The IT Light Shines for the Future Delivery of Higher Education

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Abstract

This paper outlines a research project undertaken in 2005, which aimed to explore a medium term future (5-10 years) around the use of potential learning tools and methodologies in higher education and the effects that these tools may have on student learning and educational institutions.

Technology and globalisation have changed the way education practitioners design and deliver learning programmes. Traditionally formal education has occupied the first 20 years or so of someone's life, following with entering the workforce where they developed further knowledge and skills, rather than going back to formal training (Tait & Mills 1999). However, increased access to technology means many people who would have traditionally completed their education in one block in a face-to-face learning mode, have now become lifelong learners with education being combined with the use of technology (Morrison & Oblinger 2002). Many technologies used in higher education today include the use and application of methods such as e-learning, online learning, web based learning or blended learning, each often in combination with learning management systems. Results of this study indicated that the most preferred type of tools that may be used over the next 5-10 years include learning management systems, online discussion forums, collaborative learning, on-line assessment and increased use of media rich content.

Keywords: Information Technology, IT, e-learning, m-learning, learning management systems

1 Introduction

To aid in educational institutions' strategy planning, the Ministry of Education in New Zealand released a Tertiary Education Strategy 2002/07 which laid out a series of proposed changes to the education sector to better support development goals and respond to globalisation and changing technology. Within this, an interim national tertiary e-learning framework has been developed to help ensure changes are advanced. This framework has three main areas: a vision; some agreed upon key guiding principles; followed by seven action areas.

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This framework lays the foundation and gives the guiding principles for institutions to follow to ensure they are meeting the needs of today's and our future learners in a collaborative manner. The framework's main vision and driving force is to develop New Zealand's e-learning capabilities. There is a belief that it will contribute to

education by creating "a networked, flexible education system offering accessible, relevant, high quality learning opportunities to all New Zealanders" (Ministry of Education, 2004). The Ministry believe it is essential that developments in education must be based on sound research and critique, not just be driven by technology. To achieve this goal they are encouraging research and professional development in this area.

This paper attempts to review emerging technologies and tools that are likely to be used over the next 5 to 10 years in higher education. This was conducted by carrying out a literature review and involved a panel of experts from within the Information Technology education discipline. Impacts and issues for institutions and learners will also be examined.

2 Background

Strategically, both learners and educational institutions have shifted their focus in learning modes from mainly traditional face-to-face learning to include blended modes of delivery including online and distance programmes. Learning opportunities have become more available with the use of the internet and on-line learning. Acceptance of this type of learning has been aided due to the growing use and availability of learning management systems such as Blackboard and WebCT. These learning management systems enable students to engage and collaborate with each other as well as with their lecturers in an asynchronous environment. Learning management systems also provide access to additional learning materials at any time and aid in developing students' technology and information literacy as well as increasing motivation to learn (Coates 2005).

Students expect to be able to continue studying even if they cannot attend a classroom setting and the use of e-learning accompanied by learning management systems allows for this. However, this desire to study via distance learning is not necessarily new. Extramural/distance study opportunities have been available to learners for many years, however more and more, this type of study option is being combined with web enhanced and e-learning technologies rather than just paper based readings and assessments. Mobile technologies and

mobile learning (m-learning) are also gaining popularity with wireless devices that can be used by students to access web servers for real time information from anywhere on a campus. Delivery of digital material can include course based materials or lecturer facilitated training via laptops. Kossen (n.d.) makes the following statement which encompasses the key benefits and power of m-learning: "A key benefit of m-learning is its potential for increasing productivity by making learning available anywhere and anytime. Because mobile devices have the power to make learning even more widely available and accessible, mobile devices are a natural extension of e-learning.

Oblinger and Oblinger (2005) refer to a new group of learners as the Net Generation. They assert that as technology changes, educational institutions must also adapt to these changes and to think beyond the here and now. They agree with other researchers that learning is moving beyond face-to-face modes with the use of the desktop interface, to more immersive learning environments using technologies as support tools that will help in developing and expanding learning experiences. They believe that the notion of classrooms as a physical space only, needs to evolve to a concept of learning spaces that are not limited to floors and walls, and which methodologies such as mobile learning supports. This learning space concept poses other issues – education has become a borderless marketplace and institutions must now compete in this international marketplace (Ministry of Education 2004). However, it is important to note that for those students still engaging in face-to-face learning, expectations do include being taught knowledge and expertise from a teacher, but additionally these students expect those teachers to use technologies to enhance and support their learning.

Information technology learning tools allow for just-in-time learning, simulations and learning objects, virtual learning, discussion groups, and 24 hour access to learning and online facilities (Jukes & McCain 1999). Due to these advances in technology and globalisation, educators today need to ensure that their teaching practices and curricula are keeping up with these technological changes and expectations of today's student.

