E-learning in industry: Case studies from New Zealand

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In an increasingly Information and Communication Technology (ICT) dependent world, industry leaders are recognising the critical need to investigate the potential of ICT in developing workplace competencies. It is considered a strategic imperative to be aware of effective processes, procedures and plans to improve workforce capability through the implementation of e-learning applications, strategies and techniques. The aim of the "Using e-learning to build workforce capability: A review of activities" project was to produce a series of research reviews which would increase awareness in industry of the development, delivery and impact of effective, cost efficient and educationally sound work-based and work-placed e-learning. This paper presents the findings of the third phase of that research project and outlines the key findings from six case studies undertaken. The findings indicate there will be a steady, but notable, increase in the use of ICT and e-learning applications to enhance traditional training methods in industries.

Keywords: e-learning in industry, workplace learning, work-based learning

Background

The New Zealand Tertiary e-Learning Research Fund (TeLRF) was established with a view to funding research into e-learning in post-compulsory education and training (Ministry of Education, 2009). The overarching purpose of TeLRF was to fund e-learning research that would provide a more comprehensive context and framework to inform strategic investment and decision-making around e-learning for tertiary education organisations and industry training providers. After consultation between the Ministry of Education and external stakeholders an identified need was to determine the answer to the question of 'how effective e-learning has been in a vocational/workplace context both in terms of meeting learner/business needs and in increasing organisational productivity' (Clayton, Elliott, Saravani, Greene & Huntington, 2008).

In 2008 the TeLRF funded a multi-phased project, "Using e-learning to build workforce capability: A review of activities", to produce a series of research reviews to increase awareness in industry of the development and delivery of effective, cost-efficient and educationally-sound work-based and work-placed e-learning.This paper, "E-Learning in industry: Case studies from New Zealand", presents the key findings of the third phase of that research project (Clayton & Elliott, 2008).

Data collection and analysis

Advocates of qualitative research point out that case studies produce more detailed information and inferences than available through statistical analyses. Moreover, while statistical methods might be able to deal with situations where behaviour is homogeneous and routine, case studies are able to deal with factors like creativity, innovation, and context (Trochim, 2006). In mid- 2008 the training managers, or their equivalent, in a range of divergent industries were contacted by the researchers through an e-mail invitation. This invitation informed participants of progress made to date in the e-learning in industry research project and invited them to participate in the case study phase of the project. Six positive responses were received, identified in this report as Case Studies A, B, C, D, E and F. This paper describes the data generated from those case studies. A general description of the six participants is provided below.

- *Industry A:* This Company is a national energy supplier with over 500 employees. The major focus of the organisation is the generation and retailing of electrical energy.

- *Industry B:* This Company is the commercial education/ training division of a commercial organisation supplying learning and teaching technologies to educational and training organisations.
- *Industry C:* This Company maintains a large number of retail outlet stores nationwide. It currently employs 4000 people.
- *Industry D:* The major focus of the organisation is the design, development and provision of training courses for the Electrical Industry.
- *Industry E:* This Company is a not-for-profit organisation specialising in improving workforce literacy.
- *Industry F:* This Company is a large organisation specialising in the processing and marketing of milk-based products.

On confirmation of an agreement to participate in the case study phase, a follow-up e-mail was distributed. As well as thanking participants for their willingness to contribute the e-mail included an overview the procedures that would be followed and included a detailed structured interview template. The template contained a number of discrete sections including; background information, key business drivers for e-developments, specific workforce capabilities addressed, e-solutions developed, participants involved, impact on building workforce capability, benefits, barriers and potential future developments. Face-to-face/telephone interviews with participants started in mid-June 2008 and were concluded at the end of August 2008.

In reviewing the data-generated from the structured interviews conducted an 'intuitive-rational' approach was adopted (Aldridge, Dorman and Fraser, 2004: Kennedy & Dorman, 2002). In essence, the intuitive-rational approach is a constructivist methodology (Driver, 1989; Gilbert, 1993) that involved the researchers identifying the salient themes within the data investigated. In order to confirm validity of each case study, a draft copy was sent to the participants for their final comments and to ensure the case study was an accurate reflection of their e-learning activity before inclusion in the final report.

