

THE WIRED SAGE TAKES TO VIRTUAL STAGE: TECHNOLOGY, COMPLEXITY AND A FRAMEWORK FOR EFFECTIVE E-TEACHING

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ABSTRACT

Based upon the experience of establishing and maintaining a Learning Technology Unit within a Faculty of Medical and Health Sciences, this paper addresses the assertion that e-learning has failed to live up to its potential and that e-learning enthusiasts need to “get real” if e-learning is to come of age. We will suggest that “getting real” involves – most fundamentally - emphasizing the foundations for effective teaching in the move towards e-learning. The principle of emphasizing the foundations of teaching: mediates between the pedagogical tradition of the standard lecture and seminar scenario and technological innovation; engages Faculty in the process of technological change; provides for realistic e-learning goals in an institutional setting characterized by limited financial and technological resources; makes minimal demands on already busy lecturers; delivers instruction to students that is capable of meeting diverse student needs; and paves the way for a technologically innovative future.

KEYWORDS

Pedagogy, technology, teaching, instructional, design, learning

1. INTRODUCTION

It has been claimed that e-learning has failed to deliver on its initial promise (Zemsky and Massy, 2004, Pp.56-57). Specifically e-learning has failed to “yield a revolution in pedagogy itself” where revolution is defined in terms of a shift to customized, self-paced and problem based learning; e-learning has failed in terms of its promise to provide for a significant increase in distance education and lifelong learning; and e-learning has failed to secure the required financing from venture capital and course revenues to “live up to its potential” (Zemsky and Massy, 2004, Pp.1-2).

The authors of the report on the failure of e-learning suggest that it is time for e-learning to “get real”. They call for less talk and for more action on the part of those involved with e-learning. The authors note that the success of e-learning will depend as much on the nature of the institution as on the “power of technologies”. In concrete terms the authors suggest that a number of conditions must be met if e-learning is to realize its full potential. These conditions include: an improvement in the quality of education particularly at an undergraduate level; an attention to costs and efficiencies; the emergence of a dominant design for learning objects so that these objects become truly interchangeable between institutions; and a technological focus on what students really want so that students are motivated to learn using technologies (Zemsky and Massy, 2004, Pp.57-58).

The first part of this paper reflects upon the reality of establishing and maintaining a Learning Technology Unit charged with meeting the flexible and distance learning needs of a Faculty of Medical and Health Sciences. In terms of methodology, there is a sense in which this paper tells a story but it does so with

a particular purpose. Accounts of particular projects in specific situations can possess, “what might be called epiphanic power: they disclose an exemplary significance in the setting they depict so that it proves capable of illuminating other settings – without the need for rerouting through abstract generalities” (Dunne and Pendlebury, 2003, P.203).

Thus, detailing the specific reasons for the relative success of our unit – measured in terms of significantly increased requests for our services from Faculty staff, satisfaction of academic staff with the process of transitioning to e-learning, provision of a range of courses within all five Schools in the Faculty, increased student numbers at a postgraduate level particularly in Nursing and Pharmacy and positive qualitative feedback from students on course provision – provides for a potential understanding of why e-learning has failed in terms of the goals that it initially set for itself.

Avoidance of a “narcissism of the particular” (Dunne and Pendlebury, 2003, P.203) is achieved through an appeal to the fact that those actually engaged in producing e-learning solutions – as opposed to those occupying an abstract space characterized either by those engaged in entirely abstract thinking about e-learning or by those seeking significant financial gains from e-learning – will recognize the straightforward practical reasons for the successes and failures of e-learning. We might summarize by saying that given what we know from working within a Learning Technology Unit, we have considerable cause to wonder how the e-learning enthusiasts got it so wrong in the first place.

In the second part of this paper we will juxtapose the current approach of our unit to e-learning with the potential of e-learning in terms of the capacity of technology to provide, for example, sophisticated simulations and three dimensional learning worlds. We will suggest that the reality of our particular context militates against adoption of “cutting edge” technology and that realism around the future of e-learning must necessarily involve a continuing commitment to the principles of effective teaching. Technology must be assigned its rightful and important place as an enabler of a good teaching practice leading to rich learning experiences and realized learning outcomes.

