Developing a framework for Evaluating e-Learning

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Abstract:

Technology-assisted learning, including online or e-Learning seems to be well established in educational and training institutions. When e-Learning solutions were being introduced, both educational experts and technologists claimed considerable value for adopting e-learning solutions. It was argued that e-learning solutions would fully transform knowledge transfer and learning practices. A review of a number of case studies in recent times suggested that many e-learning solutions adopted seem to be used as communication tools and storage for learning material. This observation motivated initiation of a project to attempt to assess the value of e-learning in institutions today. In phase I of this project, based on a review of literature (including literature at the time e-learning solutions started to take shape and be promoted) an evaluation model was put together. While the evaluation model will later be used to assess what strategic value has been added to educational and business practices in intuitions, this paper discusses the findings from the literature review and presents the latest version of the evaluation model.

Keywords: e-Learning, strategic value of e-learning, Knowledge Management, Evaluation Frameworks

I. INTRODUCTION

The Internet and Web-based technologies have both had significant implications on the ways in which educational and training institutions now operate; it is now possible for many innovative educators/trainers (within ICT-enabled nations) to think of new ways in which to provide Web-based knowledge management (KM) and training opportunities.

Various studies from the times that technology assisted learning started to take shape (e.g., [7], Baynton 2001, Rosenberg 2001, Higgins 2002, Burns et al 2001, and Dobbs 2000) suggest that in the early 2000s we witnessed rapid advancements in ICT – which have in turn contributed towards the emergence of a globally and electronically connected world. A paradigm shift with regard to the ways in which the transfer and management of knowledge is handled was witnessed.

There was significant optimism amongst technologists and strategic planners for knowledge management (KM), in that they viewed global networking and Web-based solutions as catalysts for addressing today’s challenges of KM and e-learning. A review of e-learning cases (e.g., various cases in online learning in the Training Magazine, Asgarkhani 2003, Kiser 2001, Montanden 2002 and Rossett 2002, Pan et al 2010) in the early 2000s suggests that most tertiary educational institutions and professional training organizations (within ICT-enabled and globally networked countries) had acknowledged to some extent the strategic importance of using technology-based education.
and learning through Web-based applications. They seem to have viewed e-learning as being a fundamental and positive shift in the academic and professional KM world. Yet some acknowledged that there was also a danger.

Placing too much emphasis on the technology aspect of e-learning and overlooking broader issues and/or strategies makes it difficult to deliver high quality solutions relevant to educational delivery objectives. On the whole, some electronically delivered programs/courses appear to have been developed and implemented in a somewhat reactive manner and in isolation. More specifically, insufficient thought has been given to strategic implications, global developments, cultural issues, the "digital divide" and the complexity of today's KM systems. As a result, some of these solutions have proved incapable of meeting the expectations of their potential users, i.e., the students.

This paper is concerned with assessing the strategic value of e-learning and knowledge management. It discusses the outcome of Phase I of the study – a model for evaluating e-learning effectiveness.

II. TRANSFORMATION OF LEARNING PRACTICES AND THE EVOLUTION OF E-LEARNING

As e-learning initiatives started to percolate the world's learning institutions, they represented, according to Salmon, "a new way of doing something familiar." (Salmon 2005, p201). The physical environment gradually changed to incorporate technological innovations, early examples of which included computer-based multi-media presentations and data projectors. These were then supplemented with a wide range of digital ancillaries such as wireless mice, projection cameras, touch-screen theatre controls, smart boards and the like; new gadgets but using the same approach to teaching. Many institutions have moved on to replace or supplement the existing learning environment with alternatives that use technology to create a virtual learning experience. Here, students can engage at their own pace, in their own time and from their own space. This implies a distinct departure from traditional pedagogies; for example, the responsibility for acquiring and assimilating new knowledge into a student’s own schema tends to shift from teacher to student. Salmon claims there is a belief among non-executive managers that any new processes required to capitalise on new technology adoption will be created "in some magical way" and thus teachers will instantly and effectively be able to cope with and capitalise on new concepts such as remote knowledge construction. "Learning technologies are not transparent, their properties are not obvious and they do not broadcast their utility." (Salmon 2005, p203).

