

CONTENT DELIVERY AND CHALLENGES IN EDUCATING HYBRID STUDENTS

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ABSTRACT

Traditionally, taught postgraduate programmes placed students in well-defined categories such as ‘distance learning’ and ‘on-campus’ or “part-time” and “full-time”. The practical reality is that postgraduate students rarely fall into such simple, diametric roles and can be more suitably generalised under the concept of the “hybrid student”. Hybrid students are dynamic, with changing requirements in relation to their education. They expect flexibility and the ability to make changes relating to module participation level, study mechanism and lecture attendance, in order to suit personal preference and circumstance. This paper briefly introduces the concept of the hybrid student and how the concept has been handled within the School of Electronic Engineering at DCU. Following this, some discussion is provided in relation to a number of the content delivery technologies used in programmes facilitating these students: HTML, PowerPoint, Moodle, DocBook and Wiki. Finally, some of the general challenges, which have been encountered in supporting such diverse students, are briefly discussed.

INTRODUCTION

The RACeE programme at Dublin City University (www.racee.ie) is believed to be one of the first of its kind in Europe to deliver a course for credit entirely via the Internet. Since 1996, the RACeE (Remote Access to Continuing Engineering Education) programme has provided an opportunity for engineers to update their skills remotely [1].

RACeE, in more recent years, has taken the form of a mechanism of study, rather than a programme. It has become a merged and integral part of the Electronic Engineering Masters programmes at DCU. The benefits of this merger have, together with a number of other initiatives and factors, provided considerable growth in student numbers in recent years, as illustrated in Figure 1.

Earlier definitions of student categories have become blurred. Students are no longer considered to fall into the simplistic (and limiting) categories of ‘distance learning’ and ‘on-campus’ or “part-time” and “full-time”. Instead, the single concept of the “hybrid student” is utilised by the School of Electronic Engineering.

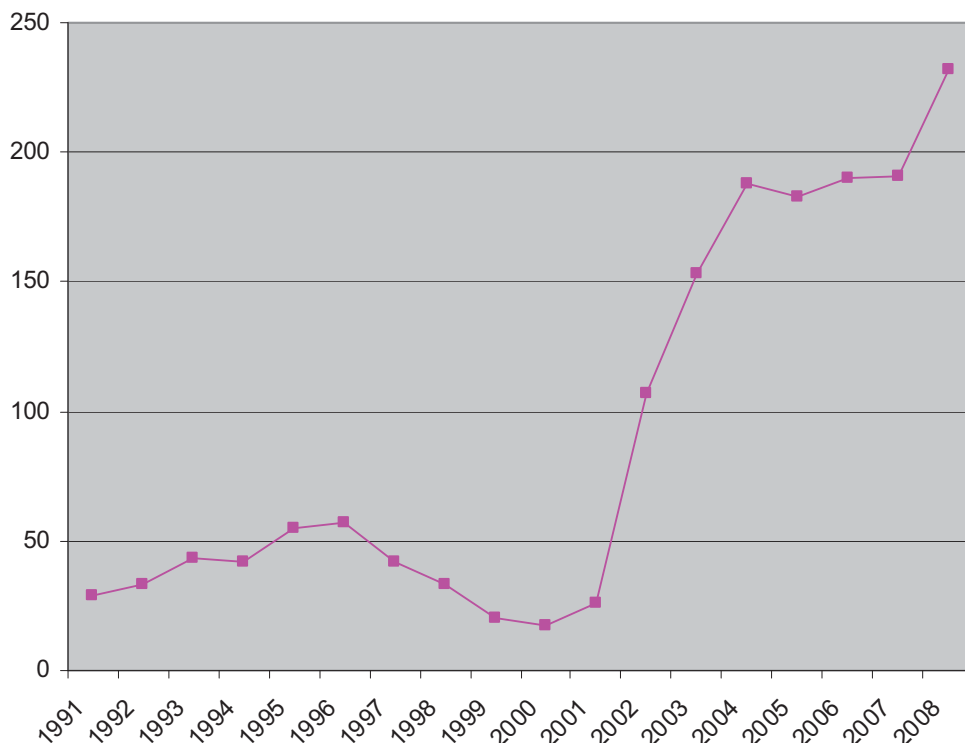


Figure 1: Change in number of taught postgraduate students with time. **Note:** The data shown includes all students, for whom education may be spread over multiple years, either by choice or academic performance. Hence, the actual number of new registrations and graduations on a yearly basis would represent a lower figure.

