

2004

## Tensions in learning content and technology: the experience of education students in a web-based research project

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## **Tensions in learning content and technology:**

### **The experience of education students in a web-based research project**

Shi, L., Reeder, K., Slater, T., & Kristjansson, C. (2004). Tensions in learning content and technology: The experience of education students in a web-based research project. *Technology, Pedagogy and Education*, 13 (1), 43-60.

#### **ABSTRACT**

There has been little research on how a content-based teacher education course can embed effective training in the use of the World Wide Web (WWW) to search for information and present learning outcomes. To address this gap, the present study documents the experience of 64 pre-service and in-service teachers who completed a web-based group project in an applied linguistics course. Participants expressed general appreciation of the experience but also felt tension between technology and content learning. The study raises questions about the role of technology in knowledge construction, teachers' beliefs regarding what constitutes learning in a content-based course, and how new technology can be used to enhance the learning of content knowledge.

#### **Introduction**

The multitude of resources available on the World Wide Web (WWW) underscores the importance of using information and communications technology (ICT) effectively in education. The Internet may be the most widely used computer technology in education aside from word processing applications (Becker, 1999). However, despite a general recognition that all teachers should be technologically literate, most teacher education programs have not been providing their

students with sufficient opportunities to become proficient in computer-based technologies (Oliver, 1994; Russell, Finger, & Russell, 2000; Willis & Mehlinger, 1996). Such opportunities should include, as Cloke and Sharif (2001) point out, not just learning about technology but learning with or through technology. In response to this pedagogical need, the present authors modified a group assignment for a senior course in applied linguistics for the purpose of encouraging and assisting pre-service and in-service education students to create a web page to document their research on linguistic, cultural, and pedagogical aspects of a language. The assignment assumed a constructivist understanding of knowledge whereby learning takes place through involvement with content rather than imitation or rote learning (Abdal-Haqq, 1998; Kroll & LaBoskey, 1996). Kaufman (1996) argues that it is important for teacher education programs to include constructivist-based experiences if teachers are to move away from teacher-centered classrooms that limit students' active involvement in the learning process. When applied to the integration of technology and content learning, this means using technology to construct knowledge through the creation of personally meaningful products (Blocher, de Montes, Tucker, & Willis, 2000).

This article draws on our experience of working with 64 education students as they collaborated in small working groups to research 18 world languages. While all working groups (22) used the Internet to gather information, 18 working groups took on the additional challenge of creating a web page rather than a poster or a PowerPoint presentation to document their findings. This resulted in a website [www.lerc.educ.ubc.lerc/courses/489/worldland/index.html](http://www.lerc.educ.ubc.lerc/courses/489/worldland/index.html)

The article begins with a review of the need for research on training education students to use ICT such as the WWW. We then describe how we administered the project and report the results of the questionnaires, small group discussions, and focus-group interviews which were

designed to identify what participants had learned and how they perceived their learning experiences. Analyses of these comments reveal both appreciation and frustration at having to learn content and technology simultaneously as well as views about technology, particularly the WWW, as an artifact rather than a tool in constructing, developing, and transforming knowledge. We end the article by calling for further research on the role of technology in knowledge construction and by highlighting how traditional beliefs about what constitutes content learning influence participants as they try to use new technology in teaching and learning content knowledge.

### **The integration of ICT into content courses in teacher education**

The literature of the past decade has called for more instruction on computer technology in teacher education programs. Based on the observation that teachers typically consider ICT to be additional content rather than a means to aid content acquisition in other subject areas, researchers have recommended integrating advanced computer use throughout all areas of pre-service teacher education programs as a potentially effective way to model successful implementation of computers in education (e.g., Cuban, 1993; Gibson & Nocente, 1999; Goldman, Cole, & Syer, 1999; International Society for Technology in Education, 1999; Smith-Gratto & Fisher, 1999). There is a strong belief that the integration of technology into specific teacher training courses is more effective than learning computer skills in an isolated manner (e.g., Halpin, 1999; Scheffler & Logan, 1999; Selinger, 2001; Shibley, 2001). As Clift, Mullen, Levin, and Larson (2000) put it, “coursework in technology and telecommunication is not nearly as important as embedding technology and telecommunication use throughout the university curriculum—in and out of education courses” (p. 47). Because of a strong connection between teachers’ ability to use computers and positive attitudes about using them in classroom

instruction (e.g., Becker, 1999; Dupagne & Krendl, 1992; Ropp, 1999; van Braak, 2001; Watson, 2001), training in the use of computers in content courses is crucial if teachers are to successfully implement technology into their own teaching.

