CONTINUOUS IMPROVEMENT THROUGH SHARED UNDERSTANDING: RECONCEPTUALISING INSTRUCTIONAL DESIGN FOR ONLINE LEARNING

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Abstract

Many Australian tertiary institutions provide support for academic staff in the design and development of online teaching and learning resources, often employing a centralised unit staffed with educational and instructional designers, multimedia and online developers, audio/video producers and graphic artists. It is not unusual for these units to have evolved from print-based distance education providers and consequently the design and development processes inherent within those units are often steeped in 'traditional' sequential instructional development models. We argue that these models are no longer valid for effectively working with academic staff given the dynamic nature of online learning environments and the diversity of skills to implement effective online learning. This paper therefore 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. It is a model that builds on instructional design processes and integrates concepts of team-based development, shared understanding and the development of relevant communities of practice.

Keywords

Continuous improvement, Shared understanding, Instructional design, Academic professional development, Communities of Practice, Scaffolding, Online learning

Introduction

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. Our operations have also been characterised by scope or specification documents that are prepared with limited consultation time with the academic staff member, resulting in the delivery of learning resources that may not align with all the requirements of the teaching and learning environment. We believe a more preferable environment is one where of phased implementation and longer-term *rollouts*, where the academic and development team develop an ongoing partnership.

Another factor impacting on our work is that 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 also have ramifications for all online development activities.

An important component of our argument is that the processes and resources applied to the development of online teaching and learning resources must be consistent with the institutional framework, the teaching and learning environment and the technological infrastructure. Within our two institutions, this is typically 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.

In addressing these issues, this paper describes an enhanced instructional design model such 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.

More importantly, the development of teams who focus on shared understanding can also provide the foundation for the establishment of "communities of practice" where the shared learning and interest of its members keep it functional (Wenger, 1998).

Critical Factors

Instructional Design

An important foundation for presenting our arguments is that the overall process of Instructional Design and the associated methodologies are now exposed to more public criticism and scrutiny. The early instructional design models (for example Dick & Carey, 1996) propose a cyclical model in which the instructional resources are designed, developed, implemented and then evaluated, leading to subsequent modifications and redevelopment. 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. More recently, new models have been proposed that present the critical elements of the design process using different perspectives and at the same time, the overall process (Syrtis, 2001).

However as early as 1992, the rigid methodology of Instructional Systems Development (ISD) methodologies were challenged in a mock trial of ISD (Sims & Spannaus, 1992). More recently, the efficacy of ISD was again challenged with four charges (Gordon & Zemke, 2000):

1. **It's slow and clumsy**: applying ISD methodologically results in it taking too long, costing too much and by the time its complete, the training opportunity has passed by.
2. **There is no science of ISD**: "The beginning of the end was when universities developed curricula to produce PhD's in ISD. The whole thing became process-driven rather than results-driven" (Gordon & Zemke, 2000, p 49).
3. **Used as directed, it produces bad solutions**: frequently, great training programs are not created by someone schooled in ISD and following the process.
4. **It clings to the wrong world view**: even if we did understand the most effective ISD process, it is unlikely people would follow those steps.

While there are arguments for and against these charges, they are consistent with our experience in developing online teaching and learning environments within the tertiary education sector. More importantly, we must continue to challenge the relevance and currency of any processes associated with the creation of educational resources to ensure that how we go about their development must align with institutional expectations, contemporary pedagogies as well as available resources and skills.

Academic Professional Development

For the academic new to online learning, maximum exploitation of the online environment means having to reassess the overall approach to the content, how it should be presented or accessed and the relationship between teacher and learner in that process. In addition, the options for unit or course content should be considered in terms of the interaction with the major design issues and their impact on the learning community (Sims, Dobbs & Hand, 2002).

Competencies of academics is such that many do not have the skills to work online and therefore require support to assist in the transfer of good classroom practice to good online practice.
Continuous improvement - scaffolding - academic + student

Team-Based Approaches

A third factor that informs our model is a team-based approach to the development process that encompasses regular and frequent communication and a commitment to maintaining a shared understanding of the development outcomes. These elements are emphasised by Syrtis (2001) in proposing the concept of "lean teams" in the context of "concurrent instruction design", where different elements of an instructional development project are worked on simultaneously by different teams, with communication being the binding element between those teams.

A significant difference between their model and that proposed is the environment; ours is characterised by an often distinctive gap between the academic and the developer, whereas that described by Syrtis (2001) is more typical of course development within a corporate training setting. Nevertheless, the critical component is that teams of people working towards a common goal are integral to the success of online development projects.

