

E-Learning: Much More than a Matter of Technology

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Abstract—Education benefits of e-learning have been confirmed in numerous research studies. This paper focuses on Web 2.0 technologies, various e-learning systems and discussion of student attitudes toward utilizing these Web 2.0 technologies. The paper commences by reviewing the basic concepts of e-learning, Web 2.0 technologies, various e-learning systems and their roles, and provides a rich picture of the development in the area. Aiming to better understand and contribute to the utilizing Web 2.0 technologies in an online teaching and learning environment, we have used our university's online courses as an example to identify trends, changing expectations, evolving needs, the advantages, disadvantages, issues and opportunities of using technologies in e-learning. The paper concludes with findings that although technology comprises an important element of e-learning, successful e-learning commands more than just technologies. Other elements, which include appropriately designed courses, relevant, current content, reliable and strategic teaching plans, and service/support from all levels staff are also considered essential. Our paper offers an alternative dimension to the analysis and interpretation of the role of technologies in an e-learning environment.

Index Terms—E-learning, e-learning technology, e-learning systems, Web2.0, Facebook, blackboard, social media, illuminate.

I. INTRODUCTION

E-learning is now an established presence within the global higher education industry. As in other sectors of the global economy, the impact of digital technologies has been all-embracing, ranging from the modest to the truly disruptive. Its effects include, but are by no means limited to the following [1]-[4].

- Separation of educational content from carriers and transmission channels;
- Achievement of both richness and reach in content;
- Decimation of time and distance and the ability for both synchronous and asynchronous engagement;
- Emergence of new educational products and services;
- Emergence of sophisticated learning management systems;
- Broadening of the pool of stakeholders;
- Adjustments to the roles of respective stakeholders and patterns of interaction;
- Emergence of new business opportunities within the higher education industry.

E-learning has been variously defined, depending on the needs of particular organisations and circumstances. For our

purposes, a simple definition will suffice: “E-learning or *technology enhanced learning* describes the use of technology to support and enhance learning practice” [5].

Today, this technology-enhanced learning involves the use of authoring and development tools for multi-media content creation and editing of enterprise content management systems and a range of delivery and collaboration tools [6].

Clearly, e-learning is a dynamic concept, existing in a continuing state of flux. As with the technologies that empower it, e-learning has evolved to the point, where the largely one-sided exchange of knowledge between staff and students has been transformed by a dimension that recognises that knowledge is socially constructed. Increasingly this involves the use of social software such as blogs, wikis, podcasts and virtual worlds [7]. It is also evolving as a different kind of educational experience, one that takes fuller account of such issues as social context, culture, ethics and learner engagement to respond to the needs of post-industrial society [6]. This continual development and the constant interplay between human, organisational and technological factors have complicated attempts to analyse the contributions of the various elements in e-learning, and not least in our understanding of the relationship between technology and learning.

A 2010 study reports that, as of 2009 in the US, online enrolments have continued to grow at rates far in excess of the total higher education student population, with the most recent data demonstrating no signs of slowing [8]. In Australia, King [9], commenting on the implications of the Bradley Review [10], makes the case for a prestigious, national institution for regional students with an emphasis on forms of off-campus delivery. In doing so, he notes the success and profitability of Open Universities Australia, which is characterised as ‘something of an anomaly in Australian Distance education’, as it is a brokering company offering enrolment in partner university courses, allowing for greater flexibility for students whilst relying on the partner University to maintain a large part of the technical infrastructure. Since most conventional face-to-face university courses tend to have learning material, assessment task specifications and submission mechanisms, student-student and student-teacher interaction, many such courses can be considered to be a simple case of blended learning. Given the proliferation in online and blended courses, it is incumbent on practitioners to explore methods to make the online and blended learning experience both engaging and effective.

II. SIGNIFICANCE OF TECHNOLOGY

The one area that e-learning has made significant advances in recent times has been in the area of using the concepts supporting social networks and social media to promote and

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enhance the learning experience. The term social media (Web2.0) was first notably coined by Tim O'Reilly the founder and CEO of O'Reilly Media, Inc., known throughout the IT industry as representing one of the foremost computer and IT book publishers in the world.

