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Building a sustainable e-learning development culture

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Abstract

Purpose – The purpose of this paper is to provide details on Simon Fraser University's new School of Interactive Arts and Technology (SIAT) approach to creating a culture that supports rapid development of high-quality e-learning materials, why it has been successful, and what has been learned.

Design/methodology/approach – Describes how, over a period of four years SIAT has had the unique opportunity to build an integrated set of graduate and undergraduate degree programs from the ground up. The organization has recognized the importance of its people – both in terms of the knowledge they bring to the organization, and the added value it gains by providing an environment where all employees can continue to learn – from courses, from their own experience, and from each other.

Findings – Because of the organization's structured, yet flexible, approach to course design and development workflow, each set of courses was ready just as the students became ready to take them. The organizational culture's combination of clear structure, openness to new ideas, and commitment to high quality courseware has enabled us to meet the needs of our students and prepare them for careers in today's high-tech workforce.

Originality/value – SIAT have developed best practices for the implementation of organizational e-learning strategies and the approach will be useful in informing the strategies adopted by other organizations.

Keywords Learning, Organizational culture, Project management, Universities

Paper type Case study

Introduction

As organizations respond to the demands to make education and training 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. In Simon Fraser University's new School of Interactive Arts and Technology (SIAT), we have developed a process that can provide a useful guide for other organizations interested in creating a highly-scalable, self-perpetuating means of developing online courseware.

Because of the differences in approach and the barriers and risks posed by any new technology, many organizations 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 organization impractical. We have developed and implemented a process – and created a culture – that ensures quality results across projects. Our approach may provide a useful model for other organizations interested in creating a highly scalable, self-perpetuating means of developing online courseware.

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Background

SFU Surrey is a new campus of the existing Simon Fraser University (located in Canada). While programs from the other parts of the university will eventually extend to this campus, the Surrey campus was initially home only to SIAT and its unique set of three undergraduate (four-year) and graduate degree programs in information technology, interactive arts, and management and technology. The implementation plan for these programs specified that only the first year courses would need to be ready when the campus opened its doors to the initial cohort of learners. The remaining courses would be developed on a just in time basis to minimize our start-up time – second year courses would be developed while the inaugural cohort was in first year; third year courses would be developed the following year, etc.

All development was guided by a plan that outlined expectations for graduates and for learners in each year of the program, but the development of the courseware itself occurred immediately prior to delivery. To meet this ambitious goal, there were two types of learning that had to occur within the new organization. First, all members of the organization had to learn to work together to define the organization itself, and second, as innovators in e-learning, the faculty and staff had to rapidly build a culture that would enable them to meet a very demanding implementation schedule.

This paper provides a high level overview of our approach in a way that will be of use to other organizations attempting to achieve similar levels of openness and productivity.

Guiding principles

To prepare for the first cohort of students, faculty and staff worked with government and industry advisory panels to determine what graduates from the three degree fields would need in their careers. They then worked backwards to develop the specific undergraduate curriculum and the necessary infrastructure to support it. There were four guiding principles that provided a common vision for this work.

Ensure graduates are workplace-ready

The programs were designed to produce graduates who are workplace ready and able to continue to learn and collaborate as technology and work methods evolve. In today's economy, it is not enough to finish a program with a head full of facts from a specific discipline. Graduates need to have learned how to keep on learning outside the structured environment of formal courses. They need to know where to find information and how to interpret, evaluate, and apply it. They must be able to work collaboratively with others in their own and other areas of expertise, and they must be able to understand and communicate ideas. To this end, our programs place a strong emphasis on interdisciplinarity, team projects, and learning how to learn.

Feedback from our co-operative education employers, who hire students for four-month work terms, indicates that we have been successful in teaching the skills that our students need to be successful in the workplace. According to the report on our summer 2002 co-op placements (Chima, 2002):

> SFU Surrey students proved to be analytical, good problem-solvers and strong team players who could communicate ideas concisely to all types of business audiences .... Employers commented on how well [these students] could work both independently and as part of a team.

The performance evaluations showed that 100 percent of the students were ranked as very good or outstanding by their co-op employers. Based on this level of success in co-op terms, we are confident that when our students graduate, they will indeed be workplace ready.

