Connecting CALL Theory and Practice in Preservice Teacher Education and Beyond: Processes and Products

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ABSTRACT

This paper integrates the theory and practice of computer pedagogies in a variety of language courses, all stemming from participation in a graduate level course on computers in language teaching. First, the graduate level preservice CALL course is described, focusing on how connections between theory and practice were developed. Descriptions of how four participants from the course continued to apply theory in their practice of computer integration in four language courses follows. Each of these four courses demonstrates how computers can be integrated into language teaching to meet course and program goals. Drawing on task and computer pedagogy theories, the first two projects make use of the Internet to provide adult foreign language learners with authentic language input and interaction opportunities, one in a distance learning course in Finland and the other in a French as a foreign language course in the US. The final two projects ground practice on theories of English for specific purposes and computer pedagogies in adult courses in the US, the first a business English course integrating a computer simulation and the second a graduate electrical engineering writing course with materials developed using concordancing software and a specifically designed corpus of engineering texts.

KEYWORDS

Computer-mediated Communications, Computer Pedagogy, Concordancing, English for Specific Purposes, Simulation
INTRODUCTION

In language teacher education, a tension exists between the expectations of faculty and students in balancing theoretical underpinnings of the field and practical teaching experiences. Once in the field, however, teachers draw on both theoretical and practical knowledge (Freeman & Richards, 1996; Freeman & Johnson, 1998; Wallace, 1991), indicating that both are needed in language teacher education programs. Theoretical knowledge includes the exploration of language learning/teaching theories and content knowledge, while practical knowledge is acquired through reflecting on prior experience as language learners, teaching observations, and direct teaching experiences (Drever & Cope, 1999; Golombek, 1998; Freeman & Johnson, 1998; Roberts, 1998). Integrating technology training into the preservice teaching experience increases the tension between the theoretical and the practical because these novice teachers may be at varying stages of computer literacy and may be more or less comfortable with the notion of integrating computers into their developing pedagogies.

Computer training and integration is needed in preservice teacher education as society transitions to an electronic age where reading, research, and communications are increasingly conducted online. Many in-service teachers report feeling inadequately trained and ill prepared to meet the challenges of integrating computer technologies into their pedagogies (Schrum, 1999; Sprague, Kopfman, & Dorsey, 1998), and, additionally, teachers may feel isolated if the pre- or in-service technology experience was limited (Brownell, 1997; Orrill, 2001). Providing preservice teachers with varied experiences with new electronic literacy practices can model the application of theory to practical use that they will need to apply computer technologies to the language classroom.

The graduate preservice course described here integrates technology as a primary tool in teaching language through theoretical explorations of electronic literacy and hands-on practical training in using those technologies. By integrating theory with practical applications, the teacher preparation course gave the students a model for exploiting theory in the application of practice. Four participants of this technology course applied and expanded on theories they had studied in the course by creating practical language teaching applications once in their roles as novice language teachers. This paper begins by describing the teacher education course, focusing on the development of theory and applications in computerized language teaching. The four computer integration projects are then presented, demonstrating a range of technology integration projects in ESL, EFL, and FL. In each case, the novice teachers firmly wove technology into the fabric of their courses by applying theoretical constructs from the field to practical applications in language teaching.

THEORY AND PRACTICE IN A PRESERVICE TECHNOLOGY-IN-PEDAGOGY COURSE

Although many preservice teachers have experience using computers for a variety of purposes (e.g., word processing, information retrieval, and communications),
few have considered how computers might be integrated into language courses to promote course and program goals. Computers in Language Teaching, an elective course in an MA TESL Program at a mid-sized university in the US, surveys theoretical issues related to educational technology and provides hands-on opportunities for participants to practice using and applying new technologies in language teaching. Participants in the course typically include graduate students preparing to teach either in preK-12 schools or in adult education contexts. The term preservice teachers used here applies to students preparing either for public school or adult education settings. Once the students had graduated and were in charge of their own language courses, applying computer and pedagogical theory to their classroom practices, we refer to them in this article as novice teachers.

Computers in Language Teaching serves as a beginning step for preservice teachers interested in incorporating computer technologies into their teaching repertoire. The course increases their foundational electronic literacy skills (e.g., word processing, email, and critical reading on the Internet) (Shetzer & Warschauer, 2000), and it provides opportunities to expand their electronic literacies to include pedagogical applications (Hatasa, 1999) such as software/Web evaluation, authoring, computer-mediated communications (CMC), and basic corpus linguistic techniques in language analysis and materials development. The preservice teachers apply these expanded literacy skills in the development of materials and tasks for language teaching and testing.

Throughout the course, participants consider the theoretical issues of (a) integrating the technologies into the curriculum rather than using the computer as a mere add on (Wildner, 1999), (b) extending language learning beyond the classroom through computer-enhanced learning (Salaberry, 1996), and (c) realizing the social constructivist nature of language teaching that enables learners to acquire the target language through interactions with the teacher, with each other, and with other learners at a distance (Beatty, 2003). In addition, the preservice teachers gain experience in mustering institutional support for technology integration within a wide range of contexts (Ehrmann, 1995).

