Computer Science Student Helped Child with Autism

BY MELISSA AUMAN

It was an attempt to take the easy way out that introduced Kylan Turner '03 to what is now her life's passion.

After three years of basic mathematics courses at George School—Algebra, Geometry, and Pre-Calculus—Kylan wasn't interested in taking another standard math class her senior year. She was hoping to find a different way to satisfy her last math requirement.

"I opted to take what was called Computer Science," says Kylan. "I had never really considered learning to program at that point; I simply wanted to satisfy my requirement in a way that seemed to be more hands-on, and hopefully more interesting."

Kylan's Computer Science teacher, Chris Odom, says, "There is more than one way to cover course material, and I am a big believer in learning by doing. It is important that the students take ownership of their education, so they are encouraged to find projects that are meaningful to them."

"Chris taught the class in a way that allowed us to learn all the functional skills in programming that could be directly applied to our interests, whatever they might have been," says Kylan.

As it turned out, the class's universal applicability and Chris's encouragement to his students to match that applicability with their personal interests helped Kylan change not only her life, but someone else's. Her interest at the time was Max, a child in her neighborhood whom she had been tutoring. Max had been diagnosed with high-functioning autism, which was affecting the way he learned and interacted with others.

"One day, at a block party, I began talking with his mother about his diagnosis," says Kylan. "Once the conversation turned to therapy, I was really interested in learning more. His mother invited me to sit in on a daily session with Max and one of his therapists. From that day on, I was hooked. Max is the sweetest boy in the world. He is so full of love and life, and his smile is by far his most infectious attribute.

"I got the idea to use a computer program to help Max

In her George School Computer Science class, Kylan Turner '03 experimented with a facial expressive robot named ESRA (Expressive System for Robotic Animation) similar to the one pictured below. Her experiments led her to pursue a new passion in the field of autism research.

learn when I was trying to teach him to add and subtract one day. I was getting frustrated because he was losing motivation to pay attention. I simply couldn't engage him long enough to let the concept sink in. Then I realized that I could possibly write a program to help make learning his addition and subtraction more exciting."

Kylan approached Chris, who jumped at the chance to help one of his students discover a real-world application of her studies. Chris recalls, "I was thrilled! I still get goose bumps thinking about it. Here was a student who admitted that she didn't like math and enrolled in my course because she thought it was the lesser of many evils. In one long run-on sentence, she explained that she wanted to create a math program that would be exciting for Max to use and would give Max's teachers instant feedback on his progress; and would it be possible for her to program a computer to do this; and if so could I help her get started?

> "I was so happy for her that she had found her passion. It was one of my proudest moments as a teacher."

Photo: Brian Patton
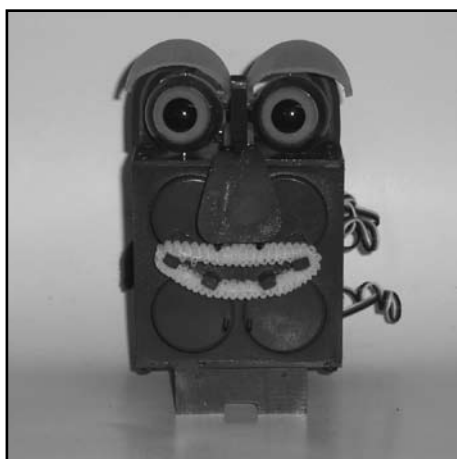
I distinctly remember her talking for over a minute on one breath of air. I was so happy for her that she had found her passion. It was one of my proudest moments as a teacher."

"Several weeks later, after running to Chris with this idea, I had a fully functioning program and put Max on the computer to try it out," says Kylan. "He got on the computer and after a few trials appeared to be the most motivated I'd ever seen him to work on anything. After a while of using the program, he was able to do his math pages for school without much assistance."

While Kylan's reward was watching Max improve, Chris also had the opportunity to watch one of his students grasp what he had been trying to teach. "It is the hope of all teachers that our students will discover that flame that burns within each of us—that yearning for deeper understanding," says Chris.

