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*by Susan Crichton and Gail Kopp*

This paper shares a model for content development for teacher education in Western China. The goal of our project, Strengthening Capacity for Basic Education in Western China (SCBEWC), is to improve student learning through teacher education with a focus on student-centered instruction (SCI) and SCI's tie to multiple intelligences (MI). Both SCI and MI are consistent with the New Curriculum for China, which has given greater emphasis on active, project-based learning activities for students as opposed to traditional forms of teacher-led instruction (Perrement 2005). By the end of the project, a teacher training program of courses and resources in these two areas will be available to approximately ten million Chinese teachers, particularly those in rural regions. Funded by the Canadian International Development Agency (CIDA), SCBEWC's project partners include the Chinese National Center for Educational Technology (NCET) and three Canadian universities. NCET provides expertise in the New Curriculum in China, the context of educational practices in rural China, and media production; the Canadian universities offer expertise in distance education, student-centered instruction, and preservice teacher education.

Because of the number of teachers involved and their geographical distribution, distance education (DE) was deemed to be the only scalable delivery option. All SCBEWC schools had access to materials via an IP satellite system that allowed one-way electronic communication, and only a limited number of schools had two-way connectivity via the Internet. The challenges of this international project—implementation of curriculum reform, changing practice to reflect SCI and MI approaches, and limited communication and connectivity for distance course and resource delivery—offered us an opportunity to rethink the implementation of conventional models for instructional design and distance learning. Multimedia played a critical role in our approach.

As most current scholarship on technology in education tends to focus on American settings where sufficient resources abound, it becomes all the more important to address other contexts that demand greater ingenuity in the implementation of technology for student learning. In outlining the structure and development of the SCBEWC project, the following account may provide a helpful model for planners and administrators faced with the challenge of implementing distance learning for teacher preparation programs in geographic areas where technological resources and infrastructures are limited.

## Building on Research

We think that combining project-based learning and multimedia offers a rich and valuable means of instruction. As Armstrong (2000) suggests, project-based learning tends to redefine the boundaries of the classroom. Through project-based learning, the curriculum is moved toward authentic complexity and the "big ideas" of the world, allowing students and teachers to look beyond what can be housed within the traditional schoolroom. In turn, multimedia projects—those that integrate media objects such as text, graphics, video, animation, and sound to represent and convey information—have the potential to connect key learning objectives in a prescribed curriculum to real world contexts, integrate diverse curriculum areas, support student decision-making, and foster authentic collaboration. Utilizing multimedia in project-based learning enables students to acquire new information and build personal knowledge and skills in the course of designing, planning, and producing some product or performance (Simkins et al. 2002). Finally, the potential of multimedia to foster the strengths of the multiple intelligences described by Gardner (1993) is fairly obvious. We believe that incorporating the theory of multiple intelligences and multimedia increases opportunities for problem-solving and promotes learning activities that are context-rich and naturalistic

(Armstrong 2000).

From our work with students (both children and adults), we know that student-centered instructional strategies and access to multimedia tools allow students to wrestle with important concepts and construct personal knowledge. Students strive to collect, filter, evaluate, organize, and make sense of the world's ideas presented as media outside the classroom walls. Moreover, as suggested by Eisner (1998) and others (Jacobsen and Crichton 2004; Theodosakis 2001), students engage in the powerful act of editing and creating when they work to produce knowledge, to represent this knowledge using various media, and to share their understandings within a larger world forum. As a result, multimedia becomes a powerful tool by which learners become engaged by—and in—the production of knowledge through

- individual and collaborative engagement,
- different representations of understanding,
- the presentation of these representations, and, ultimately,
- the creation of a visible record for formative and summative assessment of process and product.

We believe that it is through this process of producing personal, relevant knowledge from information obtained through the course content that teacher-learners in this DE project can experience first hand what student-centered instruction is about and begin to share it with their own students.

**Design of DE Teacher Training Course**

We designed a DE model with these goals in mind (Figure 1). For each lesson segment, consideration was given to the different media (top layer of the model) that could be used most effectively to frame the instruction for the learner. As the learner accessed each segment via a menu, text served to organize internal information and additional pieces of instructional media were often provided as embedded or hyperlinked objects. The electronic nature of distance learning enabled the use of rich media for instruction while encouraging the designer to keep multiple intelligences and different learning styles in mind.

The bold elements at the center of Figure 1 indicate a structural flow and sequence for each DE lesson or module. In keeping with student-centered and inquiry approaches, it is important to note that lesson segments such as introduction and presentation are not to be confused with the traditional teacher-transmitted lectures. Through the use of multimedia, the introduction and initial activity are intended to get attention, motivate the learner, establish an appropriate mindset, and raise curiosity and questions about the topic of instruction for the lesson.

