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Corporate sector practice informs online workforce training for Australian government agencies: Towards effective educational-learning systems design

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The purpose of this paper is to outline government online training practice. We searched individual research domains of the human-dimensions of Human Computer Interaction (HCI), information and communications technologies (ICT) and instructional design for evidence of either corporate sector or government training practices. We overlapped these domains to investigate primary research outcomes. Corporate sector and government employees encounter barriers to their adoption of web-mediated training. One such barrier is a lack of enthusiasm, possibly due to ineffective instructional design, which in turn affects motivation towards online learning. Although the Australian Government offers training incentives to the general community, a negative attitude towards online training persists in the community, particularly throughout

the government sector. Adoption of effective ICT training tools is a critical issue for the corporate sector and government agencies worldwide. This paper presents a compelling case for courseware designers to develop sound instructional design principles to enhance web-mediated learning programmes.

***Keywords**: corporate sector, government agencies, online training, instructional systems design, human-computer interaction, workforce training.*

Introduction

The first concepts of online learning were developed in the 1960s at the University of Illinois through the creation of a computer-based education environment called PLATO (Programmed Logic for Automatic Teaching Operations), designed for delivery to university students. Some say PLATO paved the way for much of the online interaction seen today (Woolley 1994), including discussion forums, message boards, interactive testing, e-mail, chat rooms, picture languages, instant messaging, remote screen sharing and multi-player gaming. In many places around the world, the online learning environment is now integral to higher education and training sectors. While online learning is yet to reach some countries, the number of institutions and individuals accessing web-mediated learning resources is increasing exponentially (Anderson 2008). Flowing from this connection, one may expect that online training would occur as a natural consequence in workforce skill development practice.

The main aim of this paper is to investigate online training adoption in Australian government agencies. To initiate our government-funded research, we examined the literature to provide a critical analysis of current e-learning/training practice in the corporate sector—with a view to inform government agency

workforce training. The paper unravels similarities and differences between government agencies and the corporate sector.

First, we analyse government reports and corporate sector research, before outlining the importance of prior domain knowledge and individual preferences in adult learning. To clarify our use of the term 'prior domain knowledge', we simply mean that people may know relevant knowledge within one particular area of the specified learning content. For a full description of the concept of prior domain knowledge and how it may interact with the cognitive performance outcomes of educational-learning systems, see Yu (2007) and Yu, Jan, Simoff and Debenham (2007). We present the crux of our argument through the human-dimensions of human-computer interaction (HCI) (McKay 2008) and instructional systems design. To identify possible barriers to the adoption of e-learning, we examine this concept at an organisation level and an employee level. The paper concludes with a review of models that are used to measure training effectiveness.

Current research

Government reports

Established in 1996, the Flexible Learning Advisory Group (FLAG) is the key Australian government advisory group on national directions and priorities. This body publishes widely and promotes information communications technology (ICT) tools in vocational education and training (VET) and in adult and community education (ACE). The Australian Flexible Learning Framework (the Framework) is one of the key FLAG initiatives that leads collaborative development and provision of essential national ICT infrastructure. As such, it evaluates and provides advice on emerging technological opportunities. It also facilitates access to e-learning products and practices that enable an innovative, flexible and responsive national training system [http://www.flag.edu.au/]. To compare this

Australian experience, it is useful to look at the training practice in the UK.

In the UK, there is the National School of Government's initiative for e-learning—a partnership with the Ministry of Defence, supported by a growing syndicate of departments. It instigated a massive e-learning program entitled Understanding the Civil Service. This program includes a comprehensive list of training modules for policy and civil service processes (used within the European Union and the wider UK civil service). An example from its long list of workforce skill development includes finance and ethics. Its online training modules are designed to provide a sound and comprehensive resource of knowledge acquisition and foundation skill development.

Foundation skills have been examined in Australia through the Adult Literacy and Life Skills Survey (ALL), to assist individuals, educators, employers and other decision-makers. The ALL survey collected individuals' data on their familiarity with ICT tool usage. This survey involved a series of self-assessment questions on perceptions and degree of comfort in using these tools. The final outcomes explored the relationship between the use of ICT tools and associated computer-literacy skills (Statistics Canada & OECD 2005). While this research concentrated on basic knowledge and understanding, another Canadian research team at the Athabasca University continued to review the theory and practice of online learning (Anderson 2008).

