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DALHOUSIE UNIVERSITY
Inspiring Minds

FOCUS ON UNIVERSITY LEARNING & TEACHING

From the Director

The range and user-friendliness of technology tools that can enhance teaching and learning experiences has changed radically over the last decade. In this issue of Focus, Dalhousie colleagues provide snapshots of some of the ways they are using technology to enhance their teaching. For an opportunity to discuss more technology initiatives, readers are invited to participate in the Dalhousie Teaching with Technology Showcase on November 1st (see back cover).

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Teaching, Technology, and our Shared Responsibility for Learning

David Patriquin
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Photo from Biology website

Few people today would question that technology, and the web in particular, has changed the way we conduct our affairs in universities, whether academic, administrative, or social. Except for e-mail, the first sweeping changes at Dalhousie came in 2000 with the implementation of a web-based student information system. Now we take for granted that students can access the course calendar and timetables, register and pay their accounts, and obtain their academic records online, all without lineups or even more than a few seconds delay.

Teaching with Technology Grows at Dalhousie

Change in the classroom has been less comprehensive and more of an incremental process, but very significant. Our Academic Computing unit bought into WebCT early on, participating in some of the first trials of this Canadian developed, first major CMS (Course Management System) in 1996/97. Growing demand for Internet access in those years quickly exceeded our systems' capabilities and, for a period, hardware (servers, bandwidth, numbers of workstations, etc.) was a serious limitation to our ability to make use of Internet technologies in learning and teaching. The University responded and by 2004/05, there were no such limitations: we had over two dozen computer learning labs distributed across the campus; the entire campus, including residences, classrooms, and student recreational and work spaces were wired for Internet access; a large Learning Commons was created in the Killam library; and a major strategic initiative saw the creation of a large number of "high-tech" classrooms in existing and new (Computer Science, Marion McCain, and Rowe) buildings. Professors in our large first year classes deliver superb, electronically supported lectures in modern classrooms. Alison Thompson, Department of Chemistry, has been instrumental in this regard. (See Article on page 10) The library has also made the switch from predominantly paper-based journals to almost exclusively, electronically accessed journals, the numbers available increasing substantially (now about 15,000). Away from campus, students and faculty could access a broad selection of the electronic resources available through the Libraries. Students are now able to turn in well researched, up-to-date literature reviews, using many of these easily accessed electronic resources.

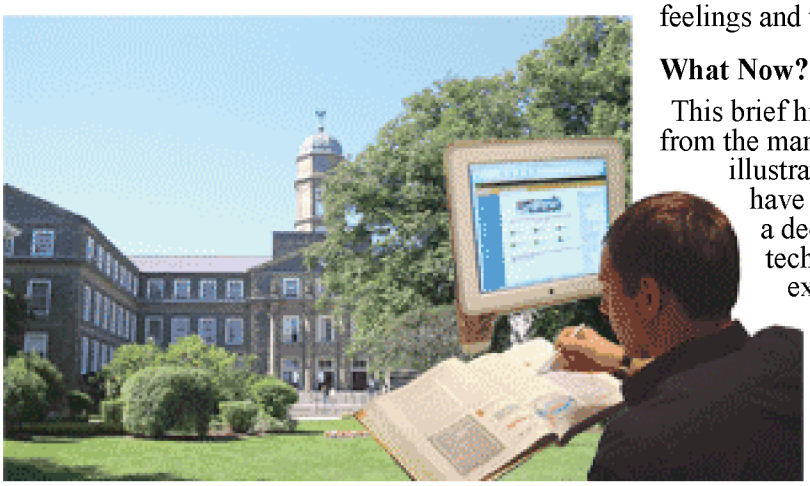
Technological Innovations at Dalhousie

These developments have resulted in an increased use of technology and consequently in teaching and learning innovations : currently, more than 60% of classes have class websites, and several programs in business and the health professions are available completely online. Since 2003/04, students taking the two Introductory Biology classes have the option of taking the classroom versions in the regular semesters (one is offered in the fall and one in the winter semester) or fully online versions in any of the three semesters, or a mixture of the two versions [4]. Students learning French make use of a state of the art Flexible Learning Classroom and Computer Assisted Language Learning (CALL) technology introduced by Marie-Josée Hamel who came to Dalhousie in 2003. [See article on page 6] Physical Chemistry students now benefit from access to Differential Scanning Calorimeters that give them experience with a piece of real-world laboratory equipment. [See article on page 8] Students in literature can search whole texts online and learn the mark-up languages for creating searchable texts. (Professors Ron Tetreault of English and John Barnstead of Russian Studies, Vittorio Frigerio, Department of French, and others were early innovators in the

development and use of electronic texts, establishing the Electronic Text Centre in 1999).

A variety of approaches in the use of web technology is emerging in upper level classes. Martin Willison (Biology and the School of Resources and Environmental Studies) and Holly Richardson (Nursing) were computer neophytes who adopted web platforms for their classes and have not looked back. Both say that use of the web and a CMS have helped to simplify the organization and delivery of classes and that communication with students is enhanced. Over the years, Martin had developed a text for his class on Nature Conservation, which he handed out in printed form. In late October of 2003 he investigated the possibility of distributing it via WebCT for a class beginning in January. With a few hours (in total) of what he describes as incredibly clear and helpful, one-on-one instruction from Sally Alshazly of ILO (Integrated Learning Online), he realized that his trepidation about the technology was unfounded (I suspect that substantial improvement in the technology over its earlier days was also a factor) and the website with the text and a few bells and whistles unfolded on schedule. "What about the Tools?", Martin asked Sally. "Just use them," she said and he did and it was as simple as that. Martin finds the Calendar to be a particularly useful tool and updates it regularly with links to pages in his Web-CT text and on the web. Now the class site hosts a wide range of activities and discussions, and students contribute to its content. Job advertisements are posted, which is popular with students and demonstrates that conservation biology can provide meaningful employment. The class (typically about 145 students) is divided into groups of eight, each one with a Teaching Assistant who moderates discussions online and in face-to-face tutorials. Martin tells students that they don't need to come to lectures (three a week), but most do. He is proud to call it a "paperless class," which allows conservation students to "walk the talk." Martin is looking forward to offering the class completely online to a wider forum, which, at this point, is a relatively small step.

