

Q&A

A Journey of Discovery

Ed Lazowska discusses his heady undergraduate days at Brown University, teaching, eScience, and being chair of the Computing Community Consortium.

AS AN UNDERGRADUATE student at Brown University, Ed Lazowska hardly seemed destined to become a leader in computer science. Actually, he wasn't sure what he wanted to do. He started as an engineering student, switched to physics, and briefly considered chemistry. Essentially, he was "adrift." (His description, not ours.)

It wasn't until he fell under the tutelage of computer science professor Andy van Dam that he discovered what really excited him: the process of discovery.

"We had access to an IBM 360 mainframe that occupied an entire building," Lazowska recalls. "Despite its size, it had only a couple hundred megabytes of disk storage and 512 kilobytes of memory. Today, your typical smartphone will have 1,000 times the processing power and storage of this machine. During the day, it supported the entire campus. But between midnight and 8 A.M., we were allowed to use it as a personal computer. We were building a 'what-you-see-is-what-you-get' hypertext editor—Microsoft Word plus the Web, minus networking. It was revolutionary."

Four decades later, Lazowska is dedicated to making the same transformational impact on countless computer science students. After graduating from Brown in 1972, he received his Ph.D. from the University of Toronto in 1977, and joined the University of Washington faculty, focusing on the design, implementation, and analysis of high-performance computing and communication systems. Today,



Lazowska holds the Bill & Melinda Gates Chair in Computer Science & Engineering at the University of Washington, where he served as department chair from 1993 to 2001. He also directs the university's eScience Institute and chairs the Computing Community Consortium, a National Science Foundation initiative that seeks to inspire computer scientists to tackle the societal challenges of the 21st century.

How invigorating were those early days at Brown under van Dam?

It was an amazing time. He had a crew of 20 undergraduates who were his research assistants. Typically, re-

search assistants were graduate students, but Brown had few computer science graduate students at the time. Andy was asking us to join him in discovery—to figure out how to do things that no one had done before. Up to that time, including my freshman year at Brown, I had been learning things that people already knew. It blew my mind that Andy was asking 19- and 20-year-olds to find answers to questions that he himself didn't know. People rise to the expectations and challenges that are set for them. Andy understood this.

Back then, most people thought of computers [CONTINUED ON P. 127]

[CONTINUED FROM P. 128] as calculators for business and scientific applications. We were using it, however, as a personal augmentor. The hypertext system we built was used in the early 1970s for a poetry class, where someone would enter a poem and invite commentary about it. This was like creating a wiki, only 35 years earlier.

How different is it teaching computer science now than it was five, 10, or 20 years ago, given how fast-shifting the landscape is?

Actually, much has stayed the same. We're still teaching students the process of discovery. Children have an innate interest in discovering everything around them. But, tragically, by the time they've gotten to college, this has usually been beaten out of them. So we teach them how to be children again—how to think like they did when they were four years old.

Undergraduates go to a research university to engage in discovery. We constantly convey to them that we all got involved in computer science because we wanted to solve real problems and change the world. To do this in the modern era just makes it more exciting. The students in my classroom now will go on to computer science grad school, to law school, to medical school, to Microsoft, Google, Amazon, and startups. Then, they change the world.

What was your philosophy when it came to chairing the department?

First, it's about leadership, not administration. Be a leader; hire an administrator. Second, it's about people and making them productive. You provide a shield that allows the people working for you to focus on their research and teaching. Third, it's about students—they're the multiplicative factor. If you're at a university and you're not engaged with students, you're in the wrong line of work—go to an industrial research lab.

With respect to your role in the eScience Institute, how are you working to take research about disruptive technologies and make a real-world impact?

We are undergoing a revolution in science. The growth of data sensors has been phenomenal. They're everywhere—in cell phones, in telescopes,

“I’m surrounded by people who can be counted on to produce. I try to be one of those people, too.”

in gene sequencers, in highways and buildings and bridges, on the sea floor, in forest canopies, on the Web. In the old days, if you wanted to study the creation of a social clique, for example, you'd pay some undergraduates \$6 to participate in a focus group during their lunch break. Now, you have millions of such cliques that can be researched through social media. The challenge of research before was finding enough data. Now, we're drowning in it. This is a new turn of the crank in the field of computational science—it's about the data, not the cycles.

With the eScience Institute, we're focusing on finding better ways to pursue the collection and exploration of all of this data. We want to apply this knowledge first to the needs of the research scientists here at the university—the biologists and astrophysicists who need to resolve big-data exploration problems to do their jobs. Then, we can create solutions for people around the world.

You're also chair of the Computing Community Consortium (CCC). What are the primary efforts the CCC is most involved with now? And what do you hope to accomplish with these efforts?

Let's face it, as computer scientists, we can come across as a bit geeky. Our neighbors don't understand what we do. But what we do greatly impacts the issues that affect our neighbors, like the improvement of our transportation systems, energy efficiency, health care, education, open government, cybersecurity, and discovery in all fields. As computer scientists, we have a rich intellectual agenda with the capability to have an enormous breadth of impact upon daily lives. We need to do


a better job of telling that story, and a better job of garnering the resources to do the research that will enable further breakthroughs. That's what the CCC seeks to do.

You also seek to increase the role of computer science in K–12, within the Science, Technology, Engineering, and Mathematics (STEM) Education Coalition learning framework. Kids spend plenty of time with computers these days, but it seems more voyeuristically focused, with lots of social networking and watching YouTube clips. How do you get them to take a step beyond?

There's a positive aspect to what they're doing. It's better than in the days when the only computer in the house was a video game console. When you have young people using their home computers or iPhones for communication and social networking, it's good because it introduces them to the broader power of computer science. Hopefully, many of these young people will say, “I want to create something like this.” But to empower these kids, there needs to be a revolution in STEM education.

All available data tells us that our K–12 students are falling behind the rest of the developed world. To address this, we're exploring how to better teach STEM disciplines. We need to revive the concept that science is about discovery, and not the memorization of facts. And computer science needs to be a big part of this revolution—it needs to be viewed as an essential STEM discipline.

You clearly have a lot on your plate. How do you serve so many needs without shortchanging some?

I'm the wrong person to ask! As responsibilities increase, the hours of the day don't. If I'm writing a report, I always want to have another month. If I'm preparing for a class, I always want to have another hour. I wish I had to power to say “no,” but I don't. I'm surrounded by people who can be counted on to produce. I try to be one of those people, too. 

Dennis McCafferty is a Washington, D.C.-based technology writer.

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