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Effective implementation of e-Learning: A case study of the Australian Army

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Case study

Purpose
This case study identifies factors influencing the implementation of e-Learning within the Australian Army training context.
Design/methodology/approach
A grounded theory approach (Glaser & Strauss, 1967) was used to gain an understanding of the concerns of stakeholders involved in e-Learning implementation This research included interviews with Army managers, course developers, instructional designers and instructors.

Findings
The main factors that were important for respondents involved in e-Learning management, design, development and delivery could be identified. This case study demonstrates the importance of maintaining focus on organisational priorities and learning goals while meeting the demands of change pressures.
Research limitations/implications
This is an initial study to gain an overview of the main issues. More research will be required to understand the Army's e-Learning context and to confirm these findings. Further research will include other stakeholders, including trainees' perspectives and extend to other Army sites.
Practical implications
For effective implementation there needs to be a process of continual adaptation and alignment of e-Learning to reflect changing demands while meeting the priorities of the organisational culture and learners' needs.
Originality/value
This paper analyses the first independent external research into e-Learning in the Australian Army. Although this is a specialised context for e-Learning, the issues raised in this case study will inform research into other workplace e-Learning projects.

Keywords: e-Learning, training culture, learners' needs, managing change, Army, Australia

Introduction

Knowledge of e-Learning has largely developed from the experiences of learners and teachers in education using interactive Internet technologies to create online learning environments that support learning communities (Downes, 1998; Fisher, Phelps & Ellis, 2000; Hill & Hall, 2001). Research into e-Learning in workplaces is more limited and tends to be anecdotal accounts by organisations or commercially based research companies with a U.S. focus. Reporting from knowledge-based industries, where computers tend to be integral to their business has also created a bias in the e-Learning case study literature (Newton, Hase & Ellis, 2002). Therefore, there is a need for more exploratory case study research into the processes involved in adopting and adapting e-Learning in different learning contexts.

From their analysis of adult learning theories and e-Learning literature for the U.S. Army, Bonk and Wisher (2000, p. 67) discuss the importance of recognising inherent differences when attempting to transfer knowledge of learning innovations in one context to another, including 'learning culture, social interactions, motivational and affective factors'. Boud (2004) explores the resulting differences between education and training contexts in terms of the position of the learner as central in education and more 'elusive' in workplace learning. Thus, understanding the inherent features of the learning context is important when considering e-Learning implementation.

It has also been argued that e-Learning requires a major cultural change to be successful (Bates, 2000) or that it can provide opportunities for shifts in the culture of training and education (Rosenberg, 2001). However, researchers have found that understanding the culture of the organisation and adapting the e-learning strategy to fit that cultural environment is more likely to lead to success (Lea 2003; Newton, Ellis & Hase 2001; Rogers 1995). Lea (2003, p. 218) advocates awareness and inclusion of

the 'inherent culture of learning' for effective e-learning development including, the nature of the target audience, the amount of time people have to train and the 'tone of voice' that the organisation uses. Further, the authors' previous case study research (Newton, 2002; Newton, Hase & Ellis, 2002) suggest the importance of aligning e-Learning implementation with organisational culture, organisational structure, organisational priorities and learners' needs.

Thus, it is important for research to identify the particular characteristics of workplace learning and to highlight the factors influencing effective e-Learning implementation. This case study of the e-Learning implementation in the Australian Army provides the perspective of those involved in its design, development and delivery. A model of factors influencing effective e-Learning implementation that emerged from analysis of the research data is provided.