Design learner-centered programs

Calvert (2002) describes a learner-centered approach to education and learning in which "learners are given significant cognitive responsibilities: analysis, synthesis, problem solving, and creativity." The goal for learners becomes two-fold – learn the basic content presented at any given stage in a program and gain an awareness of the process of learning that can be used to evaluate how well the current material has been learned and assist in updating and adding to the current knowledge over time.

In SIAT, we have made strong use of available technologies for education to help ensure our curriculum is learner-centered. Students use online conferences and web-space to share and critique one another's ideas, while the instructor moderates the discussions and guides the feedback. Because most fact-based content is presented online, students can review it whenever it is convenient for them – but they also need to accept the responsibility for covering this material prior to applying it in their assignments or during in-class collaborative activities.

Create a culture of collaboration

Our goal, from the start was to create an open environment where processes and products could be continuously improved through open sharing of ideas, frequent, regular evaluation of processes and products, and collaboration across different areas of the organization. Courseware developers and delivery teams were encouraged to work together to develop communities of practice in which members supported each other in the pursuit of common goals (Wenger, 1999). This is best exemplified by our courseware development processes outlined in the work clusters subsection below.

Build for economic sustainability

While economic sustainability is not usually the first thing one thinks of when considering guiding principles for a university program, our responsibility to contribute to the economy of British Columbia and to be economically sustainable as an entity was set out in the provincial legislation that made the university a legal entity (Province of British Columbia, 2000). So, from the start, this responsibility was built into our way of doing business. Our emphasis on online course materials means that our curriculum can easily be re-purposed for a variety of uses. Our use of online delivery for portions of the curriculum has also meant a reduction in the amount of physical space that is required, compared to traditional fully-face-to-face delivery, again saving costs. Links with industry also contribute to our means of following this guiding principle and are evident in many faculty-industry research projects.

Best practices

Workflow

Because we had to develop our entire programs from scratch, within strict timelines, and because many of our developers were new to online courseware and all were new to our school and our programs, 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 developed an enterprise-wide program planning tool for the development of academic programs, known internally as the TechBC workflow tool (TWT).

The TWT is not simply a behind-the-scenes management tool. All faculty and staff are expected to be familiar with the processes outlined in the tool and to understand how their particular roles contribute to the overall workflow. The detailed version of the TWT recognizes four distinct phases in the development of academic programs: planning, resourcing, implementation, and analysis. Figure 1 shows a simplified version of the tool and 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.

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 school's strategic objectives into a macro plan for academic programs and instructional systems. Gate 2 articulates the macro plan into a series of constituent detailed plans that specify the courses 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 implementation phase, gate 5, which deals with the implementation of projects, including recruitment, infrastructure setup, and development and delivery of courses. 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.

The use of an explicit workflow process facilitates open communication amongst stakeholders during planning and implementation and increases visibility of the

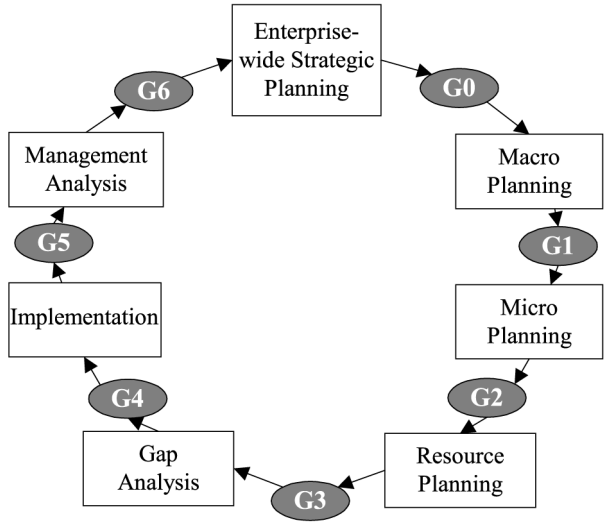

Figure 1.
TechBC workflow tool

processes, which is critical in any organization that is trying to create a new way of working. For SIAT, it enabled us to continually monitor progress and make adjustments in response to both external pressures and the experience we gained as an organization during the ramp-up process.