A hybrid student, for example, might wish in a single academic year to:

- Attend four modules in Semester 1 through traditional on-campus means, while searching for employment
- Following employment, attend one module in Semester 2 on-campus through half-day release from work, occasionally participating through online means where work situations dictate
- Attend one module in Semester 2 through distance learning, occasionally attending the lecture on campus where possible

Flexible, modular-based programmes, without hard-enforced “categories”, enable such an approach to postgraduate education. In addition, remote students take great comfort in the knowledge that they are not participating in merely a “distance education course”, but rather in parallel with traditional on-campus students in a “proper course”. This was predicted by Lawhead et al. who stated – “it is necessary to guarantee that degrees earned primarily by distance learning are equivalent to conventional degrees offered by the same institution or the same type of institution”

[2]. The concept of “*equivalence of product*” must be adhered to for hybrid students, who should receive a common course experience regardless of study mechanism.

It is important not to confuse the concept of a “hybrid student” with that of “hybrid courses”. Hybrid courses (also known as mixed mode courses) are courses in which a significant portion of learning activities have been moved online and time traditionally spent in the classroom is reduced but not eliminated [8]. Hybrid students, on the other hand, have neither a requirement to attend the campus at any time (excluding examinations) nor a requirement to participate via distance learning – the mechanism and rate of study are chosen at their own discretion.

The next section will provide some discussion relating to the delivery of engineering course content to hybrid students. Following this, the remainder of the paper will focus on some of the challenges experienced in the delivery of programmes to such a diverse category of student.

COURSE CONTENT DELIVERY

While there is considerable overlap between the education of distance learning and hybrid students there are some additional issues to be considered:

- Physical lectures must be provided for attending hybrid students.
- Quality of online learning resources must be high and must provide independent means of study.
- Non-attending students should be confident that they are not disadvantaged when compared to attending students.
- Equivalent support should be maintained for all students regardless of study mechanism.
- Verbose notes are less suitable for in-lecture presentation material. Similarly, terse PointPoint slides do not make appropriate, exclusive study material for remote students.

There is a considerable range of deployment mechanisms available for course content. Equally, there is also a vast array of learning tools available to lecturers: surveys, quizzes, forums, synchronous chat, multiple choice questions, whiteboards etc. [9]. While pedagogical arguments can be made on behalf of each of these tools, experience has highlighted three primary elements which should exist for an effective hybrid postgraduate programme:

- **High quality detailed notes:** “The key educational concern of any course, whether it is taught in the traditional manner or on a remote access basis, must be the quality of the course material” [1]. This has been confirmed through student feedback and it has been determined that those courses with standalone, detailed notes written in a book format are more effective from the student perspective. Courses consisting of bullet-point notes or pointers to third party books are regarded negatively.
- **Physical lectures:** On-campus lectures should take place in parallel for students who have a preference of attending lectures, either consistently or occasionally.

- **Mailing List Support:** The hybrid model of postgraduate education makes no assumptions relating to the attendance capability or availability of students at particular times. While scheduled online chat sessions might appear to provide more immediate support, it is unlikely that a time can be facilitated to suit the majority of students. A well-supported mailing list makes no assumptions in this regard and while support is not always immediate it can be guaranteed regardless of personal student timetables. In addition, mailing lists provide peer support, resulting in some reduction in teaching overhead.

To focus on the first of these points, we will introduce some of the various mechanisms for the delivery of content, which are in use within the School of Electronic Engineering at Dublin City University.

MECHANISMS FOR DELIVERY OF CONTENT

1. Hypertext Markup Language (HTML)

HTML is the predominant markup language for web pages and provides a well structured means of describing text-based information in a document. It is the most widely used and oldest format for the purpose of the online deployment of notes, although frequently as a front-end to application specific formats, such as Word, PDF and PowerPoint. Benefits of using well-written HTML include accessibility, effective presentation and relative portability across mobile devices. One negative aspect is that there is an overhead associated with users either learning HTML or becoming familiar with the use of a graphical HTML editor (WYSIWYG). Additionally, there is a technical overhead with setting up access restrictions and file transfer mechanisms, although the majority of universities would provide such facilities.

