

Teaching Integrated Information Technology



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Computer Science

But is it Music?

It is just before lunch on a Friday in February, and three first-year students are performing their original musical composition for a mixed audience of their first- and second-year peers. Beethoven never composed for their instruments—cardboard box, an empty pop can, a whistle, and a bottle. Reading a score in a notation of their own design, they discover the difficulty of keeping in step under the stress of live performance. The composition conveys tension, contrast, resolution, and a touch of humour in the antics of the performers.

This is not a class in ultra-modern music! It's one of the interdisciplinary excursions of the new Bachelor of Informatics program offered by Faculty of Computer Science together with the Faculties of Medicine, Arts and Social Sciences, Health Professions, and Science. The music performance concludes a module on improvisation led by Jérôme Blais of the Music Department, built on Gary Ewer's earlier sessions on musical form, especially the sonata form. The students have learned by experience that purpose, form, structure, notation, documentation, teamwork, and communication transcend the boundaries of academic disciplines. Beyond that, they have gained an insight into what musicians might bring to a

multidisciplinary team in a future workplace. All of this is part of creating a new kind of computer science graduate.

Overture: A New Program—Bachelor of Informatics

The Bachelor of Informatics is one of Dalhousie's newest and most innovative degree programs, launched in the fall of 2006. As our website explains, the study of Informatics brings people, technology, and information together [<http://informatics.dal.ca>]. It's more than learning about computers: it's learning how to use technology to meet the needs for information in human organizations for human purposes.



Music with (un?)sound objects

This program is a response to the ramifications of the dot-com bubble burst of 2000. By mid-decade the industry had more than recovered its pre-2000 strength, and although demand for graduates was higher than ever, Computer Science enrollments continued to drop across North America. Participation by women in these programs was particularly low. Further, the industry was looking for a new kind of computer science professional. Employers told us that although they appreciated the graduates' technical skills they required more "professional skills" or "soft skills." The new workplace was less about writing programs and

more about selecting, configuring, and integrating software. It was less about understanding the computer and more about understanding the organization and its information needs, less about prima donnas and more about teamwork. In short, the focus was more on people and multidisciplinary teams, and less on the computer.

During 2004-05 a committee in Computer Science began to grapple with many possible approaches to these issues. One of us had taught in the DISP program earlier, and we learned about the Kings Foundation Year Program. We agreed that a multi-disciplinary, integrated approach seemed to be the right cornerstone for our new program but our goal was to extend this approach across all four years of study. The workplace orientation of our program suggested that co-operative education programs be mandatory for all our students. By spring our ideas began to gel, and we benefited from discussions with an amazing panel of industry and government experts assembled for us by Industry Canada in June 2005.

By the fall of 2005 we put forward a formal proposal. Our documentation listed four goals: to provide a diverse multi-disciplinary curriculum combining core informatics content with a major in an application area in order to meet the needs of the changing workplace; to teach professional skills as well as technical skills; to attract more students into information technologies; and to balance student participation by gender and background.

We wrestled with program approval, teaching assignments, integrated scheduling, space allocation, budgeting, marketing, and all the challenges of a new program launch. To meet our multi-

disciplinary goals we sought and found enthusiastic collaborators in the Faculty of Arts and Social Sciences, the Faculty of Health Professions, and the Faculty of Science, and partners in the Faculty of Medicine agreed to create new courses for our Major in Health Informatics. Lynn Taylor of the Centre for Learning and Teaching and Janice MacInnis of Human Resources Development provided very helpful training sessions for our instructors during the summer. We admitted our first students in the fall of 2006.

First Movement

The music activity described above is a small part of INFX 1600XY.18, the integrated year 1 Informatics course that meets for 12 hours a week and counts as 3 full-year courses. In addition to the interdisciplinary modules, it includes streams in computer science, programming, mathematics, and communications. Students also work in teams on projects for real clients; this provides a setting for learning teamwork and leadership and for peer learning and mentoring. The student teams have a “cross-cohort” membership, that is, each team consists of students from all years of study. The course is taught by a team of instructors who meet weekly to discuss topic coordination, student progress, joint assignments, tests, and so on. Instructors use a variety of activities to engage students in the content and to interconnect content with skill building. For example, the final “deliverable” in Suzanne Sheffield’s module on the impact of technology on society was a group-created poster for an in-course conference. Instead of asking for a traditional interim book report, Barry Boyce had pairs of students practice an “elevator pitch” (a one-minute conversation during an elevator ride) and report to the class on the other student’s book.