One way to train education students to integrate technology into content teaching is to engage them in web-based or web-design projects. Lan (2001) observes that teachers need experience in technology-facilitated instructional activities in order to integrate the use of the WWW in teaching. Based on two years of experience with web-design projects in education, Lim, Plucker, and Nowak (2001) outline six issues which instructors must consider when planning learning-by-web design projects: students' reasons for choosing a web-design project, group collaboration within the project, the ease with which content can be located and organized, the effects of web publicity, visual design considerations, and the balance between learning content and design skills. The authors stress that in order to promote learning of both content and skills, web-design projects should include difficult-to-find information because "the more effort that students are required to expend in order to locate and organize information, the more they are likely to feel that they have learned" (Lim et al, 2001, p. 24). The importance of engaging education students in web-design projects is also indicated by Chen and Huntsberger (2000-2001), who observe that only those teachers with experience and skills in using the WWW will use technology to engage their own students in higher-level learning activities.

Despite recommendations to weave ICT into the curriculum, little research has been done to document the effectiveness of integrating ICT into content teaching, particularly in pre-service teacher education programs. In their review of research on integrating computers into teacher education programs, Willis and Mehlinger (1996) note that the integration in previous research revolved around such activities as evaluating how certain application programs and CD-ROM-

based books might be used to teach particular content areas along with how various multimedia programs can strengthen and support lesson plans. According to the review, students in some teacher education programs were required to demonstrate the effective use of technology in their lessons. The focus, therefore, appears to have been more on technology itself as content—or perhaps how to use technology—rather than using education students’ assignments and projects as models for integrating technology into content teaching. If the definition of computer literacy includes the ability to solve problems and communicate the solutions electronically (McCade, 2001), the research suggests that pre-service teachers need to learn how to use technology such as the WWW in the context of their content learning and feel confident in doing so.

In sum, there has been a call for teacher education to integrate ICT into all areas of the curriculum. Research is therefore needed to address the effectiveness of integrating the learning of technology with the learning of content in teacher education. With the aim of exploring appropriate integration of the WWW into the learning of content, the current study documents the authors’ experience of working with 64 pre-service and in-service teachers completing a web-based research project on world languages. By observing how these learners used the Internet to search for hard-to-find linguistic and cultural information about the 18 selected languages and created web pages for 14 of them, we examined 1) what they learned as a result of doing the web-based project and 2) whether they perceived the simultaneous learning of technology and content as a positive experience.

## **Method**

### ***Participants and academic context***

The participants were pre-service and in-service teachers enrolled in two sections of a 72-hour senior undergraduate course (September 2001- April 2002) in the faculty of education of

a large Canadian university. The course, “Applied Linguistics for Teachers,” provides a knowledge base about language, its nature, functions, and structure, classification of world languages, writing systems, first and second language acquisition, and sociolinguistic topics such as language and culture and language and gender. Each topic is applied to some aspect of language teaching and learning. There were 30 students in one section and 34 in the other, for a total of 64 students. The majority were in their 20s (45, 71%), a few were in their 30s (8, 13%) or 40s (9, 14%). There were more female participants (50, 78%) than male participants (14, 22%).

Based on an initial questionnaire survey (adapted from Oliver and Towers, 2000) that pertained to participants’ levels of technological literacy at the outset of the course, the majority of participants possessed basic computer skills: only a few had never created (4, 6%), deleted (7, 11%), or printed out (2, 3%) a word processing document. The majority, however, reported a lack of more advanced ICT skills such as creating a WWW page (56, 90%). This suggested that although many participating students were consumers of the WWW—as indicated by the numbers who claimed that they had sometimes or often used WWW search engines (61, 98%), information from the WWW in projects (55, 89%), and bookmarks to record useful WWW addresses (46, 73%)—few of the participants reported having ICT skills which would allow them to be contributors to the WWW. A project with a web-design option therefore appeared to be a useful way to help consumers contribute to electronic learning and teaching. Web-page creation by learners, de Boer and Collis (2002) point out, allows students to turn their own learning into resources for others, a move which marks a pedagogical shift from an acquisition orientation to a contribution orientation.