Enabling Success

The environment in which we operate is one in which academic staff are continually being challenged with new teaching and learning paradigms, often implemented as a result of modifications to institutional strategic directions to counter broader national and global competition. Currently, these paradigms are often inextricably linked to online learning environments and complex learning management systems and academic staff not only have to adapt to new ways of thinking, they must also develop an understanding of the knowledge provided by educational design support. At the same time, once-accepted instructional design models are facing increased scrutiny for their relevance to contemporary development environments.

Consequently, the role of our support units face the challenge of providing advice to academic staff relating to effective online teaching and learning strategies and monitoring the development of resources to support those strategies. At the same time this must be achieved with limited resources and predetermined time-frames for delivery. It is in within this context that we have developed the Three-Phase Design (TPD) model that incorporates appropriate scaffolding to develop the skills of academic staff as well as focus on a continuous improvement model that is consistent with the work environment of academic teachers.

A Three-Phase Design Model

Our enhancement to the traditional instructional design process focuses on the creation of functional course components, which are 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 (Herrington & 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.
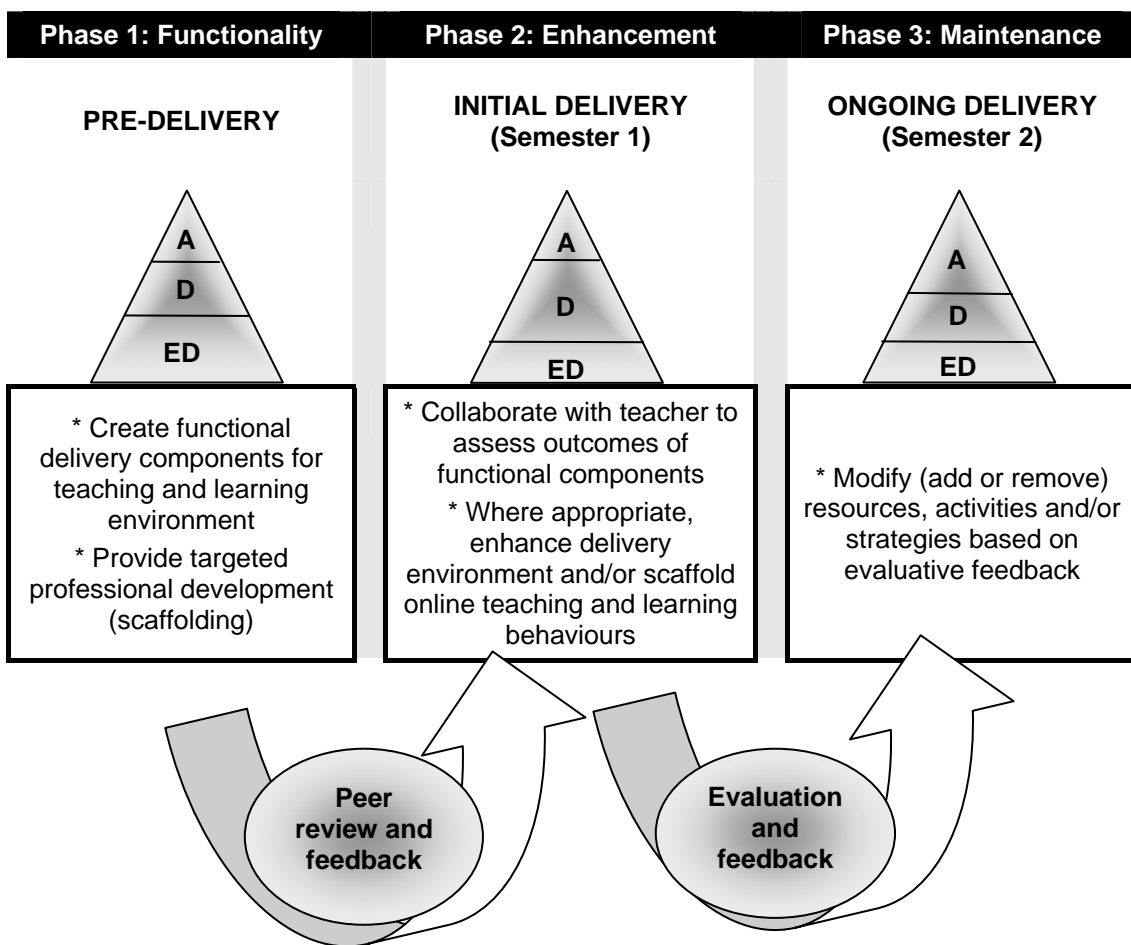
Phase 1: Functionality	Phase 2: Enhancement	Phase 3: Maintenance
PRE-DELIVERY	**INITIAL DELIVERY (Semester 1)**	**ONGOING DELIVERY (Semester 2)**
A / D / ED	A / D / ED	A / D / ED
* Create functional delivery components for teaching and learning environment * Provide targeted professional development (scaffolding)	* Collaborate with teacher to assess outcomes of functional components * Where appropriate, enhance delivery environment and/or scaffold online teaching and learning behaviours	* Modify (add or remove) resources, activities and/or strategies based on evaluative feedback