For example, watch the video clip in the Course 1 Module 3 initial activity (Exhibit 1). In the classroom activity portrayed in the video, students are asked to collaborate in a brainstorming activity in order to determine the purpose of a particular "mystery object"; accompanying the movie are textual prompts that offer planning advice, key questions that can be used to promote active learning, and specific questions for participants to address in their notebooks as they observe the activity. We felt that a movie, along with a task to be completed with both colleagues and students, provided participants with a more explicit sense of student-centered instruction that they could then apply to their own teaching. Multimedia allowed us to share teaching practice from urban Canada with rural western China.

The planning stage of the course (provided here without actual media but in English) provides further illustration of how the structure of the course relates to the components illustrated in Figure 1. In turn, the NCET project site provides illustration of the finished course; while only available in Mandarin, it offers a glimpse of the general look and feel of the interface and how the media segments were integrated with the course materials in print. By moving between these two sites, readers can get a sense of the course content as well as a clearer idea of the final course design.

**Actual Practice**

The training for the Chinese teachers in the SCBEWC project was organized into a number of courses. Project partners anticipated that implementation of professional development courses with a student-centered philosophy of education in rural China would present some challenges because of the lack of expertise in innovative course design required to support and sustain student-centered learning through DE. Prior to this collaboration, NCET was primarily a producer of television segments for teacher professional development; their technical knowledge did not encompass DE course design.

As a result, a cascade model was introduced to phase in course delivery by distance. First, in August 2003, 80 teachers were trained in a face-to-face session using the course materials. The following summer, those initial 80 teachers then became the facilitators for 1000 more teachers; during this second phase, the training for the 1000 teachers was based on the original materials developed for the initial face-to-face training session, which had been converted to distance delivery during the summer of 2004. Finally, during the 2004-2005 school year, 10,000 teachers used the DE version of the course materials; this deployment was facilitated by the teachers who had been trained in the earlier two stages of the process. Teachers learning from the distance education course in SCI were therefore supported by a total of 1080 trained colleagues who facilitated the project at the school level as materials were received via IP satellite. This approach supported the blended model of distance education that underpinned the project.

Meanwhile, development of subsequent courses, also delivered via DE, began, informed by a formal evaluation of the original course content and design. All courses to date have been designed to support both the content and the spirit of SCI by engaging participants in activities that allow them to experience what SCI in a classroom could be. An intentional design consideration of the DE model outlined above, this structure recognizes the importance of allowing teachers to experience changed practice from the point of view of students *before* being called upon to incorporate it into their professional practice (Jacobsen and Crichton 2003).

In each course, a variety of informational segments and tasks were used to engage the teacher-learners and build on the multiple intelligences of the participants. The courses modeled a range of technology and multimedia in both the design of the course and in the assignments given to the teacher-learners. In Table 1, the content and the medium are leading the students to see the different ways that people experience learning.

To involve the teacher-learners as producers of knowledge, both short-term projects (i.e., lesson projects) and long-term projects (i.e., cumulative projects that were developed across lessons) were used in the project courses. One example of each implementation is outlined below.

*Short-Term Project Example*

In Course 1, which focused on student-centered instruction, the culminating project for the technology lesson was the development of a technology plan that included site maps and an inventory of existing hardware. Participants were then asked to consider their students, their learning styles, and the challenges inherent in their specific school contexts. Working from the starting point of learner needs and learning outcomes, the participants developed technology plans within a budget constraint of 20,000 RMB (approximately $3,500 CDN—a reasonable sum in this context). The technology plan was a collaborative effort that involved writing a proposal (Figure 2), drawing a floor plan of the school (Figure 3), creating a cover page that illustrated the cultural components of the community (Figure 4), preparing a budget (Figure 5), developing a spreadsheet that linked hardware and software to learning outcomes (Figure 6), and delivering a verbal presentation.

Experience with the initial cadre of learners in August 2003 taught us that building a technology plan from diverse learners' needs and curriculum outcomes prevented the plan from being simply a shopping list for equipment by moving it into a discussion about how technology can support changed practice,

student-centered instruction, multiple intelligences, and disabled learners. Follow-up technology topic activities will focus on integrating specific applications into specific curriculum areas.

*Long-Term Project Example*

Questions about how to assess projects that vary in terms of length, content, design, and resources abound. Rather than having instructional units conclude in a tidy final exam, multimedia projects challenge instructors to critique and evaluate student work as the production progresses, allowing the student and the teacher to understand where the work is going and whether or not it is meeting expectations. The structure, activities, and application project in Course 3, Information and Communications Technology in the Classroom, presents an example of how assessment of process and product can be promoted in a DE environment (Figure 7). Although only two modules are shown in Figure 7, note that the multimedia lesson plan project developed by the teacher-learners actually spanned the six modules of the course.