Four components of the Computers in Language Teaching course laid the foundation for the projects which participants developed in the year following the course when each was established in a professional language teaching context. Topics and skills beyond those listed below were practiced in Computers in Language Teaching as well (see Rilling, 2000). Course components included

1. Internet and software design and development, requiring the preservice teachers to design and author: (a) simple interactive learning software using an authoring tool (Authorware, 1999) and (b) an Internet site with multiple links and graphic elements using an HTML editor. Applying theoretical readings of web/software design and use, participants designed and generated software and Internet sites to suit a given target population with specific language learning goals.

2. Electronic communications using a variety of computer-mediated communications (CMC) applications (e.g., electronic chats and bulletin boards)
in the discussion of issues related to CMC for language learning. Theoretical discussion topics included fluency building through CMC, affect and CMC, cross-cultural exchange through CMC, discourse conventions in CMC, and social constructivist theories of language learning and CMC. Theoretical readings provided topics for discussions through various CMC media.

3. CD-ROM/software/Internet literacy, focusing on evaluation of native and nonnative speaker software/CD-ROMs and Internet sites for language teaching applications. Participants developed supplemental learning tasks and materials to target specific teaching goals by applying course readings and discussions to a variety of language teaching contexts.

4. Corpus linguistic techniques in language materials development, exploring issues of representativeness in corpus design and considering the needs of both English for academic purposes (Thurstun & Candlin, 1998) and English for specific purposes (Dudley-Evans & St. John, 1998) language learners. Participants practiced using a concordance program and a published corpus collection (Hofland, Lindebjerg, & Thunestvedt, 1999) to support or refute what they were learning about lexis and syntax in other coursework, with an eye toward developing authentic learner materials.

Computers in Language Teaching combined CALL theories with practical teaching applications by

1. exploring current trends in CALL;
2. providing the preservice teachers access to challenging materials and technological innovations;
3. reading and discussing texts that included both theory and practical classroom applications;
4. allowing the preservice teachers to choose the readings they wanted to lead discussions on;
5. asking the preservice teachers to explain how they understood the readings, how they could benefit from that knowledge, and how they might apply that knowledge in the field;
6. having the preservice teachers use real scenarios, real students, and real contexts in realizing course projects;
7. asking the preservice teachers to make personal connections to the course materials and technologies; and
8. creating autonomous learners by providing the preservice teachers with concrete resources and tools to use after the course.

This preservice graduate course laid the groundwork for four participants to develop computer integration projects in a variety of professional contexts. Each of the four projects is presented, showing how the novice teacher applied theory in the practical application of technology in language learning.
THE INTERNET IN AN EFL COURSE IN FINLAND

One of the participants in Computers in Language Teaching investigated combining task sequences with authentic materials and interaction opportunities on the Internet in preparation for teaching a summer course in higher education in Finland. By applying social constructivist theories of language learning (e.g., Beatty, 2003; Weasenforth, Biesenbach-Lucas, & Meloni, 2002), this novice teacher was able to develop a distance learning course that met various needs of her learners, including test preparation and increased language proficiency.

The Internet and Internet tasks that the novice teacher developed formed the focus of the 8-week EFL distance learning course. The course prepared learners for a national exam of English listening, speaking, reading, and writing skills. Since the course participants were all public educators in Finland, many of whom teach courses in English, the course also developed the learners’ English proficiency to enhance classroom instruction. The first and the last week of the course took place on campus during which learners had computer orientations and oral discussion/presentation opportunities. The 6 weeks between comprised a distance-learning period using computer and other technologies for language development.

The goals of the course were threefold. First, the language learners needed to increase their motivation to learn and use English. By exploiting authentic English language input available on the Internet, learners increased their opportunities to improve their reading and vocabulary skills, and they increased their motivation to use English (Buell, 1999). Through the process of using the Internet, positive learning experiences with technology were created, thereby minimizing technophobia (Johnston, 1999) while promoting learner autonomy, responsibility, and motivation.

A second goal of the course was to support individual differences among learners. The Internet is an optimal site for the creation of tasks tailored to different learners’ language skills and personal/professional interests (Dahlman & Rilling, 2001). One way of tailoring tasks was achieved by giving learners choices, at times asking them to compare more than one Internet site on the same topic (Healey, 1999; Hanson-Smith 1999b). Some tasks allowed learners to choose texts that matched their interests, thus simulating the concept of an *I-search paper* (Macrorie, 1988), a content-based research paper or presentation based on student interest. Tasks were also tailored by providing the language learners with specific Internet sites to match their language skills or interests. This controlled freedom gave learners opportunities to explore the Internet at a level most beneficial to them.