Peer review and feedback

Evaluation and feedback

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 components, 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.

An important feature of this model is the distribution of resources (A - Academic; D - Designer; ED-Educational Designer) at each iteration. The outcome of our continuous improvement paradigm is to enable the academic to become an independent designer and developer, through the maintenance of online content, over a period of time. However, it is also assumed that the Designer and Educational Developer would maintain contact with the project over a period of time.

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.

The process therefore that we are implementing is one which aligns the development process with the *modus operandi* of the academic staff is to stagger the creation of online materials over a number of delivery cycles and to work with the academic and users (learners) during actual course delivery. This process has three discrete phases: first, environments are established to provide fully-functional online teaching and learning components; second, subject to feedback from the teacher and learners modifications are made to the environment; and third, these environments are monitored and maintained for quality. To maintain the communication it is essential that the teams, as far as possible, remain cohesive for the long term, meaning that the initial shared understanding is developed and builds into a long-term confidence and rapport where trust between players is the key to ongoing effectiveness of the resources.

Phase 1: Prepare Functional Components

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.
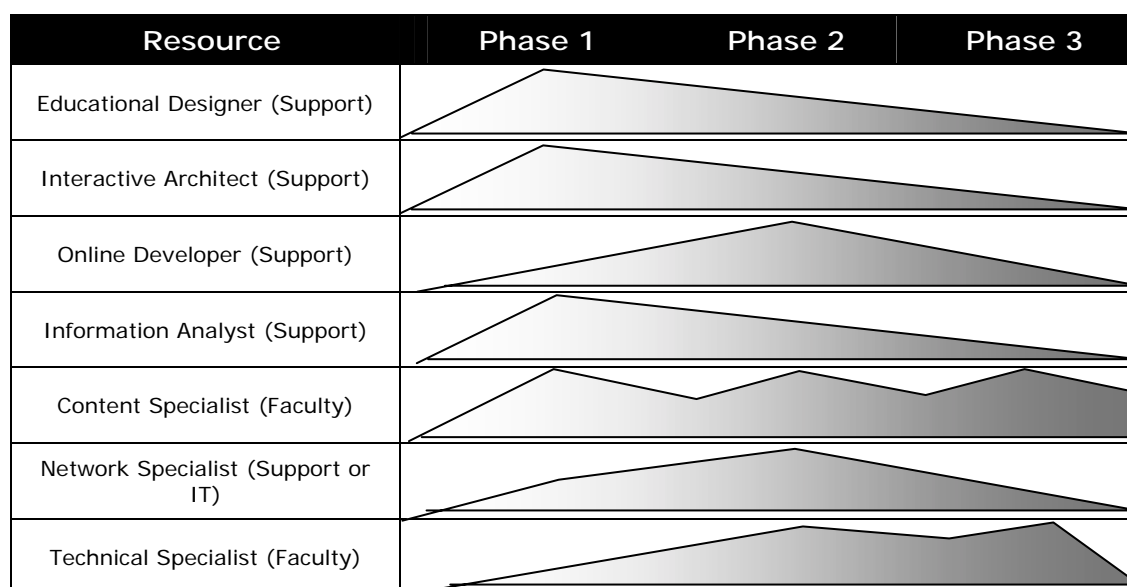
Resource	Phase 1	Phase 2	Phase 3
Educational Designer (Support)			
Interactive Architect (Support)			
Online Developer (Support)			
Information Analyst (Support)			
Content Specialist (Faculty)			
Network Specialist (Support or IT)			
Technical Specialist (Faculty)			

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

Phase 2: Evaluate, Elaborate and Enhance

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 (Sims, Dobbs & Hand, 2002). 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.