Background to the study

The Australian Army has been using e-Learning since 1987 and has received strategic support from 1996 to develop multimedia CD-ROM training packages as part of its regular training content. Since its establishment in 2000, the Army's Training Technology Centre's (TTC) staff members of instructional designers and course developers have produced over fifty CD-ROM multimedia training packages. 2004 saw the implementation of the Defence Online Management and Instructional Network (DOMAIN) using THINQ Learning Solutions® Learning Management System (LMS). This network was populated with Commercial off the shelf Web courses, which were predominantly targeted at soft skill areas, such as, occupational health and safety, equity and Microsoft Office tutorial programs. In 2005, Army instructional designers and developers will concentrate on re-authoring existing media rich CD-ROM content into Web friendly-based packages using OutStart's Trainer® course authoring program. These packages will be customised Army built products compliant with Sharable Content Object Reference Model (SCORM) and Aviation Industry CBT Committee (2005) standards. This case study provides insight into the challenges faced by the Australian Army in managing effective e-Learning implementation to meet changing demands within an authoritarian and hierarchical culture.

This paper represents the initial stages of a larger research project investigating the factors influencing the effectiveness of e-Learning in the Australian Army. Ellis and Newton (2004) provide a history of the technical changes over the last decade and Newton and Ellis (2004) discuss change implications for course development staff with the shift from CD-ROMs to Web-based learning in the Army. Although this is a specialised context for e-Learning, the issues raised in this case study can be related to other workplaces.

Methodology

As there has been no previous external research into the Australian Army's implementation of e-Learning an exploratory, inductive approach using grounded theory (Glaser & Strauss, 1967) was adopted for this research. Grounded theory is a well-established inductive process for developing theoretical models with a high level of rigour. It was important to gain an understanding of the concerns of the stakeholders involved in the design, development and delivery of e-Learning. Also, as the authors are university academics with no previous experience of military training

this inductive approach would also provide them with a better understanding of the organisational context.

Convergent interviewing as described by Dick (1998) was used as it allows the content not to be structured but provides a structured approach to the interview. That is, predetermined questions were not used but questions emerged thorough constant comparative analysis of the data. The focus was on noting confirmation and seeking disconfirmation and possible explanations for disconfirmation to gain a better understanding of respondents' perceptions and concerns.

The data for this case study included analysis of interviews with a range of stakeholders: six interviews with senior Australian Army personnel involved in the development and implementation of e-Learning (referred to as 'Manager' in this study); ten interviews with course developers and instructional designers at the TTC and twelve interviews with instructors and managerial staff involved in e-Learning delivery at a Regional Training Centre (RTC). Most of these respondents were involved in the implementation of a first stage promotion course for soldiers. Army policy and directive documents related to e-Learning and evaluation trials of the e-Learning courses were also analysed and compared with interview data and provided background information for the study.

While these respondents represent a cross section of stakeholders, at this early exploratory stage in the research it is acknowledged that interviews from other Army sites will be required to provide confirmation of the issues. Also, with recent external pressures on the Defence Force to develop networked e-Learning the participants had only limited experience with some developments. However, these interviews do contribute to a case study of the historical and current issues influencing e-Learning implementation in this context.

The opening questions were the same for all respondents: 'What do you think of computer based learning?' and 'What are the advantages and disadvantages?' The interviews varied in length from about two hours to thirty minutes depending on the data being provided and the level of disconfirmation being provided by the stakeholder. The respondents were free to discuss any issues that they considered important and to continue talking with prompts from the researcher for more information and clarification.

Hand-written notes of the main points raised were taken at the interviews. Two of the senior management interviews were taped, with their permission. Statements quoting particularly illustrative expressions were noted, where possible, and have been used as quotations to attempt to capture the full sense of respondents' beliefs and understandings. The interviews were analysed using a constant comparative process of the main themes as described by Glaser and Strauss (1967). Analysis of these notes was assisted by the use of a computer program, QSR Nud*ist (QSR International, 2003), which allowed coding and sorting of the main themes.

Results

This paper summarises the impact of the workplace context on e-Learning in the Australian Army from the perspective of those involved in its design, development and delivery. Three main factors in emerged from this study as important for the effective e-Learning in the Australian Army. They were:

- Drivers for change
- Training culture
- Learners' needs

Drivers for change

Constant change in the external environment with increasing operational demands and within the Army, particularly frequent staff movements, has impacted on e-Learning implementation. The following overview of the history of e-Learning implementation reveals the main drivers for change.