### ***Project team***

Both sections of the course were taught by a faculty member who is one of the authors of the present report. The students and instructor were actively supported by two colleagues who had also taught the course recently, a librarian highly familiar with the resource base and web-based searches, and three doctoral students in language and literacy education. Two of these doctoral students were responsible for providing technical consultations on web-page design for course participants. The third doctoral student conducted the research assessments reported here.

### ***The assignment***

About five years earlier, the course instructor and a teaching assistant had devised a course assignment entitled “World Languages Knowledge Fair.” This required students to present a poster session describing pertinent aspects of various heritage languages spoken by elementary and secondary students in Canada. This project gradually expanded to include the creation of *PowerPoint* presentations. In the context of a university initiative to enhance teaching and learning, the present project team decided that the scope of the assignment could, with appropriate support, be further expanded to allow students to create their own web pages that could in turn be incorporated into a website that would constitute a valuable professional resource for the wider community of language educators. Funding was successfully obtained in the spring of 2001, after which detailed planning was undertaken for the project.<sup>1</sup> We decided to offer students the option of developing their content in any of three media: the previously-used poster or *PowerPoint* presentations, or a web page. The assignment required the following content for each language:

1. Situation and distribution;
2. Genetic and typological classification;
3. Sound system and grammatical structure;



4. Writing system (if any);
5. Communication and culture;
6. Tips for teachers of English working with native speakers of the language;
7. Print and non-print sources, including links as appropriate.

### ***Administration of the assignment***

The assignment was launched midway through the course, following course content that reviewed language functions, phonology, morphology, syntax, and writing systems. For each section, the launch session met in a central computer lab, where participants were first briefed by the project team librarian on useful bibliographic sources and electronic search techniques. The two doctoral assistants who served as technology consultants then outlined the process of web-page development and editing. Participants were also briefed on the availability of computer labs on campus.<sup>2</sup> Course participants selected languages and identified their working groups (self-selected based on their interest in specific languages) and choice of medium. Table I shows there were a total of 22 project groups with an average of two or three people per group. Four groups chose the same languages (Japanese, Mandarin, Punjabi and Tagalog), with the result that a total of 18 languages were studied. Three groups opted to create a poster and one group chose a *PowerPoint* presentation; the other 18 groups decided to create web pages.

Insert Table I about here

Students in both sections spent four to five weeks on the project. The class time was roughly divided into one-third for ongoing general course content presentation such as language classification and writing systems, and two-thirds (about eight hours) for “open lab” work sessions. During these sessions, groups had the opportunity to work on their specific language projects in the central computer labs, supported by the two doctoral student technology

consultants as well as by the course instructor, who assisted with questions related to linguistic content.

The final project session was devoted to the two-hour “Fair” held in the department’s resource room. Student groups used computer workstations to display web pages and *PowerPoint* presentations, or portable display boards to present and discuss their posters while classmates and invited guests circulated and asked questions. All participants completed previously circulated peer feedback forms, which focused on a) whether the content was sufficiently informative, useful, accurate, and reliable; and b) whether the presentation was well organized, clear and easy to follow, attractive, and tasteful. After the Fair, the two doctoral assistants uploaded the web-page files to the project’s server. Using the same criteria developed for peer feedback, the project team met as an adjudication panel to evaluate the web pages and assign grades.<sup>3</sup> The course instructor evaluated the poster and *PowerPoint* presentations separately.