Holly Richardson came to Dalhousie in 2001 and took a succession of short computer modules from ILO, beginning with one on the use of the Windows OS, another on Power Point, and "enough HTML to get by" and attended CLT events for ideas on how to apply the technology. In 2003 she developed a class on Palliative Care Nursing for a combination of upper level undergraduates and graduate students, on and off campus. On-campus students can choose to take the class entirely online or attend lectures and access other materials online. The current enrolment is about 45, with the majority fully online. Graduate and undergraduate students have different assignments and are assessed differently. Holly selectively releases lectures for the completely online students; they are prepared at her desk using Power Point to integrate visuals and narration and Impatica to process Power Point materials for the web. In both the classroom and online, lectures are interspersed with short assignments and pauses to think about important questions or issues and the website provides tools and links for a variety of activities. Holly provided a WebCT template based on her class to her colleagues, six of whom have adapted it for use in their classes.



There is a lot of interaction in Holly's class but she chooses to make most of it between herself and the students because of its highly personal nature, and she does not use Teaching Assistants. She wants her students to think deeply about life and death issues and provides different venues for them to reflect on their feelings and to express them, including for example, students creating mandalas[1] which are drawn, scanned, and submitted via the Internet as image files. Holly is very satisfied that she can effect complex interactions and deep thinking in an online class. In some ways, she says, this venue is more effective than in a classroom because the one-on-one, web based interactions provide a protected environment in which students are comfortable expressing their innermost feelings and thoughts.

What Now?

This brief history and few examples from the many that could be cited illustrate that profound changes have occurred in less than a decade and that the new technologies have greatly expanded the possibilities for how we teach and learn. Our major challenge now is not in gaining access to the technologies, but in how we use them to better address the students' whole learning experience.

The Centre for Learning and Teaching plays a vital role by connecting us with the rapidly growing literature on technology and learning and by providing forums for us to discuss our experiences and ideas. Last year the Centre for Learning and Teaching partnered with Integrated Learning On-line to host a well-attended Teaching with Technology Discussion Group and this coming November they will be organizing a Teaching with Technology Showcase (see page 12 for details). These opportunities help us individually to improve our teaching, whether online or in the classroom. More challenging, perhaps, are the changes that need to take place at an institutional level to address the needs of students more

holistically, and to be better able to deal with continual change in their needs. Andre and Gosling [2] note that large universities are complex organizations in which the tensions between managerial and collegial models of action – the latter tending to be entrenched in departments, and the former in administration– commonly prevent such change. They argue that a model of universities as 'learning organizations' is the appropriate one for coping with change and is consistent with the fundamental mission of universities. The ideal strategy "finds the right balance between the interconnectedness needed to create learning organizations and implement effective strategies for all students, while valuing and preserving what is distinctive about disciplines." Achieving that, they say, must begin with a "new conversation" about teaching and learning across all levels of the institutional hierarchy.

> "Learning is a social activity, and modeling is one of the most powerful learning tools. As participants in organizations dedicated to learning, we have a responsibility to model for students how to work together on behalf of our shared mission and to learn from each other." From: *Powerful Partnerships: A Shared Responsibility for Learning. Final Report of the Joint Task Force on Student Learning,* June, 1998. (U.S.A.)

In the context of such a conversation, I offer three suggestions for improving accessibility of learning and students' experience that would require broad collaboration. The first is that we develop fully online versions of a suite of entry-level classes in the mainstream undergraduate programs. This would give both ongoing and potential students the options of taking key classes in any semester, remotely, and asynchronously. Such options help to address the rising costs of education and the necessity of many students to work. For on-campus students, being able to take some classes online can greatly simplify scheduling and accommodate work. Development of these classes would require a major commitment of fund up front; however, a relatively small increase in enrolment in these large classes, and more retention of ongoing students, will soon recover the initial investment. [3]

In the same vein, I suggest that a fundamental revision of our "inflexible, institutionally based teaching schedules" [4] is essential to increase accessibility of on-campus classes and to simplify life for all of us. Too often students' choices are determined by scheduling rather than by their needs and interests. Full-time students deal with 10 to 15 or more classes, labs, and tutorials each week, at all times of day and in several locations AND often work part-time. The practice of meeting several times a week comes from an era when face-to-face meetings were the only way to communicate regularly. Today we have many other options and one face-to-face meeting per week should be the norm. We could then think about limiting blocks of classes to certain times of day and about how we can use face-to-face time to its greatest advantage.

Finally, I suggest that we wholeheartedly embrace the notion of Web2.0 and "the architecture of participation,"[5] including new venues and modes of communication that are increasingly common and influential such as wikis, blogs, and podcasts. We should also embrace the movement toward open source software and open access journals. Doing so would be consistent with the model of the university as a learning organization, help to reduce costs, provide more flexibility for students and more opportunities for all of us to participate actively in a "learning university." [2]

Final Note:

In this article, I have focused on the role of technology in teaching and learning.