Preparing the course developers (faculty)

We were fortunate to have been in the position of having new programs and being able to hire staff and faculty who had self-selected themselves as having an interest in the use of technology to improve the quality of education. However, as expected, behind the statement of interest we found that our faculty brought a variety of levels of technical expertise. Indeed, in many cases, there was more interest than first-hand experience.

Many of our new faculty were not yet comfortable explaining or applying the why's (pedagogical considerations) or how's (technical considerations) of using the new technologies available to educators, so we initiated an intensive and multi-faceted approach to increasing the baseline level of knowledge in these areas for all current faculty (Leacock, 2002). The newness of the school made it easier to bring about such an approach, but the same ideas would be of great value to other organizations dealing with resistance or uncertainty around the increasingly prevalent role of technology in education.

The four main categories of effort included: faculty orientations; a mandatory course on educational technology and learning; ongoing workshops; and a formalized cluster structure for development and delivery of course materials.

Orientation

All new faculty attend an orientation session that provides an overview of what we do, how we do it, and whom to talk to about specific questions. This sets the stage in a number of ways. It clearly establishes our philosophy of teamwork – we are not sending anyone out on their own into uncharted waters. It also makes clear that we expect everyone to look for new and innovative ways that technology can improve learning – we are not looking for bells and whistles, but we are not looking for the status quo for its own sake either. Finally, faculty have an opportunity to meet the people who can provide more advanced support, so they know what help is available. Typically, these orientations are held as group sessions just prior to the start of each term (when there is the highest influx of new people). This provides all new academic staff with a solid grounding, and allows continuing staff an opportunity to drop in to remind themselves of any services that they may not have used recently. The orientation sessions can do a good job of introducing the context (the "why") of our organization and how it differs from more traditional organizations, but it is too brief to go into detail about the content and processes (the "what" and "how") (Balogun and Hope Hailey, 1999).

METL

All faculty are required to take a one-semester course called Mastering Educational Technology and Learning (METL) to help them gain a better understanding for the what's and the how's of our approach. This requirement is similar to those now being adopted at other e-learning institutions. METL covers topics ranging from the design

of measurable learning objectives, to the effective use of asynchronous conferencing, to how to integrate learning objects into online content to improve learning. This course uses the same delivery methods that faculty will use in their own classes – a combination of online resources and activities and face-to-face sessions where they can apply their new knowledge. Learners (faculty) work together in small groups, using courseware that they are currently developing or delivering as examples for their discussion and activities.

Ongoing workshops

SIAT faculty also have access to optional workshops on topics such as designing concept maps for content; matching learning objectives, content, and assessments; and moderating online conferences. The topics are flexible and depend on the needs of participants. The workshops are typically informal and may be as short as a brown-bag lunch or as long as a full day, depending on the needs of the topic and the audience. These ongoing sources of professional development are particularly useful for faculty who want to further expand their courseware development toolkits.

Clusters

We use clusters of faculty and other specialists both for development of courseware and for delivery of courses that have many sections. Both types of clusters are formed on a term-to-term basis. The cluster process is explained in detail in the next section.

Work clusters

All of our courses 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. In practice, it is not as straightforward. Many organizations have found that, although putting material online can potentially save time and money in the long run, the up-front cost and effort is significantly greater than in traditional lecture-based course offerings (Bartolic-Zlomislic and Bates, 1999). For a small organization 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 looked at ways to support faculty in their development activities. The most innovative and successful aspect of our course development process has been our use of clusters. This is also the aspect that will have the biggest impact on the self-sustainability of the process because of its effects on the knowledge of participants and the culture of the organization.

Development clusters typically consist of four to ten developers (faculty), an instructional designer, and a project manager. Other specialists are also available as resources to the cluster as needed, but they are not assigned on a full-time basis to any single cluster. Several clusters may also share the same project manager and instructional designer (see Figure 2). The cluster is responsible for the development of a set of courses (up to six credits per cluster member – a cluster is not simply a single-course development team).