Despite the fact that early definitions of Web2.0 were mostly concerned with the supporting technologies and the design parameters, the realisation of the value of Web2.0 really started to make inroads into the global web environment when ecommerce sites such as Amazon.com started to allow users to provide their own "amateur" comments of products purchased [11]. This change in mindsets moved the concepts of online value from a one-way flow of information (from content provider to passive non-participative audience) to a two-way flow of information (content provider to dynamic participative audience). This in turned blurred the boundaries between the content provider and audience, altering the perceived internet value propositions to a more inclusive model. Hargadon [12] also described the shift in internet perceptions from a Three R's point of view: Read, Review and Researching into a Three C's paradigm of: Contribution, Collaboration and Creating. Some of the early drivers of the paradigm shift within the Web2.0 environment included the popularisation and shift in the recognition of self-publishing by amateurs as well as professionals through methods such as Blogs, wikis and the more recent phenomenon, Twittering. Educational institutions were amongst the first to take advantage of this participative format, while many were, and still are, entrenched in delivering content via proprietary content delivery systems. Many courses practice and embrace the concepts of Web2.0 within their content delivery and assessments.

Using Web2.0 within education is not considered a passing trend, as over its short life span it has manifested itself into many forms, from self-publishing (blogs) to collaborative publishing (wikis) to short burst instant publishing (twittering). Personal immersion within a Web2.0 environment can also vary from anonymous comments and feedback to fully immersive virtual worlds such as Second Life. The social engagement aspects of Web2.0 within an educational context links it very closely to a social, constructivist pedagogy for learning with a strong influence towards providing active learning opportunities.

Back in 2001 when Web2.0 was still in its infancy, Arsham [13] discussed the influence and rapid development of online interactive technologies presenting opportunities to break away from the traditional instructional models to a more active form of learning where students construct their own knowledge and control their own learning. Since then many early adopters of Web2.0 tools have discussed and published their experiences and value gained by using these tools in education. This growing acceptance by educators coupled with the exponential growth of the Web2.0 environment both within the traditional modes of engagement (pc and laptops) to the mobile modes of engagement (smart phones and touch pads) has helped solidify Web2.0's position in education as more than just a passing fad. Hargadon [12] succinctly summarized the benefits of web2.0 in education when he described the

changes as being fundamentally different to those experienced in a traditional (non- web2.0) classroom. He further stated that:

When a student's work is seen, and commented on, and collaboratively enhanced by a larger participative audience, those students are drawn into extended educational "conversations." In this way the relationship of the student to ideas and content are no longer constrained to the narrow avenue of interaction with their teachers, but they are suddenly interacting with their peers and others in the discovery, exploration, and clarification of knowledge. Sometimes that may appropriately just be with an audience of their immediate classmates. Sometimes it can appropriately be with students and others all over the world. But either way, it involves the students in a very proactive learning environment [12].

Other academic scholars have also validated these claims. Schwartz [14] found that the "mentoring theory" as described by Kram and Ragins [15] provides that episodes of interaction can enhance the relationship between the mentor and the student. As a higher education instructor, Schwartz judges her own experiences with students on Facebook as meeting most, if not all, these criteria and as having comparable benefits to an after-class meeting. Thus, SNS exchanges theoretically can be both a valid form of highly-interactive instructional communication and an opportunity for pedagogical mentoring. Roblyera, McDanielb, Webbc, Hermand & Wittye [16] concluded that harnessing non-traditional modes of interaction within education such as Facebook, can and do have positive outcomes.

A second aspect relates to social factors. Faculty who see teaching as establishing a relationship with students may view Facebook-like technologies as an efficient, even business-like way to accomplish that connection. Though recent experiences by some educators and students has demonstrated the problems that this kind of activity can entail [16], many educational institutions seem to be sold on the idea of communicating with students using this format.

In one sense it would be hard to exaggerate the actual, let alone potential contribution of technology to learning, not least given its influence in other spheres. The decimation of time and distance and the ability to combine richness and reach in content delivery are in themselves strong enough arguments for welcoming digitisation. In terms of specific technologies, Costa and Silva [6] identified four general categories of e-learning systems: Learning Management Systems (LMS), Managed Learning Environments (MLE), Learning Content Management Systems (LCMS) and Virtual Learning Environments (VLE). They further detected a trend, itself influenced by changing perceptions of knowledge and learning, towards the development of learning management systems that embodied personal learning environments (PLE) supported by the use of social software.