Both our work units focus on three discrete sub-teams within the instructional development cycle - the *development support* team, the *faculty* team and the *user* team. Each of these has a critical role that can only be performed effectively when the complete team has a shared understanding of its purpose and goals.

Within the development team we identify a major player as the *Educational Designer*, responsible for educational advice, curriculum design and strategic decisions for the instructional design; in addition, their role often encompasses project management and team leadership, even if a tacit implementation. The educational design role also typically coordinates other members of the development support team, specifically focusing on courseware development processes and maintaining interaction and rapport with the content or Subject Matter Expert (SME). We also identify other players in the development team such as the *Interactive Architect*, responsible for ensuring the online interactions and communications are consistent with the design; the *Information Analyst*, responsible for ensuring all required learning resources and objects are available and *Online Developers*, *Network Specialists* and *Technical Specialists* who have responsibility to both advise and be advised on required and/or appropriate learning environments.

The second major group is the *Faculty* or Subject Matter Expert team, academic staff from the teaching unit who are responsible for ensuring all necessary content is available and that all learning outcomes, learning activities and assessment tasks are defined. In addition, this team must have a commitment to the project schedule and organizational baselines or guidelines. We contend that it is the relationship with and shared understanding between the Development and Faculty teams that are critical to the ultimate achievement of project goals - on target completion of project deliverables and learning outcomes being realised.

The third set of participants essential for our projects are the *User* team or "try-out" learners, who have a major role in assessing the quality of the design process and communicate their evaluation data back to the development team. Where possible, this group would trial an initial prototype of a 'learning episode' created by the SME (Subject Matter Expert) and development team and provide feedback that can then be incorporated into the design.

It is by developing and building effective communication paths between each of these three groups that a shared understanding of the project goals and learning outcomes can be established. Without this rapport being active, we have found that educational quality and the effectiveness of online teaching and learning environments are compromised.

Phase 3: Maintain

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.

2002		2003		2004	
S1	S2	S3	S4	S5	S6
Prepare materials for S2 units	Deliver S2 units	Deliver S3 units	Deliver S4 units	Deliver S5 units	Deliver S6 units
	Shadow and enhance S2 units	Shadow and enhance S3 units	Shadow and enhance S4 units	Shadow and enhance S5 units	Shadow and enhance S6 units
	Prepare materials for S3 units	Prepare materials for S4 units	Prepare materials for S5 units	Prepare materials for S6 units	
		Evaluate S2 units	Evaluate S3 units	Evaluate S4 units	Evaluate S5 units

Figure 3: Implementing the Plan

Communities of Practice

Building Shared Understanding

In conceptualising this environment we are modelling our expectations on the concepts of communities of practice and learning as a social system (Wenger, 1998), encouraging all participants on the online development environment to actively contribute and participate. In this context, our community of practice integrates the three dimensions identified by Wenger (1998): it is a joint enterprise understood and continually renegotiated by its members, a mutual engagement that binds members together into a social entity and a shared repertoire of communal resources.

Within our work environments we have identified three main elements of developing the required level of communication and good working relationships between the academic content provider and the project groups - identifying clients, providing leadership and building rapport. It is critical for us to establish who communicates with the content expert (the academic or sessional staff member) as practice has shown that one major hurdle is to elicit the appropriate content within the timeframe prescribed by the project plan. While we can establish formal mechanisms for the content material being provided, we have found that it is the informal conversation with the academic that elicits 'clues' by which the educational designers and producers can interpret the intent of their desired teaching and learning environment for subsequent inclusion of narratives, illustrations or activities.

The trick behind developing this rapport is for the acsdemic to have the confidence that the Educational Developer and Interactive Architect are able to translate their concept into an effective online environment. This informal but important connection between team members is often fostered through the use of synchronous online technologies such as ICQ, enabling dialogue around certain current aspects of courseware development. For example, between the instructional designer and multimedia creator during the 'construction' of an interactive model, which enhances the opportunity for shared understanding of the product and its intent.

Maintaining Communication

The success of this shared understanding requires all members of 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. For educational designers and media producers, there is the opportunity to learn more about each others' work.

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.

Success from developing a culture of shared understanding will require all members of the development team to reconceptualise their roles in the design and delivery of online educational resources. For teachers it is the option to collaborate with an online development expert while delivering the course to implement modifications based on student feedback. For learners it is the opportunity to contribute to both the content base and the educational strategies, and for educational designers and media producers it is the opportunity to learn more about each other's work.

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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