The logistics of Army training prior to 1997 were enormous with more than 27,000 people being trained annually on more than 1,200 courses ranging in duration from less than a week to over 18 months and from basic skill levels to university masters level (Training Technology Centre-Army, 2003, p. 2). Training was delivered as face-to-face training through classroom based residential courses and as field based training. There was a small, dispersed group of individuals involved in the development and delivery of e-Learning, including some special purpose multi-media computer-aided learning, such as, mechanical training (Headquarters Training Command -Army, 1996).

These early e-Learning projects depended on the interests of a few dispersed individuals and as they were not centrally funded for staffing or resources, the development was erratic and often inadequate. Managers recognised the enthusiasm and efforts of these individual drivers: '…it worked well because you had an individual in the training establishment who had an idea, was committed to it and followed through with enormous energy and personal commitment'. However, the standard of training also varied considerably, depending on the skills of the staff involved. Frequent changes in postings for staff every two to three years also impacted on the sustainability of individually supported e-Learning projects: 'it died very quickly when they moved on' (Manager).

The support of higher-level managers for e-Learning was facilitated by the alignment of e-Learning with organisational priorities. Major drivers for change to implement e-Learning within the Training Command-Army were 'strategic imperatives' and learners' needs. Training managers' main priorities for e-Learning implementation in 1996 were learner centred and were summarised by a manager as:

- to minimise the disruption to units, trainees and their families arising from their participation in training;
- wherever possible (and necessary) to deliver the same training to Regular and reserve Army members;
- to create a reserve of instructor capacity-a surge capacity; and,
- 'most importantly' to optimise the quality of the learning experience provided to trainees.

Reducing the cost of training was also a driver for more centralised e-Learning implementation with a Defence Efficiency Review (Department of Defence, 1996). Residential training involves transporting trainees from all over Australia and accommodating them in fifty training centres, each specialised in a type of training (e.g. catering, signals). An estimated 70% of the costs of training was attributable to residential costs and time off for trainees from regular duties (Training Technology Centre-Army, 2003, p.2). Face-to-face classes are also very resource intensive with a high expenditure on materials (e.g. ammunition) and staffing. This Efficiency Review encouraged the use of technology to optimise effectiveness of manpower and resources and became the policy vehicle to support and scaffold changes required to refocus priorities in Army training.

To meet the requirements of the Efficiency Review and achieve these trainee-centred objectives, Training Command-Army carried out the 'Technology-Simulation (TECHSIM) Development Project' (1996) to provide an overview of existing e-Learning and future objectives. This resulted in further strategic support with the Training Command's 'Technology Development Plan 1997-2005' (1997) that outlined the vision and strategies for achieving their goals and establishment of committees and working groups to oversee and manage the implementation of flexible delivery. This planning resulted in the establishment of the Army's TTC to provide specialised staff to develop e-Learning products and Regional Training Centres (RTCs) near major concentrations of Army personnel to provide access to e-Learning across Australia. Headquarters Training Command-Army supported these goals with further policies, such as, the 'Flexible Delivery of Training Plan' (2003) and 'Flexible Learning Plan' (2004). These policies have provided ongoing strategic and managerial support and infrastructure funding for e-Learning, despite the frequent movement of staff in the organisation.

A more recent external driver for change came from a directive from the Defence Minister, Canberra in July 2003, for the Australian Defence Organisation, including the Navy, Army, Air Force and eleven defence civilian groups. This directive was for the implementation of the Defence Online Management and Instructional Network (Project DOMAIN) using THINQ™ LMS and using Outstart's Evolution® for course content management. This project has a focus on delivering networked Web-based courses with the rulings governing content development for the LMS coming from the Defence Information Systems Directorate. However, the Army was not consulted or involved in the decision-making for this project and it has proved a challenge for the e-Learning development team and managers (Newton & Ellis, 2004).

