

## *e-Learning in Industry: A Summary of Activities*

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### Project Reference Group

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# 1. Executive Summary

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## Introduction

**1.1** In the current evolving economic environment, it is important for organisations to effectively implement and utilise e-learning applications, strategies and techniques to up-skill their workforce so that they are more productive, higher performing and competitive in regional, national and global contexts.

**1.2** This research project, *Using e-learning to build workforce capability: A review of activities* has been funded by the Ministry of Education. The project objectives were to assess, explore, identify, describe and report on

- How Information and Communication Technologies (ICT) and e-learning applications are currently used within industry- nationally and internationally- to build workforce capability.
- How e-learning currently contributes to the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs.
- The potential New Zealand industry demand for training delivered through ICT and e-learning methodologies.
- How enterprises, from small to large, can be informed of the most appropriate blend of e-learning strategies, processes and procedures for their specific situation.
- The identification of critical success factors for e-learning implementation.

**1.3** For the purpose of this report, **e-learning** refers to the provision, administration and support for 'off-the-job' and 'on-the-job' training, using information and communication technologies such as stand-alone and networked computers, Internet-based technologies and mobile devices.

## Overview

**1.4** During this study key emergent themes for the successful deployment of e-learning in industry were identified:

- **Awareness:** Raising the awareness of both management and general employees on the benefits of e-learning is a key driver for their active commitment to, and participation in, e-learning initiatives.
- **Compliance:** The strong personnel management capability provided by e-learning applications such as learning management systems (LMS), ensures the compliance and knowledge of the workforce is audited, tracked and managed effectively. This enables firms to meet all legislative requirements.

- *Strategic Planning:* The development and implementation of e-learning plans must be fully integrated within the organisation's broader training plans.
- *Management Support:* Senior management of the organisation must be committed to the introduction of e-learning, evidenced through the provision of the necessary physical, financial and human resources required to successfully and effectively implement e-learning.
- *Consistency of Training:* e-learning is seen as providing a platform for the consistent delivery of quality training to all employees regardless of physical location or timing of employment.
- *People:* There needs to be the impetus for staff to move from low skill to higher level skills. There also need to be opportunities for improved collaboration, communication and teamwork within the organisation.
- *Production:* Organisations have found the growing use of e-learning applications is improving speed of learning/training and reducing employee down-time. Anecdotal comments also indicated improvement in the service provided to the customer and safer working environments created.
- *Quality:* e-learning is seen as a vehicle for improving the consistent quality of training which is essential to increase the knowledge and skill levels of employees. E-learning also moves training events from 'one off' sessions where employees can return to the online resources at anytime reinforcing the learning that has taken place.
- *Time:* The benefits of greater speed and more flexibility for the learner need to be recognised. This flexibility also means the training can be tailored to be least disruptive to a firm's work schedules and there is less time "off-the-job".

**1.5** The focus of many debates on the implementation of e-learning within an industry appears to be centred upon:

- *Financial:* A critical issue is the perceived cost of e-learning implementation versus the investment and time out for the business.
- *Relevance and Quality:* Materials presented to employees must be focused on organisational and workforce requirements. Of particular importance in this context is relevance and authenticity.
- *Acceptance:* e-learning is relatively new and the benefits and impact of deployment need to be documented, published and disseminated.
- *Infrastructure:* The infrastructure needed for ongoing development of e-learning initiatives carries costs and these costs must be identified.
- *Collaboration:* To achieve cost reduction and to increase the quality of the resources that are developed, industries are increasingly recognising the benefits to be gained by collaboration.
- *Mobile:* Mobile technologies are widely available and used by the workforce. They are also becoming increasingly 'user friendly' and sophisticated e.g. email and Internet browsing capabilities. As a result, a

number of organisations indicated the use of mobile technologies was a key component of future e-learning offerings.

- *Management Support:* Traditional approaches to training are well known and accepted and it can be challenging to get the 'traditionalists' to adopt the new approaches. This resistance can be overcome if there is ongoing, demonstrated support from senior management.

#### 1.6 The key business drivers for e-learning growth in industry training are;

- *Information Resources:* There is an ever-increasing amount of information from an organisational, individual, trade and professional viewpoint, of which employees need to be aware to complete their tasks successfully. Increasingly, the targeted use of e-learning is seen as a viable option in addressing the information needs of individual industries.
- *Technological Innovation:* The growing complexity and sophistication of modern plant combined with the rapid rate of change in production means informational and communication technologies are increasingly necessary to deal with their impacts on work practices. The nature of the impact needs to be managed in a consistent and timely manner.
- *Return on Investment:* The provision of training to improve performance at both an individual and organisational level must be done economically and efficiently. For example a key driver for many of the e-learning deployments illustrated in the case studies of this report is the financial gains generated by the replacement of traditional modes of training with targeted e-learning applications.
- *Legal Compliance:* Many of the firms reviewed often need to meet a number of requirements (such as health and safety, site safety, and, in some instances, certification). The use of e-learning delivery and administrative tools provide the firms with the ability firstly, to monitor workers' current compliance status and secondly, to ensure all employees have accessed appropriate information on their obligations.

#### 1.7 The barriers to e-learning implementations include:

- *Administration:* Difficulty of managing e-training through existing structures.
- *Change Management:* Challenges in modifying and replacing traditional training practices. Possible resistance by both managers and employees, comfortable and familiar with traditional training methods, to the change in approach and methods of training delivery.
- *Training Delivery:* Lack of knowledge, skills and expertise by managers/supervisors to create appropriate e-learning materials or design e-learning events.
- *Senior Management:* Failure to recognise the benefits derived from the provision of e-learning by senior management and consequent lack of ongoing support to appropriately resource the e-learning initiative.

- **Quality of Provision:** Confusion created through the availability of a range of e-learning providers (such as educational institutes, private-sector providers, and independent mentors) and “off-the-shelf” e-learning materials. Difficulties, especially for SMEs, in evaluating the value and impact of the myriad of e-learning options offered on their business operations.

**1.8** These barriers to the introduction of e-learning and its continued growth can be classified within three key broad categories (the three Cs). These are:

- **Connectivity:** Limited access to the Internet and adequate ICT devices/technologies.
- **Capability:** The unknown ICT competencies of managers, trainers and employees.
- **Content:** Lack of e-learning content relevant to the organisation’s specific needs.

**1.9** The review of the literature indicated the flexibility provided by e-learning applications has a role to play in providing individual firm-specific training as required; just-in-time, just-enough and just for them. Specifically the benefits of the deployment of e-learning in industry fit within three key broad categories, these are:

- **Accessibility and Flexibility:** Improving access to more training for employees and allowing training activities to be delivered flexibly in terms of time and place to meet individual employee needs.
- **Consistency and Scalability:** Ensuring training is delivered in a consistent and timely manner, and ensuring more comprehensive compliance with identified standards/best practices for employees.
- **Sustainability and Cost Effectiveness:** Ensuring minimal stoppages and employee time-off-task to improve productivity. E-learning also helps improve and increase the basic skills of employees, providing the organisation with a competitive advantage.

## How e-learning is used to build workforce capability

**1.10** From the case-studies undertaken it was noted the current scope of training provision in New Zealand industries was extremely broad. In general, the workforce capabilities addressed through e-learning were:

- **Induction:** A significant number of the firms reviewed indicated they were using e-learning to introduce staff to the firms’ processes, procedures and requirements. The flexibility provided by e-learning ensured the induction of employees could be undertaken at anytime and anywhere.

- *ICT Skills*: A number of targeted staff received specific training in the range of software applications acquired by the organisation to undertake and monitor the normal business operations of the firm.
- *Literacy and Numeracy*: Although this area was not specifically targeted by individual firms, many firms address this issue through collaboration with external experts or the promotion of courses from external providers.
- *Product Knowledge*: To increase market share and/or to ensure staff awareness of the products produced or services offered, some firms provide e-learning solutions to keep staff abreast of latest developments.
- *Certification*: Many firms provided formal recognition of training undertaken (for example, working in confined spaces or first aid) and e-learning administrative tools were used to monitor employee certification status.

**1.11** In the delivery of e-learning activities a varied range of solutions have been developed. These include:

- *On-the-Job*: Workplace/on-the-job provision accounts for a significant component of the training offered by firms and, in some cases, between eighty and ninety percent of training is provided through this approach.
- *Commitment*: Employees generally undertake the training at their place of work and have reasonable access to the necessary ICT equipment. This reduces time off task and increases profitability.
- *Assessment*: Workplace/on-the-job training is assessed by an on-the-job 'mentor' and certified assessors. A number of the compulsory induction / site safety online modules developed have mandatory assessments included. Employees must pass all these assessments before the course is considered to be completed and they are compliant with the identified requirements.
- *Custom Designed*: A range of content creation software applications, such as Articulate, HTML editors and Flash, are used to create custom-designed CDs, DVDs, or web-hosted content. These are generally created in-house to meet the specific training needs of the organisation. In many instances these digital resources are supplemented by digitally created, but print-based, workbooks.
- *Blended*: A number of firms are increasingly using laptops, DVDs and data/video projectors to enhance traditional face-to-face learning environments. The nature of the learning environments is changing with the flexibility of the technology being used. In many cases, learning events can and are being created 'out in the field'.
- *Simulations*: Simulations form a significant component of e-teaching solutions developed. In general, they are designed to replicate firm-specific, problem solving situations, ensuring the workers are up-to-date and competent with equipment functionality.
- *Intranet/Internet*: A number of informational "web-pages", outlining product functionalities and specifications, are readily available to all employees. Other Web resources include tracking systems, email, links to external information, numeracy and literacy resources and custom-designed interactive courses.



- *Learning Management Systems*: A number of firms are introducing Learning Management Systems (LMS) as these systems provide the organisation with the ability to maintain individual learning plans and to book, track and record training activities.
- *Video Capture*: Although not wide-spread, the provision of videos, often enhanced with notes and interactive graphics, of external experts installing new plant and/or operating machinery, has been found to be very effective for skills acquisition or maintenance.
- *Mobile*: Although some firms have found the use of mobile devices problematic, the increasing use of mobile devices by all sectors of society has seen firms begin investigating the benefits of using these devices for training /educational purposes.

## Using e-learning in trade, technical and professional training

**1.12** In trade, technical and professional training, the use of ICT to present content (for example, videos, simulations, animations and workbooks), to facilitate assessments and encourage interaction through asynchronous and synchronous internet based communication tools (for example, video conferences, white boards, forums and quizzes) are challenging traditional training approaches where a significant portion of learning is “classroom-based”<sup>1</sup>.

**1.13** When reviewing the results of studies on e-learning initiatives it was found trade and technical trainees, in particular, were learners with a preference for “visual” presentations with ongoing trainer-trainee communication, the personal touch. The studies demonstrated the adoption of “video” technologies (e.g. video conferencing, practical task demonstrations embedded in HTML pages, web-casts) impacted on training in a positive manner.

**1.14** When e-learning applications are used in training activities most respondents enjoy the experience. They find the use of personal devices and communication tools (the Internet, desktop and laptop computers, digital cameras and e-mail) enhance their learning environment<sup>2</sup>.

**1.15** One international study<sup>3</sup> found 46% Registered Training Organisations (RTOs) were delivering trade training using e-learning methods and/or technologies. This study also found around 70% of all teachers of traditional trades used e-learning in some way.

**1.16** The case studies indicated the innovative use of e-learning applications such as video-capture technologies, simulations and demonstrations appear to provide a consistency of approach not generally available through traditional methods of delivery. E-learning is being used for both standard and advanced trade training programmes.

<sup>1</sup> Thompson, L. & Lamshed, R. (2008). *E-learning within the building and construction and allied trades*. Canberra,: Australian Department of Education, Employment and Workplace Relations.

<sup>2</sup> Cooper, C. (2007). *Work-based learner ICT and e-learning survey: Final report Association of Learning Providers and the Learning and Skills Council*. Retrieved January 28, 2008, from [http://www.elearningproviders.org/HTML/images/cms/alp\\_e-learner\\_survey\\_final\\_report.pdf](http://www.elearningproviders.org/HTML/images/cms/alp_e-learner_survey_final_report.pdf)

<sup>3</sup> I & J Management Services. (2006). *2006 E-learning Benchmarking Project E-learning in the traditional trades*. Canberra: Australian Department of Education, Employment and Workplace Relations.

## The potential demand for e-learning in industry training

**1.17** Statistical information currently available<sup>4</sup> indicates the technical infrastructure is sufficiently robust and software applications are readily available for employees and for all sizes of business to participate in e-learning activities. Between 2004 and 2006 there has been significant growth in the use of computers and the Internet in both households and business, with seven out of ten New Zealand households and nine out of ten businesses having ready access to computers, and nearly two thirds of households and ninety percent of businesses being connected to the Internet.

**1.18** It appeared large service industries (for example, financial firms) and individuals undertaking formal study (for example, diplomas or degrees) were more likely to use ICT for their educational and training needs.

**1.19** During the extensive literature review of government reports, white papers, research reports and journal articles, it was noted a common thread within the material reviewed was the number of surveys published which *suggested*, rather than *proved*, a significant number of industries were using e-learning to build workforce capability. Therefore, this study recommends these often-optimistic findings need to be treated with caution as sample sizes in some studies were often limited, and samples were often biased as respondents had a high degree of technological literacy with a keen interest in computer-mediated training.

**1.20** The most realistic view of the perceived demand e-learning is the documentation<sup>5</sup> of the steady decline of classroom-based (from a high 78% in 1999 to a projection of 53% in 2006, a decrease of 25%) and the steady growth of technology-based training, from a low of 14% in 1999 to a projection of 40% in 2006, an increase of 26%.

## Acquire information on effective practice in e-learning

**1.21** Being updated about effective processes, procedures and plans to improve workforce capability using e-learning applications, strategies and techniques is seen as central to improving individual, organisational and national performance and global competitiveness. It is notable the flexibility provided by e-learning communication tools and presentation software applications is used extensively to share information and keep abreast of national and international trends in e-learning in industry<sup>6</sup>.

**1.22** In creating web-spaces for industry, designers need to develop tools, containing common elements to ease navigation, to encourage participant reflection, interaction and engagement. These tools fall within three broad categories- informational (e.g. database tools), communication (e.g. frequently asked questions) and data collection (e.g. evaluations and surveys).

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<sup>4</sup> Statistics New Zealand. (2007a). *Information and communication technology in New Zealand: 2006*. Wellington: Statistics New Zealand. Retrieved January 28, 2008, from <http://www.stats.govt.nz/NR/rdonlyres/B45B1ECD-E10F-4948-B243-6E7EAF34E712/0/58072SNZICTWEB.pdf>

<sup>5</sup> Rivera, R. & Paradise, A. (2006). *ASTD State of the Industry Report*. American Society for Training & Development. Retrieved January 28, 2008, from <http://www.astd.org/>

<sup>6</sup> Australian Flexible Learning Framework. (n.d.). Home page. Retrieved January 28, 2008, from <http://industry.flexiblelearning.net.au>

## Critical success factors for effective e-learning implementation

1.23 The “quality” of the learning experience of participants in an e-learning environment can be directly attributed to the quality of all of the processes used in the creation of the training event. To ensure quality, the creation of e-learning events should follow a recognized cyclical pattern conceptualised by the research team as the **Five D’s (5Ds)** of e-learning in industry:

- *Define*: the training requirement(s),
- *Design*: the training event(s),
- *Develop*: the resource(s),
- *Deliver*: the event(s),
- *Determine*: how or if e-learning can or should be used to meet the above requirements successfully.

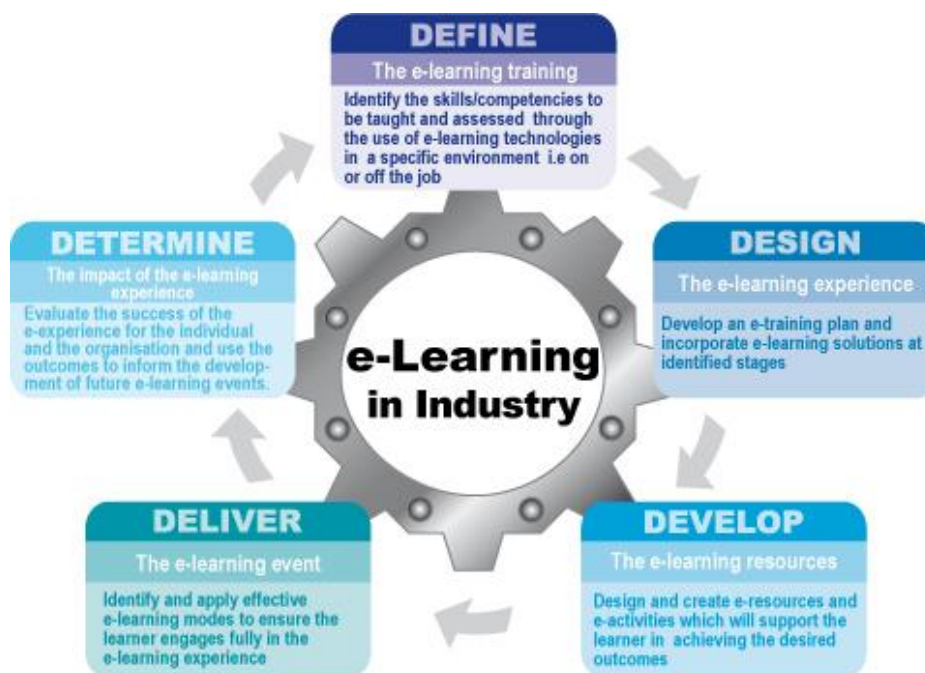


Figure 1.1: The 5Ds of e-Learning

1.24 The literature consistently indicated the critical success factors for the implementation of successful e-learning in industry differed. They depended upon the size of the organisation and the potential resources (financial, physical and human) available to the enterprise.

- *Planning*: While e-learning can be effective in a range of situations, organisations need to be clear in their expectations of how e-learning will meet their specific training needs and allocate appropriate resourcing.
- *Senior Management Support*: Support from senior management is essential for the successful implementation of e-learning. To obtain this support, advocates of e-learning need to justify the costs associated with developing

e-learning materials and deploying e-learning solutions and emphasise the benefits to be gained.