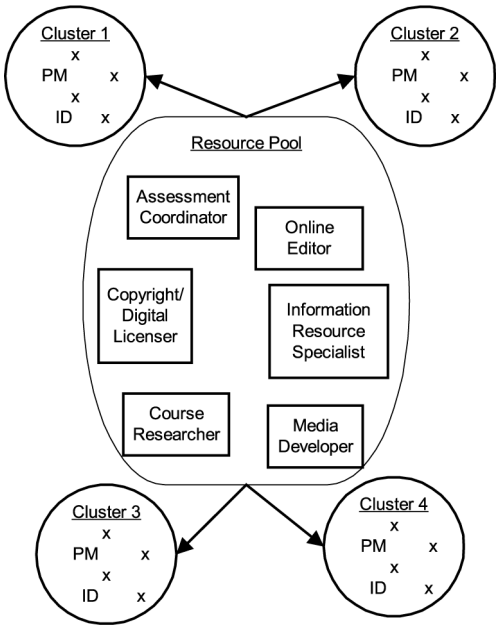

Figure 2.
Structure of development clusters

Members of a cluster generally meet synchronously on a weekly basis, using a combination of face-to-face meetings and teleconferencing. They also communicate through e-mail and informal meetings regularly. The cluster members share their experiences with using the pre-specified delivery models (see pedagogy section below) and available technologies in different teaching contexts. This feedback helps developers to learn from and build on what their peers have already tried, and it fosters a culture of open communication and knowledge-sharing.

Developers have a single four-month cycle in which to complete their assignments. There are three supra-cluster checkpoints: specifications review, quality circles, and the final show and tell (see Table I). Each cluster may decide to implement additional internal checkpoints, so there is flexibility for different approaches.

Early in the development process, at the specifications review, a university planning committee reviews detailed specifications for each course to check for resource implications, etc. Partway through the process, developers present an overview of the content, an activity plan for the course, and a sample of the online materials (usually one weeks' worth of materials) in an open meeting attended by other interested faculty, staff, and even students. A specific quality circle review team of relevant experts provides detailed feedback on the plans and work to date, and anyone attending the

Planning	Specs	Design	Production	
Week 0	Week 4	Week 8	Week 12	Week 16
Hand-off to development clusters	Specifications approval	Quality circle reviews		Show and tell session

Table I.
Development cluster external checkpoints

open presentation may also make suggestions or comments. The developer then takes this feedback back to the cluster, decides what to incorporate and how, and completes the development by the end of the term.

At the end of each four-month development cycle, developers have the opportunity to showcase their work at a show and tell session. This is rewarding for developers, but it is also very useful for the audience – again, made up of any interested parties from the whole university community – as it helps everyone to get a better feel for the overall content of our programs, it gives other developers ideas of approaches and activity-types that they could use in future courses, and it sets a high, public standard for the level of quality that we expect in our courses. Quality improvement of this type is applied as a matter of routine in business, which also fosters the culture of innovation and open discussion of pedagogy (see Leacock *et al.*, 2001, for a more detailed review).

The results of this cluster development process have been exciting. When we introduced this approach, many developers were new to the online environment and were not familiar with many of the concepts and guidelines of instructional design. The feedback from within the clusters tended to be at a low level. However, after completing the METL course and going through the cluster development process once, most developers showed a marked improvement in their choice of technologies, activities, and assessments. This also meant that they were able to provide one another with better feedback as well.

We recently extended the cluster concept to the delivery of our high-enrollment (multiple section) courses by formally grouping all instructors of each course into clusters and encouraging them to communicate regularly on what they were doing in their sections – as opposed to the more traditional approach in which two or more instructors offering a course may offer radically different versions of that course. This has helped newer instructors to learn from their more experienced peers, and it has increased consistency across sections, compared to conventional approaches.

eLearning Innovation Centre (eLINC)

In addition to recognizing the need for high quality faculty (content experts), the university also recognized the need for a group with a complementary set of highly specialized skills that would support the faculty work by providing leadership and guidance in innovations in e-learning pedagogy, e-learning tools, and related support services. This group has become known as our eLearning Innovation Centre (eLINC).

Pedagogy

In the area of pedagogy, eLINC includes instructional designers and assessment experts who worked together with other stakeholders to create five delivery models for faculty to use in course development and delivery. A delivery model is a framework that supports the use of effective educational technologies and innovative pedagogies (Belfer *et al.*, 2000). SFU Surrey delivery models are defined by three elements:

(1) *Logistics*: includes factors such as scheduling parameters and class size.

