A FIVE-LEVEL APPROACH TO THE LARGE-SCALE DEVELOPMENT AND DELIVERY OF ONLINE PROGRAMS

Chris van der Craats
Learning Resource Centre,
Faculty of Applied Science
RMIT University, AUSTRALIA
Chris.vandercraats@rmit.edu.au

Jim McGovern & Linda Pannan
ASSETT Research Group,
Faculty of Applied Science
RMIT University, AUSTRALIA
Jim.mcgovern@rmit.edu.au, Linda.pannan@rmit.edu.au

Abstract

RMIT has embarked on a flexible delivery program that requires all of its courses to have an appropriate online presence by the end of 2002. A program of this scale can only be carried out with considerable involvement of academic staff, beyond their role as content providers. This paper describes a 5-level approach used in the Faculty of Applied Science. The first level provides basic course and administrative information and requires minimal resources. Higher levels address fully online, pedagogically sound delivery, but require considerable more expertise and resources for development and delivery. This model allows staff to be involved early, and for courses to be developed to higher levels of learning support as staff members gain experience and develop their capabilities. Overall, the approach leads to earlier benefit to students, through earlier access to useful online information, and better use of resources in the long-term as academic staff evolve a better understanding of what is possible and what is desirable in a more sophisticated online learning environment.

Introduction

Like many universities, RMIT is embracing online delivery as a means of providing flexibility of access to on-campus students, accessing new markets, and enhancing or at least maintaining student learning with reduced resources. The university has provided a framework with ambitious targets of all courses to have basic online presence, a mixed mode of delivery, or a fully online presence by the end of 2002 (McGovern, Pannan & van der Craats, 2001). The University has provided the technology infrastructure and a courses portal through its Distributed Learning system (DLS), as well as a centralised support group of project managers, web publishers, multi-media developers, and instructional designers through Learning Technology Services (LTS). A good description of course development issues in this environment appears in Kenny (2001).

Overall, the University has had remarkable success, with a large number of successful online courses, and a number of programs being delivered fully online to new markets within Australia, and overseas including Vietnam, China and Africa. To build on current levels of success the university and its staff need an understanding of which underlying support structures and development models have been most

useful in making this possible, and why. While Sawers & Alexander (1998), and Kenny (2001), provide insights on centralised institutional approaches, others (such as Bates, 1999; Anderson & Downes, 2000) identify a variety of models and organisational factors, and strategies for dealing with them. In this paper we explore one fundamental methodology for encouraging the engagement of all staff in online development and delivery of courses in a decentralised environment.

The "all-in" principle

What distinguishes the RMIT online approach from many other approaches is its scale. Participation is not optional, and perhaps, it should not be. Early feedback suggests that students are expecting a web presence for all courses, and that it is a case of one in all in. Staff who do not distribute material through a web–site will come under pressure to do so. This does not mean that all courses must be fully online, in fact, just as the students are vociferous in their demands for online material, they are equally vociferous in demanding appropriate and sufficient face-to-face contact. "Fear by students that DLS will replace lectures and personal content" and "Updated and well maintained online support materials are appreciated." are cited in a Student Feedback Summary Report (2001). While an online presence is useful for all courses that we know of, there is recognition that the online presence may be very different for different courses, and there is a clear distinction between an online presence and fully online delivery.

The centralised LTS support group alone is unable to support more than the most valuable or strategic courses and programs, and the great majority of work needs to be done by academic staff within Faculties. Within the Faculty of Applied Science, one and a half equivalent full time staff are allocated to support online development. Their activities are limited to general support, such as the development of templates and methods, and specialist assistance, so a good deal of the development work falls to program teams and teaching staff within the Faculty. Hand picked teams, or special projects and out-sourced or fee for service development are not possible, even if they were desirable, and all academic staff need to be involved in online development and teaching. Consequently, online development and delivery must become an integral part of academic work, just like research, word processing, overhead slides, and e-mail. This requires the use of online development methods and support strategies that engage all staff, and that involve all staff in developing and maintaining their own courses, early and efficiently.