- *Technical:* It is important, when firms select an e-learning solution, that this solution is able to meet future demands and can be integrated smoothly with existing and planned systems. Failure to do this will add additional and unforeseen expenses and impediments to e-learning development.
- *Awareness:* When contemplating a change from traditional modes to online learning, organisations need to be aware of potential resistance and articulate a clear vision and solicit feedback from employees on the efficacy of the e-learning for them.
- *Evaluation:* To help embed e-learning within an organisation, feedback from users of the e-solution needs to be regularly obtained and the financial costs must be monitored. This will help to demonstrate the cost effectiveness, benefits and acceptance of the e-learning solutions developed.
- *Collaboration:* Collaboration and cooperation with other similar organisations will serve to establish universally-accepted practice, standards and training which will ensure the skill set of the workers is comparable and transferable across sectors.

**1.25** The success factors fit within three key broad categories which are:

*Organisational:*

- The need to develop generic e-learning material in standardised formats allowing multiple users to engage with the materials created. This can help to reduce overall organisational costs in development and delivery.
- The need to ensure that the organisation has a clear action plan for the implementation and support of e-learning initiatives. This plan should be part of the organisations key strategic initiatives.
- The need for senior managers to recognise the value of e-learning in building workforce capability and actively to support its implementation.
- The need for “e-champions” to model the successful use of e-learning applications.

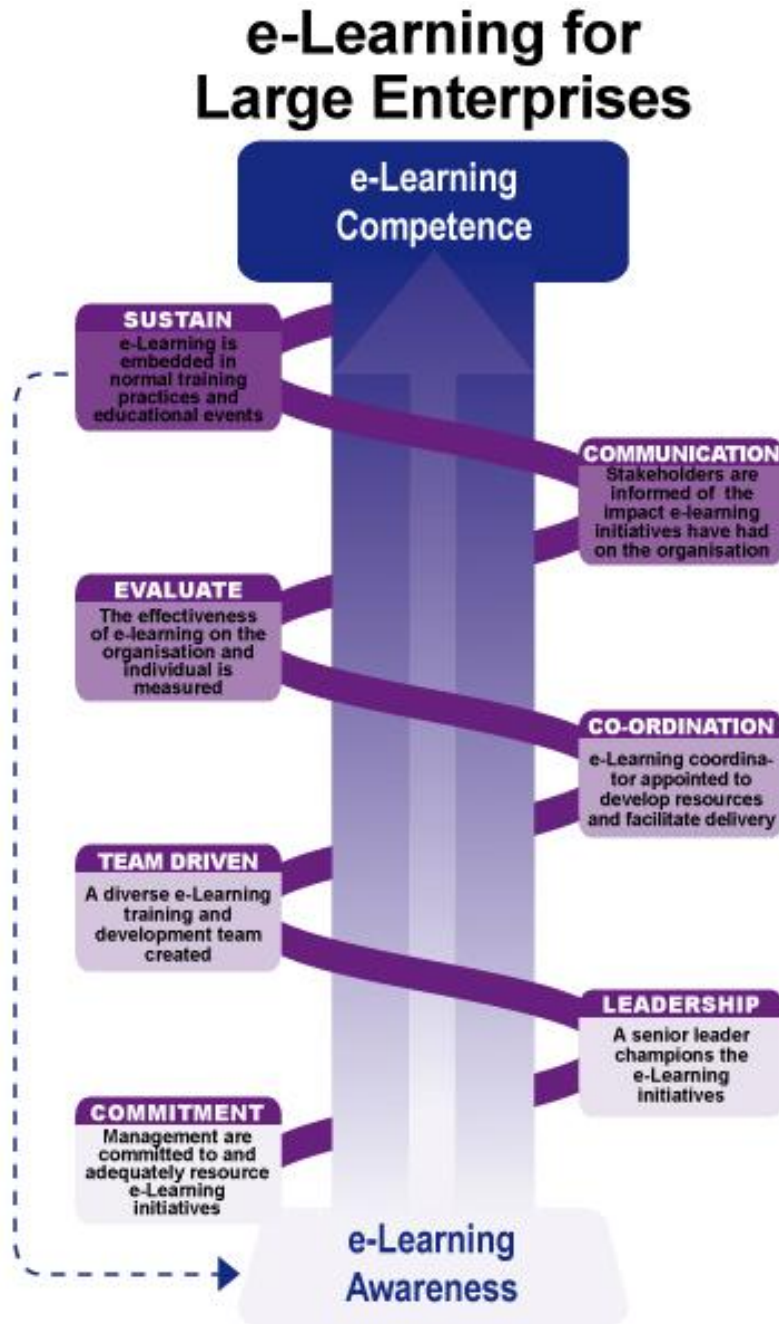
*Training:*

- Although more costly to produce, available evidence indicates that e-learning training materials are more engaging than traditional workbooks as they can include a range of multimedia-rich practical examples, interactive exercises and computer-based simulations.
- Monitoring and evaluation of both the process and outcomes of e-learning use by learners and staff are seen as critical. The deployment of material in a managed environment, commonly within a learning management system, provides the functionality for this to occur.
- The use of e-learning applications allows training to be delivered in a consistent manner ensuring more comprehensive compliance with identified standards/best practices.
- The decision whether to produce the training in-house or to outsource.

*Learning:*

- Lack of human interaction and the effects this has on employee motivation.
- The need to build confidence and, subsequently, competence in e-learning environments.

**1.26** Specifically, the seven critical success factors noted for the implementation of successful e-learning in industry in large enterprises are illustrated in figure 1.2 below.



**Figure 1.2: e-Learning in Industry – Large Enterprises**



1.27 Specifically the five critical success factors noted for the implementation of e-learning in Small and Medium Enterprises (SMEs) are illustrated in figure 1.3 below.

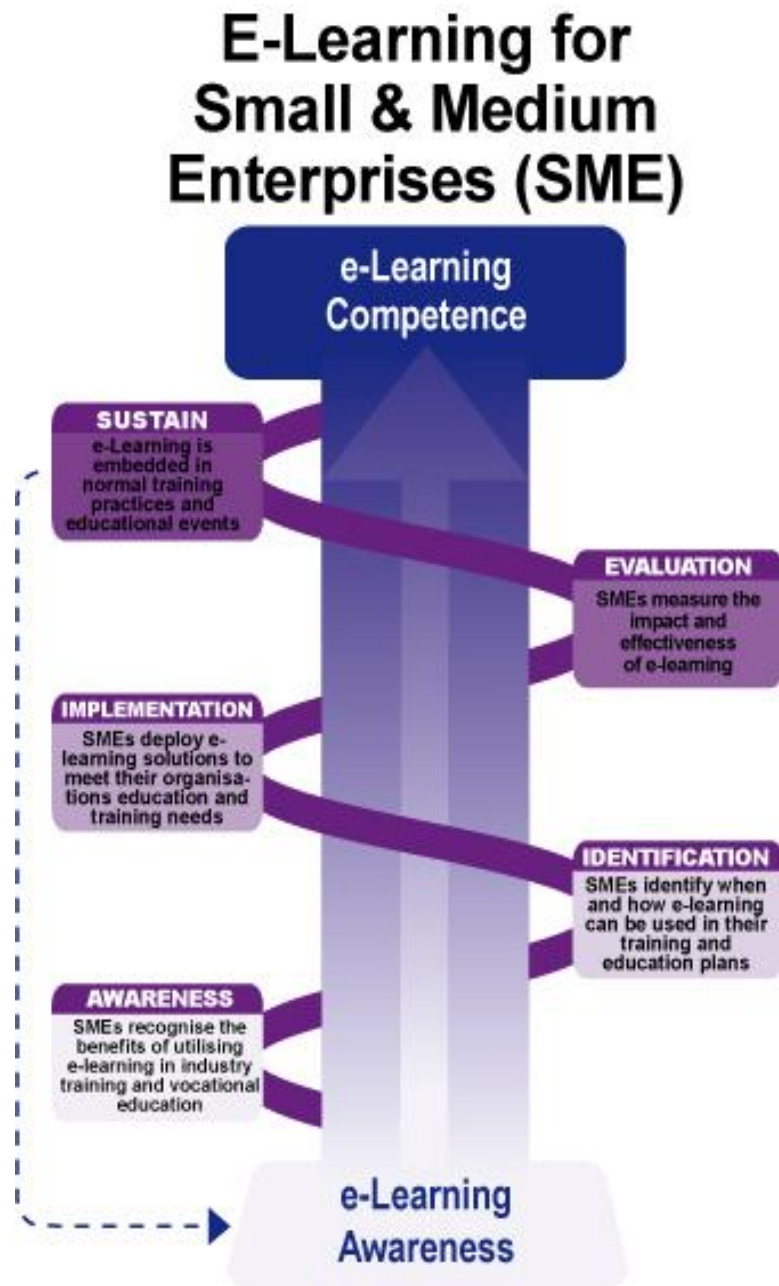
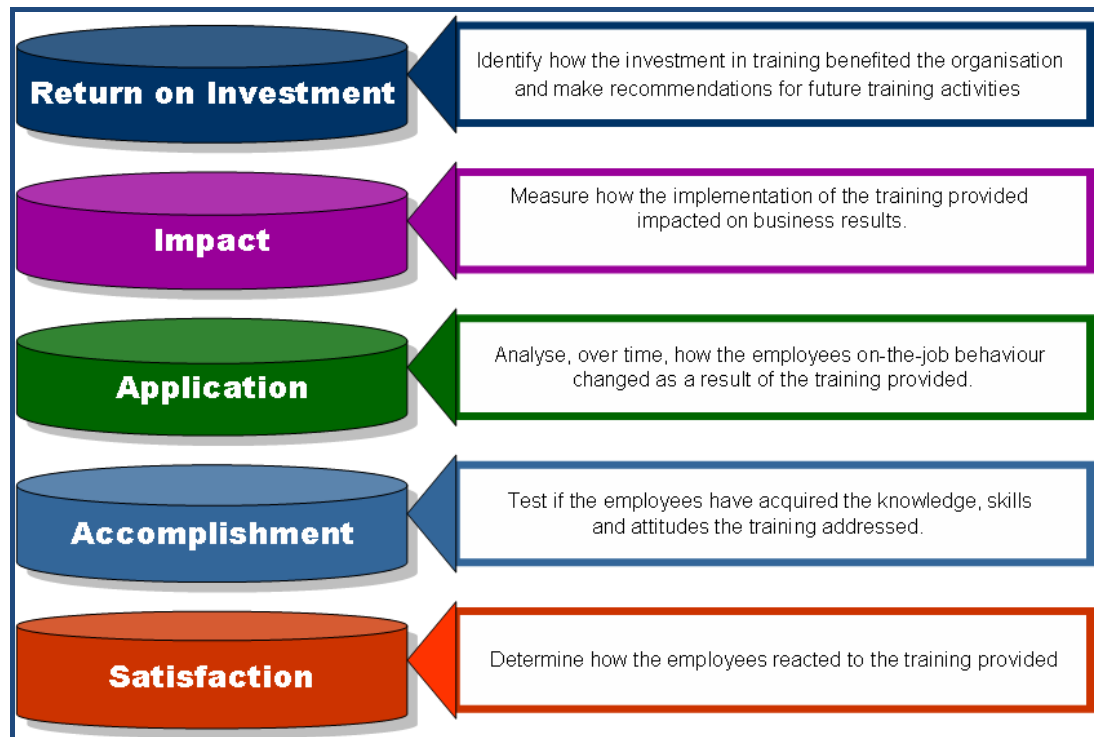


Figure 1.3: e-Learning in Industry – Small & Medium Enterprises

## Measuring Effectiveness and Impact

**1.28** In evaluating the effectiveness and impact of e-learning the two target areas of analysis are firstly, the individual level investigating competency and accomplishment. Secondly, the organisational level investigating strategic alignment and business impact. From the literature<sup>7</sup> it appears a measurement model, based on modifications to the Kirkpatrick-Philips evaluation model, would be in keeping with existing evaluation practices and could be more readily accepted by industry. The modified Kirkpatrick-Philips model advocated by the research team is illustrated in figure 1.4 below.



**Figure 1.4: Modified Kirkpatrick-Philips Evaluation Model**

## Future Developments

**1.29** Four future trends in e-learning in industry were identified during this study:

- **Blended:** Despite the growing focus in industry on e-learning, traditional approaches continue to remain important. A blended approach, incorporating e-learning with traditional formats, has already been identified by some as the way to proceed. It is envisaged that this will be a significant approach in the future.
- **Collaborative:** To achieve cost reduction and to increase the quality of e-learning resources developed, many organisations will increasingly collaborate with the producers whose goods they sell and with other organisations in the same sector.

<sup>7</sup> Skillssoft. (2005). *What Return on Investment does e-Learning Provide? White Paper*. Skillssoft. Retrieved January 28, 2008, from <http://www.elearningcentre.co.uk/eclipse/Resources/costs.htm#d2007>

- *In-House*: Increasingly, the benefits of tracking the training undertaken by employees, ensuring all employees are conversant with company policies and compliant with appropriate legislative requirements, is being recognised. This will be monitored by e-administration tools managed by in-house staff.
- *Mobile*: Mobile technologies (such as phones, PDAs and cameras) are readily available and enable information to be accessed remotely and for data transfer from those 'on-site' back to the central office and conversely for the central office to provide advice or training to those 'on-site'. A number of firms indicated in this study that the use of mobile technologies was a key component of future e-learning offerings.

## Recommendations

**1.30** Based on the findings of this project a number of recommendations are offered. These are:

- That further work, directed by a strategic management team, including national bodies such as the Ministry of Economic Development, Industry Training Federation (ITF), the Institutes of Technology and Polytechnics of New Zealand (ITPNZ), New Zealand Qualifications Authority (NZQA), Business New Zealand, New Zealand Trade and Enterprise, Tertiary Education Commission and NZ Council of Trade Unions, be undertaken for the purpose of:
  - 1. Raising Awareness:*
    - Conduct further research to identify and disseminate (through existing industry-sector communication mechanisms) how the implementation of e-learning applications, nationally and internationally, has impacted on business performance, productivity, profitability and growth. This should include information on the importance of appropriate literacy and numeracy levels in the workplace and their potential impact on productivity.
  - 2. Identification:*
    - Consider the creation of a business case for the development and deployment of a Web-space (integrated within existing industry web-sites) where case-studies, templates and guide lines for good practice in e-learning implementation in industry can be made available to inform senior managers and owners.
  - 3. Implementation:*
    - Consider the creation of specific e-learning templates, standards and procedures for providers involved in delivering courses for trades/industries. These should detail minimum expectations of the quality and nature of the digital material created and the recording, reporting and management of employee training activities.



#### *4. Evaluation:*

- Ongoing evaluation of the effectiveness and impact of the e-learning events offered, using a range of qualitative (for example, employee views) and quantitative (for example, productivity gains) measures, must occur. The results of these evaluations should be regularly communicated to all stakeholders. In keeping with existing evaluation practices, a measurement- modified Kirkpatrick-Philips evaluation- model could be more readily accepted by industry.

#### *5. Sustainability:*

- Review national and international curricula in e-learning in industry and create courses, formal and informal, to meet the current trends in e-learning in industry. Specifically the review should focus on flexibly-delivered courses that would address the following focus areas:
  - Defining the e-learning training requirement(s),
  - Designing the e-learning training event(s),
  - Developing the e-learning resource(s),
  - Delivering the e-learning event(s),
  - Determining the success of the e-learning event(s).

## 2. Project Overview

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2.1 This section has been divided into five topics;

- **Context:** This section provides the background to, and rationale for, the project.
- **Definitions of key terms:** This section defines the key terms- on-the-job (workplace), off-the-job (work-based) e-learning and blended learning- used throughout the report.
- **Methodology:** This section outlines the processes and procedures used within all of the phases of the project.
- **Limitations:** This section reviews and addresses the two identified limitations of the report.
- **Structure of the report:** This section lists the remaining sections of the report.

## Context

**2.2** The drive to improve capability has been outlined in the *Human Capability Framework* (HCF)<sup>8</sup> where the emphasis has been placed on examining the skills and abilities of New Zealanders, and how these can be used successfully to generate income and promote an inclusive and thriving community and economy.

**2.3** In the current chaotic economic environment, it is considered a strategic imperative to be aware of effective processes, procedures and plans to improve workforce capability, increase productivity and reduce overall training costs through the implementation of e-learning applications, strategies and techniques.

**2.4** Being well informed about the potential impact of e-learning on business performance is central to improving individual, organisational, regional, and national and global competitiveness.

**2.5** In an increasingly Information and Communication Technology (ICT) dependent world, industry leaders are recognising the critical need to regularly access ICT infrastructures. The flexibility provided by e-learning communication tools and presentation software applications is seen to be critical in providing appropriate web-spaces to share information, communicate with peers and experts and keep abreast of national and international trends in the use of e-learning in industry.

**2.6** This research project, *Using e-learning to build workforce capability: A review of activities* has been funded by the Ministry of Education. The Ministry has funded a range of tertiary e-learning research projects to increase the evidence base in tertiary e-learning to support and contribute to its work programme, strategic objectives and stakeholder requirements. This project aimed to assess, explore, identify, describe and report on

- How Information and Communication Technologies (ICT) and e-learning applications are currently used within industry- nationally and internationally- to build workforce capability.
- How e-learning currently contributes to the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs.
- The potential New Zealand industry demand for training delivered through ICT and e-learning methodologies.
- How enterprises, from small to large, can be informed of the most appropriate blend of e-learning strategies, processes and procedures for their specific situation.
- The identification of critical success factors for e-learning implementation.

**2.7** During the project, a series of research reviews, culminating in this final research report, was produced. These reports served to inform all industry sectors (large, medium and small) of how ICT and e-learning in its many forms, has and could be used to ensure effective and ongoing training is provided to the right person, at the right time, in the right place, in a cost-effective way. The three reports previously published are listed below;

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<sup>8</sup> Department of Labour. (2005). *Human Capability Framework*. New Zealand Government. Retrieved January 28, 2008, from <http://www.dol.govt.nz/initiatives/strategy/hcf/>

- a. *Report 1*: Overview of work-based and work-placed e-learning landscapes in New Zealand and internationally.
- b. *Report 2*: Deployment of an interactive web-space to share examples of work-based and work-placed e-learning in action.
- c. *Report 3*: New Zealand e-learning case studies.