One of the more prominent systems which encompass many of the attributes as identified by Costa and Silva [6] is the Blackboard system. While the developers of the Blackboard themselves refer to their system as a Learning Management Systems (LMS), the ability for the educator to modify and adjust the learning environment of the

Blackboard system means that it can fulfill some of the attributes associated with the other types of e-learning systems (MLE, LCMS and VLE). Although the pre-2009 version of the Blackboard system offered minimal interactivity and social collaboration, recent acquisitions and developments within the Blackboard system has transformed Blackboard from a static webpage style environment to a much more engaging and student centred system. These improvements include:

- The acquisition of the Elluminate collaborative tutorial system. This has allowed educators to present tutorials or lectures in a simple easy to use setting. Elluminate (which was renamed Collaborate) allows the educator to use real time video and audio as well as presentations from many different sources to engage the students in a near face to face mode, Unlike other methods used in the recent past to emulate or replace lectures and tutorials which included text based chat-rooms, video/audio streaming and podcasting. The benefit of Collaborate is that it allows for many of the traditional attributes associated with a real life lecture and tutorial, including student questions, impromptu breakout groups, student polling and quizzing, virtual whiteboard for free hand drawing and writing, even the release of control of the lecture/tutorial to a participant (i.e. student) for them to continue the presentation with their own resources, is also possible in Collaborate.
- Better integrated blogging tool and wiki tools. In previous versions of Blackboard students had to either source their own providers to host their blogs and wiki's or use the basic facilities provided by the system, which was lagging behind external commercial providers.
- Mobile learning, the current systems ability to translate the learning content into a mobile device friendly format enables the educator to reach students on a more personal level. As well as the students being able to remain in consistent contact, the educator can assist in retaining more students.

However, opinion on the fundamental role and relevance of technology in the e-learning process remains divided. In a positive vein however, there is the assertion that technology has caused universities to rethink their entire mission and how they go about it [17]. Nevertheless, there remain justifiable concerns that the very utility of learning technologies can cause course designers to lose sight of core learning objectives. As Salmon [18] observes, overselling and exaggerated claims from commercial providers have led academics to focus on the explicit attributes of a learning technology rather than on the inherent pedagogical assumptions, their intrinsic potential and their value for the development and achievement of new ideas, missions, markets and improvements in quality.

III. METHODS

The research methodology emerged from literature reviews and subsequent reflection and experimentation by the researchers. In analysing student experiences, a number of simple quantitative exercises were conducted to obtain frequency distributions for student experiences using different technologies, and their responses to an

end-of-semester survey. The major focus was on the qualitative dimension which focusses on various groups of students, their attitudes, ideas, experiences and opinions towards technologies directed at enhancing online learning. Feedback from these exercises contributed to improved unit design and delivery in the search for enhanced student motivation and engagement.

The qualitative analysis was also influenced by the work of Larrivee [19] and Black and Plowright [20] on critical reflection as a tool for professional development, defined as:

... the process of engaging with learning and/or professional practice that provides an opportunity to critically analyse and evaluate that learning or practice. The purpose is to develop professional knowledge, understanding and practice that incorporates a deeper form of learning which is transformational in nature and is empowering, enlightening and ultimately emancipatory [20].

The kind of reflection employed can be said to take three forms of the possible eight that are identified by Black and Plowright [20]. The target of the reflection is authors' teaching practices. The two purposes of reflection are 1) to develop knowledge and understanding, and 2) to develop and improve practice. The two sources of reflection are the teaching practice and evaluable activities involved in the unit. So, the types of reflection employed here can be enumerated as follows:

- 1) Reflection on practice through a learning experience in order to develop knowledge and understanding;
- 2) Reflection on practice through a practical experience in order to develop and improve practice.

Researchers selected their own university – an Australian university as a case study university. There are two sources of students:

- From online information technology and business units (both undergraduate and postgraduate).
- E-commerce units which the majority of students enrolled in the units are major from China in a 2+2 CAP (Collaborative Articulation Program) program. The researchers developed the units so the units delivery in a blundered mode which include both online and face-to-face methods.

IV. KEY FINDINGS AND DATA ANALYSIS

All findings are based on a combination of analyses from several different sources, which include:

- The university quality assurance student feedback survey (a non- compulsory, end of semester student survey, available to all students - whether they are online or on-campus, undergrad, postgrad, fulltime or part-time)
- Reviewing individual student communications (no. of emails sent to either the teaching staff or student support services, IT support etc...)
- Analysis of discussion board activity (reviewing the no. of positive or negative comments made by students).
- Reviewing various systems logs (Both Elluminate and Blackboard retain accurate statistics in relation to participation and access to services (for example, how many times a podcast may have been viewed or how many students attended a chatroom session).

