

## INTRODUCING TODD ABLETT...

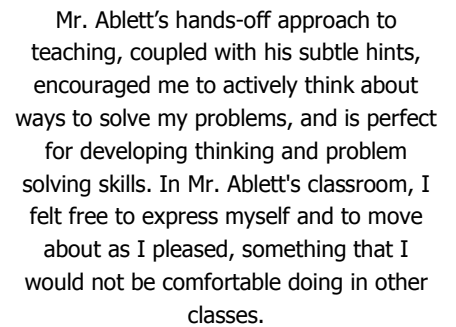
It is eight o'clock in the evening on a typically soggy November evening as I pull up to Gladstone Secondary school. The teams and clubs have long since relinquished the building to the custodians for the weekend, but in one corner of the school the lights still burn brightly. As I walk in to the robotics shop there are about two dozen students hard at work optimizing their robot's software and hardware. Their teacher, Todd Ablett, notices my arrival with a nod, but doesn't interrupt his work with one of the grade nine students who is having a problem programming his team's robot. "You need to talk to one of the grade twelve students," Mr. Ablett explains, "they've seen this problem before and can help you." The student, a bit hesitant to interrupt one of the seniors, gets a bit of encouragement as Mr. Ablett points out a student who he knows can help, "Go ask him." Todd advises, "Tell him you are having a problem switching out of Autonomous Mode."

Todd watches as the two students sit down in front of a computer to work out the problem. "It would have been quicker to show him the answer," Todd confides to me, "but I really have to work to encourage the teamwork aspect. A lot of these students are pretty quiet and unless they can learn to communicate well and work well in a team it doesn't matter how good their technical skills are."



It is six o'clock AM on a snowy Saturday in November as Mr. Ablett (centre) loads his students on to a bus bound for a robotics competition in Washington State.

This has been an aspect of Todd’s teaching for as long as I have known him. Underneath the “top layer” of technological skill, innovation, and professionalism that Mr. Ablett demands from his students has been a strong focus on growing the individual’s social and teamwork skills. As I look around the shop and see small groups of students working together on many different machines I can see that the effort is paying off, something confirmed by the overcrowded trophy case displaying awards that Todd’s students have won in international robotics competitions over the past five years.



Mr. Ablett’s hands-off approach to teaching, coupled with his subtle hints, encouraged me to actively think about ways to solve my problems, and is perfect for developing thinking and problem solving skills. In Mr. Ablett’s classroom, I felt free to express myself and to move about as I pleased, something that I would not be comfortable doing in other classes.

Devon Luu, UBC Mechanical Engineering Student

But the story of Todd’s impact goes far beyond robotics and far beyond his school. The excellence that Todd brings to his work has challenged his students, and his fellow teachers, to strive for a similarly outstanding level of success and achievement.

## DIGITAL LITERACY AND ICT

Despite a well-earned reputation for success in international competition, Todd’s classes are far from elitist. His robotics programs are open to all students, and at a secondary school in Vancouver’s East Side that means he works with a wide range of students, languages, and learning abilities. “Many of my students don’t have a computer at home,” explains Todd, “let alone high-speed internet. It’s really important that they can access technology here in the shop.” Todd has worked tirelessly to ensure that his students, regardless of their background, have all the advantages that technology can provide.

When he was able to raise funds to purchase portable computers so his teams could re-program their robots at competitions he made the wise decision to invest in netbooks rather than more expensive laptops. “The netbooks are fast enough to do the job, and I could buy more of them. That means more of my students can spend more time working on their code. I think that is pretty important.... most of

these students have never written a computer program before signing up for this class, so it takes them a while to get the hang of it.” Indeed, Todd has found that using the robots to teach students basic programming skills has served to shift the students’ perception of what a computer program is. While many students find it disenchanting to write “Hello World” when they want to write “Counter Strike”, Todd finds students don’t carry a preconceived notion of what a good “robot program” should be. “They can write a program to make the robot move forward two feet and raise its arm,” Todd says, “and gain a real feeling of accomplishment from that. It helps carry them on to the next level and keep them thinking positive thoughts about programming as they learn more about sensors, feedback and controls.... and when you consider the number of embedded systems in our lives, programming is about a lot more than just making the next fancy iPhone app.”

Todd leverages the computers for much more than just programming, however. He guides his students to useful online resources, forums and discussion boards where they can access the resources they need to take their machines to the next level. He shows them how to search through manuals and data tables to extract the information they need, and how to share their discoveries with others. He introduces his students to 3D Computer Aided Design and encourages his senior students to use CAD software to design their machines in silico prior to assembly, and does most of this on computers that he has been able to get for free through donations and community support.



