

## INFINITE POSSIBILITIES, FINITE RESOURCES: THE TECHBC COURSE DEVELOPMENT PROCESS

TRACEY LEACOCK  
[leacock@techbc.ca](mailto:leacock@techbc.ca)

HASSAN FARHANGI  
[farhangi@techbc.ca](mailto:farhangi@techbc.ca)

ALICE MANSELL  
[mansell@techbc.ca](mailto:mansell@techbc.ca)

KAREN BELFER  
[belfer@techbc.ca](mailto:belfer@techbc.ca)

The Technical University of British Columbia  
2400 Surrey Place, 10153 King George Highway, Surrey, BC V3T 2W1  
Canada

### ABSTRACT

While many models exist for the development of university curricula, ultimately the key decisions are dependant upon time, people and tradition. This paper examines the innovation made possible when tradition is removed from the equation by presenting a case study of the course development process at The Technical University of British Columbia, Canada's newest university.

### KEY WORDS

Curriculum Development, Collaborative Knowledge, Quality Control

### 1.0 INTRODUCTION

As institutions respond to the demands to make educational materials more accessible, there is a need to look for efficient, scalable methods of developing large numbers of courses – often in new formats and using new technologies – while continuing to meet high pedagogical standards. To accomplish this on an enterprise-wide level, an institution must develop a culture that nurtures the use of technology in educational delivery.

Online education is one way to make courses more accessible to many learners, but the development process and learning activities used in this approach vary significantly from the more traditional face-to-face lecture approach. Institutions such as The Open Learning Agency in Vancouver (OLA) and Athabasca University, each of which began with a distance education focus, have embraced the possibilities of online learning and have established track records of developing and delivering successful online courses [1, 2]. However, in some cases the development of a new online offering can be a significant undertaking even in institutions with a history of providing accessible courses.

Because of the differences in approach and the barriers and risks posed by any new technology, many institutions opt for an individualized or small-scale approach to ease into online education. Although this approach can lead to

excellent pilot courses, the individual attention each “experiment” receives can make the prospect of applying the same approach across an entire institution impractical.

Institutions that support the investigation and application of new technologies to education typically provide some support so that lone faculty members do not have to create entire courses in isolation. The University of British Columbia (UBC) and The British Columbia Institute of Technology (BCIT), for example, have an application process through which faculty members request permission and funding to create online or hybrid courses [3, 4]. If the project is approved, faculty are released from teaching duties and, essentially seconded to a special department where they work closely with a variety of online education specialists, often for a year or more, to develop a single course.

This approach has certain advantages. It ensures that courses are not converted to an online format without a clear idea of the benefits of the new format and how to achieve them. It ensures faculty have the time to work on development and are surrounded by an experienced and knowledgeable team. Finally, it allows adequate time to try various approaches before deciding on the best one.

Unfortunately, there are also some drawbacks to this approach. A rigid proposal and approval process can be a deterrent for those who are new to online development or unsure of their technical skills, and it can create a lot of administrative work when applied on a large scale. Releasing faculty from their teaching duties is also problematic when done on a large scale. Finally, a prolonged development cycle of a year or more is not scalable and increases both the costs and the likelihood that either the content or the technology will be out of date by the time the course is ready to run. Although this approach can work well for a small proportion of an institution's offerings and can be beneficial in the early stages of moving to online delivery, it spreads the culture of online learning very slowly, and it is impractical for institutions that have made a global commitment to offer online versions of all courses in a relatively short time.

TechBC also provides support to developers, but with

a somewhat different approach. Although TechBC is in the unusual position of not having a legacy of courses to *convert*, we are also in the position of starting with a mandate to offer significant online components in 100% of our courses. We have developed and implemented a process that is applicable across the whole institution and that ensures quality results. This process may provide a useful model for other institutions interested in creating a highly scalable, self-perpetuating means of developing online courseware.