While it could be argued that prior conceptions held by the researchers influenced the themes identified is and researchers at different ends of a theoretical spectrum could interpret the data and literature in different ways and alternative conclusions would be legitimately reached (Begg, 1993). To reduce the bias of researcher-generated assumptions, the themes generated, conclusions drawn and findings offered were submitted for review to an international reference group established for the project and a peer-review team created for this phase of the project.

Reporting

In reporting the summary of the data generated a set pattern was followed:

- Firstly, the data generated was reviewed and aligned with the discrete sections identified in the structured interview template.
- Secondly, when reporting the data, the "prompt" question in the structure interview template was often used as an identifier to the response. In short, the interviewer's prompt was interwoven with the interviewee's response.
- Thirdly, issues of specific importance to the interviewee were illuminated with the use of direct "verbatim quotes" and these were differentiated from the paraphrased and edited points by the use of quotation marks and the inclusion of the participant identifier. For example, in analysing the data from Industry A, the following was reported.

> The company regards e-learning as (the interviewer's prompt used as an identifier) "having a lot of potential to streamline and improve the learning/training environments for staff as well as saving time and eventually costs" (**A**)(the interviewee's verbatim quote and participant identifier).

Key findings

The data illustrated e-learning is slowly becoming embedded into the training and educational activities being offered across a broad range of industries in New Zealand. For example, participant A noted the e-learning solution deployed "caters for both internal employees" (approximately 500) "and external contractors" (approximately 4,000) with "approximately 10% of the workforce undergoing training at any one time" (A). While in Case Study E, the e-learning dimension deployed "caters for approximately 2,500 employees with all participants have ready access to appropriate technologies at work" (E).

It is also evident the introduction of e-learning across industry is not constrained by gender, age or level of literacy, with e-learning being potentially offered to male and female, young and old, highly-skilled and low skilled and to those with high or low levels of literacy. For example, Case Study C had "2,226 trainees ranging in age from 16 to 70 years who undertake work-based or workplace training". The company is anticipating an "increase in participation in training of approximately 15%" (C).

These findings mirror the statistical information currently available that indicates the current 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 (Statistics New Zealand, 2007).

Business drivers

The ever-changing nature of the national and international markets industries are engaging with, technological developments impacting on the production of goods and 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 (Clayton & Elliott, 2007). As participant C noted, the training system currently in place "previously met the training needs of the company the ever changing nature of the retail market has forced the company to review its training provision and schedules. It has recognised the need to up-skill its staff on a more regular basis and are looking at other ways of providing training to complement our current approach". While participant B recognized "there is a need to make training as flexible and cost effective as possible while meeting the needs of the employees and the organisation". The company is currently in the early stages of what has been described "as developing an evolving training culture".

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 (Scott-Jackson, Edney & Rushnet, 2007). As participant D noted. the major reasons for development of the e-learning initiatives were "to enable staff to increase their opportunities to apply their knowledge to the job and" for senior management to recognise the commitment to "training as a real investment with a definite ROI" (D), while participant A recognised the e-learning solution was developed for a "multitude of reasons which included financial savings, flexibility and consistency in delivery, anytime and anywhere availability of courses, reducing the time taken to train plus reducing time off the job".

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 ensure they meet them and secondly, to ensure all employees have accessed appropriate information on their obligations (Business NZ, 2003). As participant F noted, the industry must meet the legal obligations and "this is incorporated in the Moodle site". In general, the material currently available "online is mainly compliance stuff", with a "focus on health and safety" (F). Participant D commented "e-learning offers the opportunity to move compliance training online freeing up more time for developmental training". One of "the reasons for developing this e-learning initiative were 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 up-skill, get up to date with recent changes or to meet compliance requirements" (D).

Work-force capabilities addressed

The literature indicated the increasing use of e-learning in industry meant the scope of training provision was extremely broad and e-learning solutions have been developed and deployed to address a number of capabilities (Statistics New Zealand, 2007a). The data generated confirmed this wide range of provision.

- *Induction*: A significant number of the firms reviewed indicated they were using e-learning to introduce staff to the firm's processes, procedures and requirements. The flexibility provided by e-learning ensured the induction of employees could be undertaken at anytime and anywhere. As participant C commented, all "staff are required to undertake this introduction to the firm". The session "uses a short 9 minute DVD, produced in-house, which provides employees with general information about the organisation" (C). In Case Study F it was also noted "all staff are required to undertake induction" and although "by the end of the year much of the induction process will be on Moodle in general a blended approach is intended" (F).