For the TTC instructional designers Project DOMAIN involved 'a total shift' in the way that courses may be designed and presented. However, the designers emphasised that their focus is on learners' needs and providing effective learning in the new environment. In November 2004, a pilot networked Web based program was trialled on DOMAIN. However, this trial 'did more to highlight LMS architecture issues' than prove the delivery medium was effective for learning (Manager). This was described as a 'consolidation period' where more time was needed to understand the Web as a learning delivery medium. Managers considered that while networked Web-based learning could be useful there was need for further evaluation to determine the 'proof of the concept' in the Army environment.

Thus, moving from individual champions to strategic support for the development of e-Learning resulted in acceptance across the chain of command with a coordinated approach to course development, training methods and technical infrastructure requirements. It has also provided the organisational support to manage a major externally driven shift in course production and delivery. However, the shift in decision-making to outside the Army has provided challenges that will require good communication and evaluation of the impact of changes.

Training culture

The authoritarian and hierarchical nature of Army decision-making and its training culture have influenced e-Learning design and development. The Army has adopted Competency-Based Training and Assessment and has a specified scope of registration for the types of training that it can deliver and assess. The format of Army competency standards are aligned with the Australian National Training Authority's training package standards. However, there are other skills, knowledge

and attitudes required of the trainees outside of training package requirements. For example, there is a need for all training to comply with Army doctrine that provides standard operating procedures. Doctrine is constantly revised to meet operational requirements and these changes need to be reflected in all training. There is also a need for 'socialisation' (Manager) of trainees from civilian to Army culture. Thus, there is a range of content and attitudinal outcomes that need to be included in e-Learning.

However, like many other organisations, the Army's primary function is not training delivery. Although the initial push for e-Learning reflected a need for efficiency outcomes, managers' perceptions of the goals of the learning environment also influenced e-Learning development. A manager reflecting on the TECHSIM (1996) goals, stated:

> In particular, we needed to be clear on whether we were delivering information or achieving specific learning outcomes. We believed that our response to this fundamental question dictated our entire approach to e-Learning. There is obviously a significant difference between delivering information and facilitating learning…We decided that our [Training Command] core business was facilitating learning and therefore e-Learning required us to present our learners with text, audio, graphics, video, animation and virtual reality files integrated in accordance with a detailed and comprehensive instructional design and rigorous software engineering specification, and implemented with mentor/tutor support in conjunction with complementary residential training, to optimally satisfy our learners' requirements. This was our e-Learning definition

Thus, managers were supportive of a shift in focus to learning facilitation using multi-media e-Learning development. However, the design and delivery of e-Learning reflected Army's technical and operational requirements and training culture. For example, Training Command did not initially focus on the development of online (networked) learning development due to logistical and technical issues:

> With the exception of a learner management system, this will not initially include on-line delivery until a number of issues are resolved, such as:
>
> a. soldiers spend much of the year training in the field, where they do not have access to the Intranet or Internet;
> b. the limited bandwidth available on the Defence Network significantly restricts the instructional design of electronic and TBT [Technology Based Training] products; and,
> c. the Defence Restricted Network (DRN) is not yet considered sufficiently reliable to support the efficient delivery of training (Headquarters Training Command-Army, 2003, p. 7).

These conditions resulted in the development of CD-ROMs that would provide high quality multimedia courses. These products were designed to provide a 'rich learning environment' based on Army instructional design and online useability principles (Training Technology Centre-Army, 2003). Thus, as a result of the training culture and technical issues the focus has been on developing self-contained learning CD-ROM packages rather than utilising Internet communication tools.

Courses selected for e-Learning development were based on a broad range of criteria including: content (i.e. largely information based), opportunities to reduce operating costs and requirements to train large numbers of staff. The first courses to

be targeted for e-Learning development included subjects that involved high student movement costs and high training costs, such as those courses requiring regular refresher training for all personnel (e.g. navigation and first aid) and core courses for promotion. Other legislated courses were also targeted for e-Learning (e.g. equity and diversity, fraud and ethics) with the aim that all staff can do the courses at the most convenient time and at their own pace.