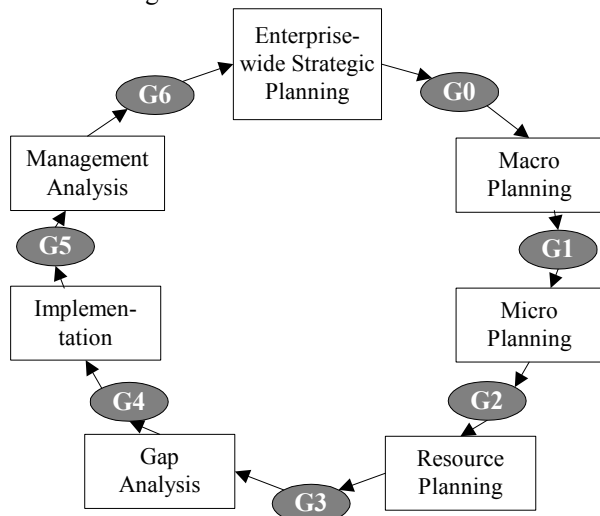
## 2.0 THE TECHBC WORKFLOW TOOL

TechBC is a new hybrid university that is committed to exploring the use of technology to enhance innovation and access in education. Although many of our courses have a face-to-face component to facilitate collaborative, team-based activities, all have significant online components. Because we must develop our entire programs from ground zero, within strict timelines, and because many of our developers are new to online courseware, we needed to create a structured and highly supportive environment in which to foster development activities.

Given our limited resources, in terms of both people and time, this challenge required an innovative approach to the development process. In response, we have developed an enterprise-wide program planning tool for the development of academic programs, known internally as the TechBC Workflow Tool (TWT).

TWT recognizes four distinct phases in the development of academic programs: planning, resourcing, implementation, and analysis. Figure 1 identifies these phases as a series of Gates. Each Gate represents the completion of a series of tasks and produces outputs that feed downstream into subsequent Gates.

Figure 1. TechBC Workflow Tool.



The planning phase includes Gates 0-3. The tasks leading up to Gate 0 determine the overall objectives and strategic directions for the next round of development. Gate 1 translates the university's strategic objectives into an enterprise-wide macro plan for academic programs and instructional systems. Gate 2 articulates the macro plan into a series of constituent detailed plans that specify the modules to be developed.

Gate 3 forms a bridge to the resourcing phase by determining what resources are needed across the organization to implement the plans. Gate 4 then determines the incremental resources needed to implement the plans.

This information is fed to the operational phase, Gate 5, which deals with the implementation of projects, including recruitment, infrastructure setup, and development and delivery of courses. Gate 5 activities will be the focus of this paper.

Finally, Gate 6 assumes responsibility for the coordination, supervision, and analysis of the entire process. The results of the Gate 6 analysis are fed back into Gate 0, thus completing the loop.

## 3.0 THE WINTER 2001 DEVELOPMENT PROCESS

Between January and April 2001, we were faced with the task of developing 89 undergraduate and graduate modules, while delivering first- or second-time offerings of our lower division modules. (TechBC operates on a modular system; three TechBC modules are roughly equivalent to one course in a traditional system.) To complete the development component of this task, we had a complement of 19 faculty and 14 Learning Support Associates (LSAs are non-faculty learning staff who hold graduate degrees and contribute to module development and delivery). Most of these developers also had concurrent delivery responsibilities.

The process we implemented for the Winter 2001 term has several key aspects, some of which are found at many institutions, and some of which are more specific to TechBC. These include: tight deadlines, limited resources, significant online components in all modules, pre-defined delivery models, and the use of a cluster approach to development. The following sections detail how we dealt with the challenges in ways that encouraged faculty participation and professional development and that ensured our learners would have access to high quality educational materials.

