

# ACHIEVEMENT OF PEDAGOGIC OBJECTIVES IN POST-GRADUATE E-LEARNING IN AN INTERNATIONAL SETTING

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## ABSTRACT

*One of the current, key pedagogical issues in the design and delivery of on-line learning is that of student engagement and interaction with the teaching and learning materials and each other. The author's experience with five different VLE platforms over the last five years shows that these two objectives can be remarkably difficult and expensive to deliver.*

*Research is presented which considers a range of factors which may impact on the pedagogic aspirations such as the definition, development and delivery of suitable teaching and learning materials and issues relating to the delivery and accessibility of resources to the students.*

## Keywords

*e-learning pedagogy international postgraduate access bandwidth*

## INTRODUCTION

Key pedagogical issues in the design and delivery of on-line learning are student engagement and interaction with the teaching and learning materials and each other [1]. The author's experience with five different Virtual Learning Environments (VLE) platforms at both undergraduate and postgraduate levels over the last five years has shown that these two objectives can be remarkably difficult and expensive to deliver.

In addition, the delivery and support of the required technical infrastructures can be, at best, challenging

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in the developed countries and, at the least, very difficult in the developing countries where there is an unfortunate history of few successful IT related projects, including those provided by donors. As Walsham [2] shows, this is one manifestation of cultural differences between donors and recipients.

Contextually, the NEPAD [3] strategy framework in Africa provides a broad framework for the ongoing development of many aspects of infrastructure; a key element relevant to this paper is the emphasis on the development of ICT infrastructure for both business and education at all levels. This has then been incorporated in the national ICT strategies with very challenging aspirations, see examples such as the Maitlamo strategy for Botswana [4] and the Malawian ICT strategy [5].

Many of the issues are relevant to Western HE institutions developing e-learning materials for use by their local students as well as their overseas students. The University of Derby has some 300 – 400 postgraduate students in Africa supported by e-learning delivery of courses.

Some of the issues are of particular relevance to HE institutions in developing countries and may indicate particular constraints to the successful implementation of e-learning programmes.

## POSTGRADUATE LEARNING NEEDS

One of the key learning outcomes at the postgraduate level is the development of critical thinking and evaluation by the student, which is a particular challenge for non-UK students. In order to do this the student requires access to considerable quantities of good quality academic journal articles. This can be delivered electronically by organisations such as EBSCO and Emerald using the internet, via University authenticated access. One module taught by the author uses some 75 journal articles, with a total download of 31 Mbytes., average size being 410 Kbytes.

These data will form the basis of the consideration of some of the infrastructure constraints on higher education use of e-learning.

In face-to-face post-graduate programmes, the seminar is one of the primary modes of learning, where the tutor provides a guiding and moderating role in the discussion between the students of a range of key issues in the topic area [6]. In order to simulate this style of learning, some form of discussion boards are required, as well as means to encourage participation by the students.

In addition, some e-learning exponents are developing the use of synchronous communication techniques using applications such as Skype, MSN and other messaging systems in both voice only and also with video enhancement.

The final points of departure for this research are the provision of suitable teaching and learning material which provides appropriate forms of interaction both with the tutors and the other students and also the availability of access by the students to suitable PCs and affordable communications infrastructures.

## **ANALYTICAL FRAMEWORK**

Using six of the 7R's of Strategy as a framework for the analysis of the needs of students and tutors, it can be seen below that, whilst there are significant potential benefits from the use of IT in education, IT also creates some significant challenges.

### **REACH**

Clearly the internet provides the means to reach students around the world. However, this may not be effective within some developing countries where the wired infrastructure is not well developed or is of comparatively low quality. In such cases, the available communication speeds are low. Broadband is available to some at a high cost and, by western standards, slow bandwidth. In Botswana, for example, the highest business broadband rate from one ISP is 768Kb/sec at a cost of US\$ 191 per month compared to the UK where standard home broadband is available at rates above 4000 kb/sec for as low as US\$25 per month which is less than the price in Botswana for a standard 256Kb/sec broadband line for home use at US\$38. 45Kb/sec dialup is available for US\$23 per month plus US\$0.06 per minute.

