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ABSTRACT

Many tertiary institutions in Australia provide support to develop online teaching and learning resources, an environment characterized by demands from students for quality face-to-face and distance education, staff concern over workloads, institutional budgeting constraints and an imperative to use management systems. There also remains a legitimate focus on using online learning to facilitate new learning strategies within a complex social setting. This paper presents an extended instructional design model in which the development cycle for online teaching and learning materials uses a scaffolding strategy in order to cater for learner-centered activities and to maximize scarce developer and academic resources. The model also integrates accepted phases of the instructional development process to provide guidelines for the disposition of staff and to more accurately reflect the creation of resources as learning design rather than instructional design. (Author)

E-Learning Development in Higher Education: Maximising Efficiency – Maintaining Quality

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Abstract

Many tertiary institutions in Australia provide support to develop online teaching and learning resources, an environment characterised by demands from students for quality face-to-face and distance education, staff concern over workloads, institutional budgeting constraints and an imperative to use management systems. There also remains a legitimate focus on using online learning to facilitate new learning strategies within a complex social setting. This paper presents an extended instructional design model in which the development cycle for online teaching and learning materials uses a scaffolding strategy in order to cater for learner-centred activities and to maximise scarce developer and academic resources. The model also integrates accepted phases of the instructional development process to provide guidelines for the disposition of staff and to more accurately reflect the creation of resources as learning design rather than instructional design.

Introduction

Teaching and learning in tertiary education has shifted over the past two decades to an environment where technology is a significant component of the overall infrastructure and the skills and credentials of both teachers and learners are crucial to enable them to work effectively with collaborative, online activities. While many teachers have embraced these new environments and take responsibility for the development and delivery of resources, many other academic staff rely on central support units to provide expertise in both curriculum design and strategies for online teaching and learning. It is this latter group of people to whom this paper is specifically directed, although the concepts will also have ramifications for all online development.

As leaders of support units in two Australian universities, one Faculty-based the other University-wide, we find that academic staff often have too little time or too few skills to maximise the benefits of online learning. At the same time our institutions, like many others, are emphasising the role of enterprise-based Learning Management Systems. Within this environment, our roles involve the design and development of online teaching and learning resources within tight timeframes and institutional constraints, which often force the units to be in a 'responsive or reactionary mode' without proper and significant long term planning. This can result in *just-in-time* delivery packages rather than more preferable long-term *rollouts*.

This short paper speculates on extending the way in which instructional design strategies are applied to educational resource development such that that production efficiency can be increased and the ongoing maintenance of online environments enabled. While instructional design and development processes integrate current good practice, the proposed variations from existing models are based on an extended approach to the development process conceptualised in three discrete phases and the integration of professional development scaffolding to effectively align online teaching resources with learner needs and expectations. In essence, the model articulated provides a means to enhance the production environment for online materials while maintaining or even increasing quality by conceptualising the design and delivery environment within the iterative and rapid prototyping methods available through contemporary development systems.

Three Phase Design and Scaffolding

The general instructional design model (for example, Morrison, Ross & Kemp, 2001) typically prescribes the creation of resources, their implementation and delivery that is then followed by evaluation and improvement. Our enhancement proposes the initial creation of a fully functional prototype, which is then used for delivery, with the evaluation and improvement activities being integrated with scaffolding (support) for the teacher and learners to provide a dynamic teaching and learning environment in which resources or strategies can be developed or modified during the actual delivery stage. The need for scaffolding has largely arisen because of the rapid implementation of learning management systems, the increased used of online teaching and learning and the evolution of learner-centred educational paradigms (He rrington & Oliver, 2001).

Integral to this process is the notion of iterative development or successive approximations, with initial prototypes being built to *test the water* before completion of the entire course. In the first iteration learning environments are generally created to provide functional delivery with the necessary componentry for effective online teaching and learning. This can include the outputs of a preliminary needs analysis of the learning environment and resources that are *scaled to fit* the proposed teaching and learning context. However with the second and subsequent iterations, development can be enhanced with each generational change. In addition, the model is based on a team approach, bringing together the three main elements of course development in a more lateral manner. No longer is process driving the development, but the project itself (i.e. the course) is dictating the make up of the teams (a cross section of skills from educational design and production) in a much more targeted and effective manner. These teams ideally stay formed for the duration of the project, potentially over a number of semesters, with communication and collaboration between academic staff and developers a key focus.