**Tight deadlines.** Faculty delivery and research commitments change with each academic term, so the development process has been designed to coincide with this four-month cycle. This has the advantage of ensuring

that current development loads don't infringe on new delivery loads, but it also means that developers are faced with the challenge of researching, designing, and authoring innovative modules (that often don't exist anywhere else), in a very short timeframe. Our process is designed to ensure that all modules have a degree of interaction and that the web presentations are not merely on-screen textbooks. However, as our first priority is the development of pedagogically sound modules, some of the added features that an online environment enables have been delayed for the time being so that we can meet the immediate needs of our learners. We're building the lifeboats first – the luxury yachts will come later.

**Limited resources.** As a new institution, we are in the process of building our faculty and learning support resources. We must balance the requirement to hire more learning staff with the need to ensure that they are prepared to support our approach to education and the need to grow the program areas in an integrated and balanced way. We expect to double our enrollment each year for the next three years. This means that recruiting, hiring, and training enough new faculty and learning staff to meet the growing demands, while retaining existing, personnel will be a challenge.

A faculty member's load is normally six modules (equivalent to two courses) per term. This usually includes a combination of development and delivery commitments. On the delivery side, most faculty will be delivering brand new modules – and dealing with all the adjustments that are an integral part of any first time offering. On the development side, many of our modules do not correspond directly with offerings at other institutions; our faculty must design the entire structure of each module and determine how it fits into our overall program and how it contributes towards producing graduates who are prepared to meet the demands of today's high-tech workforce. Although most faculty will only be assigned to 12 modules in a year, it requires careful planning to balance this academic load with the time commitment required to do research and make active contributions to one's field.

“Limited resources” also describes the dearth of proven TechBC examples that developers have to model and learn from. To help faculty understand the online environment and TechBC's approach to module development and delivery, the university offers a 15-week professional development course called Mastering Educational Technology and Learning, or METL. The METL course covers general topics in instructional design and provides examples of how instructional design techniques can be applied to TechBC development activities to create innovative, pedagogically sound hybrid and web-based modules within the project time frame. By offering this course to all faculty (including new faculty in their first or second term), we are able to

address many of their concerns about online learning, while reinforcing our culture of commitment to innovation in education.

**Significant online components.** All of our modules have significant online components, and we encourage developers to make online materials as interactive as possible to facilitate learning. In theory this is good – the online material is accessible to the learners wherever they have access to a computer; it is easy to update; and interactive activities should help learners understand the material [5]. In practice, it is not as straightforward. Experience has shown that, although putting material online can save time and money in the long run, the up-front cost and effort is significantly greater than in traditional lecture-based course offerings [6, 7]. For a small institution that is growing rapidly, this front-loading of the development work poses a real challenge.

However, instead of considering a retreat to the comfortable tradition of the classroom/lecture environment, we are looking at ways to support faculty in their development activities. To this end, our Educational Technology and Learning Unit provides support in the areas of instructional design, media development, delivery model implementation, and technical support for our in-house Course Management System, while our Assessment Group provides guidelines on learner assessment strategies and activities. Having accessible groups within the university that specialize in providing these types of support encourages developers to find innovative ways to help learners achieve learning objectives and discourages the Lone Ranger approach to development.

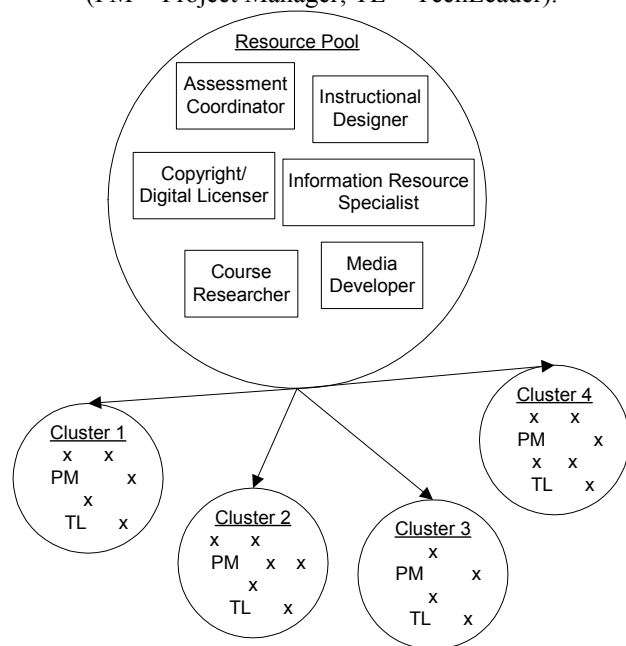
**Pre-defined delivery models.** TechBC currently uses five pre-defined delivery models. A delivery model is a framework that supports the use of effective educational technologies and innovative pedagogies. TechBC delivery models are defined by three elements: logistics, pedagogy, and technology [8, 9]. Logistics includes factors such as scheduling parameters and class size. Pedagogy addresses issues such as the balance of cooperative and individual learning, and level and type of interactivity. Technology refers to the choice of media and how it is used. Two of our delivery models are completely online, and three are online/face-to-face hybrids.