***Assessment of the Project: post-project questionnaire, group discussions, and focus group interviews***

After students completed the projects, we distributed a questionnaire which used open-ended questions asking individual participants to comment briefly on the assignment’s areas of strength as well as areas which needed to be improved. Participants’ views about the strengths and weaknesses of the project were further solicited through small group discussions, each lasting about 20 to 25 minutes (see Appendix for questions). Although there were 22 project teams from the two sections, some groups within each section joined together with the result that a total of 13 groups came together for these small group discussions. One-page summaries of the thoughts of each of these 13 groups were collected, and delegates from each group were invited to attend one of two focus group interviews held after the class formally concluded. These were

heavily attended, with about 15 participants in each. The third doctoral student conducted these open-ended interviews by probing all topics that had been raised in the small group discussions, along with any other comments and concerns that the participants wished to contribute. Both focus-group interviews were audio-recorded, transcribed and, together with the individual questionnaires and summaries from the 13 discussion groups, analyzed to identify what participants had learned, and how they evaluated and perceived their learning experiences. From those analyses, we hoped it would also be possible to draw some tentative conclusions about students' perceptions and beliefs about the study's efforts to integrate technology learning with content learning.

## **Findings and discussion**

### ***Participants' positive comments: "It was fun and useful"***

Analyses of discussion summaries from the 13 groups showed that positive comments stemmed from a) learning technology, such as creating a web page and searching for information on the Internet; b) learning content, including the linguistic features and cultural background of specific world languages, tips for teaching learners who speak English as a second language, and the selection of useful and reliable information; and c) learning collaboratively through group work. Table II reports the frequencies of relevant group responses. As the table shows, while most groups believed that they gained from both technology and content learning, nine groups (69%) said that they learned specifically how to create a simple web site with links, twelve groups (92%) commented that they learned about the linguistic features and cultures of a particular language, and seven groups (54%) reported learning relevant tips for teaching ESL learners. We also noted that four groups (31%) mentioned learning how to search for information, but only one group (8%) commented on the learning experiences of selecting and

evaluating the information. Two of the 13 groups (15%) appeared to have also enjoyed the cooperation of group work.

Insert Table II about here

In addition to discussion group comments, questionnaire responses and the focus-group interviews further illustrate the extent to which participants appreciated the experience of learning technology. The following remarks reflect the sense of enjoyment expressed by various participants:

Comment 1. It was fun—great way to meet other students, having a purpose for learning to use WWW, search engines, bookmarks, downloading, and learning proper use of tables/charts. All in all, there was a tremendous amount of learning that went on. (Questionnaire)

Comment 2. I mean it was actually a lot of fun doing it. It's really similar to writing a paper, but it was also creative. (Focus group)

Comment 3. I was terrified of the Internet [before the project] and now I know how to do an Internet search so I was all excited. I was fairly fluent at the end of it and have continued to do it after the project was over.... That was a lot of fun. (Focus group)

In addition to a sense of enjoyment and accomplishment related to the learning process, many younger participants believed that the project experience made them more employable while the more mature participants felt that they were updated for the computer age. As the following comments reveal, several mature participants acknowledged that the project was their first face-to-face experience with learning technology:

- Comment 4. Not being into the computer age at all, it [the project] helped me to get my feet wet in it and familiarize myself with it. (Questionnaire)
- Comment 5. Just learning to use the Internet rather than the library [to search for information] was amazing. As a mature student [I feel] so much has changed with the growth of the computer age. Learning was overwhelming at the beginning, but by the end it was truly amazing. (Questionnaire)
- Comment 6. I feel that when people are talking about web sites ... I'm not, you know, feeling like a dinosaur.... I have a little bit of knowledge so that I feel a little bit up to date. I know that kids now are building their own web sites. (Focus group)

Technology aside, many participants found it richly rewarding to research the linguistic and cultural backgrounds of various world languages. Some thought that the “Tips for Teachers” component was especially helpful and saw it as a useful teaching resource:

- Comment 7. Learning more about a specific language helped me to understand all its intricacies. The most useful part of the project is the “Tips for teachers” part. (Questionnaire 2)
- Comment 8. I think the most beneficial part of the project was finding information for the “Teaching Tips” section. If I had ESL students in my class, it would be this section of every web page I would go to. (Questionnaire)

***Participants’ negative comments: “The technological aspect detracted from what we could have really learned about the content”***

Although participants were generally positive about the project, they reported a high level of frustration in trying to balance the demands of combined technology and content

learning. Based on the small group discussion summaries, Table III shows that participants' negative comments focused on what was perceived to be limited and at times inadequate technical support. The majority of participants (10 groups, 77%) complained about the stress, and one group (8%) complained about the heavy workload of learning to use technology. Four groups (31%) mentioned that they had problems finding content information, and three groups (23%) felt that there was an uneven distribution of labor within groups.