- *ICT Skills*: A number of targeted staff receives specific training in the range of software applications acquired by the organisation to undertake and monitor the normal business operations of the firm. Participant B noted although "standard software applications are not demonstrated / taught the interactive whiteboard was used as a means to demonstrate/teach applications that operated with the device". These included a range of "software applications from the office suites and web-browsers to Web 2.0, photo editing packages, video editing packages etc" (B).

- *Literacy and Numeracy*: Although this area is not specifically targeted by individual firms, many firms address this issue through collaboration with external experts or the promotion of courses from external providers. For example, in Case Study A, it was noted: During the "roll-out of the e-learning solution it was found the computer skills of participants were more than adequate to undertake the training offered". However, the organisation "picked up deficits in comprehension and literacy when putting some employees/contractors through the training programmes online". To address this issue a "literacy/numeracy skills programme was introduced using ALANA (adult literacy and numeracy asses" (A). Participant E commented "given the nature of the organisations core business - literacy education - the training provision has a relatively narrow focus". All training developed and provided "has been designed to address literacy issues in the workforce" (E).

- *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 training programmes. As participant B commented "the technical and manual skills required to use educational technology are embedded in ideas on how to use ICT to improve teaching and learning provision" (B).

- *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. For example, in Case Study C it was noted that "to increase market share, staff need to be knowledgeable about the products the store retails". Some product suppliers provide a range of "DVDs which include some robust technical information included amongst the commercial stuff" and these are promoted to staff (C).

- *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. As participant F noted, a lot of time "is spent on health and safety issues and the associated training because of the nature of the manufacturing business". The organisation has "developed a lot of material on the Moodle site to support the training in this area" (F).

e-Solutions developed

Given the increasing use of e-learning in industry it is not surprising the literature indicated the range of e-learning solutions deployed was very diverse (CIPD, 2004). In these case studies the range of e-learning solutions used included:

- *Custom-Designed*: A range of content creation software applications 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. For example, participant A had created a system labelled "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" (A).

- *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'. For example, in Case Study B it was noted the firm's "internal trainers enhance face-to-face training with laptops and computers in varying degrees depending on the training environment and the availability of ICT to the participants" (B).

- *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. As participant A noted, 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" (A).

- *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, and links to external information, numeracy and literacy resources and custom-designed interactive courses. For example, participant D noted "web-pages, and associated links, have been created to provide access to a comprehensive range of information specifically related to the electrical industry". The Web-portal the firm has designed and deployed "also provides secured access to a range of online courses, each of which is designed to have modules no more than 20 minutes duration". The material "developed for these courses can also be used for blended learning purposes" (D).

- *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. As participant E noted, many staff participate in external courses such as the NZCALE (Specialist educator). This is normally done "through an external provider which uses an online dimension for the course through the LMS, Blackboard". The company "does have limited use of Moodle and currently this is used as an area for depositing useful resources for the tutors and trainers". Its use is likely to "expand in the future, depending on funding" (E).

- *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. For example, in Case Study A it was noted 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 re-purposed into other learning delivery formats" (A).

- *Mobile*: Although some firms have found the use of mobile devices problematic, for example, participant C commented "a trial using Personal Digital Assistants (PDA's) was undertaken with a national telecommunications provider", but "it hasn't worked" (C). However, 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. For example, participant B noted in their organisation "Smartphone's are used for text (tXt), email, audio to keep trainers and participants in contact with each other" (B).

Impact

Measuring and proving the value of e-learning can be a complex task and, dependent on the "model" selected (Wilson, 2004). In general, the data from the case studies indicated e-learning approaches were perceived to be effective if they were implemented in the right place, explaining appropriate skills, for the right audience.

- *People*: It was noted in these studies there was an increased number of staff who have moved from low skill to higher level skills. There also appears to have been improved collaboration, communication and teamwork within the organisation. For example in Case Study F it was noted the resources "currently on Moodle are on processes, giving a better understanding of how they and the organisation operate" this means employees "have an increased understanding of company strategy and where they fit in". The organisation has noted "there is improved literacy around using computers" as a consequence of more use of the online dimension. Although "currently there is no evidence of increased staff satisfaction the firm believes this may improve maybe after five years" (F).