Pre-defined delivery models make it easier to support our rapidly growing pool of modules and ensure that our development plans are scalable. Because each delivery model allows only certain options and components, it is easier to ensure that all of the pieces fit together and are working properly. In addition, our modules have a consistent look and feel to them, thus reducing learner overhead in accessing the information. On the other hand, delivery models do restrict the developers' options in

planning module structure and activities. However, there is still room for variety within the current models, and we have a process in place to add new delivery models as the need arises.

**Cluster approach.** The cluster approach to development is one of the most successful aspects of our course development process. Like the Open University in Britain, we have chosen to group developers together by intellectual expertise [10], so the clusters provide a forum for frequent discussions and ongoing collaboration, as well as serving a quality improvement role. TechBC development clusters consist of four to eight developers (faculty and LSAs) who share related areas of content expertise. In addition to the core cluster members, representatives from areas of the university that provide support for development, such as Educational Technology and Learning and the Assessment Group, also attend regular cluster meetings and work closely with developers (see Figure 2).

Figure 2: The cluster approach  
(PM = Project Manager; TL = TechLeader).



In order to provide consistency across clusters, two faculty members participated in all six clusters, one as a Project Manager and one as a TechLeader. The Project Manager was responsible for communicating timelines and deliverable requirements, developing and capturing the process itself, and facilitating the work within clusters [11]. The TechLeader was responsible for overall development and delivery of our third year program, which was the focus of this development cycle. He ensured that the modules fit within the scope of the third year plan. As this process grows, and as more developers become familiar with it, we may not continue to have two individuals providing a common thread across all clusters,

but for the inaugural term, this consistency was very beneficial.

Each cluster was assigned up to 17 modules, rather than a single course. For this first round, we were quite flexible in how the clusters divided up responsibility for the modules. In some clusters, one individual would take responsibility for a whole set of modules that fit logically into a “course-like” package and use the cluster to get feedback on ideas and progress. In other clusters, individuals worked on the specific modules that fit best with their expertise. The latter approach is the most collaborative, as developers needed to work closely to ensure related modules fit together effectively. All of the clusters used the group as a source of ideas and feedback and as a means of learning about what does and does not work in online education and in TechBC’s delivery models.

The clusters each held weekly face-to-face administrative meetings to provide updates on progress and to get updates on new TechBC processes and resources. These meetings also provided regular opportunities for content-sharing and feedback. In addition, sub-groups met as needed to brainstorm module design, author content, develop assignments and projects.

**Implementing the plan.** The planning and resourcing phases of the TWT provided the information that the clusters needed to get started. The clusters, themselves, had three external deadlines to meet, corresponding to the specifications, design, and production stages of the development project lifecycle.

First, the TechBC Development of Academic Programs Group reviewed detailed course specification documents at the end of the first month of the four-month cycle. This group looked at the overall plans, the balance of delivery models and planned activities, learner workload, and the fit between program requirements and individual courses/modules.

Second, the instructional design of the modules was evaluated through a Quality Circle review approximately two months into the cycle. The Quality Circle Team consisted of experts in instructional design, assessment, module content areas, and representatives from the academic planning and academic operations areas.