(2) *Pedagogy*: addresses issues such as the balance of cooperative and individual learning, and level and type of interactivity.

(3) *Technology*: refers to the choice of media and how it is used.

Some delivery models focus on collaborative team activities in a face-to-face environment, some on individual online work, and some on whole-class online discussions mixed with bi-weekly face-to-face meetings. Two of the delivery models are completely online, and three are online/face-to-face hybrids. Faculty choose the best-fit delivery model depending on the learning objectives for the course and the type of activities that best fit with those objectives.

Pre-defined delivery models make it easier to support our rapidly growing pool of courses 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 courses have a consistent look and feel to them, thus reducing learner overhead in accessing the information. Delivery models do restrict the developers' options in planning course 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. In addition to creating these delivery models, the eLINC staff also provide ongoing support to developers on an as-needed basis.

Tools

In the area of tools, our eLINC unit researched existing course and content management systems, and, upon determining that none available at the time met our core needs, they developed a custom course management system for the university. The use of our online course management system (CMS) is central for all of our course delivery; it is not simply an add-on for posting extra information. Students have access to core and enrichment content at any time of the day or night; they can read content, work through practice questions, take quizzes, submit assignments, and discuss questions with their teammates without being restricted to scheduled class times, campus hours, or local bus schedules. When students do arrive for face-to-face sessions, the instructor can focus on activities that require such an environment, e.g. working with specialized materials in a hardware lab or a drawing studio. eLINC has continued to evolve the CMS to meet the changing needs of our growing programs.

Services

In addition to pedagogical support and technical support for the CMS, eLINC staff also provide other services to course developers. Digital rights specialists work with faculty to identify and locate existing learning objects from around the world that can be used in our courses, and then to secure permission to use these objects. Media developers work with faculty to create learning objects when no existing resources can be found. And course online editors ensure the materials on the CMS are clear and effective.

Outcomes

By investing in educational programs to foster a good understanding of when the use of technologies is appropriate and why, we have changed what constitutes basic knowledge at our campus. We designed the process to become largely self-sustaining, with minimal organizational investment in across-the-board training after the initial start-up phase. In fact, the process has become part of the organizational culture.

We now have a large percentage of experienced faculty who automatically use their knowledge when interacting with new faculty, thus, increasing the baseline knowledge

of their peers. We have created a self-sustaining culture that understands the benefits and limitations of current technologies in educational delivery and that is prepared to look for and evaluate new and innovative ways to improve education through technology and better instructional design. The tangible results include:

- *Increased productivity*: online course development is typically regarded as a one to two year process in higher education. Yet, in the first four-month semester of using our combined approach of intense orientation and cluster development, 19 faculty in six clusters produced approximately 90 credit hours worth of courseware (most of these faculty also held teaching responsibilities during this term). In all, we have produced more than 300 new online and hybrid courses and more than 850 electronic learning objects in four years – all of which are available for re-use in other courses.
- *Reduction in over-assessment of learners*: we had identified a problem with over-assessment, due to the modular nature of our content delivery (courses are delivered in five-week, one-credit chunks, each with a transcripted grade). The sharing of ideas that occurs in quality circles and ongoing peer feedback has resulted in more effective ways to assess learner progress that actually reduce learner and faculty time commitments, while improving the validity of the assessments. The courseware has also become more integrated across the curriculum, has better agreement between objectives, content, and assessments, and has received improved ratings by learners during and after delivery.
- *Establishment of peer-peer support networks*: by changing clusters each term to meet operational needs, faculty get an opportunity to work and develop relationships with many others with similar or related interests. Faculty who studied together during METL or worked together to create courseware also tend to continue to collaborate during later development cycles and research projects and to openly discuss issues that arise during delivery.
- *Effective use of specialized support for technically challenging projects*: anecdotal reports from faculty, instructional designers, and student assessment specialists indicate an increased level of knowledge among course developers of how to apply sound pedagogical principles to development in the online environment. eLINC is now able to allocate its resources to new and innovative projects, as most faculty are able to take care of more basic tasks themselves.
- *Feedback from learners and employers*: in a survey of learners that asked what they liked most about the course, the top answer was "online methods of learning". In addition, first-year course evaluations have shown high ratings in the areas of learning effectiveness, activities and objectives, delivery methods, assessments methods, and teaching and overall performance, providing evidence that our processes are resulting in learner satisfaction. Positive reports from employers about our students' ability to be successful in the workplace show that student satisfaction is well-founded.