In comparison with similar studies, for example Venkatesh, Morris, Davis & Davis [21] and Yoo & Huang [22] who collected data via survey instruments. We placed more emphasis on collection of qualitative data through all possible resources. This encompassed general email feedback, end study period surveys, discussion board postings, personal observations and reflections at the conclusion of each study period. For the end study period survey, we focused on general interpretive and exploratory questions. The participation rates varied based on different study periods and units. For example, the 2009 study period 1 offered 5 undergraduate units. Total enrollment numbered 429 (Unit 1=241, Unit 2=61, Unit 3=63, Unit 4=27 & Unit 5=37). The survey was not compulsory and links were provided 2 weeks prior to completion of the study period. In Unit 1, 73 (30%) students participated, with the other units, Unit 2 19 (31%), Unit 3 25 (39.6%), Unit 4 5 (18.5%) & Unit 5 9 (24%). For each study period, the units offered and numbers of students enrolled differed, so we have elected not to list all the details in this paper due to space constraints. Table I provides a summary (by year) based on data calculated from all sources (e.g., student feedback/postings on the blackboard, informal emails, and the end study period surveys), the figures stated in the Table I below represents our closest possible calculation.

The technology identified in the Table I below relate to technology that was adopted (not piloted) as a part of the teaching and learning strategy for the course. Other attributes of the data includes:

- Unless specified with the “(R)” identifier, the technology used was either not compulsory for student participation or not linked to any assessments.
- *(R) = Student Requirement - this identifier illustrates the technology that was compulsory for students to use on a regular basis.
- The term approximate % of participation identifies the range of students that actually participated at the specified time of the event, as well as those that reviewed the recordings or transcripts (post event).
- The number of students identified (undergraduate or postgraduate) are for the whole year, not per semester.
- The term “social media” relates to the active adoption of “Facebook” and or “Twitter” within the course.
- U=Undergrad, P=Postgrad
- (-) % indicates percentage of students against the technologies and (+) % indicates percentage of students who support the technologies.

As shown in Table I, the result from our review shows a direct correlation between the changing demand and expectations of online students. The table also reveals the decline of the older passive methods of online engagement in favour of the more active engagement methods.

The results from 2009 indicated a reluctance from the students to engage in the use of enhanced, active engagement tools such as Elluminate and Second Life (2nd Life). This reluctance, coupled with technical issues associated with both the university and the students culminated in a low participation rate (Elluminate maximum participation was 17%). While the participation in the subjects which incorporated Second Life into their teaching method was mandatory, the level of negativity towards this technology was also very high (2nd Life 70% and Elluminate 40%).

TABLE I: 2009 TO 2012 TECHNOLOGY ADOPTED, PARTICIPATION RATES AND NEGATIVE/POSITIVE FEEDBACK RATES

Year	No. units and No. of students enrolled.	No. Units which adopt technology	Technology used	Approx. % of participation	+/- % feedback	
2009	U (2072)	16	5	Second life (U)	(R)	60-70% (-) 10-20% (+)
	P (307)	11	1	Elluminate (U/P)	11-17%	35-40% (-) 30-35% (+)
				Blackboard Chat room (U/P)	45-55%	10-15% (-) 60-70% (+)
				Podcast A/V (U)	(R)	15% (-) 80% (+)
Audio feedback (U)	(R)	5% (-) 95% (+)				
2010	U (3368)	16	8	Second life (U)	(R)	40-45% (-) 35-40% (+)
	P (326)	11	2	Elluminate (U/P)	21-27%	27-34% (-) 50-55% (+)
				Blackboard Chat room (U/P)	33-45%	20-25% (-) 60-65% (+)
				Podcast A/V (U)	(R)	15% (-) 80% (+)
Audio feedback (U/P)	(R)	5% (-) 95% (+)				
2011	U (4173)	16	11	Second life (U)	(R)	36-39% (-) 35-41% (+)
	P (296)	11	5	Elluminate (U/P)	33-39%	18-22% (-) 50-55% (+)
				Blackboard Chat room (U/P)	33-40%	24-30% (-) 56-60% (+)
				Podcast A/V (U)	80%	10% (-) 90% (+)
				Audio feedback (U/P)	(R)	7% (-) 93% (+)
Social Media (U)	37-42%	18% (-) 63% (+)				
2012	U (3854)	16	14	Elluminate (U/P)	49-63%	13% (-) 73% (+)
	P (373)	11	8	Blackboard Chat room (U/P)	26-32%	10% (-) 90% (+)
				Podcast A/V (U)	73%	9% (-) 87% (+)
				Audio feedback (U/P)	(R)	14% (-) 69% (+)
Social Media (U)	42-56%	13% (-) 71% (+)				