University instructors hope that students will learn professional skills

like problem solving, creativity, critical thinking, time management, communication, teamwork, conflict management, leadership, project management, and negotiation. In the Informatics program we teach these skills explicitly, integrating them into content modules and streams throughout the four years. Many of our teaching strategies actually imitate workplace activities: multi-disciplinary teams, cross-cohort project teams, peer learning, co-op, and professional skills development. We could describe the Bachelor of Informatics as a holistic program that builds a learning community modeled after the best of the workplace.

The program places special emphasis on communication, specifically reading, writing, listening, speaking, as well as presenting. Under the guidance of instructors, students have many opportunities to practice these skills. Oral testing is included as part of the assessment process to train students for the oral readiness required in the workplace. All students’ written assignments, tests, projects, and presentations are graded by the subject instructor as well as the communications instructor; the two grades are combined in a way that makes it worth the students’ while to excel at both content and communications.

The program is delivered in a dedicated “home room” environment that creates a sense of community, giving a social context in which the professional skills can be learned and practiced. This sense of community is also promoted through social activities such as Friday lunches that bring together students and instructors in the program in a more informal way.

Critical Acclaim

During our first year we have certainly provided a diverse multi-disciplinary curriculum and taught professional skills as well as technical skills. The program’s first and second year entry points attracted 27 students, most of whom would not have enrolled in a traditional computer science field. Eight (30%) of our students are women, and six of them (22%) belong to visible minorities. Two are mature students.

Student feedback has generally been very positive. The Bachelor of Informatics core instructors perceive that student morale and motivation were better than in our traditional Computer Science program. The efforts to build a sense of community have worked very well: the students have coalesced as a class and have learned to work together as team members, well-supported by a team of instructors. Many of the students have become close friends. The instructors have designed meaningful class objectives reflecting the goals



INFX 2600 - working together in the “home room” Informatics Centre

of the program as a whole, while guiding and mentoring individual students. This commitment has enhanced community-building and class morale.

Second Movement

This past summer we overhauled the curriculum in the light of our first year’s experience. This year we are

enhancing the subject integration, the specification of learning outcomes, problem-based learning, hands-on lab activity, and industry contact. The fundamental curriculum and delivery model (professional skills, integration, cross-cohort teams, projects, building a learning community, and workplace orientation) seems to be valid in our setting and will not be changed in the coming year.

instructors probably worked harder and learned more than ever before. We are excited by knowing that we are doing our bit to rethink university education in the new millennium.

Acknowledgements

A new degree program is the work of many people. The original planning committee included Nick Cercone, Kori Inkpen, Allan Jost, Melanie Kellar, Regan Mandryk, Mike McAllister, Norm Scrimger, Jacob Slonim, and the author. Instructors in the integrated program and in special courses included Raza Abidi, Samina Abidi, Connie Adsett, Christian



Posters on the social impact of computers

Finale

Watching our new-found “improv” musicians dissolve in laughter at the end of their performance reminds us that innovative learning can be fun. Last year our students as well as our

Blouin, Mike Bolton, Barry Boyce, Stephen Brooks, Linda Burke, Theo Chiasson, Ernst Grundke, Peter Hitchcock, Melanie Kellar, Gwendolyn MacNairn, Regan Mandryk, Mike McAllister, Sampalli Srinivas, and Thomas Trappenberg. Instructors from our partner faculties included Peter Selinger, Thomas Vinci, Darren Abramson, Gary Ewer, Sam Scully, Jérôme Blais, and Suzanne Sheffield. David Zitner co-ordinated arrangements with the Faculty of Medicine. We are grateful to these people and many others who gave freely of their time, energy, and advice.

Photos courtesy of Ernst Grundke



INFX 2600 - students estimating number of leaves

5th Annual

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