## Definitions of Key Terms

**2.8** The literature review highlighted the definitions of the key terms used within the project, *on-the-job and off-the-job learning, e-learning and blended learning*, were often defined within the specific context of the report produced. Therefore, throughout the literature a complex range of definitions was provided, often serving to confuse rather than clarify the landscape to be investigated. The following sections provide firstly, an overview of the meaning of the term and secondly, a simple definition to be used throughout all phases of the research project.

### 2.9 Off-the-job Learning

- Off-the-job learning provides trainees with realistic, hands-on experience and develops generic skills relevant to industry needs. Based on a contextualised form of “learning by showing”, work-based learning typically involves a pre-defined set of instructional modules, courses or programmes that deliberately use authentic experiences in the workplace as a focus for learning. These experiences attempt to instil work habits and change attitudes and behaviours. During this process participants are exposed to a variety of skills and the underpinning knowledge they will need to perform their jobs effectively or become skilled in a particular trade. In essence, off-the-job learning can be described as learning that takes place *for* the workplace or the *know how to do*.
- In general, off-the-job learning has a significant component of formal learning activities and would include instruction in normal, workplace competencies, broad instruction in all aspects of the participants’ industries as well as formal assessment activities. Off-job learning is often, though not always, linked to the achievement of formally-recognised or credentialed standards and qualifications. Since off-the-job learning is often delivered outside the participants’ normal place and, sometimes, hours of work, it has been described as *work-based* learning.
- For the purpose of this research project, “off-the-job” learning refers to authentic, evidence-based learning activities and tasks designed and provided for workers at locations other than their normal place of work. Off-the-job learning resources are normally designed in context with the worker's current working practices. This is also known as *work-based* learning.

## 2.10 On-the-job Learning

- On-the-job learning provides employees with the required hands-on experiences necessary to develop the specific skills that are relevant to a firm's needs. In practice, on-the-job learning typically involves using the participants' normal work-related tasks as a focus for learning, and recognising the skills that they develop through these tasks. Its primary intended outcome is performance improvement. It can involve all types of learning modes from self-initiated research through to discussion, demonstration and practice of work tasks. In essence, on-the-job learning can be described as learning that takes place *in* the workplace or the *know what to do*.
- On-the-job training includes a range of activities, from structured, assessed learning, which leads to qualifications (such as those arranged by many industry training organisations) to informal and unstructured *ad hoc* learning and peer education. Using the technique of "*learning by doing*" it provides opportunities for participants to improve basic skills and meet performance targets. Since on-the-job learning occurs on-site during the participants' normal working day it has been described as *work-place* learning.
- For the purpose of this research project "on-the-job" learning is structured learning that occurs within the learner's normal working environment. This is also known as *work-place* learning.

## 2.11 e-Learning

- In practice, e-learning typically involves interactivity, such as student engagement with stand-alone digital content, interactive games or virtual simulations, interaction between learners and their instructors and interaction between learners and their peers. It is facilitated by the use of computers (stand-alone and networked), mobile devices (such as laptops, PDAs, mobile phones), digital communication tools, facilitated by the Internet (such as chat, e-mail, forums, instant messaging, Voice over Internet Protocols (VoIP) and video for virtual discussions) digital content creation tools (such as Wikis, Blogs and Web-folios) and digital content (such as web pages, podcasts, audio and video files, CD-ROM and DVDs).
- In some cases, such as in an instructor-facilitated video/web-conference, e-learning activities are carried out in 'real-time' and the activity undertaken is time-constrained and dependent on the attendance of all participants. This is known as synchronous e-learning.
- In other instances, such as student engagement with a CD-ROM, interactive DVDs, stand-alone games and virtual simulations, the learning will occur in 'nominal-time' and the activity undertaken is not time-constrained and is independent of other participants. This is referred to as asynchronous e-learning.
- For the purpose of this research project e-learning refers to the provision, administration and support for 'off-the-job' and 'on-the-job' training using information and communication technologies such as stand-alone and networked computers, Internet-based technologies and mobile devices.

## 2.12 Blended Learning

- Blended learning typically involves combining aspects of traditional face-to-face activity (such as block courses in an identified room during the working week focused on theory, or scheduled weekend sessions at a learning organisation focused on practical aspects) with computer-mediated support (such as the presentation of interactive simulations on a CD completed at home, or the provision of online support through the communication tools embedded in a learning management system (LMS)).
- In essence, blended learning “*blends*” firstly, time-constrained and time-dependent, (synchronous) activities with time-independent (asynchronous) activities; secondly, dependent, identified physical spaces (classrooms) with digitally created, flexible spaces (virtual environments), and finally, instructor-facilitated, high human interactive environments (face-to-face) with computer-mediated environments (e-learning).
- However, blended learning should not be approached as a “Lego Build” where the combination of face-to-face and e-learning activities is merely “clicked” together because the “blocks just happen to fit” with little thought of integrating the learning experiences of participants. This “click together” approach can lead to poor module design resulting in learner and tutor confusion about their various roles in scheduled training activities.
- For the purpose of this research project, blended learning has been described as a design approach thoughtfully combining traditional methods to on-the-job and off-the-job training with e-learning applications.

## Methodology

### 2.13 Reference and Peer Review Panels:

- [Reference Panel](#): This panel consisted of international and global expertise in research, education and the use of e-learning and emerging technologies. The panel provided an international perspective and opinion on the nature and focus of the research, the validity of the methods used and the findings presented. In essence, the role of the panel was to provide critical analysis, constructive feedback and global contextualisation.
- [Peer Review Panel](#): This panel, consisted of national e-learning practitioners, was consulted during each phase of the research project to review the methodology, questions and findings of the research phase. In essence, the role of the panel was to act as a sounding board, to raise awareness and offer opinion on critical aspects of the research phase in progress.

### 2.14 Overview of work-based and work-placed e-learning landscapes in New Zealand and internationally:

- During this initial phase of the literature review, a “broad-brush” approach was used in searching for and locating material. The key terms defined above were used, individually and in various combinations, to search indices, data-bases, digital repositories, library holdings, bibliographies and websites. Materials were rejected or accepted based on the underlying directives of the research project.

- During the desk top research phase, interviews/conversations held with identified stakeholders were undertaken by different members of the research team. To ensure consistency in approach, a semi-formal “interview template” (Refer Appendix 1) was produced to ensure all focus areas were adequately covered and the data generated could be collated around the emergent key themes identified. It contained four sections, background, current use of e-learning, the potential demand for e-learning and the perceived effectiveness of e-learning.

#### **2.15** *Deployment of an interactive web-space to share examples of work-based and work-placed e-learning in action:*

- This report was unique in the series as it combined a literature review (examples of work-place and work-based e-learning in action), qualitative research (interviews with industry stakeholders), and technical development (description of the web-space constructed for the project). Since the methodology used in framing this phase of the project was diverse and complex it should be regarded as a reporting, rather than a research, methodology.
- In selecting practical examples of on-the-job and off-the-job e-learning applications, reports and case studies, a “broad-brush” was applied. Identified attributes of examples to be included were:
  - Selected examples must have been deployed in an industry setting.
  - The broad spread of e-learning applications and ICT technologies used in industry must be demonstrated.
  - Readers of the report must be able to access and review “demonstrator” environments created.
- To provide a New Zealand perspective on work-based and work-place e-learning the research team approached a number of individuals to provide an insight into industry e-learning activities in New Zealand. Telephone and/or face-to-face interviews were held with five individuals and two focus groups (identified as “New Zealand Industry Insights” in the report) employing a standard set of questions designed to elicit opinions from the interviewees on the use of e-learning for vocational education and training. The questions also enabled data to be collected on current e-learning activities being undertaken by the various industries, their effectiveness and future directions. Their opinions and / or experience of the role of e-learning in facilitating trade and advanced trade qualifications were specifically highlighted.

#### **2.16** *New Zealand e-learning case studies:*

- This report described six case studies in a range of industries. These qualitative studies were designed to complement the reports generated in phases one and two of the research project.
- Face-to-face/telephone interviews were held with training managers, or their equivalent, in the six industries contacted. In conducting the interviews a detailed template, containing 12 discrete sections, was used as a guide. The sections in the guide focused on:

- Background of the industry investigated
- Target audience and drivers for development
- Workforce capabilities addressed
- e-learning application / ICT solution developed
- Participants involved in the solution offered
- Impact on building workforce capability
- Benefits of the deployment
- Barriers faced and addressed
- Indications of future developments
- Advice they would give to others thinking of using e-learning

## Limitations

**2.17 Limitation 1:** The interpretation of, and reporting on, material gathered during the literature review, the data generated through the stakeholder interviews and the case studies is based on the researcher team's 'intuition', formed by an extensive knowledge of the e-training domain. It could be argued that prior conceptions held by the researchers influenced decisions made. It is acknowledged researchers at different ends of a theoretical spectrum could interpret the data and literature in different ways and alternative conclusions would be legitimately reached.

However, it is argued the overview of the reports, recommendations and findings by a peer review team and a reference panel helped firstly, to ensure all relevant literature was identified and included and secondly, all findings made were appropriate.

**2.18 Limitation 2:** The number of stakeholders involved in e-learning initiatives is significant and growing and the theoretical population is potentially substantial. Therefore, reliance on a limited number of selected voluntary participants in the interview/conversation and case study phases should be regarded as using a sample of convenience. While such samples are less complicated to create, it is acknowledged the limited sample used may not accurately reflect the characteristics of the population as a whole.

However, it is argued the inclusion of the data helps firstly, to enrich the "snapshot in time" of e-learning in industry described in the report and secondly, provides a brief insight into stakeholder/practitioner perceptions of e-learning. Therefore, the inclusion of the limited data generated in stakeholder interviews/conversations and a case study is deemed appropriate in this report.



## Structure of the Report

**2.19** The remainder of the report is presented in four main sections:

- *The e-Learning in Industry Landscape*: This section provides an overview of e-learning in industry.
- *E-Learning in Action*: This section provides an overview of case studies.
- *Conclusions and Recommendations*: This section summarises the interwoven factors identified in the design of e-learning in industry and makes recommendations for its successful implementation
- *References and Appendices*: These sections list the references used. They also include the research tools used in this report.

## 3. The e-Learning in Industry Landscape

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3.1 This section covers three topics:

- **Background:** Outlines the current use of ICT in industry and contains 4 sub-topics:
  - *Overview:* An overview of the status of education and training in New Zealand Businesses
  - *Current ICT Use by Individuals and Business:* An analysis of the use of ICT by industry and businesses in New Zealand
  - *Potential Demand for e-Learning in Industry:* National and international data on trends in the adoption e-learning
  - *e-Learning and Trade Training:* Reviews the current use of e-learning in trade training initiatives
  
- **Implementation:** Reviews the key factors influencing e-learning implementations and covers 5 sub-topics:
  - *Desired Impact of e-Learning:* An overview of the direct and indirect expectations of e-learning as an effective and efficient tool for education and training
  - *Impediments to e-Learning implementations:* Identification of common barriers to the use of e-learning in vocational education and training
  - *Critical Success Factors for e-Learning in Industry:* Evaluation of success factors for e-learning implementation in vocational education and training
  - *Ensuring Quality:* An overview of the principles and practice required to ensure quality in an e-learning environment
  - *Evaluation of Effectiveness:* Approaches to determining how effective e-learning is in practice
  
- **Summary:** The key findings of this section are presented.

**Stake Holder Responses / Industry Insights:** When appropriate the findings from stake-holder responses and interviews are included throughout this section.

## Background

### 3.2 Overview

- Although there are a limited number of reviews available on the current state of training in New Zealand industry and business, those that have been produced contain sufficient data to provide a comprehensive understanding of the current provision of business training in New Zealand. Two significant reports, the first, undertaken for the Department of Labour by Business New Zealand and the Industry Training Federation<sup>9</sup> and the second, a review of data collected in 2006 by Statistics New Zealand<sup>10</sup>, indicated over 85% of New Zealand businesses provided training for their employees, with the underlying drivers being to improve business performance and customer satisfaction.
- The predominant forms of training offered were in health and safety, trade and professional skills and computer training. The least predominant form of training offered was in literacy and numeracy. While it could be argued a number of courses may have sections devoted to numeracy and literacy skill development this has not been noted in the information available.
- Given the number of media releases and initiatives identifying high levels of literacy and numeracy as critically important skills for employees, the lack of specific industry training in these areas is of concern. Clearly industries are not aware of the potential productivity gains to be derived from a workforce with high levels of literacy and numeracy. It would be beneficial if a range of authentic case studies, where e-learning has been used to improve literacy and numeracy, were more readily available.

#### New Zealand Industry Insight: Number 1

##### Interviewee X: Training Manager Agricultural Service Industry

This interviewee was the training manager for a large (over 100 employees) agricultural-based firm located primarily in Hamilton. The firm currently provides limited e-learning opportunities based on specific software application simulations.

The main reasons for the limited use of e-learning technologies were firstly, limited senior management buy-in to the concepts and secondly, the lack of employee access on-site to appropriate e-learning technologies.

When the value of e-learning approaches to training is recognised (i.e. after “*the value added Vs time away from primary task is sold to managers*”) this training manager anticipates a steady increase in the use of the full range of e-learning applications (CDs / DVDs, computer simulations and / or games, Internet-based technologies and mobile devices).

<sup>9</sup> Business NZ & Industry Training Federation of NZ. (2003). *Report of the Business NZ Skills and Training Survey 2003*. Department of Labour. Retrieved January 28, 2008, from <http://www.dol.govt.nz/PDFs/Skills%20and%20Training%20Survey%20Report%20-%20June%202003.pdf>

<sup>10</sup> Statistics New Zealand. (2007). *Business Operations Survey: 2006*. Wellington: Statistics New Zealand. Retrieved January 28, 2008, from <http://www.stats.govt.nz/NR/rdonlyres/614517BA-CB81-4603-A0A4-09DF39B675B0/0/businessoperationssurvey2006hotp.pdf>

### 3.3 Current ICT use by Individuals and Business

- In 2007, Statistics New Zealand published a report collating data collected from a range of ICT surveys conducted between 2004 and 2006<sup>11</sup>. The report highlighted the significant growth of the use of computers and the Internet in both households and business.
- The report indicated seven out of ten New Zealand households and nine out of ten businesses have access to computers, with nearly two thirds of households and ninety percent of businesses being connected to the Internet. From this data it can be argued a significant majority of the population can access the appropriate technologies and have the necessary technological skills to participate in a range of e-learning initiatives.

#### Current state of e-Learning: NZ Stakeholder Responses

Data from the stakeholder interviews indicate the current use of e-learning methods and technologies within industry varies widely and, apart from e-providers who all indicated they used a range of technologies, there is no apparent consistency. These results complement the findings of the reports noted above. Specifically;

- The current use of e-learning applications in on-the-job / off-the-job training by employees (5) ranges from “never” (2), below 60% (1) to over 80% (2). For those engaged in e-learning, the predominant technologies used were CDs / DVDs and Internet technologies. Interestingly, two respondents indicated they had been exposed to mobile technologies in their learning experiences.
  - The use of e-learning applications in on-the-job / off-the-job training by employers (4) is also varied and again ranges from “nil” (1) to nearly 80% in one instance. The predominant technologies consistently used were CDs / DVDs and Internet technologies. There was some indication (2) simulation and games were being increasingly used in on-the-job training.
  - All the providers of training (4) indicated they were using e-learning methods (at least 50%) to deliver training. While employing a range of technologies the favoured technology was the Internet. This may be attributed to the extensive use of learning management systems (Blackboard (2) and Moodle (2) in the provider institutions surveyed.
- The use of the Internet for education or study was most noticeable for 15–19 year-old (55%) and to a lesser extent 20-24 (39%) year-old age groups. People over sixty (14%) were the least likely to use the Internet for educational purposes.

<sup>11</sup> Statistics New Zealand. (2007a). *Information and communication technology in New Zealand: 2006*. Wellington: Statistics New Zealand. Retrieved January 28, 2008, from <http://www.stats.govt.nz/NR/rdonlyres/B45B1ECD-E10F-4948-B243-6E7EAF34E712/0/58072SNZICTWEB.pdf>

- Large firms (over 100 employees) were more likely to provide staff training using the Internet (40%), with small firms providing minimal training in this medium (14%).
- Service industries such as electricity, gas and water supply (50%), and communication services (34%) were more likely to provide staff training using the Internet than the primary sector, agriculture, forestry and fishing (7%), manual trades (8%), and the manufacturing sector (12%).

<b>New Zealand Industry Insight: Number 2</b>
<b>Interviewee B: e-learning development coordinator, Education Institute</b>
<p>This interviewee was directly involved with coordinating the use of e-learning technologies in programmes within a tertiary education institute. Most, if not all, programmes offered had some degree of e-learning,</p> <p style="text-align: center;"><i>“Approximately 80% of those courses that involved industry definitely used e-learning technologies off-the-job and approximately 50% on-the-job”.</i></p> <p>The interview identified three barriers to e-learning implementation firstly, poor access to appropriate technology <i>“especially lack of suitable internet bandwidth”</i> secondly, the cost of producing industry/firm specific content and thirdly, there was <i>“lack of support from some managers who perhaps didn’t understand the benefits of the technology and looked more at the perceived costs”</i>.</p> <p>The benefits from the introduction and use of e-learning were firstly, the <i>“increase in international collaboration and sharing of best practice and resources”</i> and secondly, flexibility in scheduling and the nature of the learning environment (place, pace and time) for the students and staff.</p> <p>Evaluation of both the process and outcomes of the use of e-learning by students and staff was <i>“critical in order to inform further developments and more effective use of e-learning technologies”</i>.</p>

### 3.4 Potential Demand for e-Learning in Industry

- A number of national<sup>12</sup> and international<sup>13</sup> surveys on e-learning in industry have included specific items on the potential growth of e-learning activities within individual organisations. In general, the data gathered from the reports predicted a future rapid increase in e-learning implementations in industry. However, it should be noted these were “suggested” indicators of potential growth and were based on individual perceptions rather than hard data. Since most of the respondents were e-learning or training professionals or providers of e-learning materials the responses, and therefore the predictions, should be treated with caution.