Based on the data collected, the main focus of the negativity centred on technical issues experienced by the students and the lack of support provided by the university to appropriately support these technologies. Another theme of negativity was the perceived relevance of using this technology in relation to the content and learning outcomes. While there was some positive feedback, the main themes for

The positive feedback from the 2nd Life and Elluminate users were predominantly from students who possessed a high level of technical skills and enjoyed the challenge of using these new tools (2nd Life 20% and Elluminate 35%). Additionally, for the Elluminate users, they responded favourably to the availability of the recordings for future self-review.

Unlike the newer introduced tools of 2nd Life and Elluminate the text chat facility which had been used as our standard communication tool since 2004, did not have the same level of negativity or lack of participation (Text-chat participation 51%, negativity 15%). While Podcast's (as a format) was recently added in 2008 to the suit of delivery methods, the concept of uploading pre-recorded video lectures and audio discussions to the subject website has also been utilised by our academic staff since 2005, thus, similar to the Text-chat, it did not suffer from the lack of usage or any perceived negativity from the students (Podcast usage rate 73%, negativity 9%).

Another unique offering that was trialed in 2009 by a number teaching staff was the use of audio recordings to provide assessment feedback to the students. While not all the subjects within the postgraduate areas did not uptake this method, the level of feedback received from the students was generally very positive (level of positive feedback 69%, negativity 14%).

Both results for 2010 and 2011 showed considerable improvements on the level of participation and a lowering of the negativity against the active engagement tools. The negativity levels of 2nd Life and Elluminate fell by 31% (2nd Life) and 28% (Elluminate). While the participation level for 2nd Life remained constant, the participation level for Elluminate rose to 39%. Due to the increased promotion and continual rise in the participation of the active engagement tools, the passive engagement tools of Text-chat and Podcasts saw participation falls of 15% (Text chat) and 20% (Podcast). During 2011, the mandatory requirement of students having to view or listen to weekly podcasts was phased out in most subjects. This change in student requirements revealed a drop in usage of 20%.

The use of social media (Facebook and Twitter) was also beginning to take off in 2011. High expectations of student engagement saw a reasonable participation rate of 42% (social media) with a modest negativity rate of 18%. Based on our surveys, the main themes behind the negativity expressed by the students were due to the resentment of having to sign up to a service that was not a part of the university environment.

The results for 2012 revealed considerable increases in patronage and contentment (positive student feedback) across all the active engagement tools, except for 2nd Life, which was phased out of several subjects. The increased use

of social media to exchange information and build relationships also saw an increase in participation and positive feedback (social media rates rose to 56% participation, 71% positive feedback). As Blackboard became the new owner of Elluminate, the Blackboard integrated version now known as Collaborate was both a much easier tool for the teaching staff to use and to set up. It also proved easier for students to find their virtual tutorials and the past recordings. By 2012, a lot of the technical issues which caused negativity amongst the students were no longer issues, which impacted positively on achieving their learning outcomes. Podcast rates, while still reasonably popular, still fell in both usage and positive feedback (73% usage, 87% positive feedback).

In summary, the prevailing conditions on which the active engagement tools were introduced in 2009 were in a vastly more challenging environment, compared to the same environment in 2012. Many of the conditions which caused negative feedback, including technical issues, student assistance support, lack of alignment with subject content and staff training were overcome by 2012. Table I&II also clearly indicates the changing technological maturity of the students over the 4 year (2009 to 2012) period.

One of the main reasons for the rise in the undergraduate and postgraduate units taking on additional learning technologies (over the 4 year period) was due to consistent demand by students to the keep abreast of mainstream expectations. This has been supported by the data collected from students' surveys and feedback during the period time. The following Table II presents the students' perceptions of using various technologies. For each tool, the table provides a few illustrative students' comments.