However, I think it is very important that students experience a diversity of learning experiences regardless of the technology, and especially that they have lots of time away from the computer.

Notes and References

1. "The word "mandala" is from the classical Indian language of Sanskrit. Loosely translated to mean "circle", a mandala is far more than a simple shape. It represents wholeness, and can be seen as a model for the organizational structure of life itself – a cosmic diagram that reminds us of our relation to the infinite, the world that extends both beyond and within our bodies and minds." Source: *The Mandala Project* (www.Mandalaproject.org/).

2. D'Andrea D and G Gosling. 2003. *Improving Teaching and Learning. A Whole Institution Approach*. Society for Research into Higher Education and Open University Press.

3. Axelrod, P. 2002. *Values in Conflict. The University, the Marketplace, and the Trials of Liberal Education*. McGill-Queens University Press.

4. For a description of what was involved in developing our online Introductory Biology classes and some outcomes, please see Patriquin, D., C. Adl, J. Van Dommelen, C. O'Neil and B. Freedman. 2005. *Facilitating Access: Introductory Biology Classes Online*. Proceedings of E-Learn 2005, pp. 1008-1014. Association for the Advancement of Computing in Education (www.aace.org.). Authors' Version available at dp.biology.dal.ca/authors/

5. "Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences." Tim O'Reilly, Oct 21, 2005 on radar.oreilly.com

New On-line Assignments for Introductory Organic Chemistry


Photo from Chemistry website

Alison Thompson
Department of Chemistry

In spring 2005 I was granted a Teaching and Learning with Technology Grant, worth $5,000, for a project to design, implement, and evaluate a new system for on-line assignments in chemistry classes. The Department of Chemistry fully supported my initiative, as demonstrated by a financial commitment of $2,000. The plan was to develop a new series of assignments within a Web CT environment to replace the sixteen-year old DOS-based system then used for CHEM 2401 (Introductory Organic Chemistry). The DOS-based system had been extraordinarily innovative in its time and laid the ground-work for a modern system.

The funds were used to hire Ian Comau, B.Sc (Honours), Chemistry, to assist me in developing the new assignments during the summer of 2005. I felt that is was essential that the new assignments be completely independent of existing textbooks, so not to limit textbook selection in the future. After initial training, courtesy of Integrated Learning Online staff members, Ian and I felt equipped to explore, create, and succeed. Developing the new assignments was a lot of work. Designing hundreds of new questions to be delivered in an interesting and useful way was challenging but rewarding because I could see the new "product" grow every day. Ian did a splendid job of implementing my ideas, supplementing them with his own, and doing the hard toil of making it happen. Neither Ian nor I are computer experts but with a good strategy in hand, and the dogged determination to succeed, the online assignments were created, tested, and double-tested in time for the fall 2005 Chemistry 2401 class to be the first to use the WebCT-based assignments.

A database of 2500 questions was created, forming six online assignments (twenty questions each) accompanied by practice/self-test questions. The new assignments incorporate figures of chemical structures, and usually require students to create their own answers rather than choosing an answer from a given list. One testing strategy requires students to draw their answer as a chemical structure, using the JME Molecular Editor applet available free of charge from Peter Ertl at Novartis. The practice questions are accompanied by dedicated feedback and fairly represent each of the question types within the assignments.

Fall 2005 saw the inaugural use of the new assignments, along with a new WebCT site that I developed. A few errors were present in the assignments (around thirty in the entire database) and I announced very early on in the term that every query regarding grades would be dealt with fairly and promptly. I explained that the assignments were new and that I needed help in finding all the errors so that future students would not be exposed to such mistakes. Students were very supportive, and seemed to appreciate my honesty in dealing with the various issues.

I knew from informal discussions with students that the general consensus regarding the new assignments was one of approval. However, in order to survey students who had used WebCT-based assignments in 2005-2006 and DOS-based assignments in 2004-2005, I was advised by staff members at the Centre for Learning and Teaching that since I would be questioning human subjects I was required seek ethics approval for conducting the surveys. Although such approval for research done solely for the purpose of improving one's own teaching is not necessary, I learned that when survey results would be used outside of normal teaching practice, such as in a conference presentation or written publication, ethics approval is required. Thus I submitted my first ever application to the Human Research Ethics Board at Dalhousie University, an application that took several days to prepare: approval was granted.

I developed a series of questions and asked students to voluntarily respond, via WebCT, after all exams and grades had been posted. The response rate was approximately 48%. Students using the new WebCT-based assignments gave far more favourable responses to queries regarding the usefulness of the graded quizzes than those who had taken the course using the DOS-based system in the previous year ($t(74) = 5.41$, $p < .001$, $d = 0.93$). Similarly, students found the online self-tests more useful than previous students had found the DOS-based self-tests ($t(74) = 4.99$, $p < .001$, $d = 0.83$). These effects were statistically significant and of a large magnitude, as evidenced in the Cohen's d calculations. Furthermore, students used the new on-line self-tests much more frequently than the DOS-based self-tests had been used. The effects are not due to one class, or one set of respondents, being brighter or more achieving than the other: there were no differences in the average grades of the two responding sets of students ($t(71) = 0.798$, $p = 0.428$). It is not surprising that the average grades of students did not change, for there is no reason to believe that the inherent abilities of the students were different in the two classes. Tellingly, I realized that I had spent more office-time with students discussing material, rather than the technicalities of the assignment system.