<sup>12</sup> Clayton, J. & Elliott, R. (2007, July). *Report 2: A survey of e-learning activity in the ITO sector: E-Learning Activities in Aotearoa / New Zealand Industry Training Organisations*. Tertiary e-Learning Research Fund, Wellington Retrieved February 1, 2008, from [http://ito.elearning.ac.nz/file.php/1/Report2\\_TELRF.pdf](http://ito.elearning.ac.nz/file.php/1/Report2_TELRF.pdf)

<sup>13</sup> Kim, K. J., Bonk, C. J., & Zeng, T. (2005, June). Surveying the future of workplace e-learning: The rise of blending, interactivity, and authentic learning. *E-Learn Magazine*. Retrieved February 1, 2008, from <http://www.elearnmag.org/subpage.cfm?section=research&article=5-1>

- Traditional training methods are still popular with many individuals, organisations and enterprises. They are familiar, safe and predictable. A review of the literature indicated there was, in fact, a varied demand for e-learning implementations and, in many ways, these studies refuted the rapid growth rates predicted above<sup>14</sup>.
- The most realistic view of the perceived demand for e-learning is the documentation<sup>15</sup> of the steady decline of classroom-based training (from a high 78% in 1999 to a prediction of 53% in 2006, a decrease of 25%) and the steady growth of technology-based training, from a low of 14% in 1999 to a projection of 40% in 2006, an increase of 26%.

### Demand for e-Learning: Stakeholder Responses

- In general, the data from stakeholders indicate the demand for e-learning methods and technologies within industry is steady, with a majority indicating the use of e-learning will increase slowly. However, this is most notable in employee and provider responses. One manufacturing industry respondent actually predicted a decrease as e-learning undertaken previously had not met their expectations. These results complement the findings presented in the section above. Specifically;
- The perceived demand for e-learning in on-the-job / off-the-job training by employees (5) ranged from “remain the same” (2), “increase slowly” (2) “increase significantly” (1). While CDs / DVDs were expected to be still available; respondents indicated they expected an increase in the Internet-based resources (5), mobile devices (4), and simulations and games (2).
- The perceived demand for e-learning in on-the-job / off-the-job training by employers (4) was varied and ranged from “decrease slowly” (1) “remain the same” (1), “increase slowly” (1) “increase significantly” (1). While CDs / DVDs were expected to be still available, respondents indicated they expected an increase in Internet-based resources (3), simulations and games (2), and mobile devices (1).
- All training providers (4) indicated e-learning would increase in the next year. However, the rate of this increase would be varied “increase slowly” (1) “increase significantly” (3). While CDs / DVDs were expected to be still available, all respondents indicated they expected an increase in Internet-based resources (3) simulations and games (3), and mobile devices (3) and some indicated a move to “Web 2.0” applications (2).

<sup>14</sup> CIPD. (2007). *Latest trends in learning, training and development*. London: Chartered Institute of Personnel and Development. Retrieved January 28, 2008, from <http://www.cipd.co.uk/research/rsrchplcypubs>

<sup>15</sup> Rivera, R. & Paradise, A. (2006), *ASTD State of the Industry Report*, American Society for Training & Development. Retrieved January 28, 2008, from <http://www.astd.org/>

### 3.5 e-Learning and Trade Training

- It is increasingly recognised there is a shortage of a skilled, trade-qualified population in developed countries such as New Zealand, Canada and Australia. This lack of trade-qualified personnel is making it increasingly difficult for these countries to compete successfully within a global economy<sup>16</sup>.
- Traditional training approaches, the “apprenticeship model”, where a significant portion of learning is “classroom-based”, are being challenged and alternative models of skills-based training are being investigated<sup>17</sup>.
- The use of ICT to present content (for example, videos, simulations, animations and workbooks), to facilitate assessments and encourage interaction through asynchronous and synchronous internet-based communication tools (for example, video conferences, white-boards, forums and quizzes) is being explored as alternatives in providing appropriate skills training.
- Trade-trainees, in general, are learners with a preference for “visual” presentations and ongoing personal contact. To meet these preferences, increased adoption of “video” technologies (e.g. video conferencing, practical task demonstrations embedded in HTML pages, web-casts) will impact learning in a positive way<sup>18</sup>.

Thompson, L and Lamshed, R. (2008). CASE 2: E-learning within stonemasonry Trade and Technician Skills Institute (Brisbane North) in *E-learning within the building and construction and allied trades* Canberra, Australian Department of Education, Employment and Workplace Relations

There are few stonemasonry courses in Australia and e-learning resources for teaching this topic are scarce. This study demonstrated how a tutor, initially with limited ICT skills, brought innovation to the learning experiences of stonemasonry apprentices.

**Key features:**

- The teacher first worked with resources distributed on CD-ROM and then migrated this content to a learning management system.
- A range of development tools was used and included a number of freeware programmes (e.g. *Hot Potatoes*, *MSN Group*, freeware HTML editors).
- During the resource development process, the teacher discovered his student cohort comprised visual learners. He therefore, developed visually-rich presentations and found the use of video was an effective teaching medium in this subject.

<sup>16</sup> Hill, A. (Ed.). (2006). *Alternative Trades Training: Best Practices from Across Canada*. British Columbia: Industry Training Authority.

<sup>17</sup> Thompson, L. & Lamshed, R. (2008). *E-learning within the building and construction and allied trades*. Canberra: Australian Department of Education, Employment and Workplace Relations.

<sup>18</sup> Cooper, C. (2007). *Work-based learner ICT and e-learning survey: Final report Association of Learning Providers and the Learning and Skills Council*. Retrieved January 28, 2008, from [http://www.elearningproviders.org/HTML/images/cms/alp\\_e-learner\\_survey\\_final\\_report.pdf](http://www.elearningproviders.org/HTML/images/cms/alp_e-learner_survey_final_report.pdf)



- A recent international study<sup>19</sup> found a significant number of Registered Training Organisations (RTOs) (46% of n=155) delivering trade training using e-learning methods and/or technologies. Although there was evidence a considerable number of smaller and industry-based RTOs were using e-learning, the use of e-learning applications was highest among the larger RTOs.
- The study also found around 70% of all teachers of traditional trades used e-learning in some way. The most common forms of e-learning used were multimedia interactive resources in the classroom (52%) and online access to, and downloading of, learning materials and resources (48%). Electronic submission of work and online assessment were also used by approximately 30% of traditional trades' trainers.

### New Zealand Industry Insight: Number 3

- **Group Interview Z: Human Resource personnel national retail company**

- These interviewees were the Human Resource Manager and a staff member responsible for developing training materials and schedules for a national retail organisation with over 4000 employees. These employees undertake a range of diverse activities.

- In-house staff have created a set of DVDs and associated workbooks and these have been very successful. As the developer noted

*DVDs provide an element of reinforcement learning, especially if they are accompanied by a workbook. We find those with a workbook work best and are effective in training our staff for particular purposes as they provide 'post' learning opportunities Managers are trained first in how to use the DVDs they in turn train the trainees and other staff.*

- Of specific concern was the need for an *effective assessment regime which enabled them to ensure that the skills were learnt and put into practice effectively*. They felt the functionalities of a learning management system could play a significant role in their training events.

- They noted educating the owners of the business and managers about the benefits of e-learning was seen as a top priority

*"In our industry we need to respond to consumer demand for knowledge and inspiration. Our staff needs to have the knowledge and the skills to assist the consumer and e-learning can certainly contribute to their up-skilling".*

<sup>19</sup> I & J Management Services. (2006). *2006 E-learning Benchmarking Project E-learning in the traditional trades* Canberra: Australian Department of Education, Employment and Workplace Relations.



## Implementation

### 3.6 Desired Impact of e-Learning

- In the literature<sup>20</sup> a number of “benefits”, direct and indirect, derived from the deployment of e-learning in the workplace have been documented. The direct benefits for the employer included:
  - increased output of products and services
  - reduced time per task
  - reduced error rate
  - a better health and safety record
  - reduced waste in production of goods and services
  - increased customer retention, and
  - increased employee retention.
- The indirect benefits included:
  - improved quality of work
  - better team performance
  - improved employee supervisor/manager relationships
  - improved capacity to cope with change in the workplace, and
  - improved capacity to use new technology.
- In essence, the benefits of e-learning implementation can be seen to cluster around three key concepts.
  - *Accessibility and Flexibility*: Employers have the flexibility to offer, and employees to undertake, training that fits their life-style and work schedules in a timely way.
  - *Consistency and Scalability*: Employers are assured all training events scheduled, and supporting materials developed, can be delivered to unlimited numbers of employees in a consistent and uniform way.
  - *Sustainability and Cost Effectiveness*: As the need for physical spaces, employee travel, employee time off work-task and trainer time is refined, the total cost of training will be reduced. At the same time, compliance training can be monitored and the impact of training evaluated.

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<sup>20</sup> Scott-Jackson, W., Edney, T., & Rushnet, C. (2007). *Realising value from on-line learning in management development*. Chartered Management Institute, Oxford Brookes University.

### Benefits of e-Learning: Stakeholder Responses

In general, the data from stakeholders indicate there are a number of potential benefits to be gained from the use of e-learning. However, the ranking of the benefits differed among the stakeholder groups. For example, all respondents agreed the flexibility provided by e-learning to provide “just in time” training was a significant benefit. However, the reduction of time spent on training was considered more beneficial by employers than any other stakeholder group, These results complement the findings presented in the section above. Specifically;

- The flexibility provided by e-learning to allow respondents to undertake training when needed, at a time convenient and at a pace they could monitor and control, was regarded as a “significant benefit” by all respondents (5). Conversely, the reduction in associated costs of training was ranked lowest, with a number of employees (4) indicating this was considered as “not beneficial” for them.
- The flexibility provided by e-learning to allow employers to offer training to employees in a timely manner, in a consistent way, at times least disruptive to production schedules were all ranked a “significant benefit” by respondents (4). While all respondents indicated the reduction in costs would be of “significant benefit”, a number of respondents (2) noted cost reductions achieved by e-learning had, so far, not been proven to their satisfaction.
- As with employees, the providers of training (4) indicated the ability of e-learning to allow training to be undertaken when needed, at a convenient time and at a pace they could monitor and control, was regarded as a “significant benefit”. Conversely, the reduction in associated costs of training and also the time spent on training was ranked as a “moderate benefit” (2) and “not a benefit” (2).

### 3.7 Barriers to e-Learning Implementations

- Organisations are conscious increased e-learning activities will place a strain both on the technical infrastructure the organisation has currently deployed and the support policies, procedures and mechanisms they have in place to deal with employee needs in this e-environment<sup>21</sup>. These include;
  - **Administration:** Difficulty of managing e-training through existing structures.
  - **Change Management:** Challenges in modifying and replacing traditional training practices. Possible resistance by both managers and employees, comfortable and familiar with traditional training

<sup>21</sup> Clayton, J., Elliott, R., Wood, L., & Pouwhare, D. (2007). *Report 4: Final report of e-learning activity in the ITO sector (pp. 146): E-Learning Activities in Aotearoa / New Zealand Industry Training Organisations*. Wellington: Tertiary e-Learning Research Fund. Retrieved November 5, 2007, from <http://ito.e-learning.ac.nz/>

methods, to the change in approach and methods of training delivery.

- **Training Delivery:** Lack of knowledge, skills and expertise by managers/supervisors to create appropriate e-learning materials or design e-learning events.
- **Senior Management:** Failure to recognise the benefits derived from the provision of e-learning by senior management and consequent lack of ongoing support to appropriately resource the e-learning initiative.
- **Quality of Provision:** Confusion created through the availability of a range of e-learning providers (such as educational institutes, private-sector providers, and independent mentors) and “off-the-shelf” e-learning materials. Difficulties, especially for SMEs, in evaluating the value and impact of the myriad of e-learning options offered on their business operations.

#### **Barriers to e-Learning: Stakeholder Responses**

In general, data from stakeholders indicate there are a range of “barriers” to the successful implementation of e-learning. The respondent ranking of these barriers differed widely within and across stakeholder groups. For example, the perceived lack of necessary ICT skills of employees and learners was rated as a moderate to significant barrier by employer and provider respondents. But this lack of skills was rated less highly by employees. However, this discrepancy may be accounted for by the technological literacy levels of employee respondents. These results complement the findings of the information presented in the section above. Specifically;

- Lack of support from supervisors/managers was ranked lowest of the identified barriers where the majority ranked this as “not a barrier” (4). The lack of appropriate e-learning courses and activities was ranked highest of the identified barriers where it was rated as a “significant barrier” (1) or “moderate barrier” (2).
- The lack of appropriate, industry-specific, interactive content and the technical competencies of employees were ranked the highest of the identified barriers where respondents ranked these as a “significant barrier” (2) or “moderate barrier” (2). The lack of support from managers was ranked lowest of the identified barriers where the majority ranked this as “not a barrier” (2) or a “moderate barrier” (2).
- The costs of implementing e-learning initiatives and the appropriate level of trainee access were ranked the highest of the identified barriers where respondents ranked these as a “significant barrier” (1) or “moderate barrier” (3). The ability to motivate trainees to complete e-learning activities offered and the lack of appropriate content also ranked highly where all respondents ranked this as a “moderate barrier” (4).

- The impediments to e-learning growth can be classified within three key broad categories (the three Cs)<sup>22</sup>. These are;
  - *Connectivity*: Limited access to the Internet and adequate ICT devices.
  - *Capability*: The unknown ICT capability of managers, trainers and employees.
  - *Content*: Lack of industry-specific e-learning content relevant to the organisation's specific needs.

### 3.8 Key Drivers for e-Learning in Industry

In the literature<sup>23</sup> reviewed it was noted the perceived key drivers for e-learning growth in industries appeared to focus on:

- *Information Overload*: Employees are faced with an ever-increasing amount of information - organisational, individual, trade and professional - required to complete their tasks successfully. Since this information rapidly becomes redundant, methods of continually providing staff with up-to-date, relevant and authentic information are critical.
- *Technological Innovation*: The rapid rate of change of the use of ICT in business processes impacts on work practices and this needs to be managed in a consistent and timely manner.
- *Return on Investment*: The provision of training to improve performance at an individual and organisational level must be done economically and efficiently and represent value to the organisation.

#### New Zealand Industry Insight: Number 4

##### Interviewee Z: Human Resource Manager Manufacturing Sector

This interviewee was the human resource person for a large manufacturing-based firm located in the Waikato region.

The firm currently provides limited e-learning opportunities as "*the majority of employees are workshop based and have no access to PCs*". The limited use was also influenced by previous, and apparently not successful, experiences of e-learning when "*training via CBT was trialed with office-based workers but no buy in as they preferred to have human interaction*".

However, although it was anticipated e-learning activities would not increase significantly in the next twelve months (short term), the interviewee recognised the flexibility provided by e-learning solutions could be beneficial in the next five years (medium term)

*"with a workforce that is measured by chargeable hours the ability to pull small numbers from the workshop floor when workflows allowed was seen as a great benefit"*.

<sup>22</sup> The Australian Institute for Social Research. (2006). *The Digital Divide – Barriers to e-learning*. Digital Bridge Unit, Science Technology and Innovation Directorate, DFEEST.

<sup>23</sup> Becta. (2005). *Research into the use of ICT and e-Learning for work-based learning in the skills sector: Literature review*. Coventry: British Educational Communications and Technology Agency.

### 3.9 Critical Success factors<sup>24</sup>

- The term *critical success factor* (CSF) originated in the field of management and has been adapted for many different uses. The CSF method is based on the premise every organisation must provide value and perform well in those areas unique to its mission and the industry in which it operates. These identified key areas constitute critical success factors.
- For the purpose of this study, Critical Success Factors describe the key factors an organisation must get right throughout the life cycle of an e-learning implementation project to ensure its success.
- In the literature available on e-learning, it is noted that the perceived critical factors for effective implementation of e-learning could be identified at three levels<sup>25</sup>:
  - *Organisational*: Managers within organisations, as well as actively supporting e-learning deployments, need to develop policies, strategies and plans to encourage e-learning initiatives and measure their effectiveness and enable sustainability.
  - *Training*: Trainers need to believe in the effectiveness of e-learning methodologies, have ready access to engaging, well-designed, visually-appealing and authentic e-learning content and be able to measure the impact of e-learning implementations on participant performance.
  - *Learning*: Employees need ongoing support and motivation to continue to participate fully in e-learning activities. They also need to have sufficient literacy, numeracy and ICT skills to feel comfortable in e-learning environments created.

### 3.10 Ensuring Quality<sup>26</sup>

- Although the concept of 'Quality Assurance (QA)' can be very difficult to precisely define, its critical importance to organisations is widely accepted. Firms who provide workplace/work-based training, and the employees who participate in these events, need to be assured the activities developed and offered are firstly, effective (do what they say they will do) and secondly, are efficient and cost effective in terms on return of investment on the fiscal and human resources consumed.
- For the purpose of this report, Quality Assurance is the organisational activity undertaken to provide the evidence needed to establish confidence among all concerned that quality-related activities are being performed in an effective and efficient manner.
- The quality of the workplace/work-based training experienced by participants can be directly attributed to the quality of all of the processes used in the creation of the workplace/work-based training event. For example, the

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<sup>24</sup> Morrison, M. (2008). *Determine the Critical Success Factors (CSFs) for your company*. RapidBI. Retrieved June 20, 2008, from <http://www.rapidbi.com/created/criticalsuccessfactors.html>

<sup>25</sup> How these are reflected in large, medium and small enterprises is reflected in section 3.

<sup>26</sup> BNET Australia. (2003). *Quality Assurance*. Retrieved June 20, 2008, from <http://jobfunctions.bnet.com/abstract.aspx?docid=59018>

processes used in the creation and publication of digital learning materials, the processes used in the ongoing tutoring/mentoring/ supporting of students in workplace/work-based training environments, and the processes used in the administration of workplace/work-based training events. A lack of 'quality' during any of the identified processes will ultimately affect the final workplace/work-based training experience of employees.