A third goal of the course was to promote student responsibility for learning (Chao, 1999), an essential goal in distance learning. During three fourths of the course, the learners studied at home and participated remotely by completing distance-learning tasks. Through specific tasks, they gained insights into professional and personal uses of the Internet for future language learning, information retrieval, exchange of ideas, and entertainment. Healey emphasizes the importance of the Internet as “a connection to learners’ real-world needs and desires” (1999,
p. 136), so by designing tasks that mimicked potential computer use in their own lives, life-long learning was promoted.

Foreign language teachers face the challenge of providing adequate and varied language input. The Internet provided learners with reading and viewing input on the target and other cultures (Martínez-Lage, 1997) as well as opportunities to interact with other learners or native speakers (Chun, 1998; Gaer, 1999). In addition, the Internet provided authentic reading materials and opportunities to simulate real-life tasks.

**Examples of Internet Tasks to Accomplish EFL Course Goals in Finland**

The course Web site, designed and maintained by the novice teacher, served as an important link between the language learners and the teacher during the distance learning period, and its built-in Internet forum enabled participants to communicate with each other. These social connections proved essential in providing learners with a sense of community and opportunities to learn from each other as they completed course tasks. All required task assignments were linked to descriptions and due dates, so learners could also work independently within established guidelines, giving them plenty of flexibility in scheduling the distance-learning tasks into their own busy lives.

To meet the course goal of improving language proficiency and increasing motivation, the Internet was used to provide information, simultaneously introducing new vocabulary and associated language structures. Language and content were activated by having the language learners use the newly learned material in multiple ways. For example, learners conducted Internet research on a common topic, discussed what they had found on a class e-forum (Opp-Beckman, 1999), and reported their results to the instructor via email. Table 1 shows a series of such tasks, each designed to promote reading and interaction through the Internet.

**Feedback, Reflections, and Future Plans for Finland**

Learners were asked to give feedback about the course and the progress they made both during and after the course. Learners reported that the Internet tasks were linguistically challenging since the Web sites contained language which they did not understand, thus causing a sense of cognitive overload (see Foltz, 1996). In order to cope with this overload, learners in the future may be asked to answer focused questions at specified Internet sites, thereby reducing cognitive load in processing the wealth of materials available on the Internet. Other Internet innovations will also be incorporated based on learner feedback, including websites that offer sound—audio recordings and video clips—to provide listening practice as supplements to the students’ Internet research (e.g., clips available at CNN at http://www.cnn.com). Increasing students’ access to listening materials through the Internet will address students’ concerns about increasing their listening skills.
### Table 1
Internet Reading and Interactions in Finland

<table>
<thead>
<tr>
<th>Task</th>
<th>Preparation</th>
<th>In-task activities</th>
<th>Posttask activities</th>
<th>Computer enhancements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation: Custom design a trip to Finland for hypothetical English-speaking tourists.</td>
<td>In groups, discuss places to stay, attractions, etc., given the specialized needs of simulated tourists.</td>
<td>Explore tourist attractions and accommodations in English at different locations in Finland on the Internet.</td>
<td>Prepare handouts on your travel plans based on Internet readings and present these orally in class.</td>
<td>Examples for the Savonlinna region: <a href="http://www.retretti.fi">http://www.retretti.fi</a>, <a href="http://www.operafestival.fi">http://www.operafestival.fi</a>, and <a href="http://www.savonlinna.fi">http://www.savonlinna.fi</a></td>
</tr>
<tr>
<td>Explore Finnish and American society/culture.</td>
<td>Locate Internet information in English on an aspect of Finnish society/culture (e.g., government, education, and language use).</td>
<td>Share information and opinions on society/culture with classmates on an interactive Internet forum.</td>
<td>Discuss with US keypals Finnish and American society/culture.</td>
<td>Internet Forum authored into the class Web site, using script available from <a href="http://www.ezboard.com">http://www.ezboard.com</a></td>
</tr>
<tr>
<td>Locate suitable summer housing in an English-speaking country.</td>
<td>Visit English language real estate sites on the Internet. Compare available housing.</td>
<td>Email a written report to the instructor about the housing features, costs, advantages, etc.</td>
<td>Present a ‘virtual’ tour of vacation plans orally in class with visual support from the Internet.</td>
<td>Samples of real estate sites: <a href="http://www.homegain.com">http://www.homegain.com</a>, <a href="http://www.realtor.com">http://www.realtor.com</a>, and <a href="http://www.remax.com">http://www.remax.com</a></td>
</tr>
</tbody>
</table>

By combining life-like tasks with interaction opportunities, this novice teacher provided her learners with ample opportunities to learn both from authentic materials and from socially constructed dialogues with each other and with native-speaking keypals. These connections between social constructivist theories of language learning and the practice of teaching through such interactions provided a strong basis for the Finnish learners to increase their language proficiency and their motivation to continue to use English in real-life tasks.