- *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. As participant C noted "probably the outcomes of the training in one particular location can operate as a marketing tool, e.g. one school tells everyone else (others) who then get involved and request training which in turn will result in" further referrals (C).

- *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' training sessions and employees can go back to the online resources at anytime reinforcing the learning that has taken place. As Participant E noted using e-learning resources means there is a "consistent quality of training offered. Evidence indicates our approaches have been very effective" (E). Participant D also noted e-Learning is seen as a vehicle to improving the "consistent quality of training which is essential". Digital formats also allow the organisation "to include regional differences". They allow reinforcement and events are no longer "a 'one off' training session, participants can go back to the online resources at anytime. We know there is only one chance for the employee to learn with traditional courses, but e-learning changes that" (D).

- *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. In Case Study B it was noted "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" (B).

- *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". As participant A noted there "is evidence that the current training system dramatically reduces the time to complete training and there is less time off-the-job" (A).

Barriers

The barriers to successful e-learning implementation can be classified within 3 categories; cultural (i.e. the working and learning "environment" of the organisation), organisational and technical (Bonk, 2002). The data from case studies indicated the key barriers faced are organisational and technical rather than cultural.

- *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 and, until they have been deployed, it is difficult to argue the financial benefits. In Case Study B 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" (B).

- *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. For participant A any "potential barriers to the implementation of the e-learning solution developed were addressed by good planning and senior management support"(A). In Case Study F it was noted "the size of the company" can present unique challenges; **"**because the company is so big, getting senior management support is the biggest challenge; activities at the local level are okay". In essence, "e-learning needs a different style of leadership" (F).

- *Relevance and Quality*: Organisations recognise materials presented to employees must be relevant 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. In Case Study C "it is recognised by the organisation the production of DVDs and e-learning materials is costly". They have attempted "to outsource some materials but the materials were not relevant, they did investigate some material from Australia, a simulation, but it wasn't what we wanted" (C).

- *Acceptance*: Online learning is relatively new to many in the industry and this is evidenced by the reluctance from some employees to fully engage in the courses offered. However, as more courses are offered through this medium it is anticipated this reluctance to engage will diminish. Participant E noted "traditional methods of literacy training are well understood and the organisation has encountered some degree of staff resistance to using e-learning. Comments such as the 'I can't do it' syndrome, or the kids are on the computer so "I don't have access" are not uncommon". There has also been resistance from some clients, for example they "tried very hard to get a national organisation to create a "how to" simulation which would have made a significant difference to the trainee learning and understanding but without much success", the national organisation regarded this approach "as a bit too modern for them!" (E).

- *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. In Case Study D it was acknowledged "online delivery is relatively new in the industry there is reluctance by some authorities to accept that online learning can provide answers to a number of training problems and issues" (D). While participant E commented "the actual use of e-learning will be dependent on what the company wants the trainers to do". In many cases the "organisation is dealing with digital immigrant, not an easy task and often the company wants the trainers to use their documentation and processes and much of this is in a printed format" (E).

- *Infrastructure*: The infrastructure needed for ongoing development of e-learning initiatives carries costs both from the identification of appropriate emerging technologies to deploy and associated financing of such deployments. In Case Study D it was noted while providing "the online dimension with the potential to enable the completion of anytime anywhere training", the infrastructure needed to participate could "present some challenges both from the emerging technologies and understanding how they work, plus the software applications and their cost" (D).

Future developments

The review of the literature indicated there was a varied demand for e-learning implementations (Danish Technological Institute & Massey, 2004). The data from the case studies appear to indicate there will be a steady decline of classroom-based events and corresponding increase of technology-based training.

- *Blended*: Although within organisations there is a growing focus on e-learning, it is recognised traditional approaches remain important and significant training will continue to be offered via traditional methods. 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. As participant F commented, although this organisation recognises e-learning is "surprisingly effective, will be preferred in time in the immediate future training" will delivered "through a blended training approach with all learning linked to a competency framework" (F). In Case Study B it was noted this organisation has "noticed an increasing demand for web-provision - two years ago no requests were received for an online dimension, now there is, and it's increasing. As teachers should become more au fait with a LMS the" organisation will use its learning management system "as a learning/teaching tool as opposed to using it for learning/training events". However, the firm acknowledged full web-provision has its limitations and "the blended approach is the way to go, the face-2-face sessions are really valuable". Also participant feedback received "indicates participants really appreciate the F2F components" (B).