2. E-TEACHING – TO BOLDY GO

It has been said that “E-learning will become pervasive only when faculty change how they teach—not before.” (Zemsky and Massy, 2004, P.iii.) The notion of changing how Faculty teach has been characterised in terms of the shift from the “sage on the stage” to the “the guide on the side.” (Zemsky and Massy, 2004, P.52). The sage on the stage – that is, the traditional lecturer - lectures to a large number of students some of whom will be scribbling furiously to capture what they perceive to be the pertinent points in the delivery. The lecture might be supplemented with a PowerPoint presentation consisting of summary text and clip art but too often the PowerPoint serves to keep the lecturer on track rather than to enlighten the students.

Foreman tells us what we already know. The large lecture scenario – common in for example undergraduate nursing, medicine and pharmacy – can be deficient in terms of delivering quality teaching. Specifically, the large lecture scenario can fail in the following ways: the ideal learning situation is customised; the ideal learning situation provides students with immediate feedback; the ideal learning situation is constructive; the ideal learning situation motivates students to persist in excess of any externally imposed requirements; the ideal learning situation builds enduring conceptual structures (Foreman, 2003, P.14). Biggs also reports that lectures are not a good way for students to learn (Biggs, 1999). This is not to say that students fail to learn when taught poorly. John Harris (MD) makes the point that undergraduate medical students continue to learn despite the fact that the teaching is often “bad” (Harris, 2005). The students achieve this feat through teaching themselves. But as Harris points out this model is inefficient, inhumane and potentially quite dangerous.

Thus when we refer to changing the attitude of Faculty we are referring not just to the attempt to get Faculty to engage with the notion of utilising technology in their teaching. With respect to the shift to e-learning we are referring to the attempt to bring Faculty members to see that they need to teach in terms of principles of good teaching practice. Unfortunately much of what has counted as e-learning has been nothing more than the transference of standard teaching materials – lecture notes and PowerPoint presentations - to the web (Zemsky and Massy, 2004, P.53). This fact is borne out at our University where statistically one of the most significant uses of the Learning Management System involves the posting of PowerPoint presentations so that students might download the slides in order to print them. This form of e-learning – if

indeed this can be called e-learning – can be understood in terms of the transmission of information to a large body of students occupying a virtual space. Whilst the mode of delivery has changed, the teaching method has remained the same and the value – from a pedagogical perspective - of the process of delivering electronic pages to students is entirely questionable.

In the first instance then “getting real” about e-learning involves focusing on the fact that educational institutions need to be concerned with teaching and learning and technology should be considered as a tool that might enable educators to achieve their educational e-learning aims. This point is well made by noting that “there is nothing inherently educative about technology, high-tech or low-tech; it is an entirely contingent matter whether or not a given technology is educative or not” (Blacker and McKie, 2003, P.234). This contingency is a matter of instructional designers, academic staff and students coming together to realize an e-learning solution.

“Getting real” in terms of a focus upon teaching and learning means that a unit responsible for the provision of e-learning must have an educational theory for online learning. The practical reality of working with lecturers who can make themselves only intermittently available means that the theory must remain implicit in the process of creating e-learning courses and that it must yield a set of straightforward questions to put to lecturers in order to achieve an effective translation of a traditional course to an e-learning environment. There are two simple reasons for adopting an approach in which educational theory remains implicit. First it saves time which is always at a premium. Second it means that one does not have to call a particular teaching style into question thus avoiding potentially uncomfortable conversations with lecturers over what has gone before.

We have a measure for “good” undergraduate teaching in Chickering and Gamson’s seven principles for good practice in undergraduate education: contact between students and faculty; reciprocity and cooperation amongst students; active learning; prompt feedback; emphasizing time on task; communicating high expectations; respecting diverse talents and ways of learning (Chickering and Gamson, 1987). These seven principles have been utilized in the development of e-learning solutions (Chickering and Ehrmann, 1996) and there is evidence that the application of the seven principles in an online environment may result in a positive learning experience and a satisfactory performance on the part of students (Hutchins, 2003). Overall, however, the jury is still out on the value of e-learning in health compared with more traditional forms of learning (Upton, 2006, P.23).

With the addition of an extended understanding of “active learning” in terms of the differences between the learning of facts, the learning of processes and the application of learning in real life situations (Anderson and Elloumi, 2004, Ch.1), the seven principles have provided our unit with the basis for a realistic approach to the development of e-learning solutions. In practical terms the principles have been implemented through making use of the concept of four types of “presence”: teaching presence; cognitive presence; social presence; and emotional presence. The first three forms of presence have been noted by Hutchins (Hutchins, 2003). The fourth, emotional presence, is derived from Salmon’s recognition that students undertaking e-learning will respond in various emotional ways to the process of engaging with online learning (Salmon, 2001, Ch.2) and from the understanding that the emotions play a part in the motivation levels of the students (Kim, 2004).