Nichols, M. (2002). Development of a quality assurance system for e-learning projects. Paper presented at ASCILITE 2002 Conference. Winds of change in the sea of learning: Charting the course of digital education, Auckland, New Zealand. Retrieved February 8, 2008, from: <http://www.ascilite.org.au/conferences/auckland02/proceedings/papers/004.pdf>

UCOL uses a range of e-learning technologies, including a learning management system (LMS), to deliver a range of e-learning events. In reviewing its e-activities the e-Campus team identified 5 levels of e-learning. These were:

- Information Repository – the use of the LMS to store electronic documents.
- One-Way Communications – the use of the LMS to post announcements/ notices to students and to check learner activity.
- Online Exercises – creation of quizzes and surveys using LMS tools.
- Two-Way Communications – using LMS tools to enable students to communicate with their instructor and each other.
- Learning Objects – Learning Objects can be either placed, or hyperlinked to, within the LMS site.

### **Creating A Quality Process**

The eCampus team found the creation of quality assurance procedures were time consuming. It required the creation of procedures that were flexible, self-correcting, consistent, and enabled the realisation of the five levels of eLearning.

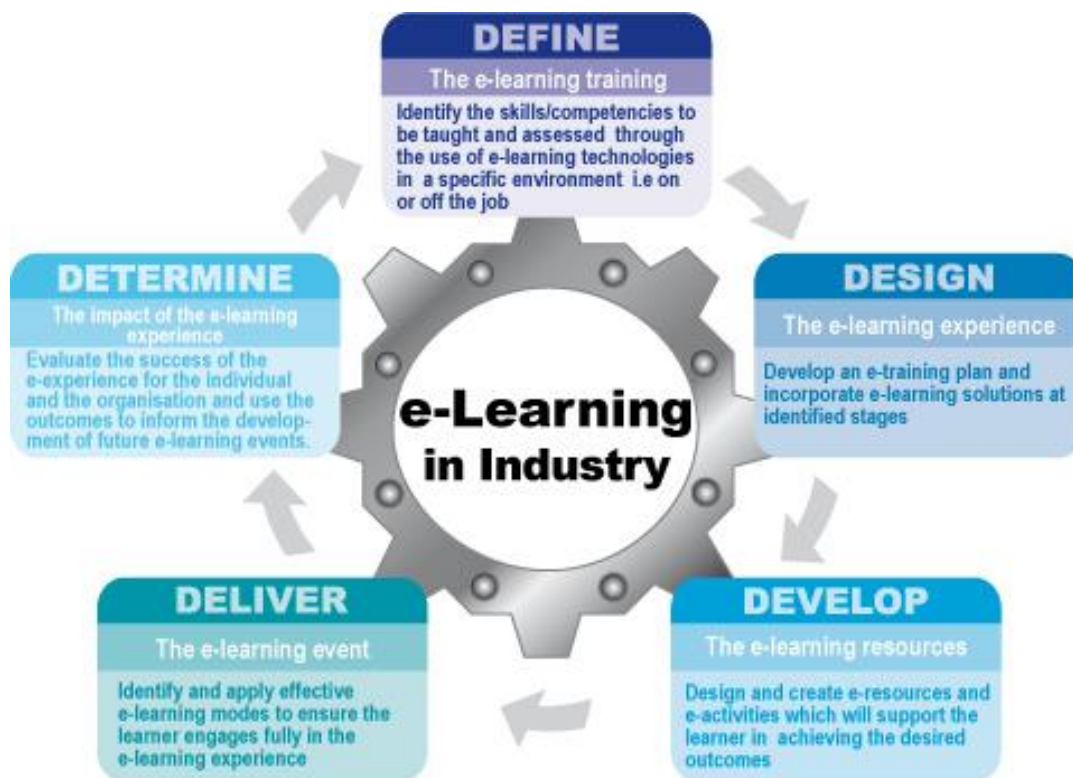
After reflecting on an eLearning pilot programme the team created four quality assurance procedures. These were:

- The training process – quality assurance for eLearning levels one to three.
- The consultancy and training process – for development at level four.
- The full project process – used in the development of major learning objects (level five) and development of courses into an RBL (resource-based learning) mode.
- The minor / single task project process – a 'catch-all' process that ensures quality in additional activities such as resource digitisation.

Each identified process was outlined in a detailed activity flowchart with identified steps and clearly defined roles and responsibilities. The team believe the provision of these quality assurance procedures ensures UCOL is in an excellent position to consistently develop high-quality eLearning solutions and learn from its experience.



- To ensure quality the creation of e-learning events should follow a recognized cyclical pattern conceptualised by the research team as the **Five Ds (5Ds)** of e-learning in industry.
  - *Define*: the e-learning training requirement(s),
  - *Design*: the e-learning training event(s),
  - *Develop*: the e-learning resource(s),
  - *Deliver*: the e-learning event(s),
  - *Determine*: how or if e-learning can or should be used to meet the above requirements successfully.
- The research teams 5Ds model is illustrated in figure 3.1 below



**Figure 3.1: The 5Ds of e-Learning**

### 3.11 Impact of Blended Learning

Organisations are recognising the real benefits derived from training can be enhanced by combining (blending) the personal touch and peer interactions created in face-to-face sessions with the self-paced, on-demand attributes provided by e-learning. Increasingly, training managers are acknowledging the

effectiveness and impact of blended learning. Three conceptions of blended learning have been identified<sup>27</sup> and these are summarised below:

- *Blending of course delivery*: The course of study would consist of a mixture of face-to-face sessions, paper-based and online activities.
- *Blending of location*: Activities are carried out within a localised class-session or they can be carried out by students in independent locations.
- *Blending of resources*: Resources, both formatted and human-based, from different sources in a variety of digital media are made available to participants.

QIA (2007). *Developing flexible delivery using blended learning* The Quality Improvement Agency for Lifelong Learning ('QIA') Retrieved February 1, 2008, from <http://www.qiaemployerled.org.uk/search/Resource-23552.aspx>

Riverside Training and Business Development in Hereford designed a blended learning programme where participants accessed workbooks, question papers and videoed interviews on specific topics on a dedicated website. Participants were then allocated workplace assignments which, on completion, they would e-mail to their assessor. Facilitators found this meant that the face-to-face contact time scheduled was no longer dominated by the laborious task of collecting evidence. Instead, the human contact time provided opportunities to assess the learner's work and to provide feedback.

The feedback from learners had been encouraging as some noted;

- *It serves as an extra point of contact to my assessor; I don't have to wait for him to return my call.*
- *It gives me the opportunity to upload draft materials and get feedback from my assessor.*
- *It provided a good opportunity to download the knowledge questions and have them sent back before my next visit.*

### 3.12 Measuring Effectiveness and Impact

- Measuring and proving the value of e-learning can be a complex task and, dependent on the "model selected", perceptions on the impact and effectiveness can vary widely<sup>28</sup>.
- In evaluating the effectiveness and impact of e-learning the two target areas of analysis are firstly, the individual level investigating competency and accomplishment and secondly, the organisational level investigating strategic alignment and business impact.
  - At an individual level it is important to ascertain if the employee has "learnt" something from the training provided. For example, have they acquired a new skill, have they modified or changed behaviour, or are they "happier" in their workplace.

Rothery, A. (2004). *The EUNIS E-Learning Workshop: Report*. EUNIS

<sup>28</sup> Wilson, D. (2004). *Measuring and Proving the Value of Learning: eLearnity viewpoint paper*. Cirencester, UK. Retrieved January 28, 2008, from <http://www.elearnity.com/index.html>



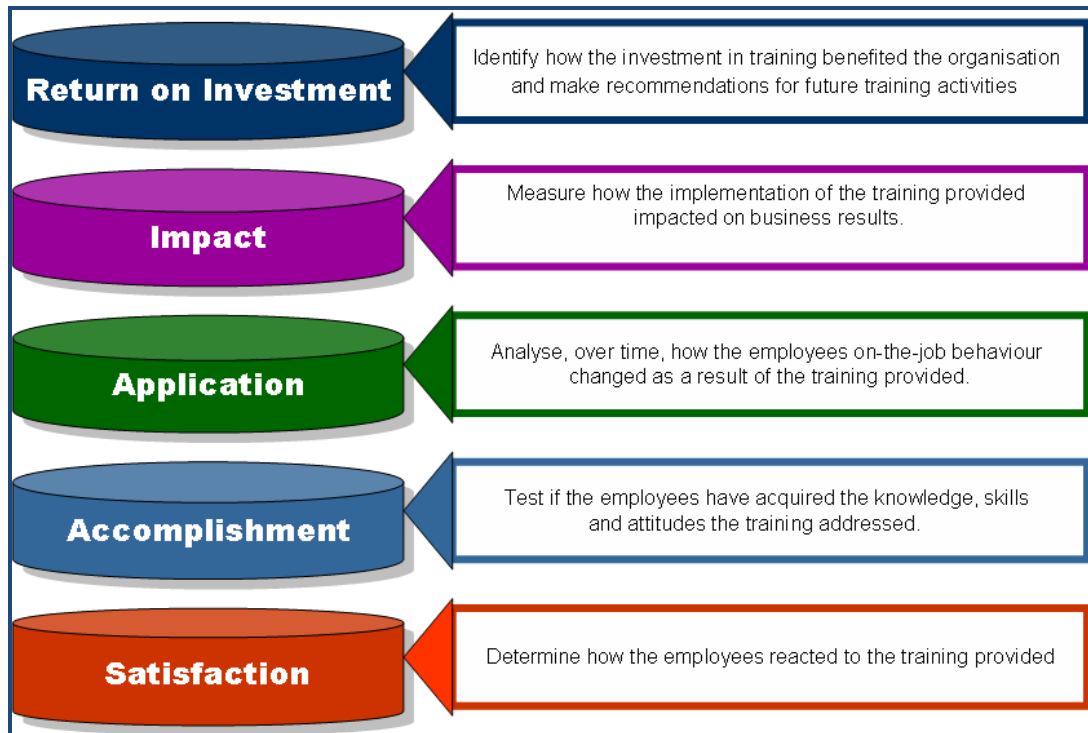
- At an organisational level it is critical to understand how effectively the learning and training opportunities presented to employees have contributed to improving the organisation. For example, has quality of product improved, has the dollar value of sales increased, is there an increase in customer satisfaction, or have staff retention rates increased, is plant being used to optimum capacity.

### **Effectiveness of e-Learning: Stakeholder Responses**

In general, data from stakeholders indicate e-learning approaches were perceived to be effective if they were implemented in the right place, explaining appropriate skills, for the right audience. However, the perceptions of the effectiveness and impact of e-learning differed widely within and across the identified stakeholder groups. For example, most respondents thought e-learning approaches were suitable for on-the-job training. However, the perception e-learning was most suited for employees regularly using ICTs in their normal duties was held more widely by providers than any other stakeholder group. In essence, the results fit within “level one” of the Kirkpatrick-Philips evaluation model described above. The specific findings were:

- All employee respondents believed CDs / DVDs were effective e-learning technologies to use in industry training. The majority also thought Internet technologies (4) and computer simulations and games (3) could also be effective for identified tasks. In general, employee respondents accepted e-learning was “as good as traditional training methods” with only one respondent indicating this was not the case and two respondents in strong agreement.
- All employer respondents believed CDs / DVDs and Internet technologies were effective e-learning technologies to use in industry training. The majority also thought computer simulations and games (3) could also be effective for identified tasks. As with employees in general, employer respondents accepted e-learning was “as good as traditional training methods” with only one respondent indicating this was not the case.
- The providers of training (4) indicated that all e-learning technologies- CDs / DVDs, Internet technologies, computer simulations and games, and mobile devices- had a place in industry training. This was very dependent on the audience and situation and was regarded as a “significant benefit”. Unlike employee and employer respondents, all providers accepted e-learning was “as good as traditional training methods”.

- Some reports advocate the use of innovative models to evaluate the impact and effectiveness of e-learning implementations in general. The literature<sup>29</sup> argues a comprehensive measurement model, based on slight modifications to the widely-applied Kirkpatrick-Philips evaluation model, would be more in keeping with existing evaluation practices and would be more readily accepted. The Kirkpatrick-Philips model defines five levels of evaluation – satisfaction, learning, impact, results and return on investment.
- The modified evaluation model developed by the research team is illustrated in figure 3.2 below



**Figure 3.2: Modified Kirkpatrick-Philips Evaluation Model**

## Summary

### 3.13 Key Findings

- Despite the limited number of reviews available on the current state of e-learning in New Zealand industry and business, those produced contain sufficient data to provide a basic understanding of the current use of ICT in industry and by individuals. They indicate between 2004 and 2006 a significant growth in the use of computers and the Internet in both households and business, with seven out of ten New Zealand households

<sup>29</sup> Skillssoft. (2005). *What Return on Investment does e-Learning Provide? White Paper*. Skillssoft. Retrieved January 28, 2008, from <http://www.e-learningcentre.co.uk/eclipse/Resources/costs.htm#d2007>

and nine out of ten businesses having ready access to computers, and nearly two thirds of households and ninety percent of businesses being connected to the Internet.

- In trade-training, the use of ICT to present content (for example, videos, simulations, animations and workbooks), to facilitate assessments and encourage interaction through asynchronous and synchronous internet-based communication tools (for example, video conferences, white boards, forums and quizzes) are challenging traditional training approaches, including the “apprenticeship model”, where a significant portion of learning is classroom-based.
- An extensive review of the literature indicated a varied demand for e-learning applications and implementations. The most realistic view of the perceived demand for e-learning is the reported documentation of the steady decline of classroom-based activities (from a high 78% in 1999 to a projection of 53% in 2006, a decrease of 25%) and the steady growth of technology-based training, (from a low of 14% in 1999 to a projection of 40% in 2006, an increase of 26%).
- The benefits of e-learning implementations can be seen to cluster around the key concepts of accessibility and flexibility (employees can undertake training that fits their life-style and work schedules in a timely way) consistency and scalability (all training events scheduled, and supporting materials developed, can be delivered to unlimited numbers of employees in a consistent and uniform way) and sustainability and cost effectiveness (reduction in the total cost of training while, at the same time, compliance training can be monitored and the impact of training evaluated).
- Organisations are conscious increased e-learning training offerings will place a strain both on the technical infrastructure currently deployed and the plans, policies, procedures and mechanisms in place to deal with employee needs in these e-environments.
- Organisations recognise the benefits derived from training can be enhanced by combining (blending) the personal touch of face-to-face sessions with the self-paced on-demand attributes provided by e-learning. Increasingly, training managers are acknowledging the effectiveness and impact of blended learning.
- This report noted the perceived critical factors for effective implementation of e-learning could be identified at three levels- organisational (managers need to actively support e-learning deployments), training (trainers need to believe in the effectiveness of e-learning methodologies), learning (employees need ongoing support and motivation to continue to participate fully in e-learning activities).
- In general, this report argues a comprehensive measurement model based on slight modifications to the widely-applied Kirkpatrick-Philips evaluation model would be more in keeping with existing evaluation practices and would be more readily accepted by industry.

## New Zealand Industry Insight: Number 5

### Group Interview M: Education Officers Government Service Organisation

These interviewees were directly involved with education and skills development of a large government service sector. The general consensus of the group was e-learning had the potential to enhance and improve all of the currently-provided training programmes.

There was general agreement that e-learning would be beneficial for trade training as a significant amount of trade training involved theory and the application of that theory to identified tasks. Digital materials were perceived as being *more engaging than traditional workbooks* as it would include multimedia, interactive exercises and computer-based simulations.

However, a member of the group noted “*we may struggle to deliver where tactile skills are required, without sophisticated hepatics in place e.g. for a hand soldering course*”.

The key drivers identified for the adoption of e-learning included:

- Shortening the amount of formal classroom training that is required, which takes trainees away from their primary roles.
- Providing easy revision or refresher material and obtaining compliance or recertification.
- Deploying training in a quick and consistent manner.

The group agreed e-learning contributed to a reduction in overall training costs, helped with retention in the department, ensured on-the-job knowledge remained current and helped meet legal and health and safety requirements.

## 4. e-Learning in Action

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4.1 This section covers two topics:

- **Overview:** Outlines the procedures used in conducting case studies investigating the current use of ICT in industry:
  
- **Summary of Key Findings:** Reviews the key factors influencing e-learning implementations and covers 9 sub-topics:
  - *Target Audience:* Provides an overview of the audience of e-learning in industry initiatives.
  - *Key Drivers for e-Learning Development:* Identifies the factors influencing e-learning implementations.
  - *Work-Force Capabilities Addressed:* Outlines the current employee capabilities being targeted by e-learning initiatives.
  - *e-Learning Solutions Developed:* Describes the e-learning applications and communication technologies used in industry initiatives.
  - *Delivery:* Outlines the approaches used in delivering e-learning activities.
  - *Impact:* The perceptions of training managers on the impact on their organization of e-learning initiatives are listed.
  - *Barriers:* Identifies the impediments to e-learning initiatives.
  - *Future Developments:* Outlines how industry perceives the impact of e-learning in the future.
  - *Critical Success Factors:* Outlines factors essential to successful implementation.

**Case Studies:** When appropriate findings from case-studies are highlighted throughout this section.

## 4.2 Overview

- During mid-2008 structured interviews with managers of seven organisations were undertaken. These provided a “snap-shot in time” of the current use of e-learning by a range of industries in New Zealand.
- In conducting the interviews a detailed template, containing 12 discrete sections, was used as a guide (refer Appendix 2). The sections in the guide focused on:
  - Background of the industry investigated
  - Target audience and drivers for development
  - Workforce capabilities addressed
  - e-learning application / ICT solution developed
  - How e-learning solutions were delivered
  - Participants involved in the solution offered
  - Impact on building workforce capability
  - Benefits of the deployment
  - Barriers faced and addressed
  - Indications of future developments
  - Advice they would give to others thinking of using e-learning
- A summary of the key findings are presented below.

## Summary of Key Findings

### 4.3 Target Audience

<b>Case Study B: Supplier of Teaching Technologies</b>
<b>Target Audience</b>
<p><i>Between January and June 2008, 350 predominantly female clients, ranging in age from early-twenties to mid-seventies, participated in external organised training events and/or demonstrations. The participants included educators across the education sector and the employees who provide the training. The current system was planned and introduced as part of the company strategy to provide more than just technical training to a wide range of educators who need to understand the pedagogical implications of new technologies.</i></p>

- *Range*: The case studies illustrated the steady embedding of e-learning into training and educational activities offered across a broad range of industries. These included industries involved in agricultural production and electricity generation and service industries such as education.
- *Events*: The e-learning events offered ranged from the practical, such as electrical generation simulations, to the theoretical, such as certified educational courses in communication.
- *Limitations*: From the case studies it was also evident the introduction of e-learning across industry was not constrained by gender, age or level of literacy, with e-learning being offered to male and female, young and old, highly skilled and low skilled and to those with high or low levels of literacy.