### **The Pink Sparkle Fairy Unicorns**

Under Mr. Ablett’s guidance the “Pink Sparkle Fairy Unicorns” became the first “all girl” VEX team in BC. They chose their team name to add extra effect when they “beat the boys”, and painted their robot pink with a stuffed “My Little Pony” style unicorn for decoration. They got off to a rough start in their first tournament, finishing 30<sup>th</sup> out of 34 teams, but two years later qualified for the VEX World Championships in Dallas, Texas where they took home fifth place in the World VEX Robotics Programming Skills Competition.

# INNOVATIVE AND EXEMPLARY TEACHING PRACTICES

As soon as you walk into Mr. Ablett's robotics shop you know you are somewhere special. Over the years the former electronics shop has gone through a process of evolution and is now one of the premiere examples of an integrated mechatronic teaching space in the country. The centre of the room is dominated by a 4m square VEX playing field raised on a 1m high platform. Around the outer edge of the platform, underneath the playing field, are lockers for each team of students to store their robot. Surrounding the field are a number of work tables where the design and assembly of the robots takes place. At the front of the classroom is a row of desktop computers for programming and research, while the netbooks are available at tables on a side wall. At the back of the room are the drill press, saws and sheet metal tools that the students need to custom-design pieces for their machines, and all around the walls are the banners that the teams have carried to various international competitions over the years... and always, always.... there are the students. If the door is open, the students are there. But it is next door, in the former drafting room, where this year's revolution is taking place.

From the beginning where I was taught the basics of how to solder circuits, to programing a robot to function autonomously, Mr. Ablett's hands-off approach to teaching gave way to experimentation and learning beyond the classroom. The hundreds of hours he spent of his own time, during lunch hours and after school were invaluable...

Leslie Mui  
First Year Engineering – UBC

The drafting tables are gone, and around the outside wall of the room are shelves holding smaller, simpler robots. Robots that were built by the grade eight students. "This is something new this year," Todd explains, "pretty much every grade eight in the school is going to build and program a robot. We've just finished our first rotation of students and it is amazing what they have accomplished. At grade eight they are still young enough that their imaginations can overcome their hesitations, and you can get them to share their ideas without worrying about whether its 'cool' or not. We want to get

them thinking that designing, building and programming are fun while they are still open to that idea... especially the girls. The girls are just doing amazing things in this course... a lot of them just didn't know how good they are at building things because they had never really done it before."

Todd will be the first to admit that the program has not reached this point without outside assistance.

"We would be nowhere without community support. The Parents' Advisory Council has been great, and all sorts of individuals and organizations have chipped in to help out the kids. We've had everything from a parent offering to build boxes to transport the robots to the local Buddhist Temple helping pay for the students to travel to tournaments."

Over the past ten years these countless small contributions have added up to well over \$10,000 of community support and sponsorship for the robotics program and enabled many students to represent their school at a local and international level.

Todd doesn't view community support as a one-way street, however. "It is really important that parents get to see their sons and daughters doing this... but we've got a lot of parents working two jobs, or who just can't afford to travel to see their kids



**The "Gladstone Open" VEX Robotics Tournament**

In 2008, Todd recognized the need for another competition in the local VEX robotics season, and organized a team of volunteers to host the first "Gladstone Open". Under Todd's careful guidance the event became a highlight of the robotics competition season, eventually attracting teams from as far away as the east coast of the United States. Here teams line up for the alliance selection process at the inaugural event.

compete," Todd explains, "so we decided to host our own robotics tournament here at Gladstone." This was the genesis of the "Gladstone Open". Under Todd's leadership a team of teachers, students and community volunteers came together to host one of the largest robotics competitions in the Pacific

Northwest. The Gladstone Open was a great experience for the students, the parents, the school and the community as to helped to focus attention on what the students were accomplishing under Mr. Ablett's guidance and went a long way to building school spirit and esteem. Members of the Gladstone community were starting to think of their school as being "really, really good" at something. And that something was robotics!