Thus, when working with Faculty to effect the change to flexible and/or distance learning we have asked lecturers questions concerning how they might achieve an effective teaching presence – that is a presence that motivates, guides, encourages and enthuses students - for an online course. We have made reference to technology in terms of how this presence might be realised. In terms of a cognitive presence we have made reference to a clear and consistent course structure, to clear learning objectives, to how students might be brought to engage with the learning material in terms of facts, principles and real world application. With respect to emotional presence we have asked questions concerning how a lecturer might deal with student emotions that will arise during the course. We have made reference to key points during the course when the students might lose motivation, begin to doubt their ability and concern themselves with whether or not they might complete the course. With respect to social presence, we have talked with staff concerning how students might be made to feel a part of a supportive learning community.

Our unit never had the aim of achieving a pedagogical revolution within the Faculty. The notion is itself absurd and for the following reasons. With respect to the medical program our unit has faced the challenge identified by Katz. Changing something that is broken can be difficult. Changing something that is deemed to have been working well for a very long time is even more difficult (Katz, 2003, P.50) particularly when the Faculty in question receives the maximum accreditation period from the Australian Medical Council. Such a

School can be deemed to be doing well. In the words of the then Dean, “The renewal of accreditation is an international acknowledgement of the quality of our teaching and research and our contribution to the medical community” (The University of Auckland, 2005). Success of this sort provides a real challenge for those who would suggest that teaching might be carried out more effectively in terms of problem based learning. Thus despite significant research into the merits of problem based learning on the part of one of our staff members, interest from lecturers on the medical program concerning problem based learning has been limited. Couple with this the fact that a shift to problem based learning would require a complete revision of the examinations and the problem becomes almost insurmountable.

More generally in terms of Postgraduate Pharmacy, Population Health and Nursing at both a postgraduate and undergraduate level, a pedagogical revolution involving a shift to customized, active, problem based learning is neither desirable nor realistic in the majority of cases. The reasons for this include: resource constraints within our unit; limited funding for e-learning development; the tension between a production ideal and the necessity for a unit such as ours to deliver courses in order to establish and maintain a viable presence within the Faculty; the limited availability of lecturers; competing demands for lecturers’ time including a very particular emphasis upon research outputs; the lack of any career incentive for lecturers to engage in e-learning; the fact that traditional teaching methods work very well for some courses; the occasionally labored rate of institutional change; and the political realities of working within a Medical Faculty comprising of individuals with a variety of interests and aims.

This is not to say that there has not been change driven both by the Heads of the various Schools and by our unit. We have introduced elements of problem based learning in Postgraduate pharmacy courses, Population Health courses such as Palliative Care and in some of the undergraduate nursing courses. A number of lecturers in the medical program have started the process of introducing problem based learning. We have made entire e-learning courses available to Postgraduate Pharmacy and Nursing students thus extending educational opportunities to a wider segment of the population. But talk of a revolution is simply out of place. We progress slowly in terms of what is realistically achievable and with a view to demonstrating the value of e-learning to a wider audience within the Faculty over time. Thus we would suggest that there is a very simple reason why there has not been a pedagogical revolution as a result of e-learning. Given the nature of institutions – and academic institutions in particular - the notion itself was never feasible.

3. TECHNOLOGY - CROSSING THE FIRST FRONTIER

Swan has claimed that an online course can be successful if three conditions are fulfilled: “clear and consistent course structure, an instructor who interacts frequently and constructively with students, and a valued and dynamic discussion” (Swan, 2001). Swan suggests that these factors jointly support interaction with content, interaction with students and interaction with the instructor. In other words, the factors contribute to enabling teaching, cognitive, social and emotional presence. This results in a learning experience for the students and in learning outcomes that are at least as good as those achieved in face to face teaching.