What has to be remembered is that these notional speeds do not represent the true speed that can be used to deliver materials to the user; use of the Speedtest web site [7] shows that the real delivered rates can be a small fraction of the rate negotiated by the modem. Typical rates to Southern Africa are 400kbps, compared to the 8Mbps of UK broadband

negotiated rates. In addition, most internet servers are unable to deliver materials at full broadband rates, often running at a maximum of 500kbps.

This severely impacts on the use of voice and video messaging which require at least high quality dial-up connections or broadband to be effective.

## **REACTION, RESPONSIVENESS, REFINEMENT, REDEPLOYMENT AND RECONFIGURATION**

In considering these five elements of the framework, it can be seen that e-Learning offers the ability for students to gain easy contact with the tutors. It also offers through the better VLEs, the facilities for the tutors to respond flexibly with new and amended teaching material to meet changing circumstances during the teaching period

## **THE RESEARCH**

This research has been carried out over the past four years at the University of Derby by the author and various of his students.

The **Research Objective** is to identify some of the key barriers to the effective use of e-learning in Higher Education.

The key **Research Question** areas are:-

- Pedagogy, design and delivery
- Accessibility of materials to the students
- Student / student and student / teacher interaction
- Costs of creation of teaching materials
- Costs of e-tutor support compared to face to face
- Cost of Ownership of IT
- Donor Funded IT Projects
- Internet Infrastructure provision and performance

## **RESULTS OF THE RESEARCH**

### **Pedagogy, Design and Delivery**

In attempting to achieve the pedagogic objectives of interactivity and, in particular, the development of critical thinking skills a key issue has been to avoid writing a textbook of material for the VLE, when there are already many excellent textbooks and academic journal articles already available on the market. This leads to the development of a design that is minimalist but guides the students through a range of materials using three types of guiding questions.

The drawback of this approach is when the students have difficulty in acquiring the relevant text books quickly. It can often take a month or two to acquire the books from the West. Several Sub-Saharan African countries do not yet permit their citizens to

use credit cards, thus removing sources such as Amazon. In addition, some of these sources of books do not deliver to some developing countries.

In many countries, the British Council libraries may be of assistance but this is often limited to certain subjects and is only accessible to students living within a short distance of the library.

### **Accessibility of Materials to the Students**

Whilst most Western students have access to broadband internet, many sub-Saharan students have difficulty in gaining access to reliable 45Kb/sec dial-up connections, let alone broadband. This leads to problems with gaining access to the relevant materials needed for developing the critical thinking skills.

Taking the example module above, using dial-up access at 45Kb / sec, the time needed to download the required journal articles will be of the order of three hours for the data transfer, to which must be added the time to identify and find the relevant 75 articles. In reality, the time for the download is often several times greater than this due to problems with the quality of the lines. Broadband and satellite connections are not financially accessible to most MSc students unless provided through their employers.

A further significant issue is the result of the low quality and bandwidth of the internet connection available in developing countries. This is the problem of failures of downloads during long download times. In the west, with the advent of web-browser 'download managers' this problem can be easily managed, for those with the skills and bandwidth to download Firefox, Opera or Netscape or other download managers. However, bandwidth is so constrained that downloading the modern browsers is generally not an option, even if they know how to do it.

As a result, such students operate with very small sets of studying materials

### **Student / Student and Student / Teacher Interaction**

One of the questions exercising e-learning tutors is the question of interaction between students in the e-learning mode, especially given the propensity of many western on-campus students to spend large amounts of time on MSN and texting each other. It is, however, noticeable that in many subjects little use is made of the discussion areas, even to present their ideas for consideration by the tutors, whilst in a few, the discussion areas are extremely busy. This is an area of ongoing research.