Kylan says, "While that program was the first, it showed me how limitless the options were to use computer programs as a vehicle to teach and record progress."

After hearing about a project being done at Yale University with a robot named Kismet, a humanoid robot that interacts socially with people, Kylan approached Chris and Brian Patton (a substitute teacher at George School) about creating a similar robot for Max.

Since autism is a spectrum disorder, individuals with autism experience its characteristics in degrees ranging from mild to severe. Many people with autism exhibit an aversion to social interactions and have difficulty interpreting other people's facial expressions. Because Kismet responds to social cues from humans and simulates human facial expressions, Dr. Brian Scassellati, assistant professor of computer science at Yale University, believes that robots like it could be used in the future as therapeutic tools for children with autism. By learning to interpret such robots' facial expressions, he believes, children with autism could improve their ability to interact with other people. "The underlying hypothesis from Dr. Scassellati is that kids with autism don't talk to people because they aren't motivated by other people's faces," explains Kylan.

Kylan received approval from Yale University to emulate their study, and began working with Chris and Brian Patton. Brian, also the vice president of Robodyssey Systems in Trenton, New Jersey, had patented his own facial expressive robot named ESRA (Expressive System for Robotic Animation) for use as a programming project in high school computer science classes. Brian gave Kylan her own ESRA with which to experiment. Three months later, the tenacious trio had a new friend to help Max.

"The end result was that Max was able to slightly build his repertoire of conversational language through using the robot," says Kylan. "The robot was able to produce faster response times from Max, and he was able to maintain a conversation for about two extra exchanges than an ordinary conversation with a peer."

The results encouraged Kylan to continue studying the ways programming could influence children with autism. After graduating from George School, she entered the University of Pittsburgh, where she is now a junior pursuing a double major in psychology and philosophy of science with a minor in neuroscience. Kylan also works in the Early Cognitive Development Lab.

"I was hired at first to just troubleshoot the computers, play with the young toddlers in the waiting room, and be a gofer," Kylan explains. "But after some negotiating, I was given the opportunity to write a program to better facilitate the testing process for many of the graduate students' research studies. Now I am a research assistant [an honor usually reserved for graduate students] and write all the computer programs for the lab. I've sold two of those programs to Carnegie Mellon University's psychology department and one to the University of Pittsburgh Medical Center. I also work with children with autism and their families as a part-time in-home case therapist (similar to the work I did with Max originally) outside of my lab position."

Kylan's most recent work has been in conjunction with researchers at Carnegie Mellon University, creating a mathematical estimation program to study response times in subjects with autism. In May, the study was presented at the International Meeting for Autism Research in Boston, Massachusetts. Once a required sample is tested, the study will appear in an American Psychological Association journal. Kylan's name was on the paper with three others: an MD, a PhD, and a master's-level researcher.

Kylan doesn't plan on stopping anytime soon. She will be spending the 2006-2007 school year at the University of London studying with a cognitive psychology professor who is interested in having Kylan translate her numerical estimation program to another programming language. She also has a standing offer to work as a research assistant at the Autism Research Centre at Cambridge with a well-known researcher in the field. She says, "If I like England, I might postpone graduate school for another year and pursue the Cambridge offer." Kylan has plans for a dual doctorate in clinical and developmental psychology, and hopes ultimately to start and run an applied research school for children with autism.

"George School gave me a lot of confidence to pursue the things I'm passionate about and certainly heightened my need to be altruistic, sensitive, and available to individuals I can help," says Kylan. "Having had Chris as a teacher was probably the best thing that could have happened; he taught me that being a student isn't just about doing what you have to do to get a good grade. Being a student is about constantly trying to build a place in your education for what engages you. Once you make the connection between what you want to incorporate and how, it's exciting to do the work. That is a philosophy I am sure I will continue to use throughout the rest of my endeavors as a student, and I hope one day as a teacher." •

[See "Teacher Authors a Robotics Book" on page 22 for more about Chris Odom.]