- *Collaborative*: To achieve cost reduction and to increase the quality of resources developed, many organisations are aware of the benefits and savings to be gained by working with the producers of the goods they sell and with other organisations in the same sector. In Case Study C it was noted while the organisation has recognised "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" (C).

- *In-House*: Increasingly, organisations see the benefits in tracking the training undertaken by employees, 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. As participant C commented "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" (C).

- *Mobile:* Mobile technologies are becoming 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. For example, in Case Study E it was recognised "young trainees and the like have mobile phones". The issue for this organisation is "so what can you do to make good use of them in learning?" (E). While participant D commented "the firm has recognised its target audience is "practically" oriented these people learn by doing. The tactile dimension is important. Once you get the touch screen stuff, you've got interactivity. Mobile technologies enable information to be accessed remotely and to transfer data/ information back to the office" (D).

Critical success factors

To increase the adoption of e-learning industry and to enable a move from periphery to mainstream the literature identified a number of leadership, planning, pedagogical and organisational strategies (Thompson & Lamshed, 2008). 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.

- *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. For example, participant A recognised it was crucial to "identify and plan early, making sure there are adequate resources in place, you have senior leadership support, improve participant ICT literacy profile through supportive techniques, a communication mechanism in place to publish results for others to review and above all focus on the experience of the participants, what does the individual see and how do they interact with it and does it work for them?"(A).

- *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. In Case Study C it was recognised support from senior management is essential "if you have the ear of the CEO and the support of the Board around commitment you can justify the spend, evolve the business". To obtain this support a "major challenge will be justifying the up front costs". Organisations need a clear idea for the future, for example, being able to state "in 24 months time we will start to get some traction and the ROI/ payback period might be three to five years" (C). Participant E commented "although planning for e-learning implementation is important probably the most critical factor is getting leadership support. If you don't get that you are not going to get the resources" (E).

- *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 delays to e-learning development. For example, in Case Study C it was noted that in "selecting an e-learning solution", organisations need to be aware "Cynics might say that you spend all the money and the software will be obsolete in two to three years time". It is important "you select the appropriate software and infrastructure" (C). Participant F noted "for e-learning initiatives to be maintained" there is a need to employ "technical expert over a long period, not intermittent support provided on a casual basis". This will enable the firm "to have Moodle hosted internally" reducing "reliance on external" hosting firms(F)

- *Awareness*: When contemplating a change from traditional modes to online learning, organisations need to be aware of potential resistance to change and articulate a clear vision and solicit feedback from employees on the efficacy of the e-learning for them. Participant B noted while, in general, educators in all sectors' "knowledge of what ICTs are available have increased there is an ongoing need to continually raise the awareness of its potential in all sectors". This will lead to an "increased uptake and embedding of the technologies in teaching and learning". An in Case Study D it was recognized when contemplating "a change from traditional modes to online learning, organisations

need to be aware of potential resistance to change". In order to articulate a clear vision "they need to persevere and ensure there is true commitment and support for the outcomes". They also need to ensure the new delivery mechanisms are recognised by "official" agencies – "there is a definite need to get the relevant authorities on their side, right from the start" (D).

- *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 and acceptance of the e-learning solutions developed. For example, in Case Study D it was noted that to help embed e-learning in electrical training, "feedback from users of the online system needs to be regularly obtained". This evaluation of "the online courses are continuous process, serving to improve and expand the resources available to the electrical workforce". It will also "demonstrate the cost effectiveness and acceptance of the e-learning" solutions developed (D)

- *Collaborate*: 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. Participant A recognised "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". The company is already doing this with a "couple of similar-sized organisations employing a similar workforce". In Case Study F it was recognised that "there is a need for" collaboration and cooperation "with good providers" and to help in the "building a network of like minded people enabling the team to reduce negativity and have a better focus on what needs to be done" (F).

