

# At Guelph

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## Features

### CIS Prof Uses Tools of Trade to Improve Learning

*Donated tablet PCs, BlackBerrys allow students to learn, practise programming skills*

BY ANDREW VOWLES

How do you improve teaching and learning in computing science? Give students more high-tech devices that enable them to study and learn more effectively, says Prof. Qusay Mahmoud, Computing and Information Science (CIS). He's using two kinds of computer-based tools — tablet PCs and BlackBerry wireless devices — for teaching undergraduate computing courses at U of G and the University of Guelph-Humber.

Guelph is one of four Canadian universities to receive funding and tablet PCs this year for a pilot project intended to integrate these computers into project-based courses and to recruit and retain female students in CIS. Under a teaching technology program designed to improve learning and spark students' interest in technology and science careers, Hewlett Packard has provided U of G with \$85,000 in cash, 21 tablet PCs and associated hardware and software.

"Using tablets enables you to create a dynamic environment in the classroom," says Mahmoud, whose Guelph-Humber students have used BlackBerry devices and developed tablet applications in programming courses.

A tablet PC resembles a laptop computer, but its electronic "pen" allows the user to write as well as use the computer keyboard. Demonstrating how a line handwritten on one tablet shows up simultaneously on the swivel screen of a linked computer, he says he plans to use the tablets in project-based courses on software engineering and distributed systems and in first-year seminar courses for sharing examples in class and collecting students' work in real time.

"I can distribute a problem set to the students, give them five or 10 minutes, and they return solutions. As I receive them, I can display them."

Mahmoud prefers tablets to clickers used for in-class quizzes. Tablets allow students to write and annotate notes — in the classroom or library, in a residence room or on Johnston Green outside his Reynolds Building office — rather than merely answer multiple-choice questions on clickers. In the classroom, the technology has a levelling effect, encouraging more students to take part in discussions, rather than allowing just a few individuals to dominate the discourse, he says.

The tablets have also enabled students to practise their own programming skills. Mahmoud shows off a networking application for tablet computers that was developed by Guelph-Humber students this year in a project-based course on distributed systems.

In a more whimsical application, those students also came up with an electronic, if disembodied, version of the ages-old dots and lines game. In LineDot, drawing lines on one screen connects the dots displayed on another computer to complete squares.

Mahmoud plans to run a pilot program with the tablets this year to assess interactive student learning. Also involved in this initiative are CIS chair Prof. Deb Stacey and engineering professor Valerie Davidson, who holds an NSERC/HP Chair for Women in Science and Engineering.

In a related project, Mahmoud is working with CIS professor Allan Dyer on using the BlackBerry handheld device in programming and computer literacy courses at Guelph and Guelph-Humber. Using about 200 second-hand devices obtained through Toyota Canada's recycling program, students have practised writing applications for these wireless products in first- and second-year programming courses.

Mahmoud says this project gives students a chance to learn programming skills not just for the BlackBerry but also for mobile devices generally, including cellphones and personal digital assistants. He also believes this will attract more students to Guelph's programming courses.

So far, students have already developed a web-based application intended to allow university instructors — even those who know nothing about programming — to create and administer multiple-choice quizzes online for a variety of devices.

This year, Mahmoud plans to establish a lab called the Centre for Mobile Education Research — funded in part by Waterloo's Research in Motion (RIM) — to help universities worldwide in integrating mobile devices into their computing science curriculum.

"We'll develop educational materials and pedagogical methods to support teaching mobile application development to computer science students — and possibly students from other disciplines such as engineering — at all levels. I've already recruited six students who will start their M.Sc. studies and will be working with me in January, all from Guelph-Humber."

Mahmoud says businesses and educators alike are interested in new ways to teach application development for mobile devices. He spoke about his research and the teaching initiative during a campus visit last spring by representatives from RIM. His topic also generated a buzz at an international computing conference this year following publication of a paper he and Dyer wrote about integrating BlackBerry wireless devices into computer programming and literacy courses.

Mahmoud, who published *Learning Wireless Java* in 2002, has edited a new volume published this year called *Cognitive Networks*. It looks at networks that respond to user needs or changing conditions.

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