3 Study Design/Method

This study set out to explore a medium term future in regard to the potential educational technology tools and methodologies that may be used within higher education in New Zealand. To achieve this goal, a literature review was undertaken and two futures methodologies were applied to gather data on potential tools from participants; the Delphi technique and a cross impact matrix. Three rounds of questionnaire were sent to participants.

Participants' experience in the education field ranged from five years to 30 years. Five out of six responded to the first questionnaire, six of six for the second and four of six for the third round of the questionnaire.

A main driving force behind change in education is a desire to improve productivity and efficiency in relation to teaching and learning and increase access to learning. The potential for this change is driven by both technology and the learners themselves. To explore this change potential and gain an insight into what tools and methods might be used, two futures methodologies were applied - the Delphi technique and cross impact analysis using a panel of six experts. The Delphi technique is designed to gain information and thoughts from a group of participants, six in this case, who have expert knowledge in a particular area. This technique is a multi-step process, with the group not physically meeting, and entails information being gathered via questionnaires. There is no real guidance on Delphi size standards and the upper limit is usually around 30. Literature states that "the response characteristics of a small expert panel in a well defined knowledge area are stable" (Akins, Tolson, & Cole 2005). Therefore, a sample of six experts was included in the study from a representative group of experts within the Information Technology education field. Each participant had experience as either distance learning or e-learning facilitators or as lecturers or programme leaders. Two rounds of of the Delphi questionnaires, followed by a cross impact matrix, were distributed to the panel achieving data saturation. Data from both methodologies was analysed using descriptive statistics.

An information sheet and questionnaire was sent out asking participants to brainstorm as many ideas as possible in regard to the potential tools and methodologies that may be used in higher education over the next 5-10 years. Once this data had been collated, a second questionnaire was sent with a summary of all items together. This gave participants the opportunity to rate their level of agreement from extremely likely to extremely unlikely on a likert scale from 1-5. During this second round, panel members were also asked to rank the top five tools/methods from the collated items that they thought were most likely to be used. Data from the two questionnaires was analysed using descriptive statistics.

Finally, a list of questions was sent to panel members in a matrix format to establish causality between issues or variables based on information found in the literature review. In this instance the cross impact of four variables related to e-learning and the effect this learning paradigm may have on learners and institutions was provided. The results from these questions were then transposed onto a cross impact matrix. This matrix considers and assesses the potential impact one issue may have on another and the correlation and interactions between them. This analysis method is effective as it ensures issues are not looked at in isolation and all matters affecting it are taken into consideration.

For this study, a cross impact matrix was set up with an aim to establish causality between four variables related to e-learning and the effect this learning paradigm may have on learners and educational institutions. Data from the cross impact analysis was analysed using descriptive statistics.

4 Results

4.1 Round One Questionnaire Findings

Round one asked participants to brainstorm as many learning tools and methodologies that may be used in the next five to ten years. The following were identified as tools and methods to be used:

Learning Management Systems (Moodle, Blackboard, WebCT)
Chatrooms
Voice Over Internet Protocol (VOIP)
Blogs
Wikis
Online Discussion forums
Mobile Technologies eg; PDA's
Voice recognition, voice synthesis
Internet phones with web cams for low bandwidth conversations
Collaborative learning
Intelligent management systems
Simulation tools
Intelligent tutorial systems
Wireless LANS for on and off campus connection
Online self-assessment tools
Increased use of media rich content in the classroom
Audio and video conferencing over the internet
Chunk/Modular Delivery of Content
Synchronous Video Applications over IP

4.2 Round Two Questionnaire Findings

To gather further data and refine ideas from round one, a second questionnaire was created with a summary of all items together which asked participants to rate their level of agreement from extremely likely to extremely unlikely on a likert scale of 1-5, on how likely it would be that the tools listed by each participant would be used.

The tools/methodologies rated as extremely likely to be used by at least one or more participants included fifteen of the eighteen tools listed, these were:

Learning Management Systems
Voice Over Internet Protocol
Blogs
Online Discussion Forums
Mobile Technologies
Internet Phones with web cams for low bandwidth conversations
Collaborative Learning
Intelligent Management Systems
Simulation tools
Intelligent tutorial systems
Wireless LANS for on and off campus connection
Online self-assessment tools
Increased use of media rich content in the classroom
Audio and video conferencing over the internet
Chunk/Modular Delivery of Content

These results differed, however, when the questionnaire also asked participants to rank the top five tools/modes of delivery that they would have a preference in using. The tools most favoured were:

Learning management systems
Online Discussion forums
Collaborative learning
Online self-assessment tools
Increased use of media rich content

4.3 Round Three Questionnaire Findings

To establish causality between issues or variables based on information found in the literature review, each member was asked to say whether an impact to a particular issue or variable is likely to be High, Medium or Low, coupled with whether it could have a positive or negative effect. A series of questions were asked and members then rated their responses. The following questions were asked;

If e-learning is used, what will the effect be for institutions for the cost of technology?