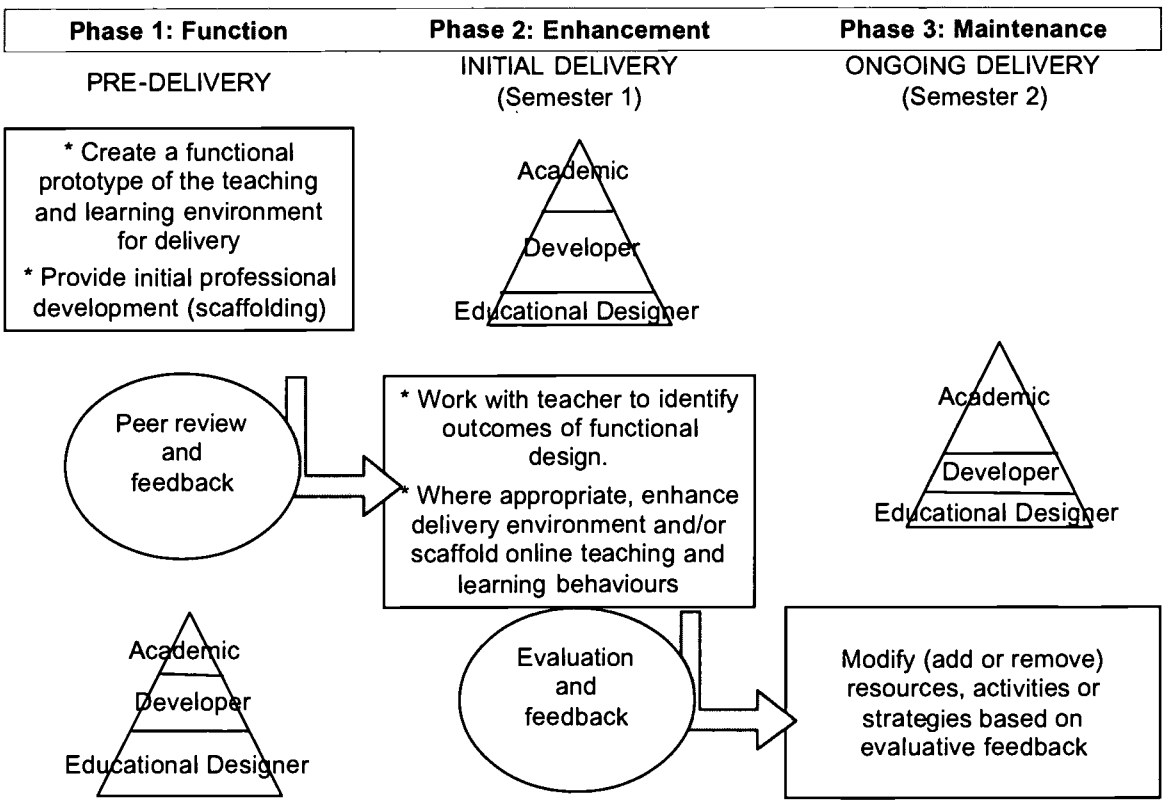

Figure 1: Three-Phase Design & Scaffolding

The model therefore reinforces both the team-based approach to the design and provision of resources as well as an *iterative* development process. One of the essential aspects of the model is the specification of *baselines* in levels that correspond to these iterations – the first relating to course functional and essential elements, the second to multimedia enhancement or interactivity and the third to ongoing maintenance. These iterations are identified within the strategy as three scheduled phases of development that integrate both a methodological approach to unit development, scaffolding and quality controls and assurance, as illustrated in Figure 1.

The triangles indicate the relative efforts of the critical members of the project team at each phase of the process, based on the influence model (Sims, 1997), which articulated the period at which factors had specific influence over the project. The allocation of resources to enable this process involves establishing "unit teams" whose commitment will vary according to the position of the unit in the development cycle, with expertise based on the varying requirements of the course. More importantly, within the context of our work environment, it is the allocation of resources for the duration of the project life that differentiates the model, as detailed in the following description of the phases.

Phase 1: Prototype Development

The aim of this phase is to design and create a functional teaching and learning online environment that will meet all learning outcomes as well as faculty teaching and learning strategies. The first phase therefore becomes easier or simpler than more traditional models of instructional design, as it is functional, and production does not try to complete a final package at the first attempt - the process can therefore be likened to enabling a "dress rehearsal" for both teacher and leaner. The process also involves specifying the *core items* for this phase, such as specific teaching resources (e.g. unit guides, study guides, readings), their mode of access (e.g. print, online) and the essential educational strategies (e.g. experiential, situated, learner-centred). In this way the academic who has minimal experience with online teaching and learning environments has an relatively easy introduction to the environment while knowing that ongoing support will enable the generational development of that environment.