**INTEGRATING CMC WITH OTHER COMPUTER TECHNOLOGIES IN THE FOREIGN LANGUAGE CLASSROOM**

Prior to teaching a first-year French-as-a-foreign-language course for the first time, another participant of the Computers in Language Teaching course considered theories of language input/output, accuracy, and fluency (Swain & Lapkin, 2001; Williams, 1999) in applying computers in the foreign language curriculum. First-year French at this mid-size US university takes a communicative approach to language teaching by integrating the skills of reading, writing, listening, and speaking while targeting specific vocabulary and grammatical structures. In addition, the language learners expand their knowledge of French and francophone
The textbook for the course (Manley, Smith, McMinn, & Prévost, 1998) focuses on vocabulary and structure development supported through short readings, limited mostly to dialogues and single paragraphs in each chapter, plus occasional authentic texts such as poems, ads, and very brief excerpts from magazine articles. The textbook also suggests one Internet activity per chapter; however, prior to this novice teacher’s involvement with the course, other instructors (TAs and instructors) had not made use of the Internet as a resource because teaching with technology had not been emphasized in training.

Technology integrated by this novice teacher provided learners in the first-year language program with literacy tasks that included access to longer authentic texts (both oral and written) and opportunities to interact in French. By using international Internet sites as reading texts and as springboards to interactive writing assignments, communicative goals of the course were met, including: (a) providing the language learners practice in literacy and computer literacy skills (Shetzer & Warschauer, 2000), (b) addressing multiple intelligences (Gardner, 1993), and (c) bringing welcome variety to a class that meets daily. As Opp-Beckman explains, “computers have the capacity to enhance language learning in ways that complement other methods and activities” (1999, p. 79). By integrating the Internet and other computer-based tasks into the curriculum, learners had access to authentic uses of French language that enhanced the textbook. Computer-mediated communication (CMC) and other computer technologies appealed to several of the learners’ multiple intelligences, such as verbal-linguistic, bodily-kinesthetic, intrapersonal, and interpersonal. Additionally, activities that included samples of French radio spoke to learners with musical intelligence, and supplemental activities like designing brochures, ads, or Internet sites based on online research provided a forum for learners with spatial intelligence.

**Computer-based Tasks to Accomplish French Language Goals**

Since it is impossible to take all French learners to Paris, Québec, Martinique, or Morocco, the Internet and available CD-ROMs provided these first-year French students with a virtual immersion experience with authentic French texts and interaction opportunities. By developing Internet tasks that made connections to words, phrases, ideas, and grammar from the textbook, the language was made relevant because the learners were functioning in a native-speaking environment while dealing with familiar language. Beauvois (1998) stresses the importance of negotiating meaning in CMC activities. By contributing their own ideas through CMC, the learners were ‘publishing’ their ideas for the class. Learners were careful with their writing because they knew that the teacher was not the only one who would read it.

In preparation for the course, this novice teacher developed a class Web page using Syllabase (2001), a proprietary Internet-based teaching forum offering teacher control over such design features as electronic forums, chat rooms, links to the Internet, a course calendar, and so on. In addition, the teacher and students could
easily up- and download files to and from the course Web page to complete assignments. The French class used the electronic forum feature of Syllabase most often, and this was combined with other computer technologies. For example, to focus on the recursive nature of writing, learners revisited postings from earlier in the semester and revised them using new grammar and vocabulary, allowing learners to see clearly the progress they had made. This approach further emphasized writing as a cyclic process, not a one-time event (Ferris & Hedgcock, 1998). An example of some of the interactive writing tasks that learners completed are presented in Table 2.

**Feedback, Reflections, and Future Plans for French**

Learners’ reactions on course evaluations over the past few semesters have been favorable and often enthusiastic about the integration of computer technologies in the first-year French course. Learners did their online tasks regularly and responded to each other’s postings with enough detail that it was clear that they had read and considered the material. The students reported on course evaluation forms that they enjoyed the Internet searches, although some, as in the Finnish context, never stopped being frustrated when they could not understand every word. More explicit teaching of vocabulary learning strategies and skimming/scanning skills will benefit these learners in the future. In terms of affect, most learners agreed with Beauvois (1998) that they like writing on the computer because it gave them “time to process” (p. 109) and reduced the stress they felt in the classroom when producing language face to face.

As Egbert (1999) has indicated, however, having learners work in groups for computer-based tasks does not guarantee a productive interaction or ensure they will speak completely in the target language. Based on structured observations by the novice teacher, the learners did sometimes slip into English when doing online activities; however, the teacher discovered that this also happens during face-to-face pair work in the classroom. Learners generally worked together diligently to decode the French pages, which meant that they were gaining exposure to more French than may have been available in a traditional class session.