We have witnessed a transformation in business practices – according to an industry report just before 2000 (Industry Report 1999) these include:

- **Outcome-focus** – Learning solutions must positively impact on learners’ performance and work-readiness.
- **Flexible access** – Knowledge solutions must meet the diverse time and location needs of learners
- **Shift to online rather than paper-based delivery**
- **Networked solutions for knowledge delivery** – physical replaced by networked facilities – (Internet or Intranet) to facilitate information sharing, communications, and content delivery
• Real time rather than cyclic learning – greater pace of change reduces required knowledge cycle time. Need for improved learning efficiency.

In parallel with the above practices, which were to some extent facilitated by it, the e-learning industry has also evolved through a number of different forms, including:
• Film, advanced TV technologies and video tapes – early multi-media
• Mainframe computer-based “teaching machines”
• Early microcomputers providing Computer Based Training (CBT)
• Touch screens and interactive videodisks based on “InfoWindows” hardware technology
• Power PCs, CDs and DVDs
• Global networking advancements and web-based solutions

Numerous universities have developed profit-orientated e-universities offering stand-alone courses through to degree programs. The e-learning industry also includes companies that support the establishment of learning infrastructures and networks for higher education institutions (as well as corporations), for example course management and delivery tools such as Blackboard, WebCT and Moodle.

The key characteristics of e-learning solutions (Rosenberg 2001) were seen to be as follows:
• Based on computer networking technologies – allowing instant updating, storage/retrieval, distribution and sharing of instruction or information.
• Delivered to the learner via a computer that is connected to standard Internet technologies. However, there is much debate over the interpretation of the term “computer” and to what it actually refers.
• Focusing on the broadest view of learning. i.e., considers learning solutions that go beyond the traditional training paradigms. E-learning moves beyond training to include the delivery of information and tools that improve performance and competitiveness within the job market.

There was considerable debate in the early 2000s (e.g., Dobbs 2000, Industry Report 1999, Kaeter 2000, and Kiser 2001) over the effectiveness of e-learning. Many people (e.g., Rosenberg 2001, Kushnir 2009) considered technology-based learning disappointing at best; they argued that its impact has been relatively minimal. Others (Kiser 2001, Dobbs 2000, and Kruse 2002a) argued that the benefits of e-learning outweighed its drawbacks.

The perceived importance of digital learning had motivated some governments to develop national guidelines and strategies for introducing e-learning solutions (e.g., New Zealand e-Learning Advisory Group 2002). Overall, elearning appeared to be taking root in organizations of all sizes - even though there were often different views concerning the ways in which e-learning can benefit individuals or organizations.
The International Data Corporation (IDC) and Online Learning Magazine (OLM) examined the general attitudes towards e-learning (Kiser 2001). According to this research, those people who had been responsible for the implementation of e-learning solutions seem to have been satisfied with outcomes. Research by the IDC showed convenience as being one of the most important reasons for employees to use e-learning.

Other studies of learners’ attitudes towards e-learning within tertiary educational institutions (e.g., Burns et al 2001, Asgarkhani 2003) indicated that there was an increasing demand for web-assisted courses. It appeared that the demand for quality web-assisted courses with multifaceted person-to-person interaction was set to rapidly increase.

III. BARRIERS TO USE OF TECHNOLOGY IN LEARNING

Today, access to information and communication technologies (ICTs) is critical for economic and social development. Developing effective digital learning and solutions depends upon the state of the ICT industry and the electronic readiness (e-readiness) of countries, organizations and societies. This was discussed in the early 2000s by numerous researchers (e.g., Information Society Index 2001, OECD Workshop 2000, META Group 2000 and Asgarkhani 2002b, Kurilovas et al 2011).

Overall, it was discussed that differences in diffusion and use of ICTs and electronic networks could lead to some division:

- Between countries, in terms of their capacities
- Within countries either socially, by income, education, age, family type, and location or by business, related to sector, region, and firm size

There was much debate over the implications of the digital divide on e-learning and knowledge management. In November 2001, the global communications company Marconi (Marconi 2001) called on government and private stakeholders in South Africa to accelerate the introduction of e-learning centres in remote, rural and disadvantaged areas - suggesting that economic and educational benefits could have an immediate and measurable impact on poverty in South Africa. Higgins (Higgins 2002) viewed e-learning as a tool that can play a significant role in bridging the digital divide in the APEC region. However, the digital divide can also be considered as a barrier to successful rollout of e-learning solutions.