An equally important aspect of this phase is the allocation of team members and their specific role within the project, which can be articulated in terms of:

- *The Support Team*: Providing the Educational Designer (responsible for educational advice and curriculum design), the Interactive Architect (responsible for ensuring the online interactions and communications are consistent with the design) and Information Analyst (responsible for ensuring all required learning resources and objects are available). In addition, Project Management support will be required

- *The Faculty Team*: Allocating the Content Specialist(s), who are responsible for ensuring all necessary content is defined and that all learning outcomes, learning activities and assessment tasks are defined. In addition, a commitment to the schedule and baselines/guidelines is critical.

In addition, an Online Developer, Network Specialist and Technical Specialist will both advise and be advised on required and/or appropriate learning environments. As an extension to the triangular concept indicated in Figure 1, the detailed representation of *influence* (see Sims, 1997) is elaborated in Figure 2 for each of the perceived roles, where the apex of the triangle or polygon represents the phase in the development cycle at which that team member will have most influence. In this illustration, the different skills are also aligned with a particular unit - Support representing the central unit within the institution that provides educational advice and development services, Faculty representing the knowledge based to be provided from the teaching unit and IT representing the potential need for highly specialised network and programming expertise. In addition, these teams will also link across the various phases as the *courseware assembly* process progresses.

Another aspect of the concept of *influence* is that members of the development team are understood to have potential levels of influence at any stage of the development and delivery process, although that influence will be affected by the current status of the project. For example the Interactive Architect, who has the main responsibility (influence) for creating the design specifications, may also be active in the quality review of the project as it nears completion. An important concept underpinning this model is that, like actors in a play, the

team members all have roles to play and particular *scenes* or *acts* within that process will require their leadership. But they can also have smaller, but by no means unimportant, roles throughout the whole development, delivery and maintenance cycle.

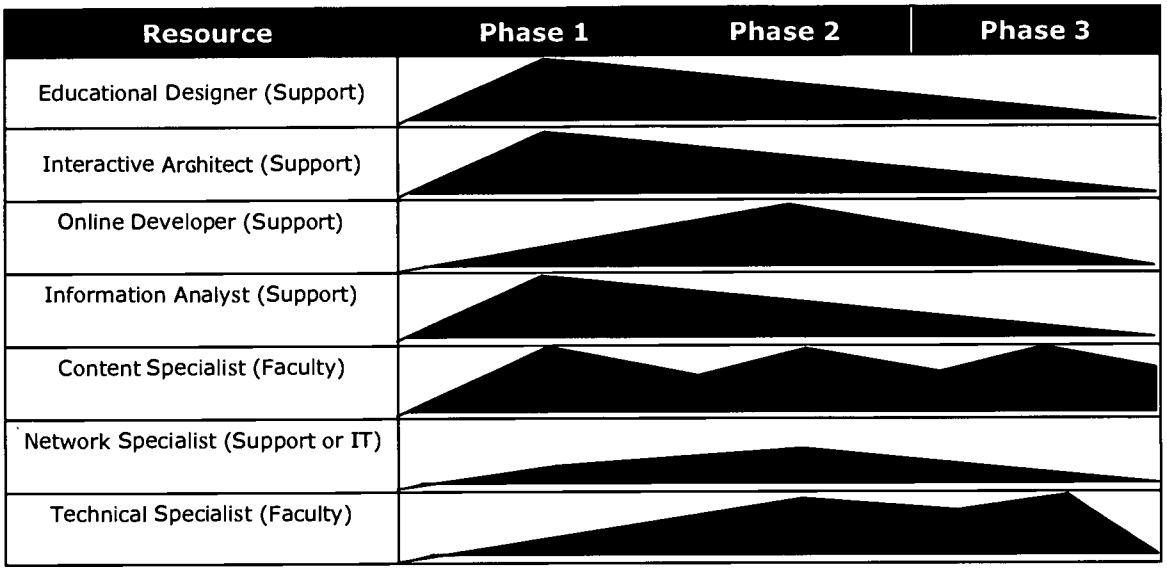

Figure 2: Influence of Team Members During Project Life-Cycle

Phase 2: Evaluating and Enhancing Delivery

The second phase is conceptualised to take place during the delivery of the unit, with feedback from both teachers and learners used to modify and enhance the delivery environment. This may include the introduction of content items and enhancement of teacher:learner, learner:content or learner:learner interaction conditions (cf Sims, Dobbs & Hand, 2001). It is also an opportunity for teachers to work in a scaffolded environment to maximise the effectiveness of online environments, where the efforts of both teacher and learner can be evaluated and the delivery environment enhanced on the basis of that evaluation. This process also allows for clearer scheduling of resources and consequently planning, production and workflow processes.

