UW program maps out dream education

INTEGRATED KNOWLEDGE TEACHES SELECT GROUP TO THINK DIFFERENTLY ABOUT THE WORLD

By Johanna Weidner

Prof. Ed Jernigan called on his experience with students in Shad Valley and Waterloo Unlimited enrichment programs to develop the Centre for Knowledge Integration. Photography • Peter Lee

KALEIGH EICHEL'S GOLDFISH are far from ordinary fish puttering around their tank.

They're specially trained, world-celebrated goldfish that took her from her local science fair all the way to Stockholm to hobnob with Nobel Prize winners.

And they brought her from her Ohio home to study in an innovative new program at the University of Waterloo. The keen student and her peers specialize not in a particular subject, but rather in how to become better thinkers.

Eichel is in the first class of UW's Knowledge Integration program, which draws from all six faculties on campus and includes core courses that teach students how to think across all disciplines.

She's a typical student in the program — a bright and eager learner with an interest in many subjects. Although just about any North American university would have eagerly accepted the outstanding student, she came to Waterloo for its new and unusual undergraduate degree.

"I didn't want to close any doors. I like a lot of different things," the 18-year-old explains.

Eichel's high school biology project proved she was an innovative thinker. She wanted to find out how animals communicate, if they communicate at all, and how environmental changes would affect that communication.

She chose goldfish for the experiment because she read they could be trained, much like a dog, with rewards. As well, they were easy to care for in an environment that was easily controlled.

Eichel created a simple maze in the tank, basically walls with small openings, and taught a goldfish the path to get through to the end, where the reward of a morsel of food awaited.

Then she added more fish to the tank to see what would happen. She discovered the trained fish helped its cohorts through the maze, either by pushing or coralling the inept fish.

"I didn't expect it at all. It was definitely a 'wow' moment," she says.

She won the grand prize at her local science fair and, after several more wins, she ended up at an international science and engineering fair where she was awarded a top prize: an all-expenses-paid trip to an international youth science seminar and the Nobel Prize ceremonies in Stockholm last December.

Eichel joined lectures, cocktail parties and banquets with the Nobel laureates and ▶

KEEPING THE DOORS OPEN

Kaleigh Eichel of Ohio says she was drawn to the University of Waterloo's Knowledge Integration program because of her broad range of interests.

Photography • Tomasz Adamski

attended the award ceremony. "That was surreal, unbelievable," she says.

While she is particularly interested in studying animal behaviour, her enthusiasm extends to many fields and careers. Knowledge Integration is giving her a taste of many different things. So far she's taken zoology, ecology, computer sciences, anthropology and geology classes.

"I'm very happy with how the program is working out. So far we're taking so many interesting courses," says Eichel, who was born in Waterloo but lived most of her life in the U.S.

Students in her program are required to take certain courses to build a good learning foundation, including the core Knowledge Integration classes plus science, math, English, a second language and computer sciences classes. But there's also lots of room in the four-year degree for students to take electives in areas they're interested in for a minor or second major.

"It's a demanding program. They need to be able to handle Shakespeare and calculus," director Ed Jernigan explains.

The students are up to the challenge. Most in this year's class had high school marks of 90 or better. The academic background is flexible, although senior-level English, mathematics and science are a must to ensure a reasonable starting point.

"They are bright, well-rounded, engaged, really keen students," Jernigan says. Most plan to go on to a graduate degree.

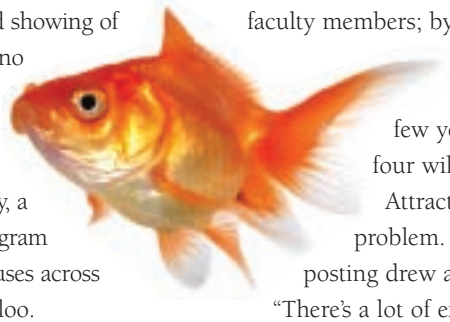
While traditional degree programs focus on one discipline, Knowledge Integration students learn to draw from all areas.

That ability, Jernigan says, is the key to adapting in a quickly changing world and "to afford a better understanding of complex problems."

Specialization is good for solving narrow problems, but complicated issues like climate change or global poverty require a broader, big-picture approach. "What we need is people who can communicate across the disciplines," he says.

The program emphasizes four crucial skills, ensuring the students are literate, numerate, articulate and able to play well with others. Those are transferable skills that will make graduates adaptable and desirable to employers in an increasingly complicated global setting.

Core courses can be quite inventive, such as the third-year museum course that starts with a field trip to a major museum city and ends in the designing and showing of an exhibit that really has no limits other than spanning several disciplines.



Jernigan had long been involved with Shad Valley, a month-long summer program held on university campuses across Canada, including Waterloo.

Then, in 2004, while chair of systems design engineering and working with Shad Valley colleagues, he launched Waterloo Unlimited, a week-long enrichment program.

Through Waterloo Unlimited, high school students from across Canada come to the campus to explore a theme in workshops with professors from different faculties. They also learn how to get more out of their education.

"It was within the first year that we knew we had something golden with Waterloo Unlimited," Jernigan says.

They began to wonder what a first-year program along the same line, perhaps even an undergraduate degree, would be like.

"In a way we sort of designed it to be what our dream education would be," he says.

Work on designing the undergraduate program began in 2005. It was approved by the university senate in March 2007, and then taken to the province, which must approve new bachelor's degree programs.

Usually it takes months for ministry approval, but Knowledge Integration got the OK in a few weeks. "They not only approved, they seemed to think it was a really neat idea," Jernigan says.

Classes started last September with 32 students. This fall there will be a total of 60 in first and second year, then 80 by autumn 2010.

The program has an exemption from the campus-wide hiring freeze because it's bringing in new students and revenue.

Knowledge Integration now has two faculty members; by the start of next school year there will be four. Over the next few years another two to four will be hired.

Attracting new faculty is no problem. The most recent job posting drew almost 250 applications.

"There's a lot of excitement and interest in the enterprise," Jernigan says.

To promote the new degree, he has visited schools across the country, especially those offering the International Baccalaureate enriched program.

Jernigan hopes the centre will expand into the School of Knowledge Integration, offering a master's degree, too. Similar programs exist in Canada and the United States, he says, but there is nothing exactly like Knowledge Integration.

"No one works as explicitly at bridging the disciplines as we do."

"It helps you think differently," Eichel says. "Now I'm seeing these other perspectives" on the world.

Eichel enjoys being with like-minded students: "We're in it to learn as much as possible."

Students can be as creative, even as crazy as they want, because they're not penalized for failing. Freedom to explore is a keystone of the program, which is intended to foster a desire in students to stretch themselves, Jernigan says.

Eichel, who plans to continue her goldfish-communication research, appreciates that approach.

"I like the creative environment that it inspires," she says. "It's work, but it doesn't feel like work because it's so much fun to be in the program."