Lessons learned

When discussing best practices, it is always important to keep the audience in mind and to be able to answer their question, "Yes, but how can we benefit from what you've

done?" SIAT, as a brand new organization, faced very strict deadlines to complete a large amount of development work. We actively sought ways to encourage and support our developers in building communities of practice and in the creation of the specific courses that would make up our core programs. Along the way, we have learned several important lessons about how to make this process work. We believe that our methods and the lessons we have learned will help other organizations build a culture that can support rapid development and deployment of courses.

Importance of non-threatening, meaningful feedback in creating quality

The clusters provided ongoing support for the development process in the form of personal support for cluster members' work, public recognition of efforts and achievements, and tangible aspects of the workflow process such as meetings and common documentation (Frame, 1987). Many of these supports are not present when developers work alone. In addition, the cluster members were a source of non-threatening feedback throughout the development process, ensuring that the end products were coherent programs, not unrelated courses. 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 courses. 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

Course developers are not factory workers, and courses 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 course 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 course 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. These processes will form the standards for future development cycles. The first time we implemented this approach on a large scale, there was a steep learning curve and a heavy investment in the storming, forming, and norming stages of group-work within each cluster. These phases have been reduced in subsequent cycles, enabling clusters to focus even more on the performing stage.

Creating a culture

In SIAT, we consciously chose to make an up-front investment in increasing faculty knowledge of the new technologies available to educators. We implemented an approach that had some mandatory components, covering basic information that applied to everyone's teaching, and some optional components that allowed those who were interested to work with certain technologies or activities more closely. The result has been as much a cultural change as a technical change. We have created an environment that encourages innovation in the search for better ways of fostering effective learning. We have created informal peer support structures that promote collaboration, rather than lone ranger or competitive approaches. Finally, we have succeeded in raising the bar on what constitutes basic knowledge of educational technologies.

Our experience has shown that the SIAT course development process described here can produce a large volume of high quality educational materials from limited resources. Our success at managing the challenge of up-front investments that often plagues attempts at creating online learning opportunities is more than encouraging. Our open, regular evaluative processes ensure the high quality of the courses. Our intensive orientation process and culture of collaboration have ensured that all faculty have a high level of comfort with online learning, and that same culture encourages those who are the most comfortable to push the limits farther in the search for better tools for learning.

Conclusion

Very few of us have the luxury of creating a new organization from the ground up, or even a new program from the ground up. Yet, the SIAT experience is very relevant to existing organizations that are looking to incorporate new technologies to improve learning. Our guiding principles, which were a key part of our successful outcomes, can be applied in any educational or training program or organization. Adoption of these principles will help other organizations determine the most appropriate – and most feasible – innovations for their particular context.

We strongly believe that creating a culture in which all management and development staff can work together towards a common goal, a culture in which openness and collaboration are the norm and which acknowledges and considers new ideas, is vital to any attempt to significantly shift development and delivery methods. Course developers and other stakeholders must feel comfortable floating new ideas and must be confidant that others will provide feedback to strengthen those ideas.

Related to this, there must be open and regular, non-threatening evaluation of the process and the products. We all know how important it is to provide timely feedback to our learners, and this is no different – the course developers and other staff assigned to migrate a program into a fully or partially online format are working in a new environment and need to know that they are working in the right direction. No less important, senior administration needs to see that the work that is being done is, indeed, in line with the planned goals. Switching from traditional face-to-face teaching to technology-mediated delivery of education is a big change for many. Openness and clear commitment to the goals at all levels will help to ensure the process runs smoothly and that the students will in fact benefit from the results.

Whether the "new technology" is a particular course management system or any other new format or technique, we believe the SIAT approach of clear workflow, investment in people, and a collaborative cluster approach to development and delivery of courseware will lead to the building of a successful e-learning organization.

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