At this stage, the design of the modules was complete and developers had created sample units for the review. The Quality Circle team evaluated these sample units against pre-defined criteria that addressed the learning objectives, assessment strategies, application of delivery models, learning activities, web presentations, interactivity, learner workload, content, balance between team-based and individual work, and match between the resources available for development and the needs of the

module. Representatives from the team then meet with the developers to provide feedback.

The Quality Circles focused on product and process review, not performance evaluation. By structuring the review to focus on the deliverables, we reduced the anxiety and defensiveness that can be associated with personal evaluations. Instead, the emphasis was on working together to create the best modules possible, and the reactions have supported this approach. The most rewarding part of this process was seeing a marked improvement in understanding of instructional design concepts amongst developers over the course of the development cycle. Feedback that showed how these concepts apply to the work each person was doing provided developers with tools that they could use in current and future development projects.

Finally, module production was to be completed by the end of the four-month cycle. This included all web presentations, assignments, descriptions of in-class activities (where applicable), instructor’s notes, etc. At this stage, the University held a “Show and Tell” where developers had the opportunity to showcase their work to members of the university community, including other faculty, staff, and learners.

The Show and Tell session was valuable both for the cluster members, who got feedback on their work, and for the larger university community, as it provided a snapshot of what directions the university is taking and an excellent source of ideas for integration in future modules. The session ended with a formal celebration, recognizing the efforts and accomplishments of developers during the term. Figure 3 illustrates the timeline of these three milestones.

Figure 3. Timeline for Winter Development Cycle.

PLANNING	SPECS	DESIGN	PRODUCTION
Hand-over to clusters	Specifications Approval	Quality Circle Reviews	Show and Tell
Early January	Early February	Early March	Late April

Beyond these three external deadlines, each cluster was responsible for setting its own internal timelines and milestones. Again, there was a lot of flexibility in this process. Some clusters chose to be very deadline-focused and set weekly milestones; others chose to focus on creativity and simply presented and discussed their progress each week. These differences in cluster style reflected different approaches to module development, and part of our intent was to explore the range of approaches that could lead to successful project completion.

At the end of the cycle, both approaches led to good results. Each reflected the working styles of the people

involved. The external deadlines and the regular input from the Project Manager and TechLeader provided sufficient guidance to keep the projects on track without stifling individual creativity.

## 4.0 CONCLUSION

TechBC, as a brand new university, faces very strict deadlines to complete a large amount of development work. We have had to find ways to encourage and support our developers in the creation of modules that will make up our core programs. Along the way, we have learned several important lessons about how to make this process work. These may be of interest to other institutions that are considering developing many online or hybrid courses in a short timeframe.

**Importance of non-threatening, meaningful feedback in creating quality.** The clusters provided ongoing support for the development process that is not present when developers work alone. In addition, the clusters members were a source of non-threatening feedback throughout the development process, ensuring that the end products were coherent programs, not unrelated modules. The Quality Circles provided feedback on a “point-in-time” snapshot during the development process, which led to a general increase in the quality and consistency of the modules. In the longer term, as more of our developers gain experience in our development process, the clusters will also form an excellent orientation team for new developers.

**Scalability of project management issues.** Academics are not factory workers, and modules are not identical pieces of machinery that can be stamped out of a single mold. In an attempt to find a balance between the creativity and innovation that intelligent and motivated developers bring to the process, and the efficiency and accountability of a fully-determined process, we chose to institute a cluster approach to module development. This enabled the Project Manager to focus on cluster-level projects and delegate the more detailed level of task sequencing and tracking to the clusters themselves. Some aspects of the development process were pre-specified, but many remained open for definition by each cluster. In taking this approach, we were able to identify the critical constraints, while leaving the control of module content and structure with the content experts. Further, having one Project Manager oversee multiple clusters provided a strong communication link across clusters.