Conclusions

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. The focus of many debates on e-learning in industry is centred on organisational expectations, the potential financial benefits accrued, the impact of e-learning on improving workforce capability and the use of e-learning to ensure firms fully comply with legislation. Currently a number of industries, across all sectors, have in place a sufficiently robust and extensible information and communication technology infrastructure to facilitate any e-learning initiatives that they wish to implement. During the review of the case studies, four emergent themes in e-learning in industry were identified:

- *Awareness*: The raising of 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 a 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 enable 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 development of the organisation's broader training plans.
- *Quality of Training*: The quality of the e-learning experience participants enjoy can be directly attributed to the quality of all the processes and procedures used in the creation of the e-learning event.

Summary

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 industries in New Zealand; a blended approach is the preferred option for the majority of training programmes. The e-learning functionalities deployed will include, but will not be limited to:

- An increase in the 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.

- The employment of e-portfolios, which enable the organisation, trainer and the employee to track and manage training needs.

References

Aldridge, J., Dorman, J., & Fraser, B. (2004). Use of multitrait-multimethod modelling to validate actual and preferred forms of the Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI). *Australian Journal of Educational and Developmental Psychology 4*, 110-125.

Begg, A. (1993). *Professional development of high school mathematics teachers.* Hamilton: Centre for Science and Mathematics Education Research, University of Waikato.

Bonk, C., (2002). Online Training in an Online World. Jones Knowledge Inc, and CourseShare.com. Retrieved October 14, 2009, from http://www.publicationshare.com/docs/corp_survey.pdf

Business NZ & Industry Training Federation of NZ (2003). Report of the Business NZ Skills and Training Survey 2003. Department of Labour.

CIPD (2004). E-learning survey results report. Retrieved January 28, 2008, from: http://www.cipd.co.uk/subjects/lrnanddev/elearning/elearnsurvreslts04.htm

Clayton, J. & Elliott, R. (2007). Report 1: A review of the literature: E-Learning Activities in Aotearoa / New Zealand Industry Training Organisations. Tertiary e-Learning Research Fund, Wellington.

Clayton, J & Elliott, R., Saravani, S., Greene, N., & Huntington, N. (2008). e-Learning in Industry: A Summary of Activities (pp80): e-Learning in Industry: Tertiary e-Learning Research Fund, Wellington.

Clayton, J. & Elliott, R (2008). e-Learning in Industry: New Zealand Case Studies (pp70): e-Learning in Industry: Tertiary e-Learning Research Fund, Wellington

Cooper, C. (2007). Work-based learner ICT and e-learning survey: Final report Association of Learning Providers and the Learning and Skills Council.

Danish Technological Institute & Massy, J. (2004). Final Report: Study of the e-learning suppliers'" market" in Europe: European Commission, Directorate-General for Education and Culture.

Driver, R. (1989). Students' conceptions and the learning of science. *International Journal of Science Education, 11*(Special Issue), 481-490.

Gilbert, J. (1993). Teacher development: A literature review. In B. Bell (Ed*.), I know about LISP but how do I put it into practice?* Hamilton: CSMER University of Waikato.

Kennedy, J., & Dorman, J. (2002). Development and validation of the Extended Practicum Learning Environment Inventory (EPLEI). In J. Reid & T. Brown (Eds.), *Challenging futures: Changing agendas in teacher education.* Armidale: University of New England.

Ministry of Education. (2009). *Tertiary (e)Learning Research Fund (TeLRF)*. Retrieved August 14, 2009, from http://cms.steo.govt.nz/eLearning/Projects/Tertiary+eLearning+Research+Fund.htm

Scott-Jackson, W., Edney, T. & Rushnet, C. (2007). Realising Value from On-Line Learning in Management Development Chartered Management Institute, Oxford Brookes University.

Statistics New Zealand. (2007). *Information and communication technology in New Zealand: 2006.* Wellington: Statistics New Zealand.

Statistics New Zealand. (2007a). Information and communication technology in New Zealand: 2006 Wellington: Statistics New Zealand

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

Trochim, W. M. (2006). *The research methods knowledge base* [Electronic version]. Retrieved August 14, 2009, from http://www.socialresearchmethods.net/kb/index.php.

Wilson, D. (2004). *Measuring and Proving the Value of Learning*: e-Learnity viewpoint paper. Cirencester, UK.

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