In many instances, where low bandwidth internet connections are used which are charged at a per-minute rate, the costs of remaining on-line in order to

interact with discussion fora are an active disincentive to involvement. The technical complexities of composing in a text editor offline and then using cut-and-paste to place the contribution in the discussion forum posting mechanisms is too laborious.

Use of the voice and video messaging often does not work due to restricted bandwidth, as shown by a recent visit to Botswana where the use of Skype was not feasible for voice communications due to restricted bandwidth.

### **Costs of Creation of Teaching Materials**

One of the first on-line MSc programmes delivered by the University of Derby (an MSc in Information Technology) was assessed in terms of the costs of creating the module teaching material to replicate the interactive tasks from the lectures, seminars and tutorials that were used on-campus. The results showed that academics spent approximately 200 hours to re-write the materials that were already in existence into a form suitable for on-line use. In addition, technical authoring of up to 400 hours per module was also required.

An alternative approach developed by the author which is suitable for MSc students with good connectivity reduces this cost to approximately 60 to 100 hours in total but relies on students buying relevant books and downloading a significant number of articles.

### **Costs of e-tutor Support Compared to Face-to-Face**

Whilst e-learning is often thought of as being a cheap way to deliver teaching to a wide audience, the measured reality is that it can be remarkably expensive. Typical allocation of time is 2.5 hours per student per 15 credit module. This compares to a cost of 1.2 hours in the face-to-face mode for a group of 20 on-campus students. However, in one of our first e-modules, the actual cost was 10 hours per student.

### **Donor Funded IT Projects**

The development of the required infrastructures in many sub-Saharan African countries relies on donor funding for much of the developments. Two significant issues result from this which will affect the achievement of effective e-learning programmes in these countries:-

- ICT Project success and donor culture
- On-going maintenance costs

A recent study in Malawi by a Master's student of the author, who wishes to remain anonymous, has shown a strong relationship between the culture of the donor organisation and the eventual success of a project. The most successful projects are those where there is a strong participative and 'coaching'

relationship between donor and recipient. The failures occurred most where the donor culture was directive.

Additionally, donors generally only fund the cost of the initial purchase and installation of the equipment and software, leaving the recipient to fund all the on-going support and maintenance. The on-going cost of ownership is a significant barrier to the success of the projects.

### **Cost of Ownership of IT**

A very recent study by M Muluubya, (a student of the author in Uganda) conducted a Total Cost of Ownership of the corporate provision of IT infrastructure that has considerable relevance to the NEPAD related national IT and education provision strategies. This study found that it cost \$1450 per annum to provide a network connected PC with internet access and the normal server provision. In addition, the study confirmed reports from the West that the total cost of ownership of such PCs is approximately three times the purchase cost of the equipment. This has consequences for projects that are only funded for the initial purchase costs. The recipients will need to find approximately twice as much again to maintain the equipment for the following two to three years, after which they will need to fully re-acquire funding for the purchase of the next cycle of equipment and software and its maintenance.

### **CONCLUSIONS**

The conclusions of this paper are:-

1. Accessibility of academic materials is a significant issue for 'distant' e-learning students.
2. Student / student and student / lecturer interaction is often adversely affected by bandwidth, thus limiting the achievement of critical thinking skills

3. e-learning is not a 'cheap option' for delivery of learning materials to students. It can, in fact, be a remarkably expensive option.
4. Internet bandwidth 'as delivered' in many parts of the world is insufficient to deliver adequate online materials to MSc students to allow the development of critical thinking skills.
5. The bandwidth restrictions in developing countries often preclude using any modern web 2.0 types of facilities such as improved / cheap voice and video communications
6. Achievement of the NEPAD and sub-Saharan African countries' ICT for education objectives will require creative approaches and a clear recognition of the "on-the-ground" realities relating to the development and delivery of effective learning environments.

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