While there is a plethora of research for all education levels (Anderson 2008), the (Australian-based) Framework frequently reports that the population is aging in Western countries. Consequently, this phenomenon is creating worldwide interest in lifelong learning strategies to maintain current workforce skill levels (Palmieri 2007). One of the ways this skill retention can be achieved is to acknowledge the special needs of an aging workforce. According to Bowman and Kearns (2007: 1):

- many older workers want to go on learning and earning, but in ways that suit their lifestyle preferences;
- this interest in learning often involves part-time work and part-time community service or volunteering; and
- the desire among many older workers to keep learning, including learning about computers and other technologies.

In facilitating effective and efficient training for an aging/mature workforce—on the one hand, it is more difficult for researchers to establish a common view on government training than it is for the corporate sector. Often, the government agency data may only appear in a report appendix listing as organisations visited or interviewed with no further detail. When this lack of published information occurs, the researcher cannot specify detailed data due to privacy laws (Benninck 2004). However, viable partnerships are developing in Australia between VET organisations, private industry operators and government enterprises (AFLF 2006) that enables a growth of expertise in training practise.

Unfortunately, there are many instances when marketing companies seize the opportunity to link e-learning to knowledge management to attract government agency sponsorship. The understandable attraction for the industry operators to such initiatives appears to be in their opportunity to cash in on the procurement of government web-services and media support (Schofield 2002:88). This is the point, we believe, where the Australian government initiatives to promote e-learning successfully negotiate across the government/corporate sector divide. By seizing these lucrative prospects and securing government contracts—the corporate sector appears to treat workforce training as a stand-alone skills development issue, disconnected from the wider competitive nature of corporate sector business strategies.

Corporate sector

We found that corporate sector research is more likely to identify barriers to online training than government agency research reports. Unlike the tendency for government agencies not to report publicly on their training practice, the corporate sector maintains a more open, transparent attitude to its online training practices. Murray (2001) described a four-staged e-learning planning process she observed in her research into the corporate sector that involved planning, building, integration and improvement. Murray argued that forward-thinking Canadian employers were starting to embrace e-learning to become more productive and innovative, regardless of the size, resources or sector of their organisation. Murray (2001) further stated that at the same time these employers were using e-learning to create self-directed, lifelong learners among their employees—and to save money. This sentiment is shared by the Australian VET community.

In 2001, networking members of the VET community developed a Framework initiative known as The Knowledge Tree. This network encourages the sharing of research and learning innovation in relation to the professional practice of e-learning development. Moreover, the group's e-journal is seen as a useful resource for anyone looking to identify and understand best practice. The common thread between the government reports and the corporate sector's research publications is their focus on skills development and their consideration for adult learning (AFLF 2007, Benninck 2004). Nevertheless, facilitating e-learning for an adult trainee cohort requires specialist facilitation.

To this end, Schofield (2002: 88) was prompted by three factors to conduct research into online learning in the corporate sector. The first relates to the unilateral weaknesses in the VET system today that are disconnected from the broader business survival objectives. The second factor is that corporations play a major role in workforce skills formation, alongside education and training institutions. The third is

the scarcity of independent research on corporate e-learning. Instead, what we know is largely provided by companies that have an interest in selling e-learning solutions. Even when the information they provide is objective, reliable and credible, perceptions of a conflict of interest remain. With this in mind, DeRouin, Barbara, Fritzsche and Salas (2005) caution readers about the use of independent survey results, acknowledging that industry partners may have a conflict of interest with regard to findings. Moreover, they identify a need for a science of e-learning that informs corporations on how to design, deliver and evaluate e-learning systems.

In keeping with the concern for evaluation, in a US-based university report, Mungania (2003) employed a web-based survey to collect data with the aim of demonstrating the viability of web-based surveys as an effective tool. Her research identified the challenges facing all stakeholders which result from the increasing demands placed on employees. Thus, the pressure to improve online training and professional development will likely increase, and consequently there will be increased investments in time, people and financial resources designated for e-learning.