The most recent success of the new WebCT-based assignments was in summer school 2006. Another professor taught this class and required only minimal initial help from me in using the assignments. I found the professor's satisfaction with the new assignments to be very rewarding and a proper test of the new system. Amendments are underway to further improve the assignments, and remove the last few errors, ready for fall 2006. I am excited to have initiated the creation and implementation of the new system, to feel enhanced enthusiasm teaching Chemistry 2401, and to discover that students are better enjoying their organic chemistry assignments. Without access to a Teaching and Learning with Technology Grant this project would not have been initiated.

Acknowledgements

I am grateful to Ian Comeau for his efforts creating the new assignments, to Professor Hélène Deacon (Psychology) for her assistance with analyzing the survey data, to Professor James Pincock (Chair, Department of Chemistry) for his encouragement throughout, to the Centre for Learning and Teaching for a Type 1 Technology Grant, and to the Department of Chemistry for financial and software support.

Call for Proposals

Teaching and Learning with Technology Grants

This grant competition is intended to encourage faculty members who are seeking new and innovative ways to incorporate technology in their teaching practice. Three types of grants will be awarded to individuals and/or groups who can demonstrate the project's benefits to students and/or faculty. Grant recipients will also be asked to share their project results with the wider Dalhousie community through the Centre for Learning and Teaching or other means. The application criteria and procedures are detailed below.

Teaching and Learning with Technology Grants are available to faculty members for projects that involve the use of technology to enhance student learning through the implementation of innovative approaches to learning and teaching.

Applications will be accepted for three types of grants.

1. Type One Grants ($1001 to $5000) will be awarded for projects that:

- involve extensive course/curriculum redesign
- will affect a significant number of students
- will result in innovations that can be sustained over time
- aim to increase active learning and student engagement

Priority will be given to projects that have a broad application for enhancing student learning beyond a single course.

Eligibility: Full-time Dalhousie faculty. To optimize the long-term sustainability of the project, non-academic staff and part-time or sessional faculty may be co-applicants but each project team must include at least one full-time faculty member.

2. Type Two Grants (up to $1000) will be awarded for projects that:

- provide direct learning benefit to students
- have the potential for a long-term benefit in a particular course or program

Examples of past projects include initiatives such as the creation of digital learning resources, virtual labs, multimedia productions, learning objects databases, computer-based student assessment systems, etc.

Eligibility: Full- and part-time Dalhousie faculty; limited-term faculty must have at least one year remaining in their contract term.

3. Type Three Grants will cover participant fees for the Crossroads Online Institute from Georgetown University.

Faculty participants will "join in a collaborative project centered on curricular design and the exploration of student learning. Learn how to effectively design and assess activities that incorporate technological components to enhance student learning." For more information visit the Institute's website at:

http://cndls.georgetown.edu/projects/fipse/coi/

Please note: Preference will be given to projects that can be completed within one year and that can be fully funded by the awarded grant plus any necessary additional funding from other sources. The application process is intended to be brief and straightforward. Note the different requirements for different types of grants.

Deadline for applications: October 16, 2006.

Applications: available on CLT's website at www.learningandteaching.dal.ca or by email at CLT@Dal.Ca

The Computer Assisted Language Learning Classroom

Photo by Spencer Cantley

Marie-Josée Hamel
French Department

Context

A collaborative initiative involving the Faculty of Arts and Social Science, University Computing and Information Services, Facilities Management, and the Centre for Learning and Teaching staff has lead to the development of three dedicated Computer Assisted Language Learning classrooms (CALL) located in the 2nd floor of the Marion McCain Building. Each of these classrooms is equipped with 33 desktop or laptop computers that can be hidden away when students do not need them. Since January 2005, over 200 beginner to advanced language students from the French and Spanish departments have been taught in two of these three new CALL classrooms. The experience, although not without a few hitches, has so far been positive for both students and staff. A majority agree that the CALL classroom is well-suited for language learning and teaching (LL&T). Overall this experience demonstrates that computer technology can be an effective LL&T support. In the following three sections I present an overview of the language learning process, teaching interventions that support this process and the LL&T contexts in which they take place. As I do this, I also provide reasons why computer technology is best suited in this particular learning and teaching situation and even more so in the task-based/project-driven CALL classroom. In the fourth section, I provide an account of the students' and staff's responses to the successful implementation of language classes and activities in the CALL classroom.

The Language Learning Process

Theorists have argued with regard to successful language acquisition, (Chapelle, 2001; Gass 1997 in Hamel, 2005: 80) that learners must be exposed to plenty of second language (L2) input (so as to notice, take, and eventually comprehend the language). Learners interact with others in the L2 (to be engaged in L2 activities, to receive feedback which is useful to them) and produce comprehensible (grammatically and pragmatically correct) L2 output. Acquiring a language is therefore a receptive and a productive process which is done through interaction. Learners must interact in their L2: with their teacher, their peers, with native speakers, and also with/through resources made available to them. Interaction can be triggered by what is referred to as 'negative' feedback: an interruption of the communicative situation by the learner (or a peer or a tutor or a computer program) to clarify (via questioning, recasting, paraphrasing, etc.) one aspect of the message which has not been understood from/by the learner. This break forces the learner to focus on the problematic linguistic form/s, reassess his/her internal grammar/lexicon and, ideally, reformulate his/her L2 output in a comprehensible manner so the communicative exchange can continue. Feedback – negative but also positive – is highly desirable in the language learning process. It can be direct or indirect; spoken, written or (audio-) visual; immediate or delayed; generic (a score, for instance) or specific (error identification); lead or not to remedial actions (further exercises, grammatical explanations, etc.) (Hubbard 1998 in Hamel, 2005: 40).