To achieve Swan’s aims we would be required – and indeed have been required in particular cases - to employ relatively unsophisticated technology in order to provide a minimal e-learning solution. For example, if we take the three factors that contribute to a positive on-line learning experience - consistent course structure, an instructor who interacts frequently and constructively with students and a valued and dynamic discussion – it becomes clear that we can make use of the most basic technology. Clear structure can be achieved through employing sound design principles in the creation of a set of HTML pages for the presentation of content. Indeed the traditional hard copy print format might be retained whilst utilizing technology for the purposes of online communication and interaction. Instructor-student interaction can be achieved using email, message boards and a chat room. A valued and dynamic discussion can be held using a discussion board or the chatroom. Thus although learning management systems lack any features that could reasonably be referred to as innovative, they do provide an environment in which effective e-teaching can take place (Katz, 2003, P.56).

Whilst we might achieve an effective e-learning presence using only the most basic of tools, our unit employs a range of relatively inexpensive software solutions that allow for a greater degree of development sophistication. For example, Macromedia Flash for developing interactive animations tracing for example the

path of Microbial diseases through the body; 3D animated models illustrating particular parts of the human anatomy from a variety of perspectives; videos of the steps in the basic life support algorithm together with corresponding animations of the internal changes that occur; video vignettes filmed in the Faculty studio and edited using Premiere; electronic lectures recorded using Articulate Presenter and delivered on CD ROM.

We see that e-learning development based upon the concept of achieving effective presence: allows instructional designers and the development team to talk with Faculty in a language with which they are familiar thus mediating between pedagogical tradition – the face to face lecture scenario and technological change – and the resource constrained delivery of e-learning (Katz, 2003); communicates to staff members that they will continue to have a central place within the educational process; effects a transition to an effective electronic teaching and learning environment; takes account of the diverse needs of students with a range of learning styles (Oblinger, 2003); minimises costs through reduction of the need for complex software solutions; and demonstrates to sceptical staff that e-learning can be effective. The overall effect of adopting this approach is to bring about the beginnings of a change in attitude on the part of teaching staff (Kamradt and Kamradt, 1999).

Within the Faculty of Medical and Health Sciences, the fact of providing flexible and distance learning courses based upon the principle of delivering effective teaching has: given hundreds of nurses in full time employment the opportunity to further their education through distance learning; doubled the number of Pharmacy students on a postgraduate course in a country where there is a severe shortage of pharmacists; provided five flexible format postgraduate Gerontology courses in a county with a rapidly ageing population; created a multimedia resource for child and adolescent mental health training in a country with a severe lack of training opportunities in this area; captured the expertise of an Australian lecturer in order to cost effectively deliver a course on Speech Language Therapy to Auckland students; worked with rural General Practitioners in order to create a course to support medical students on rural placements in a country where there is a distinct need for more rural health care. Realism has led to significant benefits for this Faculty. David A Cook (MD) has expressed our own view quite succinctly. “CBL [Computer Based Learning] is a powerful tool to be used with wisdom and judgment to enhance the learning process. Instead of deciding to use CBL and then working to fit it into the curriculum, instructional objectives should be defined first, and CBL used only when it appears to be the most effective means of achieving them” (Cook, 2005, P.546).

4. NOT QUITE THE HOLODECK

Oblinger characterizes Millennial students in terms of the fact that computers aren't technology; doing is more important than knowing; learning more closely resembles Nintendo than traditional logic; multitasking is a way of life; staying connected is essential; there is zero tolerance for delays (Oblinger, 2003, Pp.40-41). She further notes that these students often perceive teachers to be technological dinosaurs with the teacher's use of technology characterized as “uninspiring” (Oblinger, 2003, P.39). This perception of the Millennial student is extended by Chris Dede who refers to Neomillennial students and notes that for students in higher education “the standard world to the desktop interface is now complemented by multi-user virtual environments and augmented realities.” (Dede, 2005)

We can certainly agree that today's undergraduate students - whether Millennial or Neomillennial - exist in an entirely different world from the undergraduate students of 30 years ago. Many will be fluent in multiple media and many will have experienced three dimensional interactive worlds. For example, consider the following sites: activeworlds at <http://www.activeworlds.com/> and Second Life at <http://secondlife.com/> for an example of 3 Dimensional interactive worlds and Warcraft at <http://www.worldofwarcraft.com/> for a “Massively Multiplayer Online Role-Playing Game”. Students who use a communication environment such as My Yahoo – <http://www.yahoo.com> – will be able to fully customize their environment to meet their particular aesthetic and information requirements. Students will be interacting through messenger services such as MSN both for the purposes of socialization and collaboration on learning projects (Oblinger, 2003, P.39).