The Army Training System (ATS) has been developed from the need to learn doctrine content based on a behaviourist model of learning. All training must comply with the ATS. However, with the refocus on learning facilitation there has been a shift in instructional design to include features of other learning orientations, such as: a 'constructivist approach, within the body of a basically behaviourist lesson' (Instructional designer). Problem solving and scenario based activities aimed at developing higher order thinking skills and application of learning have been included in the e-Learning packages. Instructional designers aim to provide learners with 'realistic learning environments' through text-based role-play simulations or drag and drop graphic simulations for operational skills Trainees are provided with responsive online feedback and can refer back to the lesson or to the online doctrine package through an intranet, if necessary. While these packages provide learners with more opportunity for self-paced interactive online learning, the e-Learning environment is based on inherent Army behaviourist training traditions.

Most e-Learning is delivered in classrooms during residential periods of training. Managers explained that this method has evolved from: the need for security in assessment, security of doctrine, recognition that most trainees are not self-directed learners, need for trainees to be assessed in the field and equity in access to computers. For the Corporal promotion course there is an eight-week residential course with sixty hours of e-Learning combined with classroom training, practical training and assessment. Trainees have time allocated in the class to complete a certain number of e-Learning modules (e.g. three modules in a two hour period). If they do not complete the modules then they have 24-hour access to the training room during the course to finish. With the approval of their senior instructor, some of the instructors have instituted a type of blended learning. If the students complete the e-Learning modules early, instructors provide classroom or closed field practical exercises on the same day. Instructors believe that this method improves retention by providing relevant practical experience and reinforcement.

Providing interactivity using Internet communication (e.g. discussion forums and chat) has not be used and is not being currently explored for the Web-based courses. This was viewed as a more 'mature stage' (Headquarters Training Command-Army, 2004, p. 4) in e-Learning development. A manager suggested that online interaction would come later as other issues had 'higher priority at this transition stage'. It could also be argued that this decision also reflects the long-term practice of providing residential based delivery rather than true distance e-Learning and the authoritarian culture of the Army. For example, one instructor was concerned about the erosion of his authority over students if he 'said something stupid online.' Thus, understanding the impact of the training culture on the perception of e-Learning was important.

Managers considered that a potential barrier for e-Learning was the need for trainees to be 'resocialised from civilian to Army: the culture of the Army is more authoritarian'. Instructional designers considered that it was important to provide a 'human feel' and a sense of empathy with Army role models. They aim to provide vicarious learning in e-Learning packages with 'virtual mentors' who are dressed, act

and speak using required Army protocols. While e-Learning packages reflect Army culture, instructors expressed some concerns about their changing role from 'role model' to facilitator. For example, leadership modules where the learners are 'not provided with sufficient variety of real-life examples' where they might think, "I want to be like that bloke" (Instructor). The effectiveness of virtual mentors needs further investigation.

Only formative assessment is done online due to concerns about students cheating and the need to demonstrate practical competencies in the field. While some instructors consider that e-Learning activities provide a good standardised theoretical understanding of operations, others felt that e-Learning replaces too much practical training and discourages real-life decision making which are necessary in officer promotion courses. The role of e-Learning in preparing students for practical skills needs further investigation.

Thus, while a shift in perspective has been required for some of the staff, e-Learning implementation has not produced a change in the training culture. The design, development and delivery of e-Learning in the Army has reflected the existing training culture while challenging some of the processes to achieve the required objectives.

Learners' needs

While the e-Learning packages are designed to be self-contained, learners' support needs are important. An instructor is present in the e-Learning classroom to answer any content questions and to assist with any navigation or other course related issues. Information technology specialists are also available to assist with any major technical issues. However, instructors have found that trainees use less questioning during e-Learning classes. Some instructors find this frustrating as it reduces their interaction with them and 'they don't know if they are learning'. It also challenges their traditional authority and control of the classroom with some instructors finding more self-paced learning disrupting, as trainees 'just get up whenever they like.' Understanding the instructor's' position and possible resistance to e-Learning is important.

