bachelor of Arts, Graduate Diploma in Educational Studies and a Masters of Educational Administration from the University of New England. Helen has a background in educational administration in the university sector in Nursing, Welfare Studies and Aboriginal Education. Helen's expertise also extends to web site evaluation, management consulting, and curriculum development and writing in the private VET Sector - including work with training packages and competency standards and organisational compliance assessment.

Helen has also undertaken research (State and Federal education bodies). Her expertise in this area is in data collection, collation and analysis including interviewing. She also has expertise in web site evaluation (community sector), and in management and financial consulting in the university sector where she specialises in Faculty budget modelling.

# Abbreviations

AACE	Association for the Advancement of Computers in Education
Framework	Australian Flexible Learning Framework
ASCILITE	Australian Society for Computers in Learning in Tertiary Education
ANTA	Australian National Training Authority
AUSWEB	AUStralian world wide WEB conference
COLIS	Collaborative Online Learning and Information Services
ICT	Information and Communication Technologies
ILS	Integrated Learning Systems
IMS	Instructional Management System
ISD	Instructional Systems Design
TAFE	Technical And Further Education
TLF	The Learning Federation
LMO	Learning Object Model
ROI	Return On Investment
RTO	Registered Training Organisation
SGML	Standardised, Generalised Markup Language
SCORM	Shareable Content Object Resource Model
UCD	User Centred Design
VET	Vocational Education and Training
W3C	World Wide Web Consortium
XML	eXtensible Markup Language

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