Some of the causes of digital divide that can, even today also limit successful implementation of e-learning solutions can include:

- Lack of telecommunications and network infrastructure or financial resources to provide it
- Lack of ICT literacy and good PC and or internet access
- Cultural resistance
- High costs of business investment and access to global networks and the Internet
• Strategic business impediments – applicability; the need to reorganize; the need for skills, security and privacy considerations

IV. THE NEED FOR STRATEGIC THINKING

Even though technology is a major component of e-learning and KM, improving technology and infrastructure is not sufficient to produce outcomes of a high quality. A 2006 study of strategic planning and implementation of ICT survey designed to describe the "level of quality awareness in web-based teaching at the University of Helsinki", revealed that strategic planning had "proceeded well and all the faculties of the University have developed virtual university strategies in order to continue existing ICT initiatives, to further increase the use of ICT in teaching and to assure student information literacy." The study concluded "Web-based teaching must not be an aim in itself; rather, the pedagogical justifications and implications for using ICT in teaching and learning need to be revisited regularly.” In this paper, Löfström & Nevgi broadly argue as Salmon does; pedagogical issues need to evolve to meet the new demands of the changed learning environment. In evaluating their University's e-learning initiatives following a survey of the staff and students at the university, they reported that students there were less positive about the virtual learning environment being developed, with usability difficulties isolation and loneliness being specific issues mentioned. Interestingly, from the institution's perspective, "overall, the strategic planning of the University appears to have been done successfully, and the institutions follow the lead of the faculties in their strategic preparedness to utilise ICT in teaching." (Löfström & Nevgi, 2007, 319-320)

In contrast, rather less evaluation has tended to focus on any pedagogical improvements that might have occurred, or even if the new technologies had negatively impacted upon teachers' ability to improve student learning, "providing them with meaningful learning experiences including qualitative, conceptual change in thinking. (Löfström & Nevgi, 2007, 322)

Despite a readiness to invest in new technology, executives may be missing the point when it comes to appreciating its ability to render, unaided, significantly enhanced learning environments. There has been an apparent tendency to see the introduction of the new tech. toys as "job done." In measuring the value imparted by the technological developments, it thus appears there is readiness to accept purely visible changes as evidence of revolution, rather than to try to quantify any real changes that have occurred.

The development and delivery of quality e-learning and KM solutions needs to be viewed as a holistic process, whereby a strategic foundation is developed in order to optimize the application of technology within learning environments (Asgarkhani and Sarkar 2011, Asgarkhani 2003, Kruse 2002d, Gallagher et al 2002, Hsieh 2003, Rosenberg 2001, and Rossett 2002). Some of the key factors to consider include:

• establishing a culture of support for on-going learning, especially from management
• deploying a nurturing business model promoting sustainable organisational change

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Any strategic framework for introducing e-learning and KM solutions needs to be concerned with the overall direction of digital learning and KM whilst providing a foundation for tactical and operational issues. A review of some of the most widely used frameworks for strategy development (Robson 1997, Asgarkhani 2002a, Boar 2001, Heath 2003, and Rossett 2002) suggests that the process should consist of at least three specific components/phases: Analysis, Choice and Implementation.

The total strategic process for e-learning/KM is anything but linear. Integrating all the components of the strategic process is cyclic, often circling back to itself, the key elements of which are:

- **Strategic Analysis** – involves establishing an understanding of the current situation, including: aspects of the environment; current technology infrastructure; available resources; expectations; broad objectives; and power bases.
- **Strategic Choice** – involves the formulation of the strategy itself through understanding various options, evaluating options and making a decision on a suitable strategy.
- **Strategy Implementation** – involves tactical issues such as resource assessment and planning, identifying human resources and systems, contents, determining organizational structure and so forth.

The first two stages of the strategy cycle should ideally result in the formulation of a strategy plan. The strategy plan can often be formulated as a hierarchy that clearly outlines the various stages (components) of the strategy process for e-learning or KM – Figure 1.

