

# APPLICATION STORY



## Dimension Helps Bishop Reding Students Become Inventors

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— Bruce Mazer  
Bishop Reding Secondary School

Innovation fueled by fun – that's what students can look forward to when they sign up for the Robotics Challenge, the Engineering Club or enroll in one of Bruce Mazer's Computer Engineering courses at Bishop Reding Secondary School in Milton, Ontario.

Bishop Reding offers four Computer Engineering courses starting in grade 9 and extending to grade 12 as well as a summer engineering camp for grade 7 and 8 students. The course of study is essentially a pre-mechatronics program and is designed to teach students how to create useful, intelligent products by employing skills and concepts from across the engineering spectrum including mechanical, electrical, design and computer engineering.

"The Computer Engineering courses demand that students take a look at a variety of systems and components that allow new products and devices to work properly," said Mazer. "This can include programming software, mechanical design, ergonomics, etc. – all the things that might go into designing a cell phone, for instance."

Successfully working through the design of a new product frequently requires that the students manufacture custom parts and components. This stage of the process proved difficult for students and teachers prior to purchasing the Dimension 3D printer.

"We worked in the manufacturing and construction labs to fabricate parts from metal and wood, but more often than not, these parts did not meet the required design specification" said Mazer. "When our school board technology consultant, Robert DeRubeis, saw a Dimension 3D printer in action at the ITEA and OCTE conferences, he knew it was just what was needed to enhance the 'fabrication' portion of our program." With the support of Rick MacDonald, Superintendent of Curriculum Services, the board purchased two Dimension 3D Printers.

The school board purchased the printers from Cimatrix Solutions Inc., the exclusive Ontario distributor of Dimension 3D Printers. "The Dimension 3D Printer was a key addition for Bishop Reding's Computer Engineering courses and related programs," said James Janeteas, President Cimatrix Solutions. "We expect to see the expansion of this technology in other schools offering Design Technology (TDJ) and Manufacturing Technology (TMJ) courses and in Specialist High Skills Major (SHSM) schools. We look forward to helping more schools make the important jump to 3D printing and providing introductions to community business partners, demonstrating real world applications."

### Dimension 3D Printer Enhances Program

Since purchasing a Dimension 3D printer, Bishop Reding students design their parts in a virtual 3D environment (with industry-standard 3D software as such as ArtCam) to exact specifications, print the prototype, and if necessary, re-engineer the design, re-print and continue robot construction with very little down time. "We've been able to fabricate many parts and accessories with the Dimension 3D Printer that would have previously been impossible. We do it right in the room and the turn-around time is minimal." said Mazer.

"We've manufactured accessories and gears for robots that have really advanced their functionality. We even fabricated a set of golf clubs with the Dimension 3D Printer for some of the robots. The students and faculty have had a blast taking the robots out to the golf course to see what they can do. These kinds of activities have added a real spark to the program."

In addition to adding excitement, the Dimension 3D printer has also provided the students with opportunities to apply math, geometry and reasoning skills in practical, relevant and contextualized ways. "3D modeling reinforces numeracy (mathematics) skills, allows for differentiated learning and inquiry, appeals to various learning styles and it engages a wide range of students," said Mazer. "It has introduced them to a new body of concepts related to 3D design and rapid prototyping. To solve an engineering problem, the students design parts, build them, write code and then evaluate their success. This problem solving process allows them to be inventors of both hardware and software in creative and exciting ways."

### 3D Printing is all the Rage

The Dimension 3D Printer has generated interest across the curriculum in both the elementary and secondary schools throughout the school board. Students and staff from various subject areas have expressed interest in using the 3D technology in their programs – from science to math, business, engineering and the arts. A significant increase of student enrollment in grade 9 – 12 computer engineering programs has also been observed since the introduction of the 3D printers in to the curriculum.

Recently, over 100 grade 7 and 8 students from 25 elementary schools visited Bishop Reding Secondary School to compete in a robotics challenge. A demonstration was given highlighting the capabilities of the Dimension 3D printer. "The students were really excited by the presentation, some likening it to the Star Trek TNG 'replicator. We overheard them talking about what cool things they plan to make when they get to high school." said Mazer.

Interest in 3D Printing has translated into the school board running a "Numeracy through Technology" engineering camp for the month of July, 2009, for students in grade 7 and 8. They will get hands-on experience with rapid prototyping and engineering concepts while reinforcing mathematics skills.

"As we move from a traditional manufacturing economy towards a knowledge-based economy, we need students to start thinking of themselves as inventors," said Mazer. "The Dimension 3D Printer helps students build what they can imagine. Their original design concepts can become real in a matter of hours...even if what they imagine is a golfing robot!"



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