CALL technology supports this language learning process in the following ways:

- It gives access to L2 input more "thoroughly and efficiently than it is possible with other media" while providing the learner with an "unprecedented exposure to authentic samples of other cultures, integrating sound, symbol and image in ways that appeal to a broad range of learners" (Stevens 1992 in Hamel, 2005: 9);
- It is "capable of greater communicative interchange than is possible with any other educational medium, save another person" (op. cit.), therefore offers a mode of highly interactive learning (Chanier 1998 in Hamel, 2005: 36);
- It provides various forms of individualized feedback while it "can present the student feedback at more frequent intervals than would be possible for a human teacher in all but individual tuition sessions" (Stevens 1992 in Hamel, 2005: 9).

Teaching Interventions

Recommendations have been made with regard to the types of teaching interventions that facilitate the language learning process and therefore lead to successful learning (Ellis, 2003). For instance, teaching that focuses on learners' needs, pace, backgrounds, personalities, prior knowledge, learning styles, and learning strategies is more likely to lead to successful learning. Teaching that involves learners in constructive processes can also lead to successful learning. These processes should be collaborative ones, through convergent tasks (where learners have to work towards one common goal focused primarily on a communicative content), while attention is also paid to the grammatical form. These tasks will allow "the use of cognitive, metacognitive and social strategies such as planning, organizing and processing information, monitoring and cooperating" (Simina and Hamel, 2005: 217). These communication opportunities will mimic real-life situations, be transferable, and also develop further/cross-disciplinary skills.

CALL technology supports such teaching interventions by:

- promoting individualized learning as it "can be made sensible to the learner pace, pattern of responses, etc." and because learners receive "exclusive attention of the computer", therefore there is "no low attention period as the student waits for his/her turn to come round" (Ahmad et al. 1985 in Hamel, 2005: 10);
- facilitating peer collaboration through Internet access and CMC (Computer-Mediated Computer) exchanges (Hoven, 2006:237); and
- creating situations in which "the completion of the task is meaningful to the learners so that learning becomes situated in an authentic environment" (Simina and Hamel, 2005: 225).

The Classroom

Languages can be learned in several types of contexts. Teaching

interventions are much needed in non-naturalistic environment such as the classroom to provide the learners with access to a quantity and a variety of spoken and written language input, as well as with occasions to use the language learned in engaging, productive, and creative ways. These interventions of the teacher, namely in the shape of language learning tasks as I have described above, aim at providing as many occasions as possible for collaboration, negotiation, feedback, focus on form, production of comprehensible output, etc. Within the CALL classroom, the language learning context widens, as tasks can suddenly exploit a broad variety of language resources: e-textbooks, e-grammars, e-dictionaries, e-(audio-/video-)authentic documents, e-exercises, etc. accessible through e-learning platforms such as WebCT. User friendly programming applications (HTML, JavaScript, PowerPoint, HotPot, Wimba, etc.) together with natural language processing tools (tagger, parser, speech synthesizer/recognizer, machine translator, etc.) facilitate the creation, the development, the completion, and the evaluation of these language learning tasks. Hence, thanks to language-dedicated computer technology, and a new, more flexible language learning environment, the CALL classroom opens its doors to linguistic authenticity and diversity. As a result, the entire language learning and teaching experience becomes truly rich, truly enhanced.

The Experience

The overall experience with the CALL classrooms this past academic year was a positive one for both students and staff. Indeed, most students agreed that:

- being taught in a CALL classroom has allowed their language instructor to vary further his/her modes of teaching;
- has enabled them to engage in language activities that could not have been done in a traditional classroom;
- has enabled them to work on some language tasks at their own pace;
- has given them access to individual and immediate feedback while doing some language tasks;
- has facilitated collaborative work with their peers;
- has allowed them to develop transferable skills, such as IT skills;
- has, overall, offered them an environment better suited for language learning.

Photo by Dalhousie Photography

Most language teaching staff involved seemed to have enjoyed (some more than others) working in the CALL classroom. Thanks to two intensive CALL training days, individual consultation sessions, tailored e-resources developed or gathered for them on WebCT, and support from computing staff, as well as from 'techno-freak' colleagues and sometimes their own students, these profs have gradually learned–not without some frustrations at times–innovative ways of using/integrating at best computer technology in their language teaching practice. It's work in progress.

I have observed that language classes where computer technology was used on a regular basis to support a variety of language activities/tasks tended to be more successful and students tended to enjoy them more than classes where computers were used on a random or casual basis. Successful language classes have been those that made fuller use of the Web-CT platform and in particular some of its tools such as: its written and spoken (with WIMBA) forums for class or small group discussions on set topics; its spoken (with WIMBA) email facility for dictations or reading-aloud exercises; student presentation tool for building and showing individual and group Web-based projects; its coursework assignment tool for essays, translations, grammar exercises set up, submission, marking and provision of individual feedback; and, finally, its link to a Web pages tool for access to external language programs and language resources. Successful language activities were, for instance, those such as Web-Quests (Simina and Hamel, 2005) where students work collaboratively using computer technology and resources to search, enquire, collect data, exchange ideas, and revise each other's contributions to ultimately create a collective, genuine artifact such as an e-magazine, a travel brochure, or an oral presentation, etc. Grammar exercises with immediate and discrete individual feedback were also appreciated, as were pronunciation/conversation tutors.