Recently this novice teacher has integrated computer technology into the French instructor/TA training program by summarizing and helping the instructors and TAs integrate research and theories of computer pedagogies into their language teaching. Training includes brainstorming sessions designed to generate ways to integrate technology into the curriculum, and each first-year teacher now establishes a Syllabase Web page for homework assignments and CMC applications. In addition, each takes turns developing Internet activities to accompany different sections of the course textbook. These activities are tested on several different classes, and the results are compared to determine what sorts of activities both appeal to learners and are at an appropriate level of difficulty.
<table>
<thead>
<tr>
<th>Task</th>
<th>Preparation</th>
<th>In-task activities</th>
<th>Posttask activities</th>
<th>Computer enhancements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write a past narrative using passé composé and imparfait.</td>
<td>Write a past narrative on the Internet forum describing your worst vacation.</td>
<td>Create at least one lie in your narrative.</td>
<td>Read classmates’ narratives and find the lie. Write a follow-up post-ing guessing the suspected lie.</td>
<td>Internet discussion forum through Syllabase</td>
</tr>
<tr>
<td>Explore love and romance from a French perspective while recognizing and using target vocabulary.</td>
<td>Consider your ideal mate and write a brief description.</td>
<td>Read personal ads on the Internet, then cut and paste a favorite one to the electronic forum. Comment on why you chose this person.</td>
<td>React to classmates’ postings on the Forum and then take a ‘love test,’ or create a ‘Mad Libs’ style love letter. Write your own personal ad on the class forum.</td>
<td><a href="http://www.pupuce.com">http://www.pupuce.com</a> or <a href="http://www.club-internet.fr/amour">http://www.club-internet.fr/amour</a></td>
</tr>
<tr>
<td>Learn about and interact on life in Sénégal while practicing adjectival agreement and placement.</td>
<td>View CD-ROM images in the language lab and listen to the instructor’s lecture ‘tour’ on Sénégal.</td>
<td>Discuss the images from the Sénégal tour in one of several chat rooms on Syllabase.</td>
<td>Write a posting to the Internet forum comparing elements of Senegalese, French and US culture.</td>
<td>CD-ROM about Sénégal (Le Sénégal de Youssou N’Dour, 1996)</td>
</tr>
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</table>
INTEGRATING SIMULATION SOFTWARE IN BUSINESS ENGLISH IN AN INTENSIVE ENGLISH PROGRAM

A third computer integration project stemmed directly from a project in the Computers in Language Teaching course. This project required the preservice teachers to (a) evaluate native speaker software or Internet sites (Robb & Susser, 2000) and (b) develop language support materials/tasks to work in tandem with the computer application. One group of preservice teachers had developed support materials for the simulation software *Sim Theme Park* (1999) for content-based instruction. One of the members of the group further developed these materials for a business English course that she taught in an intensive English program at the university level. Once in the field, this novice teacher drew on pedagogical applications of computers in language teaching as well as theories of teaching English for specific purposes and language testing.

The Business English class described here, an elective for both intermediate- and advanced-level learners in an intensive English program associated with a mid-sized US university, was comprised of 12 learners of different nationalities and included the following basic course objectives: (a) practicing English language skills, (b) increasing content knowledge (business vocabulary, business text types, etc.), and (c) practicing basic functions of business software (e.g., word processors, spreadsheets, and presentation tools). Since simulations are potentially rich tools for language acquisition in content-oriented classes, especially when accompanied by well delineated tasks, this novice teacher decided to integrate the *Sim Theme Park* software into her course. Hanson-Smith (1999a) argues that “simulations can extend the concept of the case study by providing enormous amounts of data with which to experiment as well as offering changes based on learners’ input in various areas” (p. 141). Simulations provide a meaningful stimulus around which language and content can be constructed and practiced. While *Sim Theme Park* supported the course objectives listed above, the following objectives were also added to integrate fully the simulation into the course: (d) creating and managing a simulated business (a theme park), (e) planning and implementing decisions in a team format, and (f) preparing and pitching a business proposal to potential investors to expand the theme park.

One of the goals of integrating the simulation program into the course was to allow the intensive English program to maximize its technological resources in a way that it had not done prior to the redesign of this course. Although the hardware for technology integration was already in place, many of the courses in which technology could play a useful role in the program had not been examined, and so the technology components of most courses were limited to word-processing assignments and self-directed Internet research. This course allowed the institution to utilize its technology in a more meaningful and creative way to further the language acquisition of its students by incorporating more social interaction around computers (Egbert, 1999).

Another goal of the integration of the software into the business class was to allow students to explore and practice the cross-cultural nuances so necessary for successful international business transactions (Ellis & Johnson, 1994). Because
the groups formed for the simulation were multinational, the incorporation of the simulation software provided a rich opportunity for role play, demanding sensitivity to the cultural expectations of others on the team and those on other teams in the class. The team format allowed for increased development of each student’s interlanguage and furthered their discovery of cultural expectations by allowing them to become a “member of a transactional world where the fundamental concern is the exchange of goods and services” (Dudley-Evans & St John., 1998, p.72).

A further goal of the software integration was to provide multiple means of assessing the students’ speaking abilities (Cohen, 1994). Beyond the pen-and-paper tests and formal oral presentations embedded in the course, the simulated construction and management of the theme park created a type of extended, open-ended role play in which students were asked to produce different types of speech acts depending on the task involved with the simulation (e.g., answering a request, summarizing financial information, etc.). Through structured observations, the novice teacher was provided with daily input on how the students completed these tasks at the computer and how often and how appropriately the students applied the content vocabulary, structures, and text types introduced in the course.