The components of the strategy plan often include (but may not be limited to):

- **Mission** - What are we planning to do with e-learning and KM solutions?
- **Goal(s)** – What are we trying to achieve?
- **Strategies** - What alternative pathways are available to us – in order to achieve agreed upon goals?
- **Policies** - How should we be guiding our moves within a selected pathway in order to achieve goals?
- **Decisions** - What alternative options for moves should be considered?
- **Action** - This is the way we will implement our decision for introducing e-learning and/or KM solutions.

The strategy cycle can help in establishing a foundation for successful development and delivery of web-assisted learning - the critical components for successful e-learning being seen as:

- **Reviewing/reinventing the position of e-learning.** E.g., determining if Web-assisted solutions are to supplement face-to-face communication between students and educators/trainers, or whether Web-based learning through the Internet is to be the sole medium for delivery.
- **Compiling a sound business case for delivering on-line learning and KM solutions** – more specifically, linking e-learning goals with business goals.
• Fostering an environment balancing learner and business needs that secure management support
• Allowing for an effective change management approach
• Establishing an information vision and architecture to form the basis of the technology infrastructure needed to deliver and manage e-learning and supporting KM solutions. This would usually require advice from ICT technologists.
• Considering alternative approaches to e-learning (and KM) and the ways in which e-learning can be coordinated with other learning methods – including traditional classroom instruction.

Strategy development and implementation is an on-going process. A strategy plan is considered to be a living document. It needs to be:
• redefined as the environment and requirements change or new technology becomes available
• Continually examined against the mission and vision of your institution
To ignore the iterative nature of any strategy would eventually compromise the quality of the outcome.

V. A MODEL FOR ASSESSING STRATEGIC VALUE OF E-LEARNING

Before introducing the model for evaluation of e-learning initiatives (as the outcome of this literature review) let us look at some of the more obvious advantages and disadvantages of e-learning solutions (Asgarkhani 2003, Rosenberg 2001, Kruse 2002b, Kruse 2002c, Sitze 2001 and Burns et al 2001):

Benefits to solutions providers:
• Reduced overall cost and learning time
• Consistent delivery of learning material
• Expert knowledge can be communicated and captured effectively learning and KM systems
• Proof of completion and certification

Benefits to learner:
• On-demand availability with self-pacing and potentially greater interactivity
• Material updated in a timely fashion

Disadvantages to solution provider:
• The need for up-front investment in design and complex technology; obtaining cultural acceptance
• Educators’ workload - selecting appropriate content, modifying effective instructional design

Disadvantages to learner:
• Cost of access to technology and printed workbooks or reference material
• Reduced social and cultural interaction opportunities.

Based on the analysis conducted on previous studies and a review of a group of e-learning projects, a strategic value model for e-learning was developed; see Fig. 1. This is a two-dimensional model developed to assess the value of e-learning by considering three key strategic parameters (efficiency, effectiveness and growth). For each parameter, three functional aspects were taken into consideration (time, distance and creativity).

\[ \text{Figure 1 Strategic Value Model for E-Learning} \]

This model will be used in Phase II to evaluate e-learning practices and the strategic value of these practices within a focus group of institutions.

VI. CONCLUSIONS

When the hype of the e-learning concept emerged, both educators and technologists alike believed that it would significantly transform education, learning and knowledge management practices. It is to some extent true that ICT and web-based solutions have fundamentally altered the technological, social and economic landscape. Overall, it appeared that in the early 2000s there had been an increasing interest in the application of e-learning within organizations. However the potential benefits of e-learning only materialize when the solutions were introduced as part of a well-planned and properly supported education/training environment.

Technical innovation on its own did not seem enough to drive the e-learning development process. More specifically, access to the right technology for delivering learning and KM solutions was and still is essential but insufficient. Successful Internet or Web-enabled learning needs to be based on the development of a strategy that optimizes the application of technology through consideration of learning attitudes in potential markets (e.g., the tertiary educational and corporate training market), organizational culture and organizational business strategies.

Based on the analysis of the literature and case study reviews, a model for perceived benefits and strategic value of e-learning was developed. Based on the value model established in this paper, Phase II of the project will assess what has actually happened. More specifically, Phase II will sample organizations to assess the extent to which the perceived values that formed the foundation for planning eventuated.
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