Insert Table III about here

Questionnaire responses and the transcripts of focus group interviews further illustrate that participants, as novice applied linguists and novice web designers, felt pressured by the challenge of learning relatively advanced content and technology simultaneously. The following comments indicate the effort participants put into researching the linguistic features of specific languages:

Comment 9. Like grammar, morphology, phonology, that's huge. I mean if you don't have a background in some of that stuff, you don't know how far you should take it. ... It's almost like you needed to be doing a Master's in that language to really feel like you were getting enough information. (Focus group)

Comment 10. How far do you go with grammar when you have a highly inflectional language? I almost went crazy, the things that I had to include, you know. (Focus group)

Many participants said that they were lucky to find resources for the language they chose to study. Some who had chosen a language that they felt was not well documented expended great effort in their search for resources. For example, a group that studied the Punjabi language visited a local temple and interviewed an expert in the language:

Comment 11. Like our language ... there are not a whole lot of studies on that language. We went to the temple ... and we were lucky enough to have an opportunity to interview and talk to a man. He has his Ph.D. in the Punjabi language and taught in a university in Punjab. (Focus group)

Having worked so hard to find content, several participants said they were frustrated by the technical problems encountered when trying to put their results into web page format. The following comments reveal frustrations related to managing and preparing html files:

Comment 12. After you've written your paper you think, "Where did it go?" And then you have to write it all again. That was the part I found frustrating because there were certain parts that I completely lost and had to rewrite. (Focus group)

Comment 13. When you're doing things like pin yin [Chinese] and ... then you save it as whatever. And then it changed. ... You have to go back after you've done that for three hours. That's what I thought was really, really, really frustrating, the technology part. (Focus group)

One particular technical challenge that arose was the problem of displaying non-Roman scripts, including phonetic descriptions, in a way that could be read by any visitor to the homepage.<sup>4</sup>

Comment 14. So finally the day I have to hand in my disk, I found by myself how to get my Cyrillic fonts in there. ... [But] everything changed [on the web]! Because I couldn't put these Cyrillic fonts there I just gave up many of my examples. ... It was quite disappointing. (Focus group)

Comment 15. I'm not even fully satisfied with our final product because we were unable to use those letters in Czech. We compensated by using different characters to

replace those and so anyone accessing our site doesn't have a really accurate view of the Czech language. (Focus group)

Feeling disappointed, some participants said that they almost gave up presenting their content in a web page format. However, as one participant explained, it was his determination to learn technology that kept him going:

Comment 16. I knew in my mind that ... I wanted to learn this technology. I really felt I was going backwards further and further by not facing this. And a part of me really wanted to at least be successful in some way doing this. Whether it worked or not, I thought I wanted to do this. And I think that's what kept pushing me to do it. (Focus group)

In discussing problems and frustrations related to learning technology, several participants mentioned the competing demands of content development versus the development of technical skills and the resulting impact on time investment. Many said that they spent more time developing technical skills than learning content. In their words,

Comment 17. I felt most of our time was spent on working out technical problems instead of [learning] content. We spent many hours on this project and the technical glitches held us back a lot. (Questionnaire)

Comment 18. It was like two separate projects. One was just researching content, getting familiar with the language and culture. And then there was the extra pressure of trying to deal with the web page. ... It's difficult to find material and you can't trust everything that you find. So that alone takes a lot of time. (Focus group)



The conflict between learning content and learning technology reflects participants' belief that these are two separate tasks. Considering the time they invested in technology, some participants felt that they were learning technology at the expense of content learning:

Comment 19. I think it [the technological aspect] detracted from what we could have really learned [about the content]. (Focus group)

Comment 20. We don't have a lot of time to work on the web page. We wanted to have more time to do the research of the language and work on the content. (Focus group)

To help focus on content learning, many participants suggested bringing in professional web page designers. Some believed that technical support should be provided as a service for students who took the course for its content:

Comment 21. It's the linguistic content as opposed to the technology content. So if we have all our content and we just say [to people who know technology], "Here it is. Here are the ideas I want." They would plug it in and there you go. That would relieve a lot of frustration. (Focus group)