Yet courseware creation is integral with the availability of appropriate ICT tools. Eklund, Kay and Lynch (2003) reviewed the literature to examine a range of issues covering technology, teaching and learning, and organisational issues. They offered general recommendations on priorities that will promote the successful deployment of ICT tools in VET. They argued that organisations must consider factors and developments of a technical, organisational and pedagogical nature that are likely to generate change in the use of technologies in education and training.

More recently, Jasinski (2007) conducted applied research on embedding innovative practice in e-learning. The aims of her research were to:

- identify factors that contribute to embedding innovative practices;
- inform future decision-makers with regard to the considerations and potential impact of embedding innovative practices; and
- develop models for ongoing embedding of innovative practices to be utilised by future VET providers.

According to Jasinski (2007: 57), there are healthy signs of progress towards embedding innovative e-learning. In her survey, 86% of respondents considered they were somewhat more innovative than the average person, and 44.7% believed they were delivering innovative e-learning practices and techniques to a high or very high extent. While 53.1% believed their organisation was extremely or somewhat innovative, respondents believed their organisation was using only 25.7% of e-learning innovations to a high or very high extent. This disappointing result means that because organisations are failing to implement innovative e-learning practice, it is a sign that they (organisational management) reflect a poor understanding of the importance that adults place on having appropriate opportunities for practice (Reigeluth & Carr-Chellman 2009).

Our investigation of government reports and corporate sector research has revealed there is more evidence from the latter to stimulate and support government sector training. We reviewed valuable scholarly contributions from Canada and the UK to highlight the collaborative nature of the corporate sector towards government sector training interactions. We also identified two other major areas of inter-related research that are relevant to our investigation of online training adoption in Australian government agencies. They involve the human-dimensions of HCI and instructional systems design. We therefore draw on both these important aspects to highlight the special needs of adult learners/government trainees. Then to tease out where the problems may lie, we review the organisational barriers towards adopting e-learning and finish the

discussion by presenting models that are used to measure training effectiveness.

Adult learning

Knowing how to learn new skills is something that improves as we grow older. For the most part as we travel along our lifelong learning path, it becomes easier to differentiate which instructional strategies are likely to suit us best. The difficulties we are likely to face, especially when learning in web-mediated instructional environments, will depend on whether there are any fast-tracking options for the learning tasks. It is well known that novice learners require the full range of rules and information related to learning something new, whereas an experienced learner might only require a quick revision (McKay 2008). Novice learners will therefore respond best to measured amounts of guidance—through progressively more complex instructional/learning content—with strategic opportunities for interactive practice examples along the way (Tennyson & Bagley 1991). Alternatively, a person possessing a more complete grasp of the task will likely want to experiment first, preferring to refer to the rules and basic information only when they need them. Unfortunately, there are many web-mediated instructional strategies that do not cater for both modes of learning. When instructional systems cannot adapt to this important requirement, they run the risk of demotivating both groups of learners (Tennyson & Bagley 1991). The result may be confusion for novice learners when the primary rules and examples are not sufficiently explicit, and boredom and frustration for the experienced learner who is forced into following the complete, step-by-step, instructional strategy.

Yet because some people's ability to immediately recall prior domain knowledge may slow as they age, we include contributions here from cognitive psychology research to enhance our argument for better understanding of cognitive performance.

Repovs and Baddeley (2006) have contributed a valuable body of work on people's working memory. They say that working memory has proven to be an important part of the human cognitive system, providing the ability to maintain and manipulate information in the process of guiding and executing complex cognitive tasks. Cognitive tasks that include past experiences are encoded and held in our memory as retrievable information. According to Kalyuga (2005), an important principle of acquiring appropriate prior domain knowledge is that the instructional strategy is integrated into our working memory, while the information we receive (Riding & Cheema 1991) is held in our long-term memory. Therefore, the design of instructional materials for online delivery must include consideration of the learners' level of expertise (prior domain knowledge). Research shows that adults often have relevant experiences that either drive them (or demotivate them) to learn, and that, when the content and design of instructional materials do not challenge or interest them, they can become demotivated (Tennyson & Bagley 1991).

Regardless of the fact that an adult may require special strategies to assist them with their recall of prior domain knowledge for everyday events, we must ask: what is known about the interactive effect of individual learning preferences and adult cognitive performance, when engaged with e-learning programs?