There are many barriers to the involvement of staff in online delivery (see for example McGovern et al., 2001). While there are a number of early adopters and enthusiastic staff, many others are reluctant to engage in online delivery, because they:

- do not believe in its value (see for example, Feenberg, 1999).
- are too busy to become involved in online delivery. Generally, resources are limited, and even courses and programs of strategic value to the University require considerable non-funded input by staff.
- do not have (or do not believe that they have) the skills to undertake online delivery. Staff from some disciplines and staff over the age of 45 may be less likely to use technology in their teaching (Lawlor, 2000).

If all staff are to be engaged in online course development and delivery then much simpler or agile methods and flexible approaches are needed. There may be risks in providing large resources to staff who are new to online delivery and, in general, it is better to allow them to explore the possibilities, rather than to commission large projects. An adequately robust management approach capable of providing successful online delivery and also able to meet University targets will need the following characteristics:

- The approach needs to be immediately helpful to students, and provide information and/or activities that assist with their learning.
- The approach needs to be evolutionary or iterative, so that staff can receive quick results and feedback.
- The approach needs to use resources efficiently.
- The approach needs to deal with a variety of initial and changing expectations and capabilities of staff.

This paper recognises the need for academics to adopt online teaching and learning materials through a process that fits in with their current work practice, melds with their university's strategic programs and meets the likely requirements of students. It offers an alternative to the project approach, which is often unsuited to the academic environment (Bates, 2000). The paper advocates an iterative or evolving approach to the development of online resources and courses, that allows incremental development and expansion of online delivery over a period of time.

An iterative multilevel approach

There is little guidance in the literature for a systemic multilevel approach to the development of online learning materials. This paper identifies five levels of development, each of which has its own management and resource requirement. It recognises that not all courses need to use online resources completely, all at once (with specific deadlines). The level chosen may be determined to best match the subject context, student needs, and a teacher's individual requirements, experience and resources. Each level has its own particular demands and meets different sorts of outcomes. Expectations differ accordingly. It is realistic that a university can expect to offer all of its courses with an online presence at a basic level and needs to put in place administrative and technological infrastructure and systems to achieve this. However, at the higher end of this online level scale the expectations need to be radically and realistically reduced. Application of resources need to become more targeted and a far more stringent pedagogical quality assurance process needs to apply (such as that described by Kenny, 2001).

The five levels provide staff with the opportunity for varying degrees of online involvement as well as a mechanism for sequential development. These levels can be traversed slowly, with several development iterations possible as the personal skills of the staff involved are enhanced, student demand increases and most importantly the learning needs of students are identified. In a sense, this is a true user-centred approach to online course design (Blythe, 2001), where the designer is able to develop their course in response to feedback from users. It is possible to fast track this process by adopting a project developmental process but experience has proved this to be costly and very risky, with results often below expectation; many universities have invested in expensive projects, only to find they fail, or fail to stand-up over time.

A 5-level Model
Figure 1 provides an overview of the Faculty 5-level model. The model is about staff and teaching support, and learning support. Each level of the model raises a number of issues regarding administration, technological support, pedagogy and skills.

Level 1 addresses university policy and administration of courses. It also deals with student expectations and how they manage themselves in a course or program. This allows students to come to university better prepared and organised. Courses and course content are more transparent.

Level 2 addresses course management systems and how they can be used with minimum technical complexity. The value of this level is in communication and availability of clear well-structured access to documents. This is the "pigeon hole" approach, or the online environment as noticeboard, photocopier and paper distribution system.

Level 3 deals with the conversion of lectures away from time-based chunks to more cohesive and coherent topics. Basic online teaching principles are adopted (for example, Driscoll, 2000). Discussion forums and strategies for taking the focus off the lecturer and developing peer- based formative assessment are incorporated.

Level 4 deals with the development of fully online courses. Learning objects (Oliver, 2001) are developed, and online-specific pedagogical imperatives are addressed. This sections deals with the necessity of having to confront the requirements of the completely online teaching and learning scenario.

Level 5 provides a media rich computer based resource, along with all its potential risks. Project management strategies are needed for successful outcomes. These expensive "bells and whistles" need to provide a good return on investment. The need for high-end commercial products, and for efficient and effective, quality-assured online distance based education drives the need to develop courses at this level.