**Integration of Sim Theme Park and Examples of Tasks**

The *Sim Theme Park* program requires ‘players’ to design, build, and manage a virtual amusement park where success demands completion of an extensive set of complex business tasks, including hiring and managing staff members, cleaning the park, monitoring and responding to visitor happiness, keeping track of finances, and other related duties. While Chapelle (1999) points out the difficulties in labeling any classroom task authentic, the simulation software offers business practices resembling the demands of operating a business in the real world. Because of the relative authenticity of the simulation, it was a simple matter to integrate business concepts by matching relevant chapters of the course textbook (McDougal Arden & Tolley Dowling, 1993) to the functions and demands of the simulation software. Developing tasks that paralleled the course textbook and exploring how the software supported the course in advance had an important benefit in that it allowed the novice teacher to become very familiar with the simulation software, enabling her to troubleshoot problems in case of technical difficulties during the course. Because *Sim Theme Park* is fairly complex to use, the novice teacher compiled a set of simple instructions for the learners, providing them with commands for basic program functions in a form that was readily available outside of class.

One example of the integration of the textbook, the simulation software, and commercial business software is the course unit on accounting and finance. The overall concepts were presented in the textbook, including related vocabulary and different types of accounting tools. The *Sim Theme Park* program provided learners with detailed financial information for their simulated parks in numeric and graphic formats, effectively supporting the finance theme. Commercial spread-
sheet programs, commonly used in business situations to track such data, were incorporated for the language learners to process the business data further in support of several course goals, including oral presentations. Table 3 shows further classroom activities used to support the objectives of the course.

Table 3
Integration of Sim Theme Park Software into a Business English Intensive English Course

<table>
<thead>
<tr>
<th>Task scenario</th>
<th>Preparation</th>
<th>In-task activities</th>
<th>Posttask</th>
<th>Computer enhancements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respond to a complaint letter from a dissatisfied theme park customer.</td>
<td>In class, examine models of and various purposes for business letters.</td>
<td>Read a complaint letter about your park and respond to it by writing a letter denying the excessive demands of the customer.</td>
<td>Read the letters of other groups and critique the format, language, and solutions.</td>
<td>Word-processing templates for business letters</td>
</tr>
<tr>
<td>Prepare a portfolio of theme park business documents.</td>
<td>In class, examine various types of business documents (e.g., balance sheets, advertising brochures, and business letters).</td>
<td>Work with your team to collect data to produce a portfolio for your theme park using spreadsheet and word processing software.</td>
<td>Work with a partner from another group to critique the portfolios based on a rubric provided in class.</td>
<td>Word-processing-brochure templates; spreadsheet software for spreadsheets and performance graphics; screen dump shots for brochures</td>
</tr>
<tr>
<td>Create a business proposal to attract potential investors</td>
<td>In class, create business portfolios (see above), discuss presentation techniques and requirements, develop business language and vocabulary.</td>
<td>Present formally your financial information, customer satisfaction data, current infrastructure, and plan for expansion.</td>
<td>Panel of “investors” (local businesspeople such as realtors, bankers, etc.) rates each presentation and presents which park they would invest in and why.</td>
<td>Spreadsheets for customer satisfaction and financial data; word processing for reports and brochures; screen dump shots for brochures and advertisements</td>
</tr>
</tbody>
</table>

**Feedback, Reflections, and Future Plans for Business English**

The novice teacher incorporated several assessment tools into her teaching routines to observe and record student performance of course language and content as well as satisfaction with the course, including structured observations of an on-going nature, interviews with the students, and formal summative evaluations completed by the students at the end of the course. Because none of the resulting group members shared a native language and because many course assignments required each team to work together to produce a single product, the novice teacher observed that English usage was optimized, allowing learners to experience the different expectations and decision making processes inherent in international
The teacher recorded spontaneous use of the business vocabulary presented in class with each content theme in almost all team discussions. Especially interesting was the learners’ use of business vocabulary and structures that the novice teacher observed in the final presentations. While community members (two real estate agents and a banker) judged the learners’ business expansion proposals from a content perspective, the novice teacher could observe and record the learners’ use of language. The novice teacher noted independently recycled vocabulary from various units in the course used by the language learners to persuade the panel of potential investors.

One of the most encouraging outcomes of the simulation integration was the increased confidence and motivation reported in interviews and on final course evaluations by learners with lower linguistic abilities. These students often surpassed the more advanced learners in the development of their theme parks. Not only did the learners report their advanced simulations as a source of pride and confidence vis-à-vis more advanced learners, their experience may have also led toward the type of language negotiation that Pica, Lincoln-Porter, Paninos, and Linnell (1996) claim leads to language acquisition. During course observations, the novice teacher noted that more advanced learners began asking the lower level learners questions about their strategies for building and managing their companies and that the lower level learners enthusiastically explained their business development through a variety of interactional techniques, having suddenly become authorities in the classroom.