## New Zealand Industry Insight: Number 6

### Interviewee C: Director of an online training company

This interviewee is the director of a small company developing online resources for a number of industries. A significant focus for the firm is the creation of short interactive online courses for people employed in the electrical/electronics industries. The focus on electrical/electronics arose from a perceived gap in the training of electricians and associates who need to be regularly updated and up-skilled to meet the compliance criteria associated with the renewal of their practicing certificates. As well as providing updates the firm also provides material for certification and compliance.

The firm has deployed an online system so *employers don't need to provide time off from the workplace for employees to complete something like a 'site safe' certificate*. Being online also means the *ever-changing regulations and compliance issues* can be updated and published quickly and efficiently and they can be centralised for efficient access. *Electrical workers have a difficult job keeping up with the changes. Having all the regulations in one place where they are easily accessible and searchable makes sense*. Another advantage of having materials and resources online is that *rural workers can have access via their home computers*. Currently, access to the basic regulations is free and *if the electrician wants further information or explanation of a specific regulation or process they can enrol for a short course*.

A developmental focus for this firm is on off-the-job training providing flexibility for workers as to when and what they need to learn. In many cases, firms will pay for the short course. In this situation the provider notifies the employer when the course has been completed successfully. By doing this *the firm knows that an employee is site safe and has completed the requisite course and will comply with regulations currently in force*.

The interviewee highlighted the value of using e-learning technologies as being *highly motivating and flexible for the users and cheaper than buying books on regulations which are rapidly out of date*. For the electrical/electronics industry using e-learning technologies is *cost efficient and effective, facilitates certification requirements and reduces the amount of time required to gain competencies. Definitely useful for trade training at all levels*.



#### 4.4 Key Drivers for e-Learning Development.

- **Learning Environment:** With the ever-changing nature of national and international markets industries are engaging with, technological developments impacting on the production of goods, the provision of services and the growing use of ICT in business processes and procedures, traditional training systems are constantly being reviewed and often found wanting. Increasingly, the targeted use of e-learning is seen as a viable alternative in addressing the training needs of individual industries and align them better with environmental pressures.
- **Cost:** Business investment decisions on training are driven by return on investment. A key driver for many of the e-learning deployments illustrated in this report is the financial gains generated by the replacement of traditional modes of training with targeted e-learning applications. The ultimate benefits of a skilled workforce also help offset implementation costs.
- **Legal Compliance:** Workers employed in the firms reviewed often need to meet a number of requirements (such as health and safety, site safety, and, in some instances, certification) as a pre-requisite to employment. In some cases, it is also crucial employees are aware of their obligations under Government legislation. The use of e-learning delivery and administrative tools provide the firms with the ability firstly, to monitor workers' current compliance status and secondly, to ensure all employees have accessed appropriate information on their obligations.

#### Case Study D: Electrical e-Training Provider

##### Key Drivers for E-Learning Developments

- **Compliance:** People involved in the electricity industry are required to meet a number of requirements (such as health and safety, site safety, as well as legal requirements). Currently, information on the compliance requirements is "scattered" and can be tedious to locate. *The reasons for developing this e-learning initiative was to enable ease of access to all the required resources and materials for electrical workers. It also provides them with a range of e-courses to upskill, get up to date with recent changes or to meet compliance requirements.*
- **Cost:** By locating *all the resources in one place it reduces costs and time, plus provides a degree of flexibility in the organisation of training programmes for the individual user.* The company also anticipates registered companies will have an *online interface personalised for their company with associated logos and internal (secure, company specific) information.* This use of centralised resources with individual branding will ultimately *reduce training costs to individual companies.*
- **Learning:** The amount and types of information electricity workers have to become familiar with is complex and is often presented in ways which, for some, are difficult to comprehend. *Some guys really struggle with literacy/numeracy.* The company's aim is to *take the difficult-to-comprehend sections of the legislation and, using the latest multi-media technology, to explain it in a simple and easy-to-understand way.* In essence, *from legislation to simple explanation.*

#### 4.5 Work-Force Capabilities Addressed

The scope of industry-related e-learning training provision is extremely broad and e-learning solutions have been developed and deployed to address:

- **Induction:** A significant number of the firms reviewed indicated they were using e-learning to introduce staff to the firms' processes, procedures and requirements. The flexibility provided by e-learning ensured the induction of employees could be undertaken at anytime and anywhere.
- **ICT Skills:** A number of targeted staff received specific training in the range of software applications acquired by the organisation to undertake and monitor the normal business operations of the firm.

Case Study F: Milk Processing Company
Workforce Capabilities Addressed
<ul style="list-style-type: none"><li>• <b>Induction:</b> All staff are required to undertake induction and although <i>by the end of the year much of the induction process will be on Moodle</i> in general a <i>blended approach is intended</i>. For example a <i>practical module, making butter</i>, so workers can <i>experience the processes involved</i> will continue to be part of the induction process. The company uses Moodle for a number of online courses, currently these have some interactive <i>modules for users to complete along with a range of documents associated with various subject areas plus, pop-ups, charts and a quiz</i>.</li><li>• <b>Health and Safety:</b> <i>A lot of time is spent on health and safety issues and the associated training because of the nature of the manufacturing business</i>. The organisation has developed a lot of material on the Moodle site to support the training in this area.</li><li>• <b>Compliance:</b> The industry must meet the legal obligations and <i>this is incorporated in the Moodle site</i>. In general, the material currently available <i>online is mainly compliance stuff, with a focus on health and safety</i>.</li><li>• <b>ICT skills:</b> A number of targeted staff receive <i>some related CBT (computer based training)</i> in a range of software applications used in the normal business operations of the firm <i>but most of this is outsourced</i> to external providers.</li><li>• <b>Leadership:</b> The organisation is keen on the provision of <i>leadership skills especially for managers and supervisors in safe work practices, and off-job practice with assessment</i>. Although team leader development <i>is outsourced the trainers use the organisations resources, including Moodle</i>, and customize the training <i>to meet the firms' specific training needs</i>.</li><li>• <b>Technical and Manual Skills:</b> The organisation uses an <i>online critical analysis tool IRR (internal rate of return)</i> to assess whether a (training) project will be viable (cost/benefit analysis). <i>Works well</i>.</li><li>• <b>Communication and Team Relationships:</b> Although not specifically targeted <i>this occurs as a consequence of the training</i>.</li></ul>

- *Literacy and Numeracy*: Although this area is not specifically targeted by most of the firms contacted, many address this issue through collaboration with external experts or the promotion of courses from external providers.
- *Technical, Trade and Manual Skills*: In general, participants in this area are used to undertaking training on new devices, technologies, or production methods. The innovative use of e-learning applications such as video-capture technologies, simulations and demonstrations appears to provide a consistency of approach not generally available through traditional methods of delivery. E-learning is being used for both standard and advanced trade training programmes.
- *Product Knowledge*: To increase market share and/or to ensure staff are aware of the products produced or services offered, some firms provide e-learning solutions to keep staff abreast of latest developments.
- *Certification*: Many firms provide formal recognition of training undertaken (for example, working in confined spaces or first aid) and e-learning administrative tools are used to monitor employee certification status.

#### 4.6 e-Learning Solutions Developed

- *Custom Designed*: A range of content creation software applications, such as Articulate, HTML editors and Flash, are used to create custom-designed CDs, DVDs, or web-hosted content. These are generally created in-house to meet the specific training needs of the organisation. In many instances these digital resources are supplemented by digitally-created, but print-based, workbooks.
- *Blended*: A number of firms are increasingly using laptops, DVDs and data/video projectors to enhance traditional face-to-face learning environments. The nature of the learning environments is changing with the flexibility of the technology available. In many cases, learning events are occurring 'out in the field'.
- *Simulations*: Simulations form a significant component of e-teaching solutions developed. In general, they are designed to replicate firm-specific, problem solving situations, ensuring the workers are up-to-date and competent with equipment functionality or situational requirements.
- *Intranet/Internet*: A variety of informational "web-pages", outlining product functionalities and specifications, are readily available to all employees. Other Web resources include tracking systems, email, links to external information, numeracy and literacy resources and custom-designed interactive courses.
- *Learning Management Systems*: A number of firms are introducing Learning Management Systems (LMS) as these systems provide the organisation with the ability to maintain individual learning plans and to book, track and record training activities.
- *Video Capture*: Although not wide-spread, the provision of videos, often enhanced with notes and interactive graphics, of external experts installing new plant and/or operating machinery, has proved to be very effective for skills acquisition or maintenance.
- *Mobile*: Although some firms have found the use of mobile devices problematic, the increasing use of mobile devices by all sectors of society has seen firms begin investigating the benefits of using these devices for training /educational purposes.

## Case Study A: Energy Supply Company

### e-Learning Solutions Developed

- **My-Learning:** This formal online system is based on the integration of an international Learning Management System (LMS) and a learning content management system (LCMS). The integrated system allows the organisation to maintain individual learning plans and to book, track and record training activities.
- **WorkMate:** This informal flexible system is continually being developed and provides a range of online courses and work-related information. The system is designed to provide on-demand access to resources which enable the user to update, or refresh their skills in relation to the operations of the firm and associated equipment. In many cases, courses contribute to advanced technical/trade training in relation to the operation and maintenance of the latest equipment and technology being used within the power generating systems. The resources available include authentic audio and video clips providing media-rich explanations of particular systems, safety aspects and their functionality. Wherever possible all the training material in Work-Mate reflects authentic situations and equipment the employee or contractor will encounter on site.
- **Simulations:** The firm has purchased two high-level dedicated simulators that are used to train employees operating the various power generating plants. The simulators are used to generate authentic problems that operators must deal with, in real time, to ensure the production units are kept on stream. Downtime can be costly.
- **Custom designed:** The organisation uses several software applications including Flash, used in development of online materials and Articulate, which is an intuitive application allowing the quick integration of text audio and video, and Captivate. There are very few relevant CDs and DVDs available and these are being phased out. Because the firm has a LCMS any changes made to the content are immediately rolled-out across all courses and events, thus ensuring currency of materials.
- **Video Capture:** Videos of external experts installing new plant and machinery are captured when the experts arrive and first install the plant. They are also captured during the formal training sessions provided for the employees to enable them to operate the equipment. These videos are then available when the experts leave and if operators need to review specific tasks. Videos of regular employees completing regular operating tasks (such as walk-through) are also captured. These videos are frequently used by courseware developers as the starting point for subject matter preparation, with the video content being repurposed into other learning delivery formats. These outputs are then published both in formal courses through My-Learning and also informally on WorkMate. It has been found employees access these "just-in-time" to refresh their memory on what the specific requirements of the job are or to instruct / answer questions from junior members of staff. Seminars / tutorials/ demonstrations also occur on a regular basis. They are often recorded and put online.

#### 4.7 Delivery

- *On-the-Job:* Workplace/on-the-job provision accounts for a significant component of the training offered by firms and, in some cases, between eighty and ninety percent of training is provided through this approach.
- *Commitment:* Employees generally undertake the training at their place of work and have reasonable access to the necessary ICT equipment. This reduces time of task and increases profitability.

Case Study D: Electrical e-Training Provider
Delivery
<p>The company employs a range of delivery methods for its courses. These include</p> <ul style="list-style-type: none"><li>• <i>Computer-based:</i> CDs and DVDS are used extensively to demonstrate electrical principles and practices along with safety issues and procedures.</li><li>• <i>Internet:</i> Interactive Web tools (such as discussion boards, e-mail) are used as part of a framework of support for the online courses and as supplementary resources for face-to-face teaching sessions delivered by the company.</li><li>• <i>Mobile:</i> The company is beginning to develop resources to be available on mobile devices such as PDAs and cell phones. Checklists and forms are already available so workers can do an electrical safety checklist or rank problems in order of risk of occurring, on his/her PDA.</li><li>• <i>Simulators:</i> A range of web-facilitated demonstrator simulations and associated short courses has been created. These are based on many of the 'hardwired' simulations, representing electrical principles and practice and safety in the workplace. These models consist of a range of simulated electrical circuits and systems (e.g. a house electrical circuit or a number of appliances) into which faults can be programmed and the participant can use their knowledge, skills and tools to detect faults, safety issues and apply their knowledge to resolve the faults. Each of the online courses incorporates an assessment module in the form of a short test which enables the user to check their knowledge of electrical process and application.</li></ul>

- *Assessment:* Workplace/on-the-job training is assessed by an on-the-job 'mentor' and certified assessors. A number of the compulsory induction / site safety online modules developed have mandatory assessments included. Employees must pass all these assessments before the course is considered to be completed and they are compliant with the identified requirements.
- *Evaluation:* In general, all training events (workplace and work-based) are evaluated with firms using standard rating evaluation forms. These evaluation forms are collated and any concerns/issues are addressed.



- *Computer-Based:* CDs and DVDS are used extensively across all case study participants to demonstrate products, principles, procedures and practices. These are often multi-media rich resources including animations, audio and video files.
- *Internet:* Interactive Web tools (such as discussion boards, e-mail) are sometimes used as a part of a framework of support for the e-learning activities and as storage area for supplementary resources used in face-to-face teaching sessions.
- *Simulators:* A number of industries use a range of demonstrator simulations. Some are very sophisticated and are based on the actual machines and operating systems employees use.

#### 4.8 Impact

- *People:* The studies noted an increased number of staff moving from low skill to higher level skills. There also appears to have been improved collaboration, communication and teamwork within the organisation.

<b>Case Study D: Electrical e-Training Provider</b>
<b>Impact</b>
<p>The company recorded a number of tangible benefits across the board with the introduction of a centralised comprehensive training programme. These include:</p> <ul style="list-style-type: none"> <li>• <i>Time:</i> There is evidence that the current training system dramatically reduces the time to complete training and there is less time off-the-job.</li> <li>• <i>Flexibility:</i> Since the deployment of the integrated system in 2004 there have been better results than previous methods and the solution has provided greater flexibility in training schedules.</li> <li>• <i>Compliance:</i> The strong management capability of the LMS ensures that compliance and knowledge of the workforce is audited, tracked and managed effectively. The organisation has noted a better tracking of safety requirements. The evidence for these outcomes is readily available through the analysis of the data in the online system</li> <li>• <i>Quality:</i> The use of the LCMS and LMS has ensured there is a consistent quality of training and resources and confidence there is now organisational adherence to accepted workplace standards. Although it's not actually measured there are definite indications that quality of the work and the working environment have improved.</li> <li>• <i>People:</i> The organisation has noted there is a definite increase in the number of skilled staff, who are motivated and in a number of cases there has been a definite improvement in literacy. There is improved collaboration and communication, around subject matter delivered through the WorkMate and My Learning Portals</li> </ul>

- *Production:* Organisations have found the growing use of e-learning applications is improving speed of learning/training and reducing employee down-time. Anecdotal comments also indicated improvement in the service provided to the customer and safer working environments created.
- *Quality:* e-learning is seen as a vehicle for improving the consistent quality of training which is essential to increase the knowledge and skill levels of employees. E-learning also ensures training events are no longer 'one off' sessions and employees can return to the online resources at anytime reinforcing the learning that has taken place.
- *Compliance:* The strong management capability of the e-administration tools ensures that compliance and knowledge of the workforce is audited, tracked and managed effectively. This enables firms to meet all legislative requirements.
- *Time:* The initial findings from the case studies indicate the e-learning dimension provides both greater speed and more flexibility for the learner. This flexibility also means the training can be tailored to be least disruptive to a firm's work schedules and there is less time "off-the-job".

#### 4.9 Barriers

- *Financial:* For all organisations, a critical issue is the perceived cost of e-learning implementation versus the investment and time out for the business. In essence, e-learning solutions need to be cost effective but, until they have been deployed, it is difficult to prove the financial benefits.
- *Management Support:* Traditional approaches to training are well known and accepted and it can be challenging to get the 'traditionalists' to adopt new approaches. This resistance can be overcome if there is ongoing, demonstrated support from senior management.
- *Relevance and Quality:* Organisations recognise materials presented to employees must be relevant, engaging and authentic. However, this creates tensions as producing digital materials, especially high quality videos, can be very expensive and not be necessarily suited to budget constraints.
- *Acceptance:* Online learning is relatively new to many in the industry and this is evidenced by the reluctance of some employees to fully engage in the courses offered. However, as more courses are offered through this medium it is anticipated this reluctance will diminish.
- *Recognition:* The relative newness of e-learning has triggered reluctance by some authorities to accept that e-learning is an acceptable mode to deliver training and conduct assessments. However, as more e-systems, e-processes and e-assessments are deployed it is anticipated such hesitation will diminish.
- *Infrastructure:* The infrastructure needed for ongoing development of e-learning initiatives carries costs related both to the identification of appropriate emerging technologies to deploy and the associated financing of such deployments.



## Case Study B: Supplier of Teaching Technologies

### Barriers

- *Financial:* The organisation has found *implementing training in rural schools is problematic*. There are two reasons for this firstly rural schools themselves *don't have sufficient funds to implement training* and secondly, *to travel to these schools is not an option for the company because of the costs involved in delivery increase according to distance travelled*.
- *Management Support:* Although the firm's *focus is on the customer*, they have frequently found, when arriving at delivery locations, senior management have not adequately prepared staff for the training offered - *in many cases there is a lack of organisation/ planning for the training event for the educators, perhaps because there are too many other things to do*.
- *Motivation:* When delivering training the firm has encountered *some resistance issues from educators who don't see why they should change and adopt/ embed ICT in their teaching*. While this resistance can be overcome by including a *peer /mentoring system in the contract to train*, often *resources are not available to provide the support and input required to work with someone who has been teaching for thirty year and says, "Why should I change?"*
- *Infrastructure:* *Access to appropriate technology is a real issue in many schools*. The lack of funding within schools means *some schools can't afford ICT network support* and *overworked IT staff means in some cases software is not on the network or computers fast enough*.