The flow of development is depicted in the in Figure 1, below. Overlap between the levels is unavoidable and, being part of an iterative development process, it is possibly desirable. One example of this is seen in that independent learning objects developed for Level 5 may be adopted for use in one of the three higher levels in other courses. This enhances flexibility for staff involved in development, as advocated as a result of experiences within other projects, such as the CANDLE project (Earle, 2002).
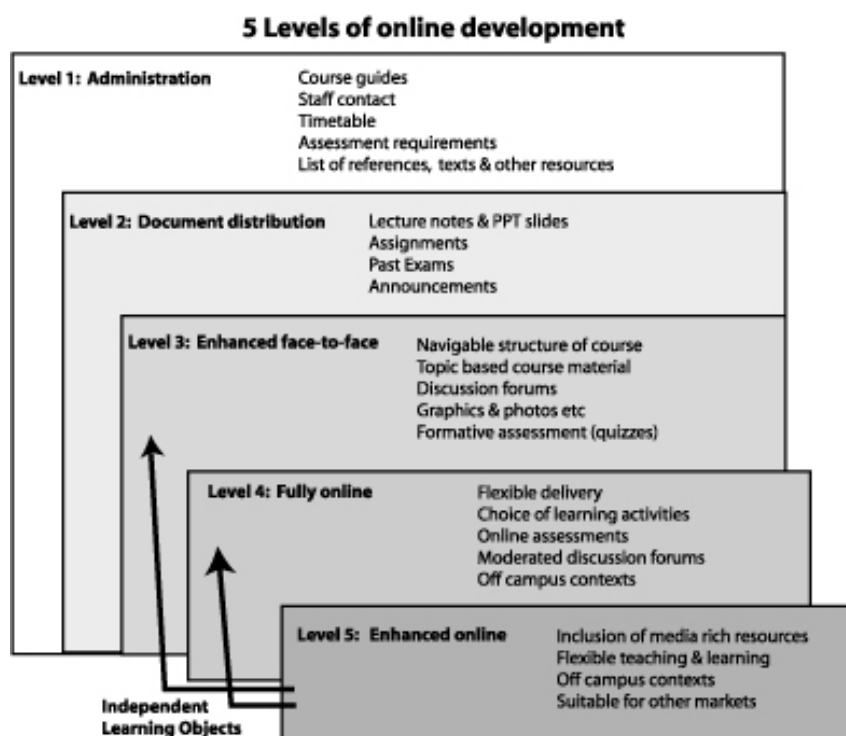
Figure 1: Development flow in the 5-level model

Level 1: The basic web presence
A basic online presence can be established through proprietary course management products such as WebCT and Blackboard, or more generic web-based approaches, which combine a number of different tools. The latter offer the greater flexibility and lower cost, but require more skills to use.

It is very important that students new to tertiary study be offered a clearly defined access point to useful information, with a consistent approach across various courses (Kennedy, Webster, Benson, James & Bailey, 2002). It is desirable that all of their courses be available online, and the new student should be able to expect the following from this online presence.

- Students are able to obtain an overview of their courses and get a clear picture of how the program they are undertaking is structured.
- Course information is provided for each course so that the student can have a clear picture of what he or she needs to do. If students can easily access comprehensive information before they start classes, then this may provide a smoother transition to tertiary study.
- Students can schedule and structure their own learning.

In addition, the content (syllabus, assessment requirements and resources list) of the course is available to be viewed by staff and other parties, such as program teams, so that:

- staff of the course teaching team, program leaders and administrators can view the course and learning materials in a more "transparent" way.
- the course becomes more of a shared resource. For example, content can be viewed by program teams, by potential students, as well as by lecturers who have to deliver a subsequent iteration of the course.

At the enterprise level technological and administrative processes need to be put in place to allow for the above with minimal effort. "Putting a course online" needs to be an automatic administrative process tied in with the same process that registers a subject and the administrative procedures of staff allocation and student enrolment. All of this coalesces into the one course management system, which the three stakeholders, students, teachers, and administration, can access. This simple process provides a wealth of information for students.