The human-dimensions of HCI

While many organisations have e-learning websites that include courseware and other online learning artefacts, these sites often lack a coherent and effective broad-based, e-learning strategy (Rosenberg 2001). We are suggesting that the human-dimensions of HCI offer the strategic 'glue' for successful online training which Rosenberg has noted is lacking. As such, the human-dimensions of HCI are but one piece of the complicated computer-usability or 'techno' puzzle that involves two distinct contexts (McKay 2008). One relates to the human-dimension or social context of computing, while the other

relates to the machine-side, where people's perspectives are shaped by the performance of the technical computing components. The literature deals more often with the latter. It is only in recent times that voice has been given to computer-usability issues that involve the human dimensions.

The human dimensions of HCI provide a useful framework for understanding how adult learners prefer to participate in online training. Attention to prior domain knowledge increases a learner's willingness to take part. It is essential to offer fast-tracking opportunities as discussed above. Yet despite the ample evidence that the corporate courseware creators include some of the principles of instructional design (Merrill 2002), there is little evidence that the government sector's online programs encourage a positive attitude towards such learner-centred participation. We discuss some of these issues below.

Instructional systems design

Before we do this, it is important to differentiate between learning theories and instructional design theories. The former are about the (internal) processes of the learning, while the latter cover the method (external) nature of the instruction (Reigeluth 1983). Our discussion on instructional systems design principles therefore draws on the views of established experts such as Merrill, Reigeluth and Tennyson. The long-standing principles developed by these experts are applicable to both traditional and computer-enabled educational systems (Anderson 2008). As before, we base our discussion on the multimedia learning principles recommended by the experts from transdisciplinary domains, which include adult learning with ICT-mediated tools.

It will be advantageous to educational-learning systems' design if the courseware creators adhere to the principles of instructional design (Merrill 2002). For example, Merrill's First Principles of Instruction

involve five principles that promote learning. These well-known strategies are effective tools for courseware creators to note when considering how to cater for learner characteristics (Merrill 2002). Moreover, when developing training materials, these principles help to determine the sequencing of the learning content.

Reigeluth (2008) presents key markers for change in educational-learning systems by contrasting the industrial-age with knowledge-age organisations. These key markers provide a general conceptualisation of the ways in which 'learning systems—and the instructional theories and strategies that guide their design—need to change' (Reigeluth 2008: 209). He recommends five factors that point to the need for change in instructional theories: the growing complexity of tasks; the increasing reliance on collaboration in performing tasks; the growth of web-based learning; the increasing power of performance support systems; and the emergence of personal tutorial systems. Reigeluth also points out that developing an individual's learning capacity must include equipping them with skills that enable them to adapt to developments in educational-learning technologies.

Tennyson (2008) recommends that instructional theory be usable, valid, theoretical and linked to learning theory. By 'usable' he means that instructional theory should be stated with sufficient clarity to allow successful implementation. A valid instructional theory should undergo empirical testing and practical evaluation. Such theory should explain how a particular instructional procedure works. The literature highlights the importance of understanding learning theories and instructional design for improving organisational training.

We have seen that adult learning requires courseware creators to pay attention to learners' special needs. This means that e-learning artefacts and instructional strategies should be flexible enough to promote choice of knowledge navigation (locked into a step-by-step

skill development path for a novice) or having the ability to pick and choose what to do next (brushing up on rusty prior domain knowledge). Having said all this, from our review of the research literature, we have identified particular categories of 'resistance' towards adopting e-learning for workforce training in the corporate sector.

The way forward

Barriers

A common thread observed in the literature is concerned with (perceived) barriers to the adoption of online training in the corporate sector. We are suggesting that one method to overcome such barriers as they may pertain to government agencies is to gain an understanding of how these barriers are affecting workforce training in the corporate sector. We categorise such barriers towards adoption of e-learning in two levels: the organisation level (Table 1) and the employee level (Table 2). At the organisation level, the barriers include costs, relevance, training effectiveness and technical support, while time, content and training effectiveness are the main barriers identified by employees.