Comment 22. What we have is the content. You [experts of technology] plug it in because it's really linguistics what we're here for. (Focus group)

Some participants expected a perfect mark after all their hard work. Despite the fact that most did get high marks (8 or 9 out of the 10 points allocated to presentation or format), many were disappointed at receiving suggestions for improvement of either content development or web presentation. Those who received comments on how they could improve their web presentation felt that they should have been evaluated only on content and not on technical skills. One complained,

Comment 23. I've learned all this content ... I think that was fair enough to mark me on the content. And I didn't think we were going to be marked on the technology part. I don't think that should have been a consideration. (Focus group)

On the other hand, some participants who received comments on how they might strengthen their content development expressed dissatisfaction about the lack of consideration for their technical effort. Some felt disadvantaged by the web page option not only because of the time invested, but also because of the limitations of technology to display content. For example, the following participant complained that he was not adequately rewarded for his efforts on web design:

Comment 24. If I'm being marked on content, then I can hand in a huge paper that has all the content there. ... If there had been more points [marks] for a web page, I think it would have been fair. (Focus group)

The tension between content and technology learning expressed by participants reflects a traditional division of labor between content specialists and experts in technology. Instead of viewing technology as a tool to facilitate new kinds of learning, many participants regarded it as "something extra" which either detracted from the time available to study content or prevented them from displaying the results in ways they wished. Based on their belief that developing content knowledge was the primary or even the sole reason for taking the course, some participants requested that technical services be provided to put their work on the web.

### **Conclusion: Can technology constitute a tool for learning content effectively?**

This study examined how pre-service and in-service teachers responded to an attempt to make the learning of technology a meaningful, constructivist-based experience by anchoring a learning task in the context of creating a web site of teaching resources. Results show an overall improvement in the technological literacy levels of the participants with many finding the

experience beneficial. However, in contrast to our expectation that ICT learning could extend the potential for content learning, many participants perceived the use of technology in terms of cognitive overload or even a distraction from content learning. The tension between content and technology experienced by the participants raises two important issues: the role of technology as a constitutive element of knowledge construction, and the influence of student/teacher beliefs in integrating technology into content learning.

Participants' view of learning technology as a separate task or, as one put it, a detraction from what they could have really learned about the content, suggests that there is a need to explore the capacities of technology in constructing and developing content knowledge. In other words, we need to identify how ICT can be exploited as a tool to maximize learning. In our case, we need to explore specifically whether our students' use of the WWW to construct knowledge results in a kind of learning which differs qualitatively and quantitatively from that acquired by means of the traditional essay or poster assignment. For example, does the construction of hypertext of the web page allow learners to construct and communicate their knowledge in new or particularly insightful ways? In what ways do hypermedia, such as image and sound, help develop knowledge? How does the search for and selection of information on the Internet help transform knowledge? Previous research has emphasized *effective technology learning through content learning* (Clift et al, 2000; Halpin, 1999; Scheffler & Logan, 1999; Selinger, 2001; Shibley, 2001). The present study, however, directs our attention to *effective content learning through technology as a learning tool*. In light of the present data, we argue that education students need to explore and experience how technology-based learning activities can lead to enhanced content learning.

The present study also suggests that the tension between technology and content learning is connected to participants' beliefs about traditional content learning. As one participant explained, it is linguistics, not technology, that is the focus of an applied linguistics course. This observation supports Cuban's (1993) statement that many teachers hold a traditional view about "what teaching is, how learning occurs, what knowledge is proper in schools" (p.186). Because teachers typically view content acquisition as their primary goal and would hesitate to allow content to take a backseat to technology (Goldman et al, 1999), the integration of technology into content learning means a gradual replacement of traditional pedagogical beliefs (Cloke & Sharif, 2001); however, such changes do not occur automatically. Indeed, as instructors of the course and members of the research team, we also wondered whether our technology training was taking too much class time away from the traditional "delivery" of content as described (and implicitly promised) in the course outline. Our experience suggests that it is a challenge for both teacher educators and their students to integrate traditional perceptions of content learning with new technology. We have yet to recognize that information technology is already a part of literacy, whether we like it or not, and that, just as we can talk, write, or read to learn (Britton, 1970; Barnes, 1976), we can also employ new media to learn. Perhaps we found our students at a stage analogous to young children "learning to read," while we had hoped to help them reach a "reading to learn" stage with respect to technology.