Trainee motivation was important, as they are not all keen to learn: 'they are doing it because they have to' (Manager). Before the e-Learning packages were developed trials were held where trainees discussed packages with psychologists and the trainers talked with them. As it was considered important that e-Learning had the 'same feel as a classroom that the trainees were used to' a standard Army lesson format was also used in all of the e-Learning packages based on: gaining attention, providing objectives, stimulating recall, presenting information, learning activities, summarising, assessing and providing feedback (Training Technology Centre, 2003). Instructors also provided insight into Army training culture by supporting the 'structured, logical path' provided in the packages for learners.

Instructors recognised that trainees' fear of failure was a part of the culture, in particularly 'not looking silly' or asking 'dumb' questions in front of their superior or other students. Self-efficacy was important for improving motivation and instructional designers aimed to build this into the packages by providing constructive online feedback on learning activities and assessment tasks. Understanding learners' needs in this context and incorporating this culture into e-Learning design was important.

Managers have also made assumptions about the learners' characteristics that have influenced e-Learning development, for example, good computer literacy was assumed as the trainees were from 'Generation X' with low concentration spans and

games orientation. Managers also expected that the generation gap could lead to 'cultural clash' between students and instructors who may not have had much computer experience. There was also an assumption that the trainees would have expectations of e-Learning packages, for example, 'responsiveness' and 'attractiveness'.

However, instructors have found that about 10% of trainees have never turned on a computer and others have a very high computer literacy. An orientation session is held on the day prior to classes to explain how to use and navigate the packages. Learning to use the different navigation systems on the packages takes some trainees a few days to learn. The instructors assist those who need help with navigation and there is some peer-support. Introducing networked Web-based learning will introduce another range of computer skill requirements. Further research is required into trainees' characteristics and effectiveness of e-Learning.

Learner diversity (e.g. gender, culture) have not been recognised in e-Learning design. However, instructional designers provide for different learning styles by providing 'split input' multiple sensory approaches with an integration of text, graphics and audio to reinforce learning. Managers thought that it would be too expensive to individualise the learning, so 'they have tried to cover most of them'. Managers assumed student homogeneity as 'in the army, aptitude and trainability are built into trainees' and 'they have no disabilities'. However, instructors found that managing individual differences in face-to-face classes was possible through active questioning and observing the trainees. The reduction of student interaction with instructors with e-Learning implementation was a concern for instructors.

Instructional designers were concerned that with the move to Web-based learning there will be a shift from multimedia to more text-based learning. Currently, limited bandwidth is available through the Defence Restricted Network restricting the use of larger graphics files. Instructional designers argued that while text based learning would suit some courses for highly literate trainees and knowledge based skills (e.g. project management), it would not suit lower literacy trainees who need practical skills. Instructors considered that many trainees have had bad experiences at school with low literacy rates and a dislike of text based learning. Managers were aware of similar issues with low reading literacy in the U.K. and U.S. armies encouraging the use of drag and drop graphics and cartoons in their e-Learning. This awareness has also raised with managers the need for literacy surveys in the Australian Army. Understanding trainees' perceptions and use of different e-Learning features would contribute to effective e-Learning design.

The TTC has formulated course evaluation procedures that include trainee pre-delivery testing and post course questionnaires and forums. Evaluations of learning effectiveness, design and usability of these packages have provided results that support continued e-Learning development. Test outcomes (pre, post and retention testing) indicated that trainees learning by e-Learning were achieving grades that, at least, matched face-to-face instruction. There has been a reported overall good user satisfaction with positive feedback on self-paced learning and multimedia features, in particular.

Therefore, the Army's e-Learning environment is influenced by the inherent learning culture that determines the nature of social interactions, motivational and affective factors in the organisation. Organisational priorities have been incorporated into e-Learning design, development and delivery with an understanding of learners' needs within this culture.