We noticed these barriers are related to the economics, training relevance, policies, regulations, compliance—the (lack of) IS-related standards seem to be factors that deter organisations from achieving their training goals. For employees, the barriers are related to the learning content and assessment, technical and professional support, limited time and access which may prevent participation, and achieving quality learning outcomes. Our general impression arising from the literature review is one that courseware creators in corporate organisations (and government agencies) need to overcome all these barriers, as we believe they affect the successful delivery and implementation of e-learning programs.

Organisation-level issues

Cost is an issue among small and medium enterprises (Murray 2001). The initial costs incurred in developing training materials and purchasing the requisite infrastructure can be prohibitive. This financial burden can be further exacerbated once an e-learning intervention is introduced. It then becomes an ongoing costing issue due to the implementation and maintenance of the educational-learning system (Murray 2001). However, in large organisations, cost is not seen as being so much of a problem, because the value of e-learning is recognised (Schofield 2002). Yet some organisations are concerned about return on investment (ROI) issues (AFLF 2006).

Table 1: Organisation-level barriers

Adopting online training—organisation level		
Barriers	**Source**	**Description**
Cost	AFLF (2006, 2007) Brown et al. (2006) Murray (2001)	Infrastructure cost, development of e-learning materials, implementation cost, ROI
Relevance	AFLF (2006, 2007) Benninck (2004) Callan (2009), Murray (2001)	Relevance to business, relevance of training content, benefit to organisation, limited understanding of e-learning, compliance
Training effectiveness	AFLF (2007) Grant & Danziger (2005) Schofield (2002)	Training outcome, meeting training expectations
Technical support	AFLF (2006), Benninck (2004)	Lack of access to industry partners, unavailability of in-house expert

The relevance of the e-learning outcomes to organisations is another issue identified in the literature (Benninck 2004). Benninck

asserts that one of the issues faced by organisations is their limited understanding of the (educative) nature of e-learning, and what benefits they may gain from such initiatives. This dilemma is apparent in small and medium enterprises, as they do not find e-learning to be relevant to their needs (AFLF 2006). However, e-learning is emerging as a promising industry (Rosenberg 2001). Thus, organisations may succumb to the persuasive marketing proposals made by e-learning product vendors, as they promise better solutions to training programs (Benninck 2004). This type of persuasive behaviour presents a dilemma, as organisations may be vulnerable to such false claims that a particular (generic or off-the-shelf) e-learning course is relevant to their specific training need. In reality, some employers may not find an appropriate e-learning program on the open market. Even when the desired learning content seems to be available, the instructional modules are usually designed for traditional methods of delivery (that means face-to-face), and as such are unsuitable for e-learning (Murray 2001).

In terms of training effectiveness, organisations want to be assured that their investments in training will be worthwhile and will achieve their business goals (AFLF 2007, Schofield 2002). Hence, it is necessary to quantify the general training and overall course effectiveness. In a study by Grant and Danziger (2005), they provide such an example using Donald Kirkpatrick's four-level model that was first developed in 1959 (we describe this model later in the paper). They explored the tangible and intangible benefits (whether realised or not) of e-learning in four large companies. Grant and Danziger reveal evidence that the corporations paid attention to employee satisfaction with the e-learning courseware, yet the indicators they employed to measure satisfaction tended to be informal and unreliable. Better models that are used to measure training effectiveness are described separately below.

A lack of technical support (AFLF 2006, Benninck 2004) is also shown to be a barrier for some organisations. They find it difficult to implement e-learning programs, especially if the training pertains to technical (i.e. ICT) issues. It is clear that such organisations need assistance from a subject-matter expert to offer technical support and independent advice (Benninck 2004).

Employee-level issues

One of the problems with e-learning that employees highlight is the amount of time they are expected to spend on training (AFLF 2007, Murray 2001). Employees report that they do not have enough time to devote to workplace learning. To this end, Mungania (2003) ranked situational barriers facing employees contemplating e-learning. According to this researcher, situational barriers relate to an employee's environment and life circumstances. More specifically, these barriers result from a lack of time for study, time management problems, over-commitment to multiple roles and responsibilities, and interruptions during study. Similarly, Jasinski (2007) finds that available time and competing priorities are limiting factors for engaging with e-learning.