The physical environment of the CALL classrooms was not always deemed ideal by some students and staff. For example, a malfunctioning alarm constantly setting off in one room and computer screens were not retracting well in the other, not to mention the noisy ventilation system in both rooms. However, solutions to these problems are in good hands and improvement should be seen by the start of this new academic year.

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Technology in the Physical Chemistry Laboratories

Patricia Laws
Department of Chemistry

One of the frequently asked questions that instructors encounter in the chemistry laboratory (regardless of the discipline or year) is: "Will I ever use this when I become a real chemist?" The teaching laboratory associated with chemistry courses offers the crucial link between theory and practice in the curriculum. In fact, it is considered to be "one of the most important requirements for connecting students' appreciation of chemistry with the world in which they reside." [1] The effectiveness of the teaching laboratory based on student learning and interest in the subject can be directly related to the number of "real world" applications that the students are exposed to and the perceived practical use of the experiments in their future careers.[2]

Computerized Data Collection

In 2004, the second year physical chemistry laboratory underwent a curriculum review wherein many of the existing experiments were revitalized with links to practical applications and the instruments were interfaced with computers wherever possible. The computer interfacing changed the focus of the students' tasks while performing the experiment. Instead of spending time on the collection of data points individually before analyzing their results, the students were able to observe the data evolving graphically on the computer screens in front of them. They no longer had to manually piece together the sections of data, freeing them to spend more time analyzing the data before leaving the lab.

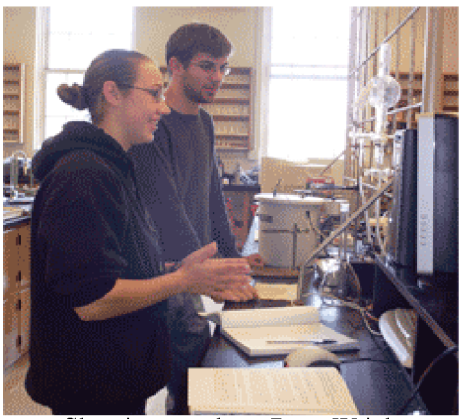
An added (and somewhat unexpected) bonus to the computer-interfaced experiments became evident as the students were performing the experiments. In the second year physical chemistry labs, the students work in partners to acquire the data. The majority of the interactions between the partners in the experiments that are not computer interfaced involve one partner calling out a number and the other partner writing the number down. For those groups working on experiments that are computer interfaced, the nature of the groups' discussions changed from a focus on describing and recording their observations to anticipating and analyzing the results. They discuss what they would expect to see, what to do if the data appears to be abnormal, and how they will analyze the data once the experiment is complete. This type of interaction is evident in the photograph, where two students are performing a bomb calorimetry experiment to determine the difference in the amount of energy that is released during the combustion (or metabolism) of Kellogg's Fruit Loops compared to Cheerios.

Home-Built Instruments

Another exciting development in the physical chemistry laboratories was the development of a low temperature differential scanning calorimeter. Supplies for the construction of the differential scanning calorimeter (DSC) were generously supported by the Centre for Learning and Teaching through the Teaching and Learning with Technology Grants and by the Department of Chemistry. The DSC was built by Brian Millier. Brian is the technical administrator in the Department of Chemistry. A differential scanning calorimeter is an instrument that compares the amount of power that must be supplied to the sample and a reference to increase the temperature of the sample and the reference at a constant rate. When a thermal event (such as melting) occurs in the sample, the event is observed in the DSC output (or DSC scan) as a difference in the amount of power supplied to the sample compared to the reference. As the sample begins to melt, more power is required to increase the temperature of the sample, and a peak appears in the DSC scan. The temperature at which the sample begins to melt is indicated by the onset of the peak and the area under the curve is proportional to the amount of energy that was required to melt the sample.

The differential scanning calorimeter is a useful instrument for monitoring quality control and studying the thermodynamic properties of materials (such as enthalpy of melting, the glass transition temperature in an amorphous material, and the percent of crystalline character in a polymer). Differential scanning calorimeters are frequently found in industries such as pharmaceutical firms, polymer and thermoplastic manufacturers and in research laboratories, where researchers will routinely perform experiments to ensure the quality of their product.[3] Unfortunately, due to the expensive nature of the commercially available DSC (at least $30,000 per instrument), undergraduate chemistry students are rarely exposed to this instrument and it's potential applications. We now have a number of differential scanning calorimeters enabling students to utilize equipment they will use as professional chemists after graduation.

In the DSC experiment students work to solve a real-world problem. They calibrate the DSC with indium metal and then identify a mystery metal based on the melting point of the metal and the enthalpy of melting. They also examine the differences between high density and low density polyethylene. (High density polyethylene is used to make plastic milk jugs and plastic gas cans while low density polyethylene is a softer more flexible material that melts at a lower temperature and is used to manufacture plastic food



Chemistry students Ryan Wright and Carrie Mae Roth
Photo by Dalhousie Photography

containers and plastic grocery bags.[4]) Once they have obtained the DSC scans of the polymers, the students are asked to use their results to explain how a forensic scientist was able to distinguish between the two polymers to solve a case of arson.

The feedback from the students regarding the changes to the physical chemistry program has been very positive. By interfacing the instruments to a computer, the experiments now facilitate discussions that link the theory they learn in the classroom to the experiment that they are performing. The development of a differential scanning calorimeter also gives exposure to the instruments that they could be using in their careers as chemists.

[1] D. S. Mason, *Journal of Chemical Education,* 81(8), 1081, (2004).