On the final summative course evaluations, many learners reported that learning the software was time consuming, but most also reported that they found using the simulation software an enjoyable context for learning Business English. The instructor’s enthusiasm for this software integration project was apparent since her creativity in integrating this simulation into the course clearly added a level of enjoyment to the class that may not otherwise have been easy to inject in a content-based course. By supporting the development of authentic tasks around a computer simulation, this novice teacher supported her practice with pedagogical theories of computer and content integration.

CORPUS LINGUISTICS IN ENGLISH FOR SPECIFIC PURPOSES MATERIALS
DESIGN FOR ELECTRICAL ENGINEERING

This fourth and final computer integration project from the Computers in Language Teaching course combined pedagogical applications of corpus linguistic techniques while drawing on theories of English for specific purposes. For more than a decade, corpus linguistic analyses have been applied in general English for academic purposes teaching (e.g., Donley & Reppen, 2001) and in English for specific purposes (Biber, Conrad & Reppen, 1998). Making extensive use of computers, corpus-based studies analyze large quantities of texts compiled using specific design principles (Sinclair, 1991). Concordancing software enables simple pattern analyses and has been used in language teaching materials and activity development (Flowerdew, 1993; Johns, 1994; Ma, 1994).
With this final computer integration project, a fourth novice teacher served as intern to the faculty member teaching the Computers in Language Teaching course in developing and delivering a highly specialized language course: English for professional writing in electrical engineering. The electrical engineering writing course was contracted directly by an engineering faculty member for his advanced advisees. All learners in the course were international PhD candidates researching a variety of subspecialties under the electrical engineering professor’s supervision. Each was in the process of writing a book chapter for a volume edited by the electrical engineering professor.

The two course instructors met the challenge English for specific purposes teachers face in developing specialized tasks and materials (Nunan, 1999) by first conducting a needs analysis (Dudley-Evans & St. John, 1998). In designing the course, the Computers in Language Teaching faculty member and the novice teacher considered input from the electrical engineering faculty member on course goals and activities. First, students’ writing was analyzed for error patterns, which showed that their texts ranged from needing only minor editing to being seriously flawed on both rhetorical and local levels. Several grammatical patterns and inappropriate use of lexical items and punctuation use in certain sections of the students’ texts were identified for study. The engineering students were also involved in the needs assessment by identifying their own concerns about writing and writing processes, and it was determined that they needed to improve their overall confidence in writing for a professional audience since they had cutting-edge research to share. The needs analysis also led to a survey of available English for academic purposes and English for specific purposes textbooks for teaching ideas as well as the research literature on teaching with genre-based approaches to such specialized discourse domains (e.g., Hyland, 2000; Hyon, 1996).

In preparing classroom materials and discussion topics, only authentic models from electrical engineering book chapters were found to be relevant for language study because this was the genre the students were in the process of producing. At times, however, the language conventions found in electrical engineering book chapters were contrasted in the writing course with research articles in the field. The writing class discussions focused on (a) characteristics of the discourse of the different sections of electrical engineering chapters versus the research articles that the students were more accustomed to reading, (b) the language introducing and discussing the myriad graphic elements presented in electrical engineering texts (e.g., equations and performance graphics), and (c) editing issues of grammar and punctuation.

Throughout the project, the Computers in Language Teaching faculty member used the novice teacher as a sounding board for teaching ideas and as a ‘gopher’ in preparing and running corpus-based studies (i.e., running punctuation, lexical item and lexical phrase searches, and culling the corpus for textual samples of desired items and patterns). In addition, the novice teacher assisted the faculty member in class during discussions of materials, at times teaching lessons she had prepared. This process enhanced the novice teacher’s knowledge of corpus linguistics and her skills in using associated computer tools. The process also
directly benefited the faculty member since the novice teacher provided valuable insights and time to the development of the course and course materials.

**Application of Concordancing**

A computer concordancing program (*MonoConc Pro, 2.0, 1999*) was used to analyze and prepare materials from a corpus of scanned texts (11 electrical engineering book chapters—approximately 49,000 words) (see Rilling & Pazvant, 2002). The corpus served as site for textual analysis and a source of language samples for course materials. The software allows users to identify and quantify specific lexical and punctuation items as well as short collocational units (lexical phrases). These functions were readily incorporated into lesson development as we sought examples and frequencies of various language patterns: lexical items (e.g., hedging markers identified by Hyland, 1996), lexical phrases (e.g., noun premodifiers, ‘a ____ of noun / NP’), and punctuation (e.g., the contrast between semi-colon and colon).

The international engineering students also needed consciousness raising about several grammatical patterns, including the use of articles, relative clauses, and participials. While the software was able to search on grammatical/syntactic tags in a tagged corpus, our corpus was untagged. Therefore, our ability to identify complex grammatical patterns using the program was limited. The materials development research described below for relative clauses shows both the possibilities and the limitations of concordance-based research of grammatical patterns using untagged texts.