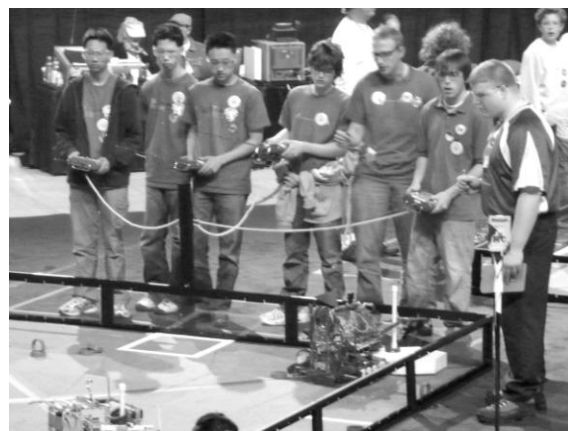
## STUDENT SKILLS DEVELOPMENT

Todd's background as a technology teacher left him somewhat hesitant to introduce robotics to his students. It wasn't that he didn't think there was potential in the learning opportunities, it was that the idea of using a robotics kit rather than manufacturing the parts from raw materials left him concerned that the students would be missing out on learning crucial tool skills. Todd is now a vocal advocate for the VEX robotics platform, however. "With a traditional 'shop' project you can spend months designing it and building it... and if it doesn't work out right you don't have time to go back and start over." says Todd, "With robotics you can compress the design cycle down to a matter of weeks. If something isn't working right the students can go back and fix it. Each time they make a change, upgrade, or repair they are learning how to design their next machine better." This encourages the students to innovate and take risks with their projects that they might not otherwise take. One of the reasons that the robotics shop is so busy is that robots are always in a constant state of re-design. The supportive nature of the program gives students the freedom to experiment with designs for their hardware and software, while the competitive aspect forces them to evaluate the success of their design. As Todd points out, "On game day the robot has to

Mr. Ablett taught me from grade 9 to grade 12. Under his guidance I explored the world of electronics, engineering and robotics. Throughout those years I gained enthusiasm for a field which I have come to select for future studies. With his unequalled skill at teaching oftentimes baffled students to release their inner-engineer, I feel that he would be an exemplary candidate for this award.

Alex Mui, 1st year engineering at SFU

be ready to go... I can't change that, their parents can't change that... they need to show up ready to play. That is a really important lesson, especially for a lot of our robotics students who aren't getting that kind of experience through athletics or other venues. Learning to be responsible to yourself, to contribute to a team, to deal with success and disappointment and elation and frustration in a socially acceptable manner... those are really important skills." It isn't just the soft skills that the students are learning, however, the robots are assembled from a wide variety of parts and raw materials that can be bent and shaped and joined in countless ways. Todd will encourage a student to research a particular design challenge online, share the results with team mates, and then find a way to design and manufacture the parts required to bring their ideas to fruition. When you inspect their robots it is apparent that not only are they still learning many of the 'traditional' skills, but they are learning them faster and moving on to incorporate sensors and software in their designs. It is when you watch the students at a competition, however, that you notice another important aspect of Mr. Ablett's approach to student skills development... he always volunteers for a time consuming, demanding job assisting in the running of the tournament. "The tournament is for the students to stand on their own." explains Todd, "It is a time for them to take the skills that we've been working on in class and put them




#### **The first BC robotics teams at the World Championships**

In the spring of 2008, two teams of Gladstone students became the first students to represent British Columbia at a major international robotics championship when they qualified for the FIRST VEX Challenge held at the Georgia Dome in Atlanta. Todd guided the team through a major fundraising effort to ensure that all team members could attend the three-day event. Both teams made the playoffs and advanced farther than any other Canadian High School, establishing what would become an enduring legacy of success for Gladstone's robotics teams on the international stage.

to use. They know how to fix their robot, they know how to upgrade their code, and they know how to get organized and work together. When they see that I am busy, it just reaffirms the faith that I have in them to do their very best without me looking over their shoulder.”


## STUDENT ACHIEVEMENT AND PARTICIPATION

Over the past five years student participation in Gladstone’s Robotics program has grown exponentially. There are now three “blocks” of robotics classes for grade nine through twelve students, and almost every grade eight student in the school will build and program a robot as part of their “applied skills” rotation this year. The students come from all backgrounds, and find that robotics brings them together, forcing them to share their strengths to the benefit of their team. It is clear, however, that this is a classroom where respect and hard work are demanded of all. “If you aren’t pulling your weight, your team is going to let you know about it before I do,” says Todd, “the students have learned that in this room it is okay to be smart and work hard and they demand that from their classmates.” Todd also



Todd has been a tremendous help over the past four years with getting a robotics program started in the state of Washington. He has been a big factor in making BC and Washington State a major force in international youth robotics.

Rick Tyler  
Director of Online Resources  
Director of the Western Region  
Robotics Education and Competition  
Foundation



takes students from grades nine through twelve and puts them together in the class so that the juniors can learn from the seniors. “That is something that worked really well for me in the wood shop,” he explains, “it forces the seniors to really know their stuff, and gives them the opportunity to take pride in being an expert. They know that they are role models for the junior students and... most of the time... really work hard to live up to the job.” In many ways it also serves as an informal mentoring program, teaching the junior students that they don’t always have to rely on “the teacher” for advice, but can find guidance all

around them if they just ask.

The results can be seen in the overstuffed trophy case outside the shop, the high number of students progressing to technical and engineering studies after graduation, and the impact of the student's success on their confidence and post-secondary scholarship applications. Over the past five years Gladstone robotics teams have won close to one quarter of all the VEX trophies awarded in BC and Washington State and have become a known factor at the international level of VEX Robotics Competition.