When we consider the level of technology with which today's undergraduates are interacting, the technological offerings of Universities appear to be nothing short of an embarrassment. We can hardly applaud ourselves for providing virtually static content within learning or content management systems capable of only the most rudimentary forms of customization. The presence of a message board and chat

room is not an innovation. Clearly structured course content delivered in terms of sound pedagogical theory - whilst necessary for effective learning - represents a minimal achievement in terms of realizing the full potential of technology. However, we should not berate ourselves too quickly. The case for using virtual environments and augmented realities is not yet made.

We must remember that teaching should be driven by sound pedagogical theory rather than the capacity of technology to provide an array of virtual interactive and immersive learning opportunities. Thus whilst Neomillennials have a particular relationship to technology and, possibly, a new learning style based on active discovery and the logic of Nintendo, our first question should not be "How can we accommodate these styles?" but rather whether immersion in a collaborative multidimensional interactive world will facilitate teaching and learning. This takes the question of teaching seriously. Starting from the fact that Neomillennials have a particular relationship to technology we must ask whether there is good reason to think that, for example, providing educational solutions based upon gaming theory is really going to enable students to learn.

At this point in time the claim that, "Higher education institutions can prosper using these emerging technologies to deliver instruction matched to increasingly NeoMillennial learning styles"(Dede, 2005) is simply not made. It is precisely this sort of talk that leads to unrealistic expectations. However, there is suggestive material concerning the value of immersive technologies. For example, Kolb's learning cycle involving conceptualization, planning, immersion and reflection (Kolb, 1984) clearly lends itself to realization in terms of engagement with interactive multimedia teaching solutions. Foreman also makes a very convincing case for the use of visually rich and highly interactive gaming technology in learning. In particular he shows how an educational game might be based on sound learning principles that will lead to deep learning and real world application (Foreman, 2003, Pp.12-15).

We must also enquire concerning student needs and it is not clear that - for example - undergraduate medical students of the Millennial generation do desire to be immersed in gaming environments in order to undergo interactive enquiry based learning. Medical students have a tendency to want facts and they are concerned primarily with their grades. In an unpublished survey of undergraduate medical students in the Faculty we discovered that they were primarily interested in the use technology for the purposes of revision where revision consisted of taking multiple choice tests to ensure factual recall. Certainly we can question whether this constitutes effective learning - a point already considered above in the discussion of active problem based learning - but that is not our current aim. Rather we are suggesting only that we should not assume that a particular generation will have a particular relationship with technology. Rather, we should consider each student group as a particular group.

In order to envisage a scenario in which immersive game playing becomes the de facto learning method in tertiary education Foreman has to make some very big assumptions and he admits that given the costs involved in developing this sort of learning material it is "hard if not impossible to justify or to amortize" the cost (Foreman, 2003, P.17). It is the very well funded American military rather than the American Universities that have invested heavily in gaming technology for the purposes of learning (Foreman, 2003, P.16). Resources and funding are currently and will continue to be a major obstacle to developing e-learning solutions that utilize cutting-edge technology. Thus, whilst technology exists that might take us a long way beyond the delivery of learning content within a Learning Management system, developing solutions based on this technology is not currently feasible for the majority of educational establishments.

It is currently still a difficult task to convince some lecturers that e-learning can make a valuable contribution to their teaching. To convince them that they need to teach in terms of an immersive online 3d gaming environment will prove impossible in the short to medium term. The balance between tradition and innovation would be entirely absent in such an approach and, therefore, the required change in attitude would not occur. There are of course additional constraints to do with resources and financing. Realism currently militates against the holodeck future.

This is not to say that cutting edge technology is entirely absent from today's teaching world. We are aware for example of the use of MicroSim within the University, an interactive patient simulator from Laerdal that runs a series of emergency-care related scenarios. We are also aware of an interactive 3D multimedia environment for practicing surgical skills. Our unit has been involved in a proposal to use PDAs at the point of care in a rural setting in order to capture video, picture and audio files for relay to doctors in the district health boards so that doctors might make care decisions without always having to visit the patient. We have worked with mobile surgical services - <http://www.mobilesurgical.co.nz/> - to beam a mobile surgery to staff and students with the School of Nursing. However, the use of this sort of technology is the

exception rather than the rule. Employment of this type of technology as standard rather than the exception will require a significant increase in funding together with a clear demonstration of the value of this technology for teaching and learning.