Conclusion

The main factors that were important for respondents involved in e-Learning design, development and delivery could be identified. This case study demonstrates the importance of maintaining a focus on organisational priorities and learning goals while meeting the demands of change pressures. In particular, individual champions in positions of responsibility within the training section were able to influence decision-making as they appreciated high-level pressures and inspired lower level work teams. By using the organisation's need for efficiency managers were able to implement the changes required to improve learning efficiency and effectiveness through e-Learning. This case study also highlighted the importance of understanding the impact of the organisational culture on the e-Learning environment. It was important that e-Learning implementation was aligned with the organisational culture expressed through the organisation's priorities and learners' needs. Thus, it is proposed that relevant e-Learning requires the responsive alignment of e-Learning with the characteristics of the organisational culture. A model of effective e-Learning implementation that summarises these relationships is presented in Figure 1.

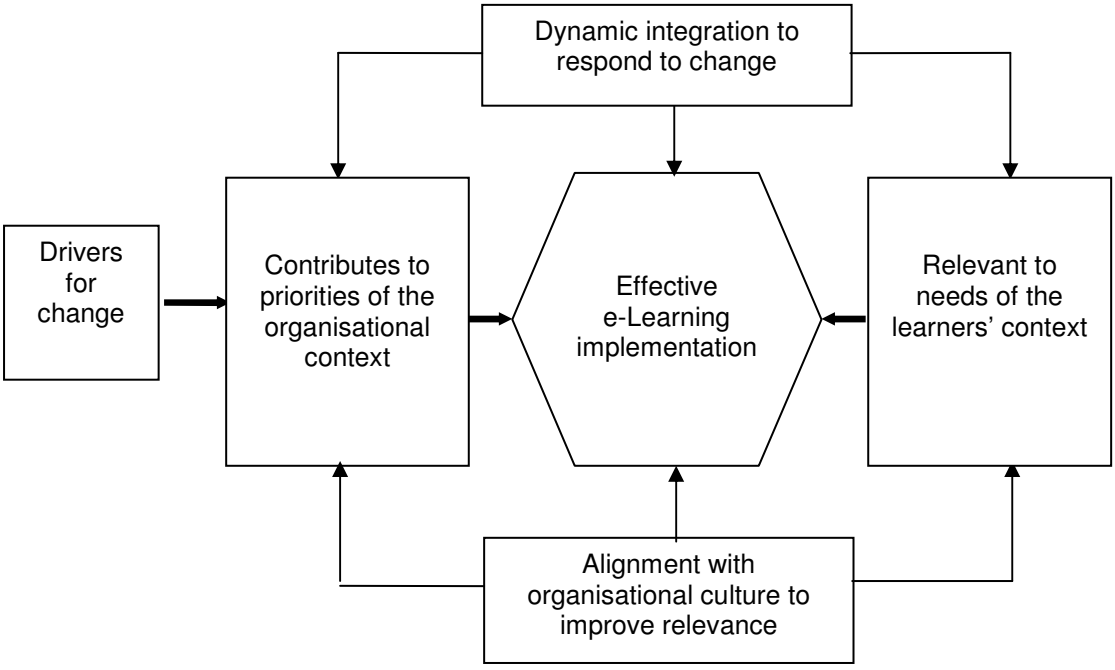

Figure 1: Model of effective e-Learning implementation based on the Australian Army case study (after Newton, 2002)

It is acknowledged that more research will be required to understand the e-Learning context, including trainees' perceptions and issues for instructors and managers in other Army training establishments. While the Australian Army provides a specialised context for e-Learning design, development and delivery it provides an excellent case study of managing change and e-Learning within an organisational culture that is hierarchical and authoritarian. This analysis has also provided some important themes for further research. With ongoing external pressures on e-Learning development and increasing operational demands in the Army, it is expected that there will an increasing need for research to understand effective e-Learning in this context, for example: evaluation of e-Learning retention and transfer to the field; the

impact of individual learning differences on e-Learning effectiveness; the role of blending learning delivery methods in learning effectiveness, the use of e-Learning by distance students and the role of Internet communication technologies (including mobile learning) in training. This case study will inform the understanding of further research and practice of relevant and effective e-Learning implementation in this context and in other workplaces.

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