Consulting English grammar texts (e.g., Celce-Murcia, 1999; Biber et al, 1999), the two instructors gained insights into the patterns we were studying and provided background materials for class presentation. Frequency counts of lexical, punctuation, and some grammatical patterns could be produced, and the two instructors located language samples (sentences and larger chunks of text) from the corpus in the development of support materials. Screen prints of frequency counts for some patterns were used directly in class to make certain points. Language samples for handouts were also identified by first analyzing the Key Word in Context (KWIC) output from the concordance program and then preparing related tasks and activities. For example, sample sentences of relevant patterns could be copied from the concordance program and transferred into a word processor where gap filler and other types of exercises could be developed.

Taking a problematic example of a construction in English, the relative clause, the faculty member and the novice teacher first identified potential relative pronouns used in the corpus by doing simple lexical searches. Table 4 shows the frequencies of these lexical items in our 49,000 word corpus.

Not all instances of these lexical items function as relative pronouns, however. ‘Which,’ for example, can function as an interrogative pronoun in addition to functioning as a relative subject or object pronoun. ‘That’ is even more problematic in that it can function variously as a relative pronoun, a complementizer, a demonstrative pronoun or article, and a conjunct. In fact, as Table 4 demonstrates, only a little more than 25% of the tokens of ‘that’ actually functioned as relative
pronouns. The KWIC output needed, therefore, to be carefully scrutinized manually to differentiate between these functions of potential relative pronouns in order to locate appropriate sample sentences for class exercises.

Table 4
Frequencies of Potential and Actual Relative Pronouns in the Electrical Engineering Corpus

<table>
<thead>
<tr>
<th>Lexical search item</th>
<th>Frequency in the corpus</th>
<th>Tokens actually functioning as relative pronouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which</td>
<td>228</td>
<td>227</td>
</tr>
<tr>
<td>That</td>
<td>857</td>
<td>182</td>
</tr>
<tr>
<td>Whose</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Who</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Whom</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Frequency data enabled the class to comment on the distribution of the different relative pronouns and to investigate further other uses of the potential relative pronouns, as complementizers, for example. By presenting materials from the students’ own disciplinary texts, language awareness of different types of relative clauses and issues of preference as to ‘that’ or ‘which’ were highlighted. Discussions of the punctuation used with these relative clauses focused students’ attention on the differences between restrictive and nonrestrictive clause types and the stylistic liberties that writers take. In this way, we were able to contrast what is taught in grammar textbooks with what writers actually use, which does not always conform to the ‘rules.’ Other features of relative clause constructions, such as the referent of the relative pronoun and whether the pronoun is preceded by a preposition, could be explored using the language samples gleaned from the corpus using the concordance program. Exercises enabled students to discover, for example, that nonrestrictive relative clauses in electrical engineering professional writing are not always marked by a comma and that ‘which’ appears slightly more frequently than ‘that’ as a relative pronoun. Figure 1 shows a sample of a gap-filler exercise devised to have students explore the choice of relative pronoun.

Figure 1
Sample Questions on a Relative Clause Handout

Fill in the blanks with the correct relative pronoun (that, who, which, whose, and whom). For ‘which,’ decide whether the clause is restrictive or non-restrictive.
1. For example, consider two users __________ are assigned the same rectangular waveform.
2. Given an invertible crosscorrelation matrix $R$ and a $K$-vector $e$ __________ components are drawn from $\{-1,+1\}$ we construct the matrix $R$.
3. We shall show that considerable performance improvement can be gained by using the optimum metric __________ leads to a maximum-likelihood sequence estimation (MLSE) algorithm.
Feedback, Reflections, and Future Plans for Concordancing in English for Specific Purposes

Concordancing software and a corpus compiled of specific texts enabled the Computers in Language Teaching faculty member and the novice teacher to prepare study materials focusing on different aspects of the language use of electrical engineering book chapters in an efficient way. By utilizing corpus linguistic techniques and drawing on English for specific purposes theory, the faculty member and the novice teacher could provide a meaningful, specialized electrical engineering course. On the final course evaluations, students commented especially positively on the authentic materials designed for the course. The relationship between the novice teacher and the faculty member created an ideal venue for exploring and exploiting corpus linguistic applications to language teaching. In the future, tagged texts will be explored to facilitate the examination of syntactic choices made by content specialists in their writing.

CONCLUSIONS

In all of our courses, from the preservice Computers in Language Teaching course to the four language courses presented above, we found that by grounding our technology integration projects in theory, we were able to support student learning and course goals with authentic materials and tasks, create autonomous learners in our classrooms, and encourage life-long learning with and through computers. The preservice teachers in the Computers in Language Teaching course discovered that, once in charge of their own language courses, they could apply what they had learned directly in their classrooms with confidence and self-assurance. The Computers in Language Teaching course modeled to these novice teachers how theory informs practice, thereby bridging the gap in many teacher preparation programs between theoretical considerations and hands-on teaching applications.

REFERENCES


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