#### 4.10 Future Developments

- *Blended:* Despite the growing focus on e-learning, traditional approaches continue to remain important. A blended approach, incorporating e-learning with traditional formats, has already been identified by some as the way to proceed. It is envisaged that this will be a significant approach in the future.
- *Collaborative:* To achieve cost reduction and to increase the quality of e-learning resources developed, many organisations will increasingly collaborate with the producers of the goods they sell and with other organisations in the same sector.
- *In-House:* Increasingly, the benefits are being recognised of tracking the training undertaken by employees, and ensuring all employees are conversant with company policies and compliant with appropriate legislative requirements. This will be monitored by e-administration tools managed by in-house staff.
- *Mobile:* Mobile technologies (such as phones, PDAs and cameras) are readily available and enable information to be accessed remotely and for data transfer from those 'on-site' back to the central office and, conversely, for the central office to provide advice or training to those 'on-site'. A number of firms indicated in this study that the use of mobile technologies was a key component of future e-learning offerings.

## Case Study C: Large National Retailer

### Future Developments

- *Blended:* Although this organisation recognises *e-learning is a solution to our future training* they still believe elements of a *classic traditional approach is still worth retaining*. They *definitely believe that blended learning is the way to go*. In essence, the organisation will *continue to do what we are doing with the Retail College and develop the blended approach*.
- *Collaborative:* The organisation has recognised that while *it would be good to share resources across the industry* facilitated by the Retail ITO, the *competitive nature of the industry is a challenge*. Retail organisations *need to get together and share with their industry hat, not their business hat*. To help reduce costs and increase the quality of the resources developed the organisation sees benefits in working with producers of goods they sell. They *want to take a partnership approach with some of our major suppliers and they will be helping to fund and develop our online resources, offset our costs*. The anticipated benefits for the suppliers are the *sort of commercial break stuff for their adverts will be their payback*.
- *Support:* For e-learning deployments to be successful they *will have strong support from our in-store network and suppliers*. They also need ongoing *strong senior management support for training*. This will ensure a *range of training options available for our owners and stakeholders*.
- *In-House:* *The College of Retailing will have options to do e-learning with Web and DVD (linked) resources with a whole range of modules and assessment. We will be able to do tracking through the LMS. We will retain many of our traditional College of Retailing courses that people can go to. My thinking is that they (staff) will have done X number of modules and then can go on to do other courses either online or through the College.*

#### 4.11 Critical Success Factors

- *Planning:* While e-learning can be effective in a range of situations, organisations need to be clear in their expectations of how e-learning will meet their specific training needs and allocate appropriate resourcing.
- *Senior Management Support:* Support from senior management is essential for the successful implementation of e-learning. To obtain this support, advocates of e-learning need to justify the costs associated with developing e-learning materials and deploying e-learning solutions and emphasise the benefits to be gained.
- *Technical:* It is important, when firms select an e-learning solution, that this solution is able to meet future demands and can be integrated smoothly with existing and planned systems. Failure to do this will add additional and unforeseen expenses and impediments to e-learning development.

- **Awareness:** When contemplating a change from traditional modes to online learning, organisations need to be aware of potential resistance and articulate a clear vision and solicit feedback from employees on the efficacy of e-learning for them.
- **Evaluation:** To help embed e-learning within an organisation, feedback from users of the e-solution needs to be regularly obtained and the financial costs must be monitored. This will help demonstrate the cost-effectiveness and acceptance of the e-learning solutions developed.
- **Collaboration:** Collaboration and cooperation with other similar organisations will serve to establish universally-accepted practice, standards and training which will ensure the skill set of the workers is comparable and transferable across sectors.

<b>Case Study C: Large National Retailer</b>
<b>Critical Success Factors</b>
<ul style="list-style-type: none"> <li>• <b>Awareness:</b> Organisations need to be clear of how they will use e-learning to meet their specific training needs. They need to be cautious and <i>don't get involved in the hype from all the providers</i>. To introduce e-learning successfully firms should <i>do your homework, spend the time, adopt a conservative approach</i>. In essence, <i>if you don't understand it why would you get involved?</i></li> <li>• <b>Senior Management Support:</b> Support from senior management is essential <i>if you have the ear of the CEO and the support of the Board around commitment you can justify the spend, evolve the business</i>. To obtain this support a <i>major challenge will be justifying the up front costs</i>. Organisations need a clear idea for the future, for example, being able to state <i>in 24 months time we will start to get some traction and the ROI/ payback period might be three to five years</i>.</li> <li>• <b>Technical:</b> In selecting an e-learning solution, organisations need to be aware <i>Cynics might say that you spend all the money and the software will be obsolete in two to three years time</i>. It is important <i>you select the appropriate software and infrastructure</i>. This particular firm <i>is very interested in looking at Moodle as an easy to use system for our employees as there is a world wide community involved in open source. Upgrade as and when necessary</i>.</li> <li>• <b>Provision:</b> The process of reviewing training provision <i>has identified for us the need to develop a new robust work-skills matrix from entry level to advanced. This skills matrix will drive any new initiatives and tell us what courses we need to be running more of</i>.</li> </ul>

## 5. Conclusions and Recommendations

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5.1 This section covers four topics:

- **Overview:** Provides the context for the final report.
- **Conclusions:** This topic reviews the 8 key factors influencing e-learning implementations identified in this study and provides a comprehensive review of the success factors noted for the implementation of successful e-learning in small and medium enterprises (SMEs) and large organisations (LEs).
- **Future Directions:** The future trends in e-learning in industry are summarised.
- **Recommendations:** The findings of this project support a number of recommendations.

## 5.2 Overview

- The Ministry of Education has funded a range of tertiary e-learning research projects to increase the evidence base in tertiary e-learning to support and contribute to its work programme, strategic objectives and stakeholder requirements. This is in response to a range of objectives outlined in the Tertiary Education Strategy (TES) and the recommendations of subsequent strategies around ICT and e-learning. This document is the final report of the project, *Using e-learning to build workforce capability: A review of activities*, prepared by researchers at the Emerging Technologies Centre at Waikato Institute of Technology.
- For the purpose of this report, **e-learning** refers to the provision, administration and support for 'off-the-job' and 'on-the-job' training, using information and communication technologies such as stand-alone and networked computers, Internet-based technologies and mobile devices.
- For the purpose of this research project, **blended learning** has been described as a design approach thoughtfully combining traditional methods to on-the-job and off-the-job training with e-learning applications.

## 5.3 Conclusions

1. Industries in New Zealand are slowly acquiring the necessary skills and operational experience in the deployment and implementation of e-learning systems, applications and content for education and training of their employees
2. The focus of many debates on e-learning in industry is centred on organisational expectations, the potential financial benefits, the impact of e-learning on improving workforce capability and the use of e-learning to ensure compliance with legislation.
3. Currently a number of industries, across all sectors, have in place a sufficiently robust and extensible information and communication technology infrastructure to facilitate any planned e-learning.
4. Review of the case studies identified four emergent themes in e-learning in industry:
  - **Awareness**: Raising the awareness of both management and general employees on the use and benefits of employing e-learning solutions is a key driver for their active commitment to, and participation in, e-learning initiatives.
  - **Compliance**: There is growing acceptance e-learning solutions can provide organisations with a flexible online system which allows them to record and track the legal compliance status of their employees and

enables them to deliver courses that ensure employee certification for compliance is current.

- *Strategic Planning*: The development and implementation of e-learning plans must be an integral part of the organisation's broader training strategy.
- *Quality of Training*: The quality of the e-learning experience participants engage in can be directly attributed to the quality of all the processes and procedures used in the creation of the e-learning event.

5. The key business drivers for e-learning growth in industry training are;

- *Information Resources*: There is an ever-increasing amount of information from an organisational, individual, trade and professional viewpoint, of which employees need to be aware to complete their tasks successfully. Increasingly, the targeted use of e-learning is seen as a viable option in addressing the information needs of individual industries.
- *Technological Innovation*: The growing complexity and sophistication of modern plant combined with the rapid rate of change in production means informational and communication technologies are increasingly necessary to deal with their impacts on work practices. The nature of the impact needs to be managed in a consistent and timely manner.
- *Return on Investment*: The provision of training to improve performance at both an individual and organisational level must be done economically and efficiently. For example a key driver for many of the e-learning deployments illustrated in the case studies of this report is the financial gains generated by the replacement of traditional modes of training with targeted e-learning applications.
- *Legal Compliance*: Many of the firms reviewed often need to meet a number of requirements (such as health and safety, site safety, and, in some instances, certification). The use of e-learning delivery and administrative tools provide the firms with the ability firstly, to monitor workers' current compliance status and secondly, to ensure all employees have accessed appropriate information on their obligations.

6. The barriers to e-learning implementations include:

- *Administration*: Difficulty of managing e-training through existing structures.
- *Change Management*: Challenges in modifying and replacing traditional training practices. Possible resistance by both managers and employees, comfortable and familiar with traditional training methods, to the change in approach and methods of training delivery.
- *Training Delivery*: Lack of knowledge, skills and expertise by managers/supervisors to create appropriate e-learning materials or design e-learning events.

- **Senior Management:** Failure to recognise the benefits derived from the provision of e-learning by senior management and consequent lack of ongoing support to appropriately resource the e-learning initiative.
  - **Quality of Provision:** Confusion created through the availability of a range of e-learning providers (such as educational institutes, private-sector providers, and independent mentors) and “off-the-shelf” e-learning materials. Difficulties, especially for SMEs, in evaluating the value and impact of the myriad of e-learning options offered on their business operations.
7. In the creation and deployment of e-learning solutions, organisations are recommended to follow a recognized cyclical pattern conceptualised by the research team as the Five Ds (**5Ds**) of e-learning. *Define, Design, Develop, Deliver* and *Determine*. These 5Ds of e-learning are illustrated in figure 3.1.
  8. From the case studies it was noted the critical success factors identified for the introduction of e-learning were often dependent on the size of the organisation and the potential resources (financial, physical and human) available to the enterprise for the introduction of e-learning initiatives.
  9. The success factors noted for the implementation of successful e-learning in small and medium enterprises (SMEs)<sup>30</sup>, included the following;
    - **Awareness:** The benefits of e-learning are accepted by senior managers/owners of SMEs. This commitment is demonstrated by the allocation of sufficient resources (fiscal, human and physical) for e-learning activities to be deployed.
    - **Identification:** Firms are able clearly to identify how e-learning can be successfully incorporated within current training plans. This would include the identification of recognised e-learning providers and potential collaborative offerings.
    - **Implementation:** An e-learning training plan is developed and offered to employees. During this implementation phase perceptual evaluations are carried out to assess the effectiveness and impact of the e-learning undertaken.
    - **Evaluation:** The impact on the organisation of the e-learning training plan is assessed. The results of this assessment are communicated to all stakeholders, owners, managers and employees.
    - **Sustainability:** After the initial e-learning activities have been delivered post-e-learning support is provided to embed e-learning in normal training practices for example in induction, employee reviews and organizational procedures.

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<sup>30</sup> SMEs in this study were regarded as enterprises with less than 100 employees



These success factors are graphically illustrated in figure 5.1 below;

# E-Learning for Small & Medium Enterprises (SME)

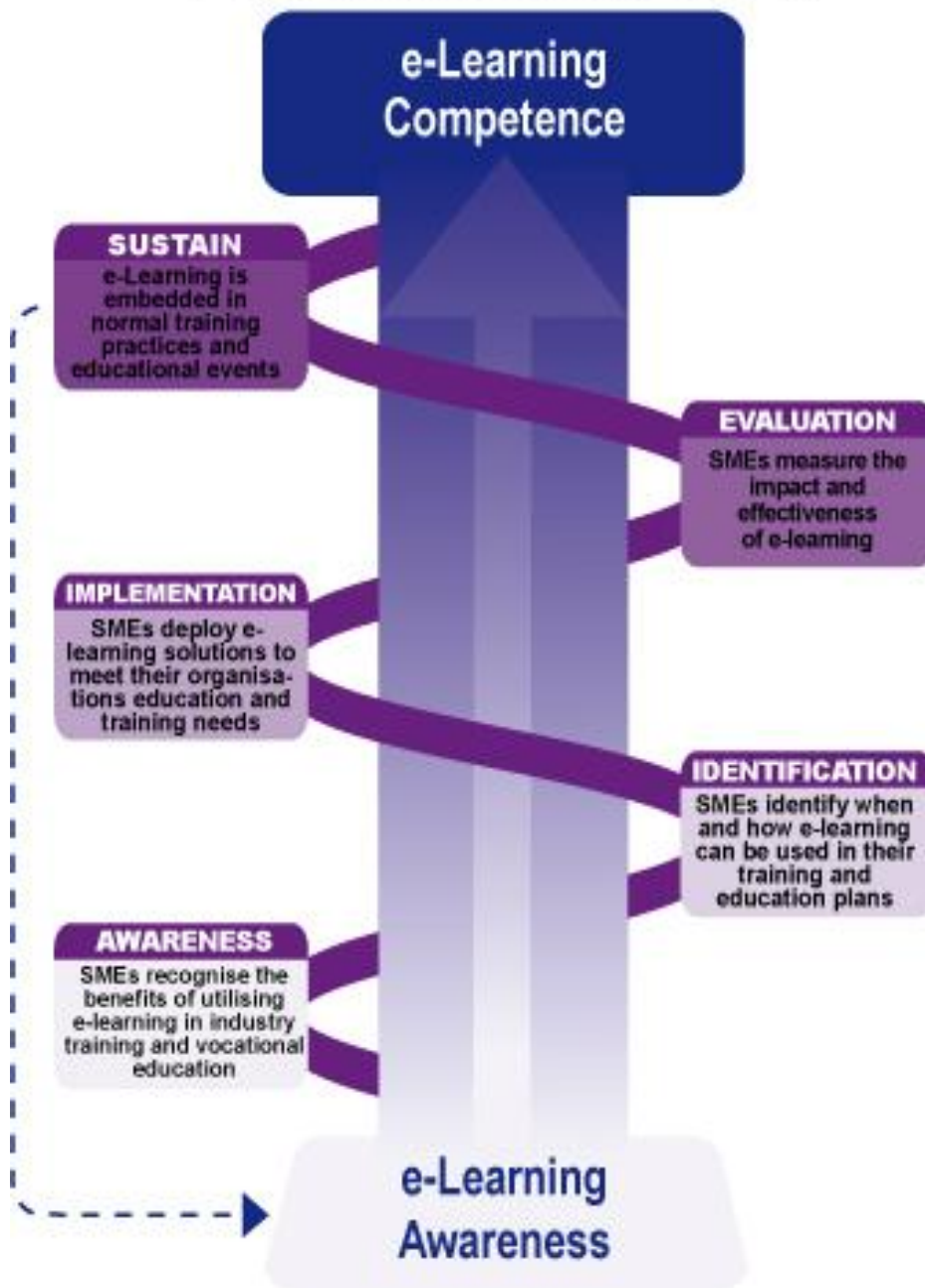


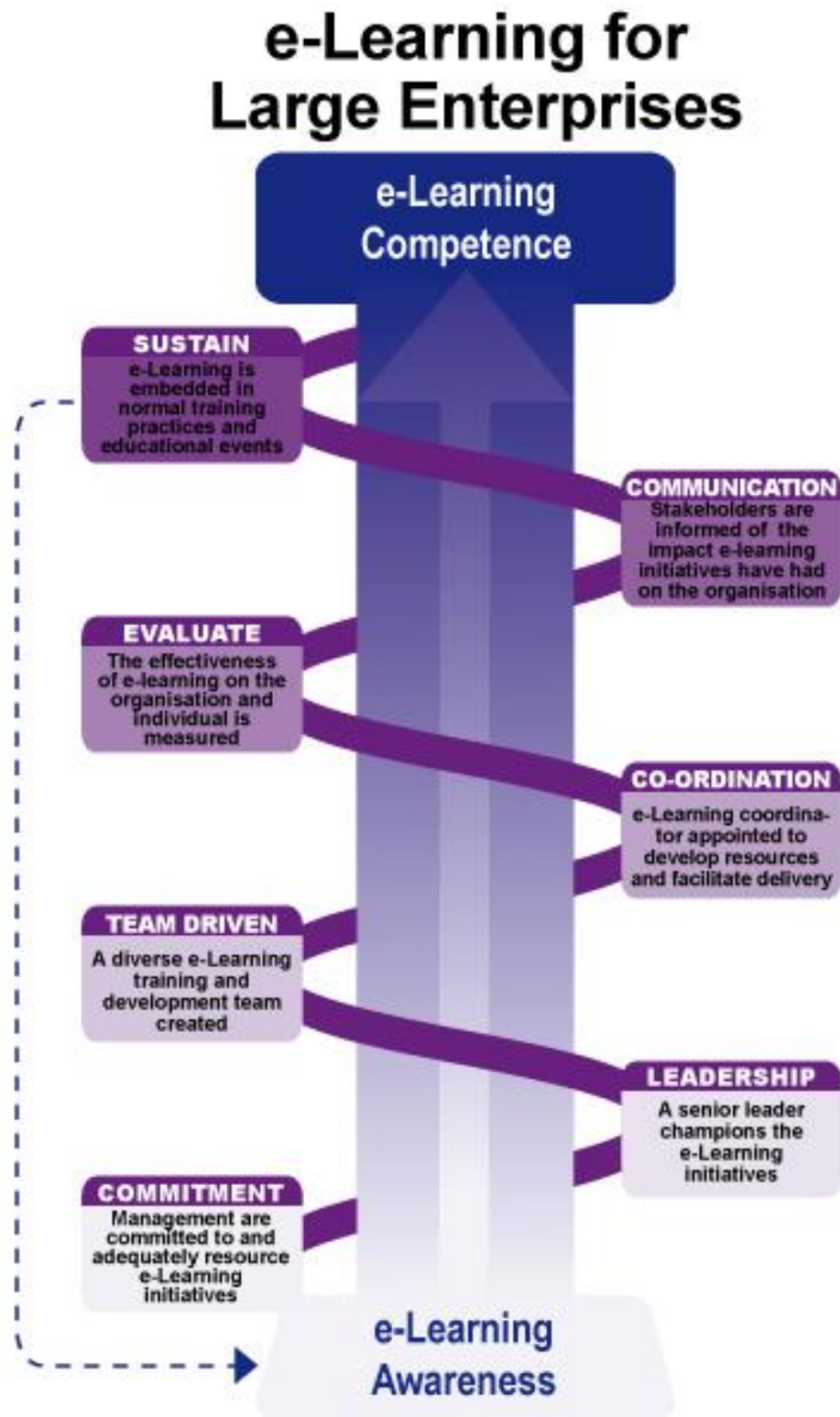
Figure 5.1: e-learning in SMEs

10. The literature consistently indicated critical success factors underpinning the successful implementation of e-learning in large organisations<sup>31</sup>, included the following:
- *Commitment*: Senior management's commitment to e-learning initiatives is demonstrated by
    - the allocation of appropriate resources (financial, physical and human) for implementation,
    - the inclusion of e-learning in training and strategic plans, and
    - ensuring the impact of the e-learning implementations are monitored and reported at the highest level.
  - *Leadership*: A recognised e-learning champion, appointed by the senior management team is identified.
  - *Team Driven*: A diverse training team from within the organisation is created to develop, oversee and monitor e-learning initiatives.
  - *Co-ordination*: A training coordinator, who will review e-learning training needs, target e-learning offered to the appropriate audience, develop resources and facilitate the training events, is appointed.
  - *Evaluation*: The effectiveness and impact of the e-learning offered is measured by the use of a range of qualitative (for example, canvassing employee views) and quantitative (for example, actual production figures) measures.
  - *Communication*: Ongoing communication with employees, using existing communication mechanisms, on the benefits of e-learning, the timing of e-learning events and the impact of e-learning on the business, occurs.
  - *Sustain*: e-Learning is embedded in normal workplace training practices, employee performance reviews, staff awards and organizational reporting procedures.