2. Moodle

Moodle is a free, software e-learning platform and is designed to help educators create online courses [4]. It is frequently referred to as a Course Management System (CMS), Learning Management System (LMS), or Virtual Learning Environment (VLE) – each of which essentially equates to the same concept.

Moodle is the e-learning platform of choice within Dublin City University and has demonstrated itself to be both stable and effective. However, in the School of Electronic Engineering there has been a low uptake in using the facility, due to existing previous formats and a lack of intuitiveness associated with Moodle. Benefits in using Moodle include the provision of additional teaching tools which may be used in conjunction with traditional notes.

3. PowerPoint

PowerPoint is widely used by educators in traditional, in-classroom teaching models. While terse, bullet-point slides provide an effective focus for teaching in such models, their use (as a standalone source) proves less effective in supporting distance learning students. This returns to the concept of “equivalence of product” – students who participate on-campus one week and via distance learning the following week, should not notice a significant change in quality in their experience. PowerPoint slides are best used in conjunction with an alternate source of detailed notes and/or video lecture resources. In this way, the benefits of using a persuasive technology such as PowerPoint can be experienced with no learning diminution for particular students.

4. DocBook

DocBook is a format of XML used for technical documentation. It enables users to create document content in a presentation-neutral format. DocBook documents do not describe the visual formatting aspect of their contents, but rather the meaning of those contents [5].

Consider a snippet of DocBook:

```
<?xml version="1.0" encoding="UTF-8"?>
  <book xml:id="simple_book"
xmlns="http://docbook.org/ns/docbook">
  <title>My Book Title</title>
  <chapter xml:id="chapter_1">
    <title>Chapter 1</title>
    <para>This is chapter 1</para>
    <para>This chapter is <emphasis>important!</emphasis>!</para>
  </chapter>
  <chapter xml:id="chapter_2">
    <title>Chapter 2</title>
    <para>This is another chapter!</para>
  </chapter>
</book>
```

Combined with XSL Stylesheets, these documents may be transformed automatically into a number of formats, including HTML and PDF. The above example could be transformed into a multiple page HTML “document” (e.g. 1 page for title/index, 1 page for each chapter). Likewise, using an alternative transformation, it could be rendered to a PDF book.

A number of lecturers have used DocBook to great effectiveness. Using a simple server-side system it is possible for example to secure PDF files against editing, customise notes for individual students, watermark pages and offer a number of printing formats (such as 2 “pages” of notes per A4 page) [11]. This has obvious benefits for lecturers concerned about the intellectual property relating to their notes.

5. Wiki/Content Management System

There are a number of utilities available which act as both Wikis and Content Management Systems (CMS). Daisy is a java-based content management system that offers both services. While Daisy can be used for many alternate purposes, it is ideally suited for information-rich, structured content such as course notes [6].

Using a CMS such as Daisy provides a number of advantages, including:

- Generic, accessible HTML notes produced without knowledge of HTML
- Automatic generation of printable PDF documents
- Browser, software, OS and plug-in independent, free editor
- Automatic generation of search facilities within course material

- Facility for student contribution, from fixing minor typos and making comments to the production of entire sections of notes
- Easy support for the deployment of multimedia formats such as video and audio
- Support for security access control on notes
- Version control and historical rollback

On the negative side, there is some initial learning in using the Daisy Editor and some technical involvement in setting up the Daisy application on a server.

DELIVERY CHALLENGES

There are a number of challenges to be tackled during the deployment of course material for hybrid students. Some of the more important aspects are discussed briefly below.

1. Intellectual Property

Most lecturers prefer to keep their course content as restricted as possible, while facilitating appropriate access. Unless access restrictions are put in place, an implied license to make copies of the material is granted, so it is important to control access to intellectual property [1]. This can be achieved using any of the delivery mechanisms discussed (in the case of DocBook/PowerPoint, in conjunction with HTML) by utilising simple username/password access controls.