As evidenced, students have their own ideas regarding the technologies adopted. Some technologies or tools are more popular than others. Also, for the same technologies or tools, the support levels varied between undergraduate and postgraduate students. Grosbeck [23] argues that students would respond more favourably to disruptive technological advancements within the curriculum if it's introduced and supported properly.

Based on our survey, in 2012, postgraduate units' students were more positive and productive from using Blogs and Wikis than undergraduate units' students, however opposite results revealed that undergraduate units' students enjoyed using the Elluminate collaboration tool more.

TABLE II: THE ARRANGEMENT OF CHANNELS

Audio feedback	<p>"I loved the audio feedback. In the five years I have been at university I have never received individual feedback from a lecturer on an assignment in any sort of details. The audio feedback is constructive and 10 mins include a lot of information. It helped me understand what I can do better for the next assignment." An undergraduate unit student 2009.</p>
	<p>"Like audio feedback as I can lesson when I catch trains."A postgraduate unit student 2011.</p>
	<p>"It is informative but I still like written feedback as it is easy for me to go straight to the comments."A postgraduate unit student 2012</p>

Online discussion – the blackboard building chatroom and Eluminate collaboration tool	<p>“I found using Eluminate a much more personal chat tool than all other chat clients I have used during my distance education. Although questions from students are typed in, hearing my lecturer Nelson Vargas verbally reply in real time was an excellent way to have questions answered. I would highly recommend it as a tool to be used in future teaching sessions.” A master student’s Email in 2009.</p> <p>“The university need to get on top of providing a solid VOIP community. It is ridiculous that in 2009 we are using IRC (text chat) to communicate in an IT degree. I play on-line with up to 16 people in teamspeak, surely they can catch up to current technology. IRC is completely unacceptable for the \$1600+ fees. This must be addressed” 2009 survey comment from a master unit student.</p> <p>“I thought the Eluminate was very useful although the number of screens and the need for microphones might be difficult for some students to grasp. On the whole though a very effective way to communicate to OUA students - made you feel that you were in fact part of something” A Student from an undergraduate unit in 2010.</p> <p>“Eluminate sessions are very useful. Even though I cannot attend as I’m still working when they are held, I can review the content at a later time. In the event that no students attend I would still find a 1 hour presentation which I can view at a time suitable to me very useful.” 2012, a student from one of the undergraduate unit.</p>
Video and Podcasting	<p>“The podcasting is short and clear, it reminds me what I should do during the week.” 2012, from an undergraduate unit student.</p> <p>“I can see lecturers/tutors’ face and feel more engaged with the unit.” 2009, from an undergraduate unit student.</p>
Social media	<p>“The opportunity to communicate with fellow students, discuss strategies and share ideas.” 2012 from an undergraduate student.</p> <p>“Using Second Life is fun, I like the way the tutor organise group meetings by using the virtual technology.” 2011 from an undergraduate student.</p> <p>“Build in Wiki tool on the Blackboard is not user friendly. I cannot see the point of using it. Discussion forum is easy to use and serve the purposes.’ 2010 from an undergraduate student.</p> <p>“Using Blogs is a good idea. Particularly it links to assessment. We post our view on a paper and other students can read and comments on my view. I also can read what others do and think and borrow some of the good ideas. Tutors and convenors also comments on our work. It provides me a lot new ideas so I can adopt to the second part of assignment. Assignment quality was so improved. A good learning experience.” 2012, from a postgraduate student.</p>
Blackboard	<p>“It has been improved a lot. From contents, layers, design and clarity point of views, it is much better than previous year. Also many tools (Blogs, Wikis, Elluminate...) are available, it makes us easy to connect to each other and with tutors.” 2012 from a master unit student.</p>

V. CONCLUSION

This paper has presented results and analysis from a research-based exercise aimed at acquiring a greater understanding of adopting technologies to enhance online

students learning experiences. The findings are based upon student and staff responses during the experimental period 2009 - 2012, and additionally reflects perceptions based upon standard feedback mechanisms, incorporating an additional perspective drawn through researchers’ own reflections.

It can broadly be concluded that the use of technologies is a positive and necessary component and should continue to contribute to student motivation, engagement and active learning. As such, these findings represent a measure of success in one of the major objectives underlying this paper, which was to encourage further work into the potential value of various technologies and how to select appropriate technologies during curriculum design and development practices. Clearly, more work needs to be done in addressing the implications of various technologies for fundamental aspects of teaching and learning theory, to different student levels (undergraduate and postgraduate), how can we use available technologies to improve student learning experiences.