- It identifies the courses and places it within a context (what courses am I enrolled in – who teaches this course - how does it fit in to my program?)
- It identifies those staff who are responsible and may need to be contacted.
- It provides a syllabus, breaking the course into topics of content.
- It outlines the learning activities students are required to undertake.
- It provides details regarding assessment requirements.
- It provides a list of resources (text books, references, web-sites and contacts).

An advantage of this level is that suitably trained administrative staff can set up this online presence in consultation with the academic delivering the course. A further real benefit is that an online portal, with this basic, readily available information, can be easily extended to a Level 2 site, which focuses more on learning management.

Level 2: Lecture notes & announcements online
Level 2 extends Level 1 by including more detailed course material and course administrative functions. An obvious advantage of online publishing over printed materials is that content can be altered at any time. This makes the administration of the course very efficient. Students can be notified on a daily basis. Times, room changes and special events can be dealt with so that students can check the web site and be informed before coming on campus.

The web site can become the equivalent of the student and lecturer pigeon-hole and a course notice board. Lecture notes and other "handouts" can be distributed ahead of time; assignment details can be posted. This gives students the opportunity to come to a lecture prepared or they can access the notes after the lecture. When students have the opportunity to read through lecture materials prior to the lecture this can make face-to-face class discussion more meaningful and allows the lecturer to deal with specific problems rather than repeatedly making a broad informational sweep. The face-to-face experience is enriched by online supplementation.

The simple inclusion of external links broadens student access to information to more than one source and teaching style. In summary, this level includes the ability to add lectures notes, often as word-processed and overhead projector documents, without any search facilities, or navigational aids to assist student access; and to interact simply with students through e-mail and announcements.

The advantage of this level then is that lecturers can use the web site for their course as an administrative tool for themselves and their teaching team. Once again, suitably trained administrative staff can assist with its development and maintenance, for example, by uploading course documents in consultation with the academics.

Level 3: Enhancing face-to-face teaching.
This level extends Level 2 by enhancing the material, to include simple pedagogical principles and techniques. This can include the integration of self-review questions, including automated responses, and the abstraction of material using hypertext, so that it can be navigated or searched more easily. This level starts to address the web to directly support learning, and starts to open up the possibility of its use for fully online teaching.

The division between course or learner management and course content and resource material becomes clearer. The other consideration in regard to the relationship between face-to-face teaching and how it is supported online is the process used for translating lectures to the web site. This is often done on a temporal basis rather than by concept and theme. Often, when you open an online course you will find links to resources and notes organised around a weekly schedule of face-to-face lectures. At Level 3, content is addressed by topic, rather than by teaching schedule. The abstraction and disaggregation of course content can be the beginnings of the development of widely applicable learning objects (Oliver, 2001). Hence, the subject areas that would benefit most from student access online can be tackled first and a gradual conversion to online presentation can occur. The order and extent of this conversion is determined by the face-to-face teaching needs, both for the lecturer and the students, and can vary substantially between courses.

Level 3 is a natural extension of the previous level, as support for face to face teaching, since lecturers can use the online materials in their classes and take full advantage of lecture theatres with data projectors and internet connections. Students can also access the same material for review. However, this level can also support fully online learning. It is important to determine at the outset, what is required. The development of a fully online course needs a whole raft of project management procedures and quality assurance processes (Kenny, 2001). The benefit is that by developing while running the courseware in conjunction with face-to-face teaching, and presenting online courseware as required, then project management is easier and less critical. The main advantage is that the process fits in with current work practice, the academic retains greater ownership and allows for constant evaluation and adaptation. Development goes hand-in-hand with traditional delivery.

Level 4: The online course
There is a ready and willing market for fully online courses (Thornton, 1999). There are advantages for all types of learners (Cooper, 1999; Laurillard, 1993) and there are also advantages for the teacher as well as commercial advantages. The pedagogical principles that come into play at the previous level of online involvement become imperatives at this level. Because students will possibly be totally reliant on the effectiveness of the online course, it needs to be pedagogically sound, meeting all standards of what is increasingly being defined as "good practice".