**Process creation and definition.** Rather than imposing a rigid process onto clusters, we allowed each cluster to explore process options within certain high-level constraints. Communication between clusters enabled the groups to begin to converge on common processes that cluster members believed in [12]. These processes will form the standards for future development

cycles. As this was the first time we had implemented this approach on a large, well-supported scale, there was a steep learning curve and a heavy investment in the storming, forming, and norming stages of team-formation within each cluster. With clearer process definition, based on our actual experiences this term, these phases will be reduced in the next cycle, and clusters will be able to focus even more on the performing stage.

In our first university-wide cluster approach to development, the vast majority of modules were completed on time and to a high standard of pedagogical expertise and innovation. Along the way, our many new developers gained a solid understanding of the important aspects of the development process and attained a comfort level that will help them in future development activities.

Our success at managing the dragon of up-front investments that often plagues attempts at creating online learning opportunities is more than encouraging. Whether the “new technology” is online education or any other new format or technique, we believe the TechBC approach of cluster formation, Quality Circle reviews, pre-defined delivery models, and open Show and Tell sessions will help to spread understanding and acceptance, while providing recognition and encouragement for the people involved.

Although we hope not to have to maintain such a demanding pace for every cycle, we have shown that the TechBC course development process described here can produce a large volume of high quality educational materials with finite resources.

## ACKNOWLEDGEMENT

The authors would like to acknowledge the contributions of Ron Wakkary (Dean of Academic Planning), Laurie Summers (Academic Programs Development Officer), and the TechBC Educational Technology and Learning and Learner Information Services Units for their help in defining the current process. We would also like to thank the TechBC faculty and LSAs for their willing participation in the module development process, and Griff Richards (Research Integration Officer, TeleLearning Network of Centres of Excellence) for feedback on drafts of this paper.

## REFERENCES

- [1] E. Comrie. *Athabasca University: An overview*, <http://www.athabascau.ca/calendar/00/overview2.html> (Athabasca University, 2001).
- [2] *Online courses via the web*, <http://www.ola.bc.ca/services/web-reqs.html> (Open Learning Agency, 2001).
- [3] *Distance Education and Technology: What we do*, [http://det.cstudies.ubc.ca/detsite/framewhat-](http://det.cstudies.ubc.ca/detsite/framewhat-index.html)

- [index.html](http://det.cstudies.ubc.ca/detsite/framewhat-index.html) (University of British Columbia, 2001).
- [4] *Design – Development – Delivery Guidelines*, <http://online.bcit.ca/guidelines> (British Columbia Institute of Technology, no date).
- [5] T. Jones & S. Schieman, Learner involvement: A review of the elements of more effective distance education, *Canadian Journal of Educational Communications*, 24(2), 1995, 97-104.
- [6] A.W. Bates, *Technology, open learning and distance education* (London: Routledge, 1995).
- [7] W. Dick & L. Carey, *The systematic design of instruction* (New York: Harper Collins, 1990).
- [8] K. Belfer, S. Chu, & J. Nesbit, *Delivery model specifications, version 2.0*, <http://www.etl.techbc.ca/data/0003DeliveryModelSpecs/DeliveryModelSpecsJune2000.pdf> (Technical University of British Columbia, 2000).
- [9] *Course delivery models at the Technical University of British Columbia*, <http://www.etl.techbc.ca/data/0005DeliveryModelSummary/DMSummaries.pdf>, (Technical University of British Columbia, 2001).
- [10] *Current Practice in Learning and Teaching*, <http://www2.open.ac.uk/lto/Ltstrategy/ltppractice.htm> (Open University, no date).
- [11] M. Greer, Organizing and managing the ID process, in L.J. Briggs (Ed.) *Instructional design principles and applications*, 2<sup>nd</sup> ed. (Englewood Cliffs, NJ: Educational Technology, 1991) 315-343.
- [12] T. DeMarco & T. Lister, *Peopleware: Productive projects and teams* 2<sup>nd</sup> ed. (New York: Dorset, 1999).