In conclusion, at a time when the Internet is shaping and transforming our educational system, the present study suggests that there is a long way to go in preparing upcoming as well as experienced teachers to be technologically literate educators. We believe that teachers need to be given evidence that ICT can make teaching/learning more effective. Put otherwise, we continue to need research to demonstrate that the time and energy people spend on learning technology

along with content is worthwhile. Such evidence is crucial if teachers are expected to use technological skills to enhance content learning in their own teaching. As part of our ongoing research, we have planned to provide open forums at various stages of the project for our students to discuss the role of technology in content learning and to debate the question of what constitutes content learning in this technological era. We hope that, together with better technical support and more specific evaluation criteria for our web-based research project, such open forums will help teachers recognize the importance of their own understandings and beliefs in changing the educational system as we evolve into an increasingly rich information age.

**Notes:**

1. The authors gratefully acknowledge the support of the University of British Columbia's Teaching and Learning Enhancement Fund given to Ling Shi, Ken Reeder, Elaine Decker, Sheryl Adam, JoAnne Naslund, and Tammy Slater, as well as the assistance of Keith McPherson, Coordinator of the Language and Literacy Education Research Centre, and Bob Bruce, Director Education Computing and Media.
2. There were three computer labs available on campus: one large PC lab and one large Mac lab each with about 25 networked computers, and a smaller PC lab available in the daytime and by instructor booking, all with *MSE* and *Netscape* browsers, *DreamWeaver* or *Netscape Communicator* html editors.
3. Halfway through the project in both sections, a one-page set of guidelines for peer/instructor feedback was circulated and discussed with participants. The adjudication process for the web pages took over thirty minutes for each presentation. High agreement was achieved in the assessment process.

4. This prompted consultation with colleagues in the linguistics department and computing services, a search of the technical literature, and extensive trial-and-error by participants and project team members alike. In response to concerns from participants who had expected better results for their efforts, a set of solutions about how to display non-Roman scripts was compiled and posted in May of 2002 on the project site at: [www.lerc.educ.ubc.ca/lerc/courses/489/worldlang/index.html](http://www.lerc.educ.ubc.ca/lerc/courses/489/worldlang/index.html). In addition, *WebStart*, which could be accessed through the project home page, was linked to the Summer Institute of Linguistics' phonetic font download site with the caution that visitors to particular web pages might need to install font sets to view phonetic characters.

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Appendix A. Guide for small group discussion and focus group interview

1. What were some of the strongest features of this experience?
2. What did you learn? How might this be useful to you in your future teaching?
3. Did you experience any frustration when doing this project? Explain.
4. What ideas do you have for improving the World Language Fair project?
5. Is there anything else you would like to add?

**Table I. The project's working groups**

	<b>No. of group presentations</b>	<b>No. of members</b>	<b>No. of languages studied</b>	<b>World languages studied</b>
Web pages	18	53	14	Arabic, Bulgarian, Cantonese, Greek, Halkolmelem, Japanese (2 groups), Punjabi (2 groups), Polish, Spanish, Tagalog (2 groups), Turkish, Mandarin (2 groups), Vietnamese, Taiwanese
PowerPoint	1	3	1	Italian
Posters	3	8	3	German, Korean, Spanish
Total	22	64	18	

**Table II. Positive features mentioned in small group discussions ( $n=13$ )**

<b>Topics</b>		<b>Number of groups mentioning the feature</b>	<b>%</b>
Technology Learning	Web creation	9	69%
	Information research	4	31%
Content learning	Language and culture	12	92%
	Teaching ESL students	7	54%
	Selecting information	1	8%
Cooperative learning		2	15%

**Table III. Negative features mentioned in small group discussions ( $n=13$ )**

<b>Topics</b>		<b>Number of groups mentioning the feature</b>	<b>%</b>
Technology Learning	Lack of support	10	77%
	Workload	1	8%
Content learning	Lack of resources	4	31%
Cooperative learning	Uneven distribution of labor	3	23%