Issues may also arise on whether or how to protect an author's investments in course development or materials. It may also be necessary to provide some control over "*setting accidental or intentional changes to Web-based materials*" [2]. The custom DocBook approach has proven popular with lecturers who were concerned that their course notes might either be modified or reused in other modules/training courses. The facility to watermark PDF notes, protect documents from editing and the ability to place student details in headers or footers provides this extra element of security [11].

2. Plagiarism

The predominance of plagiarism in any programme is difficult to quantify. While universities generate policies for handling plagiarism, the detection rate is of most concern. Some observations have been made:

- Facilities such as Turnitin [12] are effective at detecting some elements of plagiarism, but lack the functionality to handle other formats, such as detection of stolen source code. Tools such as Moss and Jplag provide facility for the analysis of source code, although this is a notoriously difficult problem to address. Plagiarism detection software has several drawbacks, so manual checking and human judgment is still needed [7].
- Plagiarism has been more commonly found with students attending the campus, particularly where a "peer group" has formed.
- Plagiarism issues create an effective glass ceiling on the percentage of marks attributable to continuous assessment, particularly in a course with a high quantity of students.

3. Examinations

One of the core restrictions on academic programmes within the school is the requirement to sit examinations at Dublin City University. Arrangements may be made with other institutions in the case where a number of students are taking the modules remotely at the same location. In general, direct supervision is required for academic integrity.

4. Lecture Timetabling

A number of steps have been made to ensure suitability for hybrid students in relation to timetabling. Unlike many part-time programmes, lectures do not take place in the evenings or at weekends. They are scheduled in exclusive three-hour blocks either from 10am-1pm or 2pm-5pm. In addition, students have considerable flexibility in the set of modules that are chosen. In the case of the most flexible programme, a student may choose any eight of a total of twenty two different modules. Combined, with the capability to take any of these modules remotely, this provides a range of customization options for almost all traditional categories of students. The natural exception is the part-time student who wishes to attend campus for evening/weekend study. Feedback indicates that this is an almost inexistent category of student, the majority of similar students citing preference for online study.

5. Video Enhancement

Numerous attempts had been made to perform “traditional” video recording of lectures since the development of the programmes. These had mostly been found ineffective due to the high manpower requirements involved, both at the recording and editing phase. In recent years, Camtasia has been deployed to strong success and positive student feedback. Camtasia is a professional solution for recording, editing and sharing high quality screen video on the web [10]. In essence, it will perform a video screen capture of a computer screen and record the lecturer’s voice during lectures. While it is effective in recording computer demonstrations and PowerPoint presentations, it is less suitable for “chalk and talk” sessions. Additional support for such functionality can be achieved using tablet PCs/graphic tablets. Wireless microphones, such as the Plantronics CS60 provide roaming functionality for more mobile lecturers.

6. International Visa Requirements

Citizens of certain countries, who wish to pursue education in Irish Universities, must meet a number of visa requirements set by the Irish Naturalisation and Immigration Service. Among these is the requirement that the student has “*been accepted and enrolled on a course of full-time education, involving a minimum of 15 hours organised daytime tuition each week*” [3]. One of the limitations of the hybrid student model is that certain nationalities of students may have enforced minimum levels of study. In addition, careful analysis of academic performance must be made in relation to those students who are deemed to be lacking in annual progression.

DISCUSSION

Both programme structure and content design require considerable forethought in relation to handling the different subcategories of student. The structure utilised within the School of Electronic Engineering at DCU starts from the basis of assuming that all students are simply “hybrid”.

Many of the requirements for supporting hybrid students are identical to those for supporting distance learning students. The primary difference is that physical lectures must take place in parallel. This introduces some new considerations relating to the format and deployment of course material. Lecturers must create courses with one primary question in mind – “Am I developing a course which is effective and fair to all of my students, regardless of their mode of study?”

Issues such as intellectual property, plagiarism and examination location provide similar challenges for both hybrid and distance learning students. However, some additional considerations must be made for hybrid students in relation to on-campus timetabling and visa requirements.

In relation to the provision of video for remote students, teaching with a hybrid student model provides a considerable benefit. When combined with suitable screen/voice capture software, remote students experience a feeling of participation in a real class environment and a strong sense of equivalence of product.

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