Table 2: Employee-level barriers

Adopting online training—employee level		
Barriers	**Source**	**Description**
Time	AFLF (2007) Jasinski (2007), Murray (2001)	Lack of time, situational, time management, availability, priorities
Content	AFLF (2007) Benninck (2004) Bowman and Kearns (2007) Callan (2009), Jasinski (2007) Mungania (2003) Murray (2001)	Relevance, suitability, quality, design issues
Training effectiveness	AFLF (2007) Brown et al. (2006) Berge and Giles (2008) Grant & Danziger (2005) Mungania (2003) Schofield (2002)	Learning style, instructional, learning motivation, personal, dispositional, organisational, delivery media (preference for blended learning)
Technical issues	Mungania (2003)	Lack of ICT skills, cultural

Low quality e-learning content is cited by employees as problematic (see Table 2). These niggling issues include: relevance, quality, design and suitability of the materials. 'There was little understanding of the human element that is needed to design effective learning activities to be used in conjunction with relevant technology. Technology alone is meaningless and useless' (Benninck 2004: 3). However, e-learning is thought to be particularly relevant to the learning and skills developmental needs of older workers, for example, 'when used in appropriate strategies, and when carefully managed to take account of the diverse needs and preferences of mature age workers' (Bowman &

Kearns 2007: 30). These special requirements call for the customised design of relevant learning materials that are suitable and engaging for adult learners.

Training effectiveness is also identified as a barrier for employees (AFLF 2007, Brown et al. 2006). Employees want to perform better and view e-learning as a skills building tool. Yet many people still feel unable to adopt e-learning programs at work to improve their skills and performance (Murray 2001).

It is reported that mature-age employees encounter difficulties linked to technical issues as barriers (Mungania 2003). Oddly enough, these older workers are described as people over 45 years of age (Bowman & Kearns 2007)—according to this research, most mature-age employees have difficulty coping with the use of computers for training. Frequently they lack ICT and computer literacy skills that are necessary for dealing with e-learning programs. Furthermore, those employees who have broader organisational, managerial responsibilities often face cultural barriers caused by stereotyping based on their age or the differing attitudes that emanate from employers and younger workers (Bowman & Kearns 2007). It is therefore important to reduce the difficulties experienced by mature-age employees. Designing computer interfaces that are easy to follow may help older workers to enjoy using e-learning programs. Another benefit is to improve their understanding of the technology, while maintaining their productivity and usefulness in the workplace.

We have discussed whether there are similarities between the perspectives of the organisation and the employees towards adoption of e-learning in two levels. At the organisation level, the barriers appear to denote a wider business strategic attitude relating to costs, relevance, training effectiveness and technical support. With an emphasis more towards instruction/learning, time, content and training effectiveness were identified as barriers by employees.

However, a real issue for concern is whether we can tell if the e-learning/training is effective or not.

Models used to measure training effectiveness

The literature reveals that researchers do use a range of models and approaches to measure the effectiveness of training. Among these models are Kirkpatrick's four-level approach, Phillips's Five-Level ROI Framework, the IBM ACE Model and the PEL-IRT model.

According to Aguinis and Kraiger (2009), Kirkpatrick's four-level approach is the most popular evaluation method used by researchers to measure training effectiveness in corporate organisations. The four levels relate to reaction, learning, transfer and results (Kirkpatrick 1998). Level I—Reaction—measures participants' reactions to learning, and questions them about what they think of the program. Level II—Learning—refers to the learning that is gained and measures how much additional knowledge is acquired through the training and whether participants have learned to do something differently. Level III—Transfer—concerns the application/transfer of the learning into a new environment, providing a way of tracking whether people who have been trained improve by using e-learning techniques and may be able to share their learning with other people. Level IV—Results—measures the impact of learning and whether it contributes to improvement of the (corporate) business. In summary, the Kirkpatrick model is focused on the learning event itself and its effectiveness.

Some modifications to Kirkpatrick's model have been introduced. For instance, Phillips extended Kirkpatrick's model to Level V—ROI (Kramer 2008, Phillips 2003), and this is known as the Phillips Five-Level ROI Framework. Nevertheless, for IBM, their latest innovation effectiveness model goes beyond that of Kirkpatrick (Tai 2008). As such, it is known as the IBM ACE Model (ACE stands for accountability, context and effectiveness). This accountability

model reflects that motivation and diligence to learn should be the responsibility of the learner, identifying four partners who share the accountability for a learning program: the learner, the designer of the program, the instructor or facilitator who delivers the program, and the manager who supports the program (Tai 2008). Context involves the organisation's learning that supports the employees' needs. Effectiveness is achieved when employees are given training that is focused on and relevant to their work environment, according to Tai (2008).