This phase will require a *team-based* approach to delivery combining, where appropriate, both academic and technical staff in two discrete components. The first requires more technically-oriented teams to "shadow" the delivery of the unit materials defined and created in Phase 1 to both assess their efficacy as well as integrate additional content, interactive learning objects and collaborative activities. The second includes the provision of targeted professional development or scaffolding on an "as required" basis for all participants in the learning process. Overall, this phase emphasises generational changes with an increased emphasis on the production (completion) of resources, with the students or learners having the role of research or evaluation assistants. There is less emphasis on handover, and more emphasis on *duty of care* through the availability of sustainable course materials and teaching resources.

Phase 3: Maintenance

Following completion of the course of study, additional modifications and enhancements are prescribed and implemented for subsequent delivery. The unit would then continue in "maintenance mode", involving ongoing support and training, until it undergoes a more formal review. Again, the important concept underpinning this model is that the original functional system developed will always be subject to change and that any development environment must cater for resources to be available for the duration of the life-time of a course (or

unit) of study. Within tertiary institutions this can be as long as five years, the time between a unit's conception and its formal review for reaccreditation. However, the sustainability of the course is catered for by the continual process of gathering and incorporating evaluation data.

The success factors will depend not only on the concept being accepted but also for academic staff, students and the development team to reconceptualise their roles in the design and delivery of online educational resources. For teachers there is the option to collaborate with an online development expert while delivering the course to implement modifications based on student feedback; for learners there is the opportunity to contribute to both the content base and the educational strategies

In Figure 3 following, a sample model is provided to demonstrate how the model may be implemented over a three-year cycle, with the assumption that units of study are delivered on a semester basis.

<table>
<tr><th colspan="2">2002</th><th colspan="2">2003</th><th colspan="2">2004</th></tr>
<tr><td>S1</td><td>S2</td><td>S1</td><td>S2</td><td>S1</td><td>S2</td></tr>
<tr><td rowspan="3">prepare materials for S2/02 units</td><td>deliver S2 units</td><td>deliver S1 units</td><td>deliver S2 units</td><td>deliver S1 units</td><td>deliver S2 units</td></tr>
<tr><td>shadow and enhance S2 units</td><td>shadow and enhance S1 units</td><td>shadow and enhance S2 units</td><td>shadow and enhance S1 units</td><td>shadow and enhance S2 units</td></tr>
<tr><td>prepare materials for S1/03 units</td><td>prepare materials for S2/03 units</td><td>prepare materials for S1/04 units</td><td>prepare materials for S2/04 units</td><td></td></tr>
<tr><td></td><td></td><td>evaluate s2/02 units</td><td>evaluate s1/03 units</td><td>evaluate s2/03 units</td><td>evaluate s1/04 units</td></tr>
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Figure 3: Implementing the Plan

Conclusion

Higher education in Australia is changing and to meet these changes and challenges innovative models for academic support are required. The model proposed in this paper articulates an enhancement to traditional instructional design processes where specific aspects of development and delivery are viewed in parallel rather than in sequence. Instead of a development team watching delivery of resources remotely, it is proposed that, where feasible, members of the development team actively participate with both teachers and learners in the delivery process. In this way support or scaffolding in the form of professional development can be provided on an *as required* basis while technical specialists can implement modifications to both content and pedagogy.

The value of this model can therefore be realised through the innovative ways in which it conceives the development process as *develop baseline – implement/evaluate/develop – maintain/evaluate* rather than the more traditional process of *design – develop – implement – evaluate*. The model provides an holistic framework consisting of long-term development teams, course templates, design and delivery standards and specified delivery platforms. The development of course materials is therefore not a short-term production process but a long-term collaborative process by all.

Based on this analysis we believe the benefits to teaching and learning in higher education will include the following:

- it can be a *try it and see* approach, where the first phase enables strategies to 'test the water' so initial budgets aren't blown out in expensive experiments, as has been evidenced in many multimedia projects;

- funds can be allocated across more projects for a longer period of time, such as towards second iteration enhancements that really target the learners and are appropriate to the learning environment; and
- course design in this development model includes both teacher and learner feedback and is enhanced incrementally to match learner needs.

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