5. CONCLUSION

It has been our contention in this paper that the multiple demands placed upon a Learning Technology Unit can best be met by approaching e-learning in terms of sound educational theory together with a rigorously practical attitude towards what is realistically achievable within an academic institution. We would further submit that our account sheds light on the bigger question concerning why e-learning has failed to fulfill its potential.

REFERENCES

- Anderson, T. and Elloumi, F. (Eds.) (2004) *Theory and Practice of Online Learning*, Athabasca University, Athabasca.
- Biggs, J. (1999) *Teaching for Quality Learning at University*, Society for Research into Higher Education and Open University Press, Buckingham.
- Blacker, D. and McKie, J. (2003) In *The Blackwell Guide to the Philosophy of Education*(Eds, Blake, N., Smeyers, P., Smith, R. and Standish, P.) Blackwell Publishers Ltd, Oxford.
- Chickering, A. W. and Ehrmann, S. C. (1996) Implementing the Seven Principles: Technology As Lever. *American Association for Higher Education Bulletin*, Vol. 49 No. 2, pp. 3-6
- Chickering, A. W. and Gamson, Z. F. (1987) Seven Principles of Good Practice in Undergraduate Education. *AAHE Bulletin*, Vol. 39 No. 7, pp. 3-7
- Cook, D. A. (2005) The Research We Are Still Not Doing. *Academic Medicine*, Vol. 80 No. 6, pp. 541-548
- Dede, C. (2005) Planning for Neomillennial Learning Styles. *Educause Quarterly*, Vol. 28 No. 1, pp. Online
- Dunne, J. and Pendlebury, S. (2003) In *The Blackwell Guide to the Philosophy of Education*(Eds, Blake, N., Smeyers, P., Smith, R. and Standish, P.) Blackwell Publishers Ltd, Oxford.
- Foreman, J. (2003) Next Generation: Educational Technology Versus the Lecture. *Educause Review*, Vol. 38 No. 4, July/August 2003, pp. 12-22
- Harris, J., 2005. *Why We Need Better E-Teaching, Not More E-Learning*. MELD. Available from: http://meld.medbiq.org/divergent_views/better_eteaching_harris.htm. [Accessed 24th April 2006].
- Hutchins, H. (2003) Instructional Immediacy and the Seven Principles: Strategies for Facilitating Online Courses. *Online Journal of Distance Learning Administration*, Vol. 6 No. 3, pp. Online
- Kamradt, T. and Kamradt, E. (1999) In *Instructional Design Theories and Models - A New Paradigm of Instructional Theory*, Vol. 2 (Ed, Reigeluth, C. M.) Lawrence Erlbaum Associates Publishers, Mahwah, New Jersey, pp. 756.
- Katz, R. N. (2003) Balancing Technology and Tradition - The Example of Course Management Systems. *Educause Review*, Vol. 38 No. 4, July/August 2003, pp. 49-59
- Kim, K.-J. (2004) In *Conference on Emerging Technologies and Theories for Teaching and Learning* Association for Educational Communication and Technology, Denton, TX.
- Kolb, D. A. (1984) *Experiential Learning: Experience as the Source of Learning and Development*, Prentice Hall, Englewood Cliffs, N.J.
- Oblinger, D. (2003) Boomers Gen-Xers and Millenials. *Educause Review*, Vol. 38 No. 4, July/August, pp. 37-47
- Salmon, G. (2001) *E-Moderating. The Key to Teaching and Learning Online*, Kogan Page Ltd., London.
- Swan, K. (2001) Virtual Interaction: Design Factors Affecting Student Satisfaction and Percieved Learning in Asynchronous Online Courses. *Distance Education*, Vol. 22 No. 2, pp. 306-334
- The University of Auckland, 2005. *Medical Degree Accreditation Renewed*. The University of Auckland. Available from: http://www.auckland.ac.nz/uoa/about/news/articles/2005/08/medical_accredit.cfm. [Accessed 24th April 2006].
- Upton, D. (2006) Online Learning in Speech and Language Therapy: Student Performance and Attitudes. *Education for Health*, Vol. 19 No. 1, pp. 22-31
- Zemsky, R. and Massy, W. F. (2004) The University of Pennsylvania, Pennsylvania.