We believe that consideration of the elements presented in Figure 7 help to honor both the process and product. Formative assessment options within each lesson and at the application level of each lesson allow for student revisions and understanding of key concepts during the development process. In addition, had it been required for accreditation purposes, summative assessment could have been done at the end of the project. In the SCBEWC project courses, it is anticipated that summative evaluation of the entire course will be addressed by asking teacher-learners to submit a portfolio of their work to the facilitator in their school.

Other assessment strategies used in the project courses to include process and product were

- pre-assessing or pitching the project idea (Theodosakis 2001),
- a consideration of the possibilities for multimedia representation,
- an initial storyboard of the content before work is started,
- a checklist of the technology skills and the level of basic competency required,
- maintenance of an ongoing journal,
- opportunities for group evaluation based on the group's predetermination of criteria,
- evidence of collaboration,
- evaluation of project design,
- execution of project and tie to original storyboard, and
- assessment of quality of final project.

**Sustaining the Experience**

As illustrated in the model we developed (Figure 1), DE is seen by this project as a way to sustain the experience of participants in their exploration of student-centered instruction. Depending on the activity, the participant's responses can be turned in, self-critiqued, or saved for a face-to-face seminar. Activities are also linked to previous and subsequent activities, allowing the participant to understand the importance of the task and its relationship to the overarching goals of the learning experience (e.g., the module or course). The final component of the design, an opportunity to demonstrate understanding, is where sustainability comes into play. Elegant solutions or responses to activities can saved, vetted, and distributed as additional resources and activities, thereby customizing and modifying the content of the project to be culturally and regionally specific as well as keeping the content fresh and relevant.

An interactive central DE platform is currently being designed, and it is hoped that teachers will contribute to the site as they begin to incorporate SCI strategies and plan activities that develop students' multiple intelligences in their own professional practice. Figure 8 illustrates the process by which we propose that content can be vetted before submission for sharing with a broader audience of educators. The first step of the vetting process, shown in Figure 8, questions the integrity of the content itself. If it is inadequate, revisions are made. If it is satisfactory, the process continues, and the second step questions the consistency of the

principles of SCI and MI. If these are found to be consistent, the process asks if the content is suitable for distance delivery using the available technology. The last step asks whether the content supports construction of personal knowledge.

At the same time, it should be noted that SCBEWC activities and applications were necessarily flexible with respect to asking teacher-learners to create course materials and adapt them to electronic multimedia. Lack of electronic facilities (computers, hardware, and software) for use at teacher workstations in many of the project schools dictated that activities must be achievable with external resources—primarily paper. In future phases of the project design, we anticipate that production via electronic applications can be phased in as computers, software applications, digital cameras, video camcorders, two-way Internet connectivity, and other technologies and infrastructures become available.

Similarly, while a recent evaluation of the course discovered 96% of teachers surveyed felt the media elements were valuable, it was unfortunate that approximately 25% were unable to view them (videos, Flash, audio files, picture) due to issues directly related to the digital divide. Sixty percent of the SCBEWC schools have only one or two computers, so access to the content has remained a problem. As the lack of access to the DE content limits the degree to which rural teachers can experience SCI first hand, bridging the digital divide will continue to challenge the project.

## Conclusion

As teachers in China increasingly gain access to global information and create, share, reuse, and repurpose assignment artifacts for their practice, we anticipate additional challenges to learning with respect to digital literacy. In addition to learning the course topics, teachers will also need to learn how to use electronic productivity tools, deal with credibility and copyright issues, and implement knowledge management techniques. These challenges are consistent with research into multiple literacies by Eisner (1998) who suggests that foundational skills and competencies for the 21st century must be reconsidered. These ideas are also supported by the 2002 summit in Berlin (Starks 2004), Armstrong (2000), and the Secretary of Labor's Commission on Achieving Necessary Skills (SCANS) report (1991). For the SCBEWC project, these literacies may be "on hold" temporarily, but they are consistent with the goals of the new National Curriculum of China.

To date, the first complete course, based on the content developed for the original face-to-face training, has been delivered by distance. A formal evaluation of this course has been completed, confirming the effectiveness of this course design (Exhibit 2). However, the ultimate test of whether this model is effective will be the degree to which the teachers become active participants in the project by changing their classroom practices and sharing their successes and experiences in the soon-to-be launched online learning community designed to support an emerging community of practice.

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