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<sup>31</sup> Large organisations in this study were regarded as enterprises with greater than 100 employees

The success factors are graphically illustrated in figure 5.2 below



*Figure 5.2: e-learning in large enterprises (LEs)*

## 5.4 Future Directions

In the next three to five years there will be a steady, but notable, increase in the use of e-learning functionality to enhance and expand traditional training methods in New Zealand industries; a blended approach is the preferred option for the majority of training programmes. The e-learning functionalities deployed will include, but not be limited to:

- Increasing use of e-administration tools to monitor and report on workplace or work-based training events offered by individual industries.
- Increasing electronic access for trainees to visually appealing, work-place relevant, interactive digital course materials accessible anytime, anywhere.
- Increasing remote access for employees to organisational procedures, operational best practice videos and records of learning through mobile devices.
- Integrating all training through a web-space to ensure consistency of delivery, plus transparency, currency and accuracy of the policies, procedures and legal obligations of an organisation.

## 5.5 Recommendations

Based on the findings of this project a number of recommendations are offered:

- That further work, directed by a strategic management team, including national bodies such as the Ministry of Economic Development, Industry Training Federation (ITF), the Institutes of Technology and Polytechnics of New Zealand (ITPNZ), New Zealand Qualifications Authority (NZQA), Business New Zealand, New Zealand Trade and Enterprise, Tertiary Education Commission and NZ Council of Trade Unions, be undertaken for the purpose of:

### *1. Raising Awareness:*

- Conduct further research to identify and disseminate (through existing industry-sector communication mechanisms) how the implementation of e-learning applications, nationally and internationally, has impacted on business performance, productivity, profitability and growth. This should include information on the importance of appropriate literacy and numeracy levels in the workplace and their potential impact on productivity.

### *2. Identification:*

- Consider the creation of a business case for the development and deployment of a Web-space (integrated within existing industry web-sites) where case-studies, templates and guide lines of good practice in e-learning implementation in industry can be made available to inform senior managers and owners.

### *3. Implementation:*

- Consider the creation of specific e-learning templates, standards and procedures for providers involved in delivering courses for trades/industries. These should detail minimum expectations of the quality and nature of the digital material created and the recording, reporting and management of employee training activities.

### *4. Evaluation:*

- Ongoing evaluation of the effectiveness and impact of the e-learning events offered, using a range of qualitative (for example, employee views) and quantitative (for example, productivity gains) measures, must occur. The results of these evaluations should be regularly communicated to all stakeholders. In keeping with existing evaluation practices, a measurement- modified Kirkpatrick-Philips evaluation model- could be more readily accepted by industry.

### *5. Sustainability:*

- Review national and international curricula in e-learning in industry and create courses, formal and informal, to meet the current trends in e-learning in industry. Specifically the review should focus on flexibly-delivered courses that would address the following focus areas:
  - Defining the e-learning training requirement(s),
  - Designing the e-learning training event(s),
  - Developing the e-learning resource(s),
  - Delivering the e-learning event(s),
  - Determining the success of the e-learning event(s).

## 6. References and Appendices

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## 6.2 Appendix 1: Structured Interview Guidelines (Used for Industry Insights)

### ◆ Overview

- Since the structured telephone or face-to-face interviews with the three identified stakeholders (employees, employers and providers) were to be undertaken by different members of the research team a series of formal “interview templates” were produced to ensure
  - a consistency in approach,
  - all focus areas were adequately covered and;
  - data collected could be collated around the key themes identified.
- The templates were designed around a “base template” (see employer template below) to explore the participant’s existing use of e-learning. It contained four sections - background, current use of e-learning, the potential demand for e-learning and the perceived effectiveness of e-learning.
- A small number of questions were changed to meet the specific needs of identified stakeholders. For example, “*Which industry “category” would you say best describes your organisation*” in the employer template was replaced by “*Which provider “category” would you say best describes your organisation*” in the provider template.
- Words and terms were adjusted to match the respondent stakeholder. For example, the term *your organisation* in the employer and provider interviews was replaced by *you* in the employee interview.
- However, these minor changes did not alter the inherent structure of the template designed.

### Base Template

#### Introduction

As part of the government’s Tertiary e-Learning Research Funded projects for 2008, the Ministry of Education is supporting research examining the role of e-learning in building workforce capability to meet regional and national industry needs.

The aim of the project is to produce a series of research reports culminating in a final research report, which will increase awareness in the industry of the development and delivery of effective, cost efficient and educationally sound work-based (off-the-job) and work-placed (on-the-job) e-learning. This brief interview is part of phase one of the project providing an overview of e-learning in industry in New Zealand. We anticipate this structured interview will take no more than 15 minutes of your time.

Please be aware all of the information we obtain from you during this interview will remain confidential to the research team. Information collected will only be reported to third parties in a summary or aggregate form that will ensure your confidentiality and anonymity. Two years after the completion of the project the original data will be destroyed.

## Section 1: Background

**1.1** Which industry / provider “category” would you say best describes your organisation?  
(Interviewer will circle the response).

Agriculture, Forestry, Fishing	Finance, Insurance
Mining	Property, Business Services
Manufacturing	Government Admin (including Local
Electricity, Gas & Water Supply	Government)
Construction	Education
Wholesale Trade	Health, Community Services
Retail Trade	Culture, Recreation Services
Accommodation, Hospitality, Restaurants	Personal & Other Services
Transport, Storage	ICT / Web Services
Communications Services	Multi-Media Production (Videos/Games)
Computer Industry,	Other (please
Telecommunications	specify)_____

**1.2** Approximately how many people does your organisation currently employ?  
(Interviewer will circle the response).

**0 - 5**      **6 - 9**      **10 - 49**      **50 - 99**      **100 - 1000**      **1000+**

**1.3** Does your firm currently provide skills training and / or personal development for your employees? (Interviewer will circle the response).

**Yes**      **Some**      **No**

## Section 2: Existing use of “e-learning”.

**Off-the-job training:** for the purpose of this research project, “off –the-job’ training refers to authentic, evidence-based learning activities and tasks designed and provided for workers at locations other than their normal place of work. Off-the-job learning resources are normally designed in context with the worker’s current working practices. This is also known as “work-based” learning.

**‘On-the-job’ training:** For the purpose of this research project “on-the-job” is structured learning that occurs within the learner’s normal working environment. This is also known as “work-place” learning.

**e-Learning:** For the purpose of this research project e-learning refers to the provision, administration and support for “off-the-job” and “on-the-job” training using information and communication technologies such as, stand-alone and networked computers, Internet-based technologies and mobile devices.

Reflecting on these definitions

**2.1** What proportion of your organisations employees do you estimate participated in e-learning activities in off-the-job / work-based learning in **2007**? (Interviewer will circle the response).

**Nil: <10%**                      **<30%**                      **<50%**                      **<80%**                      **100%**

**2.2** What proportion of your organisations employees do you estimate participated in e-learning activities in on-the-job / work-place learning in **2007**? (Interviewer will circle the response).

**Nil: <10%**                      **<30%**                      **<50%**                      **<80%**                      **100%**

(If response is “**Nil**” proceed directly to 2.5)

**2.3** What e-learning technologies did **your organisation** use in off-the-job / work-based training in **2007**? (Interviewer will circle the response(s)).

CDs / DVDs    Computer simulations and / or games  
Internet-based Technologies                      Mobile devices  
Other Technologies (Please describe)

**2.4** What e-learning technologies did **your organisation** use in on-the-job / work-place learning in **2007**? (Interviewer will circle the response(s)).

CDs / DVDs    Computer simulations and / or games  
Internet-based Technologies                      Mobile devices  
Other Technologies (Please describe)

**2.5** What, in your opinion, were the major issues to the implementation of e-learning activities in **your organisation** in on-the-job / work-place and off-the-job / work-based learning in **2007**? (Interviewer will circle the response(s)).

a. The costs (time, financial and human) of implementing e-learning

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

b. The lack of appropriate, industry specific, interactive content.

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

c. Lack of necessary employee ICT skills to complete e-learning activities.

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

d. Poor employee access to the appropriate e-learning technologies.

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

e. Motivating our employees to complete e-learning activities offered.

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

f. Lack of acceptance and support for e-learning approaches from managers.

**Significant Barrier**    **Moderate Barrier**    **Not a Barrier**

2.6 Any further detail which the respondent wishes to add, to highlight any particular area or areas not fully addressed, will be entered in the box below.

### Section 3: The potential demand for “e-learning”.

Once again reflecting on the definitions

3.1 Do you consider the adoption of e-learning approaches by your organisation in **off-the-job / work-based** learning activities in 2008 will (Interviewer will circle the response):

increase significantly      increase slowly      remain the same      decrease slowly      decrease significantly

3.2 Do you consider the adoption of e-learning approaches by your organisation in **on-the-job / work-place** learning activities in 2008 will (Interviewer will circle the response):

increase significantly      increase slowly      remain the same      decrease slowly      decrease significantly

3.3 What e-learning technologies do you anticipate **your organisation** will use in off-the-job / work-based training in 2008? (Interviewer will circle the response(s)).

CDs / DVDs      Computer simulations and / or games  
Internet-based Technologies      Mobile devices  
Other Technologies (Please describe)

3.4 What e-learning technologies do you anticipate **your organisation** will use in on-the-job / work-place learning in 2008? (Interviewer will circle the response(s)).

CDs / DVDs      Computer simulations and / or games  
Internet-based Technologies      Mobile devices  
Other Technologies (Please describe)

3.5 What, in your opinion, could be the benefits of implementing of e-learning activities in **your organisation** in **2008 and beyond**? (Interviewer will circle the response(s)).

a. e-Learning allows “just in time” training to be offered

Significant Benefit      Moderate Benefit      Not a Benefit

b. e-Learning assures there will be a consistency in the delivery of training

Significant Benefit      Moderate Benefit      Not a Benefit

c. e-Learning will help reduce overall costs of training for the organisation

**Significant Benefit**

**Moderate Benefit**

**Not a Benefit**

d. e-Learning will provide a degree of flexibility in scheduling training events

**Significant Benefit**

**Moderate Benefit**

**Not a Benefit**

e. e-Learning will help reduce the overall time it takes to deliver training in the organisation

**Significant Benefit**

**Moderate Benefit**

**Not a Benefit**

f. e-Learning allows employees to complete activities at their own pace, anywhere at anytime

**Significant Benefit**

**Moderate Benefit**

**Not a Benefit**

**3.6** Any further detail which the respondent wishes to add, to highlight any particular area or areas not fully addressed, will be entered in the box below.

**Section 4: The perceived effectiveness of “e-learning”.**

**4.1** To what extent would you agree with the statement “*e-learning is as good as traditional training methods?* Please circle the response.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**4.2** To what extent would you agree with the statement “*e-learning is most suited to work-based (off-the-job) activities?* (Interviewer will circle the response).

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**4.3** To what extent would you agree with the statement “*e-learning is most suited to work-placed (on-the-job) activities?* (Interviewer will circle the response).

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**4.4** To what extent would you agree with the statement “*e-learning is most suited for employees regularly using ICTs in their normal duties?* (Interviewer will circle the response).

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**4.5** To what extent would you agree with the statement “*e-learning is not suitable for the teaching of practical skills to employees?* (Interviewer will circle the response).

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**4.6** Which of the following e-learning technologies do you think are most suitable for e-learning in your organisation? (Interviewer will circle the response(s)).

CDs / DVDs

Computer simulations and / or games

Internet-based Technologies

Mobile devices

Other Technologies (Please describe)

**4.7** Any further detail which the respondent wishes to add, to highlight any particular area or areas not fully addressed, will be entered in the box below.

## 6.3 Appendix 2: Case Study Template

Case Study Title: \_\_\_\_\_

### 1 Background

Organisation Profiled	Will be confidential
Industry Sector	
Industry Size	
Industry main location	
Topic	
Date deployed	

### 2. Target audience and key drivers for development.

This programme was developed for (all employees, contractors, senior management, technical training .....)

The reasons for developing were (Costs, flexibility, time .... ....)

### 3. Work-force capabilities addressed

The training was developed to address/improve skills in

- Communication, Team relationships ....
- Health and safety ....
- ICT skills, Software applications .....
- Literacy, numeracy ...
- Induction ....
- Legal Compliance .....
- Trade, Technical, Manual skills .....
- Obtaining certification, practising certificate
- Other ... ..

### 4. e-learning application / ICT solution developed

What resources were/are used for the training/education initiatives

For example content

- Off the shelf content
- Flash Application
- Web-pages
- Computer game / simulation
- Custom designed



For example delivery

- CDs DVDS
- Internet / ICT Web tools
- Learning management system
- Mobile
- Integrated Workbooks
- Seminars/tutorials/demonstrations
- Simulations

For example devices

- PCs /Laptops
- Mobile
- Videoconferencing
- Other

## 5. Delivery

What mechanisms were used in the initiative

For example the training programme involved

- % self paced e-learning
- At a registered provider
- On the Job
- At home
- At a dedicated learning centre
- Distributed locations

The programme was assessed by/through

- Online
- At a registered provider
- By an assessor
- Worksheets / work books
- By portfolio
- Self assessment

The programme had the following support systems in place

- Student/trainee mentoring
- Online support
- Offline support
- Trainer support
- Mechanism for feedback

## 6. Participants

How many participated .....

What "level" were they at (literacy numeracy ... .. )

Male / female    Age group

What types of training had they experienced in the past

What feedback was obtained on the nature of the programme (support, value to them ... ..),

What level of commitment was required (time, at home, at work ... )

Did all participants have ready access to appropriate technologies (at home, at work ...)

## 7. Impact on building workforce capability

People moved from .... .. To .... ..

Production increased .....

Production line stoppages decreased

Quality improved .... ..

Knowledge base of organisational operations increased

Increased competitive advantage through highly skilled workforce

Improved collaboration, communication, teamwork in the organisation

Measured by .....

## 8. The benefits of the deployment

This initiative enabled

- Faster learning, better results than previous methods, provided greater flexibility (any time anywhere) .....
- Evidence of outcome (If available ... .. )
- Less off-the-job / production stoppages, Consistent quality of training, Better safety records
- Evidence of outcome (If available ... .. )
- Increased number of skilled staff, motivation, improved literacy ... ..

Evidence of outcome (If available ... .. )

- Staff retention through increased work satisfaction and career support

Evidence of outcome (If available ... .. )

## 9. Barriers faced and addressed

The main barriers to implementation of the training programme(s):

- The challenge (cost, non-compliance ... ..  
The was/will be addressed by (if available ...)
- The challenge (leadership / management ... ..  
The was/will be addressed by (if available ...)
- The challenge (Motivation, staff resistance ... ..  
The was/will be addressed by (if available ...)
- The challenge (access to technology and support ...  
The was/will be addressed by (if available ...)

## 10. Future

Where to now .....

Would you continue to do what you are doing? Because?

Would you contemplate introducing similar initiatives? Why?

What will training provided by the firm be like in 5 years ...

## 11. Advice for others

What would you advise others to do (critical factors)

- Resourcing
- Leadership support
- Planning
- Staff ongoing PD
- Trainee ICT profile
- Trainee support
- Publishing results for others to review

## 12. Summary

- What do you think of e-learning now
- What is different from when you started
- What was the major finding / feeling after the event

## 6.4 Appendix 3: Glossary of Terms

Term	Definition
Blended Learning	A design approach thoughtfully combining traditional methods to on-the-job and off-the-job training with e-learning applications.
Computer-Based Training	An electronic self-paced learning activity. Media-Rich content and learning activities are generally stored on a CD-Rom, DVD or memory stick.
Distributed learning	A student-centred approach to learning that incorporates the use of technology in the learning process.
e-learning	e-learning refers to the provision, administration and support for 'off-the-job' and 'on-the-job' training using information and communication technologies such as stand-alone and networked computers, Internet-based technologies and mobile devices.
Flexible learning	The provision of a range of learning modes or methods, giving learners greater choice of when, where and how they learn.
Off-the-job learning	Authentic, evidence-based learning activities and tasks designed and provided for workers at locations other than their normal place of work. Off-the-job learning resources are normally designed in context with the worker's current working practices. This is also known as "work-based" learning.
Online learning	Learning occurring where education and training are delivered and supported by networks such as the Internet or intranets. Learners are able to learn at any time and any place.
On-the-job learning	Structured learning that occurs within the learner's normal working environment. This is also known as <i>work-place</i> learning.
Web-space	The provision of access to a range of materials and resources on the Web specific to a particular discipline or organisation.
Web-tools	Applications that function as Web-based resources These include chat, e-mail, forums, instant messaging, VoIP (for virtual discussions), digital content creation tools such as Wikis, Blogs and Web-folios.