Chen et al. (2005) personalise their e-learning system based on the Item Response Theory (IRT)—calling it PEL-IRT. This model estimates the performance abilities of online learners and recommends appropriate course materials for them. Experimental results show that this adaptive, educational-learning system can provide personalised course material recommendations for online implementation based on learner abilities. According to Chen et al. (2005), this learner-centric feature accelerates the learner's learning efficiency and effectiveness. It provides learners with adaptive and personalised, web-based, instructional strategies according to the course materials that are visited by each individual learner and his/her responses.

The studies mentioned above indicate that the effectiveness of training can be measured using different methods and models. Moreover, in measuring training outcomes, it is important to quantify the effectiveness of the training. Even so, there still remains a need to enhance the effectiveness of the instructional strategies that are often employed. We suggest that this improvement can unlock the corporate knowledge of adult learners (DeLong 2004), which all too often lies dormant. We are proposing that, due to the unresolved barriers to the adoption of e-learning described earlier in this paper, the success of online training is currently rather tenuous. Yet we also see there is no reason why efficient and effective ICT training tools

cannot provide the necessary adaptive and flexible, learner-centred, e-learning that is required by adult trainees.

Conclusion

Corporate organisations wishing to involve their employees in online training require a thorough understanding of the e-learning paradigm. When organisations embrace e-learning, they do need to be assured of the quality of training that the educational-learning system offers to their employees—for example, that the training will assist the business to achieve its goals and improve customer service. In the majority of studies reviewed in this paper, it was noted that the barriers to adopting e-learning that were most frequently identified by employees were learning content and quality of delivery techniques. These barriers must be reduced if not eliminated—particularly in light of the significant investments in e-learning made by such organisations. Both government and corporate organisations invest large amounts of funds, resources and employee time into various forms of training. Clearly, there is a lack of evidence regarding which strategies are effective in different environments to support online training in diverse government agency contexts (McKay et al. 2007).

Content and quality of e-learning instructions also need to be designed with the utmost consideration for the effectiveness of the training outcomes. To achieve this worthy impact, it is perhaps useful to think that the **'e'** in e-learning refers to **'how'** an online course is digitised, while the **'learning'** refers to **'what'** the course content involves. The instructional strategies should be carefully examined to ensure they achieve the expected training outcomes. Furthermore, the **'why'** is about helping individuals achieve their educational goals or assisting organisations to improve employee skills and workforce performance (Clark & Mayer 2008).

We propose that employees/corporate trainees engage more intuitively with e-learning. It is important for courseware creators

to consider the learning needs of adult learners, and to effectively measure their learning outcomes. Jasinski (2007) asserts that e-learning may facilitate highly valuable training and skills development. Even so, if the learning achievement is not measured accurately, employers and employees will be less inclined to participate (or believe in) the potential of adopting e-learning. Due to the verbal/visual nature of the online learning environment, measuring the effectiveness of e-learning can be difficult (McKay 2000)*;* however, this is an educational-learning systems' usability goal and by default is a design challenge that is shared by other types of training and workplace strategies (Jasinski 2007) and should not be bypassed.

We believe that creating a learner-centred, flexible and adaptive online training program that integrates the power of ICT multimedia tools will improve the delivery of e-learning programs. Along with this, it might also address the needs of organisations which seek to become more competitive by building a well-trained, skills-enhanced workforce. Moreover, we also say that a user-centred, flexible and adaptive training program relies heavily on good instructional design and a learner-friendly interface. A poorly designed e-learning interface means that the learners will spend more time on 'learning the materials' than on mastering the information and knowledge provided (Ardito et al. 2006). Finally, we say that the difficulty encountered in adjusting to a poorly designed, e-learning interface will render the whole learning experience ineffective, delaying the inevitable groundswell against implementing good quality e-learning in government agencies and corporate training rooms.

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