It is at this level that various disciplines within the Faculty of Applied Science are adapting technology to support more active learning and constructivist approaches (for example see Lord, 1999; Ben-Ari, 2001). This work involves reorganising course materials so that the lecture program is presented as *topics*. Each topic may include the lecture notes, and will have additional descriptive and explanatory information as well as any graphic content developed for the previous level. Some topic areas will be better suited to delivery using online tools than others and a variety of student interactions can be selected from. Greater use of structured and moderated discussion forums and a comprehensive list of online resources are important additions, and past exam questions may be put online in the form of quizzes.

Time and resource management are necessary considerations at this level since the need to incorporate specific learning objects may require the use of multimedia producers, and during delivery lecturers will need to form an online communication relationship with every student.

Level 4 provides a quality assured, pedagogically sound online learning environment, which can be used to fully support students off campus. The advantage of the iterative approach advocated in this paper is that by the time a course and its resources have been developed to this standard it will have been proven along the way. Indeed if this process is undertaken the point at which a course can be said to be "fully online" may not ever be very distinct, as students may be already doing the course fully online well ahead of the university offering it formally as such.

Level 5: Media rich learning experience.
Level 5 differs from Level 4 in that it is enhanced to address specific learning audiences. With this approach complex (and expensive) resources can be targeted more effectively. This may include a high degree of interactivity, or techniques that exploit the visualisation capabilities of information technology.

The effort and cost of developing courses to this level requires that the content needs to able to be repurposed either as an entire course or through using its topics and learning objects in other courses. Often, it may only be components of a course that are developed to this level. With use of the topic-based approach separate online courses may be created from a number of these components. At this level the academics need to be prepared to give a substantial amount of time to developing their online course, and to its maintenance. The skill levels required (HTML editing, graphics and animation) necessitate involvement of development and support teams.

There is a need to avoid the "wish list" syndrome where lecturers are offered the opportunity to propose rather complicated online simulations and interactivities which inevitably have limited usage, prove to be too ambitious and not really of much practical use due to bandwidth, unresolved problems or poor quality (done too cheaply). A problem with this approach is that much of the development is bound up in one particular learning management style (Bain, McNaught, Lueckenhausen, & Mills, 1997). The online resource becomes the equivalent of the text book and just as we don't expect students to plough through a text book or a lecturer to teach completely to the dictates of one publication many rather costly multimedia products have had a limited relevance.

For effective distance education (which is essentially what this is) a great deal of consideration needs to be given to the interface and instructional design of the course. The elements of good online education being:

- a flexible approach to student learning mode preferences
- communication between students, and between students and supervising staff
- formative assessment with meaningful feedback
- clear learning pathways and outcomes
- distinct learning activities
- well structured course content

Although courses at this level are offered fully online they, also, may have a number of key face-to-face (such as student teams) activities where appropriate, or a block of laboratory sessions that potentially would be mandatory.

The benefit at this level of development is that the learning experience is more engaging. Real world simulations can be constructed to better support action learning and constructivist approaches. With careful programming, design and high quality production, a computer-based resource can meet a great number of learning needs, be used within many different contexts including commercial markets.

Implementation experience

The five-level approach has been gently developed and implemented over a number of years. A short guide has been prepared and made available to all academic staff. A Faculty flexible delivery forum has

been dedicated around the 5-level theme. At the "project" or course level, Faculty staff use this to assess and assist online development appropriately.

The University's DLS came into being at the start of 1999. By the close of 2000 the Faculty of Applied Science boasted 64 courses with an online presence on this system, although a number of them were later removed because they were unused and essentially just empty "shells". The Faculty online support and management group accepted and promoted a step-wise, or iterative, development mind-set during 2000, and later endorsed and adopted the five-level approach reported here during 2001. Since then staff within the Faculty have consistently created a new online presence on the DLS for a minimum of 50 additional courses per semester. Most of these courses have undergone iterative development over time and the experience can be summarised as follows.

- Very few courses remain implemented at Level 1.
  This is due partly to the lack of real system support for this level. Most of the required information exists, but has not been drawn together into a single on-line resource. As mentioned, creating empty shells generally does not encourage staff or students to use the system. Creating a Level 1 course requires a similar process and work as does creating a Level 2 course, and, once engaged in this process, most staff move directly to Level 2 courses by choice. This does not mean that Level 1 has been abandoned and, providing systems are in place to automate this process and to provide the basic information described above, it is a useful starting point in some programs and academic units.