With the use of e-learning, what will the impact on student motivation and learning behaviours be?

Will the use of e-learning increase information literacy?

How will the cost of technology affect the use of e-learning technologies?

Each question was asked in reverse to check for variations in responses. The responses to questions were then transposed onto both vertical and horizontal axis of the matrix, variables that show as either low or medium impacts only were put aside for reviewing at a later stage.

The results indicate that there are six variables on the matrix that have either a high positive or high negative impact. These resulted in four variables/impacts to be considered:

That e-learning will have a high positive impact on information literacy

That the cost of technology will have a high negative impact on the use of e-learning

That learning motivation and behaviours will have a high positive impact on information literacy

That information literacy will have a high negative impact on the cost of technology

5. Analysis and Discussion

The tools listed as likely to be used over the next 5-10 years range from already well known technologies such as learning management systems and online discussion

forums to new methods such as wireless/mobile and simulation technologies.

The most favoured tools listed by participants included learning management systems, online discussion forums, collaborative learning, online self-assessment tools and increased use of media rich content. All of these tools have a similar theme in their functionality. Four of the five are mainly student driven interactive tools, which require participation with either their lecturer or other learners. These preferred tools seem to be common terms and tools that are already in use and are tools and methods already very familiar to educators, hence a probable reason for their popularity. Bishop (n.d.) describes learning for distance students as one where they typically carry out learning alone rather than in a classroom and notes that tools such as ones listed above encourage interaction which promotes learning in either scheduled chat sessions or interactive lessons. Each of these tools also provide flexible learning opportunities where learning can take place at the students convenience and learning material is available at any time.

To establish causality between issues or variables based on information found in the literature review, participants were asked to respond to questions using a cross impact matrix. The factors and issues that arose from this analysis were that: with the use of e-learning tools information literacy will increase; institutions will have to be committed financially to e-learning technologies and if funding is not available the implementation of e-learning could be affected; students will be able to learn in new ways that suits their learning styles; as information literacy grows, learners will expect more tools and methods to be used to support their learning which could increase costs to institutions.

Important issues identified in both the literature review and the cross impact analysis show that education institutions will have to show commitment in making progressive steps to commit to the e-learning paradigm. Learners will be motivated by factors on how and when they can learn, based on need and interest, rather than location. The teacher is no longer seen as the main resource, with learning now taking place via global networks rather than just in the classroom (Jukes & McCain 1999). To commit to this new learning paradigm, investment in e-learning technologies and the implementation of wireless network infrastructures to support such tools as wireless and mobile technologies will be essential.

Literature and participant feedback suggest that information literacy and learning motivation and behaviours will increase with the use of e-learning tools as learners are able to learn where, when and how they wish

6. Conclusion

Technology is changing the way education is being delivered particularly within the higher education arena. Increased access to this technology means that educators need to incorporate new methods of delivery in their teaching. People are becoming lifelong learners engaging in learning opportunities when and where they choose, based on need and availability, rather than being limited to physical location.

It is important to find new ways to integrate emerging technology into current learning practices and training programmes for current educators. A commitment from institutions to research and training for educators into these new methodologies is essential. Educators themselves will also need to commit to change and understand that they need to move with emerging technologies to ensure they are attracting, engaging and retaining learners of the future.

5 References

Akins, R.B, Tolson, H., & Cole, B.R. (2005). Stability of response characteristics of a Delphi panel: application of bootstrap data expansion http://www.biomedcentral.com/1471-2288/5/37. Accessed 8 May 2006.

Bishop, S. (n.d.). Basic Principles of E-Learning Reviewed. http://all-free-info.com/e-learning/. Accessed 8 May 2006.

Coates, H. (2005). Leveraging LMSs to enhance campus-based student engagement. Educause Quarterly, vol 28, 1. www.educause.au. Accessed 12 April 2005.

Jukes, I., & McCain, T. (1999). Education in the future: A shifting paradigm. Technology and Learning, December. 72-73. www.techlearning.com. Accessed 16 September 2003.

Kossen, J.S. (n.d.). When e-learning becomes m-learning. http://www.palmpowerenterprise.com. Accessed 15 April 2005.

Ministry of Education (2004). Taking the next step. http://cms.steo.govt.nz. Accessed 8 April 2005.

Morrison L., & Oblinger, D.G. (2002). Information technology and the future of education: An interview with Diana Oblinger. Technology Source, March/April. www.ts.mivu.org. Accessed 20 March 2005.

Oblinger, D.G., & Oblinger, J.L. (2005). Educating the net generation. www.educause.edu. Accessed 8 April 2005.

Tait, A., & Mills, R. (1999): *The convergence of distance and conventional education: Patterns of flexibility for the individual learners.* USA: Routledge.