## TEACHER COMMITMENT AND LEADERSHIP

VEX Robotics is merely Todd's latest expression of his passion for teaching. Prior to robotics he led Gladstone teams to excel at Electrathon racing, using electric motors to power student-designed and driven race cars around a closed track at speeds in excess of 50 kmh. For three years the Gladstone teams were unbeatable, before a loss of racing tracks and the dangers of ever increasing speeds led him to seek out a new challenge for his students. He developed projects for his wood work students to give back to the community, having them make two toys as a project... one for them and one for the toy bank. He has inspired students to design and build radio controlled airplanes, and co-developed a tethered electric airplane unit that is now being taught to future shop teachers at BCIT. He has taught stagecraft and lighting design to support the school's drama productions, and always has time to help



### Gladstone's 2010 World Championship Teams

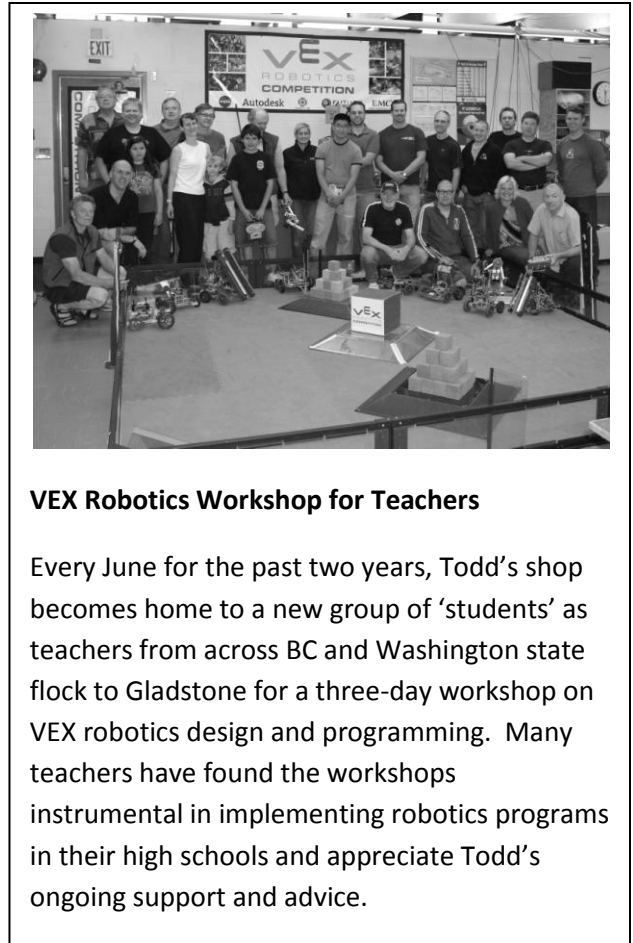
Gladstone teams returned to the World Championships in 2010 with one of their strongest efforts to date. The Gladstone student teams were "721 TBA," including Alex Jew (team Captain), Frankey He, Alex Mui, Les Mui and Connor Stewart-Hunter; and "2z Death From Above," including Kelvin Tam (team Captain), Nathan Lau, Jame Lee, Edward Leung, and Andy Loi. Team 721 finished the qualifying rounds with a 7-1 record, and both teams advanced to divisional playoff rounds.

out with a big project at the school. But most importantly, he has shared his passion, knowledge and experience with teachers across BC and Washington State.

For the past two years Todd has hosted three-day long robotics professional development workshops for teachers. At a time when he could be cleaning up the shop and preparing for summer holidays, Todd has up to twenty teachers from across the province hanging out in his shop, building robots, and asking him how he does what he does. Many of the teachers are interested in teaching robotics, but not sure where to start, and Todd goes out of his way to

make sure that they have a positive first experience with robots, and that they know he is available to follow up and help them out during the year. He particularly stresses that teachers are welcome to bring their students over to his shop after school to work alongside his students and take advantage of the playing field and other resources he has accumulated over the years.

Todd Ablett is truly an amazing and inspiring teacher. His work has not just improved the lives and education of his students, but has raised school spirit, and had a positive impact on teachers in two nations.



### VEX Robotics Workshop for Teachers

Every June for the past two years, Todd's shop becomes home to a new group of 'students' as teachers from across BC and Washington state flock to Gladstone for a three-day workshop on VEX robotics design and programming. Many teachers have found the workshops instrumental in implementing robotics programs in their high schools and appreciate Todd's ongoing support and advice.

Mr. Ablett taught me the most important skill of engineering: problem solving. I changed my thinking from simply "It does not work" to "Why doesn't it work?". Now I am in my fourth year of engineering. Without this set of problem solving skills, I could not have made it this far.

Andy Io, 4<sup>th</sup> Yr. Mechanical