- Most courses are at Level 2.
  In practice, this is achieved easily. Most staff now have highly developed notes or overheads in electronic form. These form the basis of most Level 2 sites, and by and large, the feedback from students is positive about these sites. Proprietary course management tools make it easy to create a simply structured course and to upload documents.

- There are many courses at Level 3.
  Level 3 courses have mostly developed from "chunking" or re-packaging of notes into HTML-based documents that allow search and navigation facilities for easy on-line access. The Faculty has made available a number of templates that support this type of web publishing and most of it is done with the assistance of web publishers who take annotated ("chunked") overheads or word-processed documents and convert them to HTML. While the web publishing task can be done by suitably trained staff, the "chunking" or structuring of information can only be done by teaching staff – often creating a bottleneck in course production.

- There are a small number of courses at Level 4.
  Level 4 courses include self-assessment facilities through RMIT WebLearn (an in-house developed, objectives-based testing environment). Discussion groups, integrated with learning management tools, are used extensively, and a considerable amount of effort is spent on creating and maintaining useful discussion forums. A successful example of such an approach is the Mathematics courses offered through Open Learning Australia (OLA).

- There are only a few courses at Level 5.
  Some of these have been developed from scratch as part of a University based strategic course renewal. This is a developing experience level. Because of the need for considerable resources, for development, delivery and maintenance at this level, the number and experience with their use is limited.

Overall, we have found some evidence that staff who engage with online development and delivery at Level 2, eventually continue onto at least Level 4, and arguably to Level 5. Generally, staff quickly move beyond Level 2, and the goal of providing an entry point for a wide range of staff capabilities, which can be extended, seems to be achieved.

Ultimately, our students must be the beneficiaries. Figure 2 below presents a summary extract of recent data gathered through university-wide surveys (Scarlett, 2002) and indicates the degree of engagement with online resources experienced by students in their programs. It is encouraging to find that 70% of the Faculty of Applied Science students rate their experience of using these online resources as "useful", although, with 39% finding it "frustrating", there is yet room for improvement.

Student Online Experience	Proportion of students using online activities and materials provided by their programs	
	University-wide (% of all respondents)	Faculty of Applied Science (% of all respondents)
How often did they use it?		
"Quite a lot" or "A great deal"	37	44
"Some" or "A little" or "None"	59	53
What did they do?		
Received announcements	45	56
Accessed lecture notes	65	75
Completed quizzes / surveys	26	44
Researched information	54	61
Communicated with		
lecturers/tutors	42	50
Discussions with other students	24	36
How valuable did they find it?		
"Useful"	56	70
"Engaging"	16	18
"Frustrating"	43	39

Figure 2: Student perceptions of their online experiences within programs.

In practice, the distinction is not completely clear between the levels in our 5-level model. Some courses have used discussion groups extensively, without using any other online resources. Others use RMIT WebLearn extensively for self-assessment by students doing an otherwise traditional face-to-face course. Some courses that we would call Level 2 are offered fully online. This 5-level, iterative approach is the subject of evaluation by ASSETT, but early feedback is that it is a useful framework to engage staff, to provide useful resources for students and to improve the overall online development and delivery capabilities of staff of the Faculty.

Conclusion

The challenge for many universities is to provide quality on-line support for a large number of courses and programs with little additional resources. To employ the required number of instructional designers, web publishers and multi-media developers is not practical. The approach here is to develop academic staff skills along with their courses, and to give academic staff a stake in the development of such courses. The 5-level approach described in this paper has been applied within the Faculty of Applied Science over the last 2 years. The approach has been found to be useful and has contributed in part to the Faculty's success in improving staff capability and attaining its on-line delivery success. In the words of a previous Vice-Chancellor – "There are no points for promising, only for doing". By engaging staff early at basic levels, the Faculty has been able to provide a portfolio of on-line courses, which are useful in their own right, but are also the basis of enhanced, improved courses.

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