[2] M. B. Nakhleh, J. Polles, E. Malina. "Learning Chemistry in a Laboratory Environment." *Chemical Education: Towards Research Based Practice*. Ed. J. K. Gilbert, O. De Jong, R. Justi, D. Treagust, J. H. Van Driel. Norwell, MA: Kluwer Academic Publishers, 2003. 69-94.

[3] D. E. Budil, L. R. Khundkar, I. A. Shehadi, M. J. Ondrechen, *Journal of Chemical Education*, 76(5), 601-602, (1999).

[4] www.howstuffworks.com (accessed July, 2006)

Upcoming CLT Workshops

CLT offers a variety of professional development workshops for faculty and graduate students.

Visit the CLT website for details on the Fall 2006 sessions.

www.learningandteaching.dal.ca

image from eInstruction.com

Classroom Performance Systems

The Centre for Learning and Teaching, Academic Computing Services, Integrated Learning Online, and the Dalhousie Bookstore are pleased to announce an agreement with eInstruction (http://www.einstruction.com) for the purchase and use of their Classroom Performance System in Dalhousie classrooms.

The Classroom Performance System (CPS) allows teachers to electronically capture students' responses to questions and then immediately display the results through the classroom computer/ projection system. The system consists of a receiver connected to the instructor's computer which records the responses given by students on small, hand-held units (so-called "clickers" which the students purchase at the Dalhousie Bookstore). The results are instantly available and can be immediately displayed to the class, saved on the professor's computer, or entered into the course records.

The primary benefit of using CPS technology lies in its pedagogical impact, in its potential to enhance learning and teaching. The system allows instructors to engage students and to monitor their progress by:

- asking conceptual questions to determine if students understand the material
- encouraging active learning and peer instruction by posing problems for individuals or small groups to answer
- soliciting students' opinions on controversial issues
- stimulating interaction and overcoming the problem of a few students dominating classroom talk
- using quizzes and tests to give students frequent and timely feedback on their progress
- giving students a safe way to practice answering typical exam questions that require "higher-order thinking skills"

For more information, contact one of the following people for information on:

- *How to order clickers for your students*: Judy Davidson (494- 6275 or Judy.Davidson@dal.ca), Dalhousie Bookstore
- *How clickers can enhance the classroom experience*: Carol O'Neil (494-1895 or Carol.ONeil@dal.ca), Centre for Learning and Teaching
- *How to use the clickers and the software*: Integrated Learning Online (494-3456 or ilosupport@dal.ca), Academic Computing Services

Useful Resource: Douglas Duncan, *Clickers in the Classroom: How to Enhance Science Teaching Using Classroom Response Systems.* San Francisco: Pearson Education, 2005

Using Tablet PC for Lectures

Alison Thompson
Department of Chemistry

The Challenge

The lecture-based teaching of organic chemistry, as agreed by many, requires live hand-written notes generated by the teacher and simultaneously re-written by the students. Students need to experience the process of solving problems, and to see the solutions unfold before their eyes, line by line, as facts, figures, concepts and theories come together. A kind of visual art, organic chemistry requires the training of both the hand and the eye along with the brain – a little like algebra whereby the next line of the solution can only be deduced once the previous line is available. In smaller rooms, large chalk-boards are perfect for use when lecturing this material but in the Scotiabank Auditorium, where I teach CHEM 2401 (Introductory Organic Chemistry), the white boards and projector are inadequate for teaching and demonstrating processes in the ways needed. Convincing others that change is necessary and important is often challenging. Discussions with Media Services, colleagues at other schools, PCPC, and sales representatives were time-consuming and sometimes frustrating. However, I was determined that my students' learning needs should not be compromised and, persevering, I eventually convinced everyone involved that a tablet PC would be an ideal tool for teaching chemistry in large lecture halls. Eventually, I was able to convince the Department of Chemistry to purchase this piece of equipment.

Solution: Tablet PC

A tablet PC is simply a laptop computer with a screen that can be written on, by hand, using a special pen. One can draw or write in a blank document or "on top" of prepared slides. Various colours can be used, as well as "ink" thicknesses, and there is an eraser. Notes can be scrolled (akin to roll-through chalk-boards) as well as saved. The creation of figures and text can be projected live, just like the image from other computers. As the image originates from the laptop, the brightness of the image can be adjusted to match the room.

Implementation

Fall 2005 saw the new tablet PC in operation. The projected image was wonderfully clear. My hand-written notes were easy for students to see from all parts of the Scotiabank Auditorium and I felt proud of the notes that I created in class. Students responded well and began suggesting to faculty in other classes that tablet PCs were useful for lectures. After just a few weeks, other chemistry faculty members began using the tablet PC in their classes too. The Department of Chemistry has since acquired a second tablet PC, and a reservation system is in operation.

New Opportunities

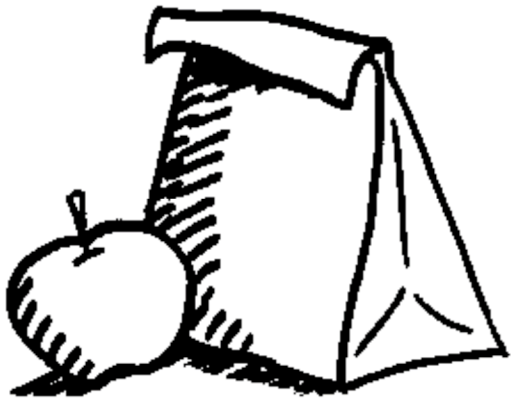
With the tablet PC in hand, I began to explore new opportunities for teaching. For example, I was able to seamlessly use the tablet PC for projecting computer-generated chemical models and programmes that show three-dimensional reaction mechanisms (a key part of Chemistry 2401) during lectures. Furthermore, I used the tablet PC to prepare a series of vignettes to demonstrate the process of solving problems in organic chemistry. The vignettes feature the solving of a problem, with hand-written answers and voice-over, in essence showing students how to develop solutions similar to the ones that they are required to create under exam conditions and retain for future chemistry classes. I posted the vignettes on-line, through WebCT, so that students could view them again and again. I received rave reviews from students, both oral and written, and was pleased that the technology was helping learners. Following the success of this project, the Department of Chemistry is now creating an extensive series of vignettes for use with first-year classes.