VI. DISCUSSION

For all the wonders of technology, there can be little argument but that the fundamental outcome and purpose of its application in an educational context is learning. For e-learning this denotes the application of innovative learning theories and pedagogies to the transmission of knowledge [24]. In this connection, Salmon [3] has consistently argued that technology cannot be successful without appropriate, well-supported and focused human intervention, good learning design or pedagogical input and the sensitive handling of the process over time by trained online tutors. Indeed she argues, teaching online has almost nothing to do with computers and everything to do with time, motivation, knowledge and the new agency of cyber-experience, as well as good, appropriate teaching.

While important, this comparison of the respective contributions of technology and learning to the e-learning phenomenon has inevitably resulted in the simplification of a complex phenomenon. Stacey [25] widened the perspective somewhat by mapping the e-learning marketplace in terms of content, technology and services. Recent scholars [6] have argued for a rethink of the nature and role of the content category, owing to the importance of knowledge as a resource and a perceived convergence between knowledge management and e-learning. Our own reading of Stacey’s [25] categorisation is that there is a clear overlap between technology and services (certainly in the case of technology services) resulting in a blurring of the boundaries between the two. More important however, we suggest the inclusion of an additional category, to his list, that of models of e-learning. Before turning to consideration of this latter suggestion, we comment briefly upon the content issue as raised by Costa and Silva [6].

With regard to digital content in an educational setting, Costa and Silva [6] argue that like knowledge it derives from cognitive activity. In their view, content results from the addition of collective representation and utilization to knowledge, and particularly of unprocessed or uncodifiable elements in relationships and behaviours. Knowledge here

consists of two kinds: subject knowledge and pedagogical knowledge. Moreover, in an e-learning environment, content assumes a higher level of importance, residing not in the academic staff or teaching support materials, but in learning objects available on a 24 X 7 basis [6]. This is all extremely important to the development and application of effective e-learning models.

Concerned about an over-reliance on technologies that were perceived as being pedagogically neutral and unconnected to methodological strategies, writers such as Denev [26] have advocated use of the term e+learning. Essentially this entails the use of integrated models that include e-learning principles, technologies, means and tools with the potential for application to a wide spectrum of subject domains and according to different didactic principles and pedagogical strategies [26]. Although arguing that there are really no models of e-learning per se but only e-enhancements of models of learning, Mayes and de Freitas [5] offer a cluster of such entities categorised by pedagogical approach, ranging from the conversationalist and cognitive to the behavioural, constructivist and contextual. Recognising that most implementations of e-learning will include blended elements that emphasise learning as behaviour, as the construction of knowledge and as meaning, they stress the importance of alignment between the underlying assumptions about learning, the chosen learning environment and teaching and learning methods.

A model for describing and collecting evidence with which to evaluate technology-enhanced learning was developed as part of the 'Tangible Benefits of e-Learning' project which took place in the UK in 2007 [27]. Participants were drawn from a variety of disciplines and a range of pedagogic theories (behavioural, cognitive, social cognitive, and constructivist) were involved in research underpinned by theories of the potential of technology to bring about organisational change. Allowing for differences in perspective between for example, Arts-Humanities groups and those from business and related studies, this research identified tangible benefits from e-learning. It further reinforced the view that what might look like a technological intervention actually depends on a web of skilful activity, human relationships, and subtle adjustments to a changing material environment [28].

One of the most popular approaches to e-learning is Salmon's [3] five-stage model. This describes the stages of progressing towards successful online learning both for participants (learners) and e-moderators. It describes how to motivate online participants, to build learning through online tasks (e-tivities), and to pace e-learners through stages of training and development. This model provides a framework for good practice in engaging learners in online discussion. Its pedagogical stance has been described as a theoretical [5], and it has at once been criticised for lack of a constructivist approach [29] and recognised for having this [5]. It continues to be a valuable and dynamic source of knowledge and perspectives on the theory and practice of e-learning.

However, as they increasingly exhibits the characteristics of a collaborative dialogue between stakeholders engaged in the creation and management of life cycles of digital knowledge and content, efforts at modelling e-learning have

grown increasingly creative and expansive. This includes acknowledgement of the need not only to accommodate differences in learning styles or stakeholder motivation, but also to reconcile diverse ethnic and cultural perceptions in the context of the global human experience [6].

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