LUNCH & LEARN: TA DISCUSSION GROUP

Controversial Questions in University Teaching and Learning

The Lunch & Learn series of discussion groups will provide an opportunity for teaching assistants to engage in informal conversations about teaching and learning with their peers. Dates and details are available on our web site at www.learningandteaching.dal.ca

To register call 494-1622 or email CLT @ Dal.Ca



WebCT- Discover the Possibilities: Come on up to SIX

Adrienne Sehatzadeh
Integrated Learning Online (ILO)

Our institutional Learning Course Management System (LCMS) is the product called WebCT. The next generation of WebCT, known as College Edition 6 (CE6), provides a remarkable tool to complement classroom activities with an online learning presence. We encourage faculty to join the fall pilot of CE6 to experience the many exciting enhancements, such as:

- A convenient Quick Start wizard to set up a course space.
- Every course has a demo student so you can experience your space as a student. Group Manager that allows you to create groups or sign-up sheets.
- Improved Selective Release for virtually everything in the space.
- An Announcement Tool where you add important messages for all or some students.
- An enhanced spreadsheet-style Gradebook for fast and efficient review of grades, statistics, and individual student audit histories.
- Create Peer-reviewed, gradable Discussion Topics including Blogs and Journaling.
- Access to Respondus LockDown Browser, Turnitin's plagiarism prevention services, and HorizonWimba Voice Tools and Live Classroom.
- Upload or download Multiple Files, plus easy access to set up WebDav folders.

These are just some of the many new features available in CE6. Discover the possibilities by contacting the ILO team at ilosupport@dal.ca or 494-3456 for additional information.

CUTL
CERTIFICATE IN UNIVERSITY TEACHING AND LEARNING

Inspire the Minds of Tomorrow! Enroll in the Certificate in University Teaching and Learning today.

The Center for Learning and Teaching (CLT) at Dalhousie University invites doctoral students to enroll in the Certificate in University Teaching and Learning (CUTL).

The Certificate provides a flexible framework for integrating and recognizing a comprehensive range of teaching development programing including:

- Basic teaching workshops.
- An annual series of professional development opportunities.
- A course in university teaching and learning (CNLT 5000 - Learning and Teaching in Higher Education).
- Opportunities to reflect on and synthesize learning about teaching.
- Formal recognition of efforts to develop teaching.

CLT offers a range of professional development opportunities which doctoral and graduate students may participate in without being enrolled in the full Certificate. Participants in the full Certificate program will benefit from an opportunity to reflect on and synthesize their learning about teaching in a systematic framework and from having their efforts to develop their teaching formally recognized. Go to www.learningandteaching.dal.ca/cutl.html for more information or call CLT at 494-1622.

TAPD
TEACHING ASSISTANT PROFESSIONAL DEVELOPMENT

September 13 and 14, 2006

Teaching Assistant Professional Development Days

Are you a teaching assistant at Dalhousie or a graduate student interested in a teaching career? Sign up for CLT's TA Professional Development Days. Through a series of workshops we'll help you learn how to grade lab reports, help students in crisis, lead discussion groups, mark academic papers, run labs, and much more.

For more information and to register call CLT at 494-1622 or visit our web site at

http://learningandteaching.dal.ca/tapdd.html

TEACHING WITH TECHNOLOGY SHOWCASE

November 1, 2006

10:00 a.m. to 3:30 p.m.
Rooms 303 and 307, Student Union Building

The Faculty of Health Professions and the Centre for Learning and Teaching announce an exciting one-day showcase of Dalhousie courses, programs, and services that use technology innovatively to support student learning on campus and at a distance.

Faculty, librarians, staff, and administrators are invited to share their knowledge and experience by showcasing their use of technology to enhance the learning environment at Dalhousie University.

Other people want to know what you are doing; come and show us how you use technology to:

- develop and teach an online course
- deliver a course or program by distance
- engage students in active learning
- extend learning outside of class
- enable communication with and among students
- create simulations, animations, video, or other media-rich learning materials
- promote effective online discussions
- better organize and manage courses
- provide meaningful and timely feedback to students on their progress
- make library resources available to students
- support students through counseling, skill development, personal and career counseling
- achieve any other goal that enhances students' learning experiences

Types of Sessions:

- **Exhibition Hall • Room 303**: Displays, posters, demonstrations (including computer-based demos), sample learning activities, videos, etc. Exhibitors will interact with participants as they circulate around the Hall.
- **Presentations • Room 307**: 20-minute presentations on some aspect of technology in higher education. (For example, teaching with technology activities and methods, the impact of the technology on student learning, the role of distance and flexible learning in enrolment management, or institutional support for the development of technology-mediated instruction.)

Deadline for proposal submissions: **Monday, September 25, 2006**.

To submit a proposal for an exhibit or presentation, please visit the Showcase website at www.learningandteaching.dal.ca/showcase.html or contact Carol O'Neil at the Centre for Learning and Teaching (email Carol.ONeil@Dal.Ca or call 494-1895).

clt
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