



accelerate

Letter from Joe Astroth, Chairman of the Board of the REC Foundation

The profile of STEM (Science, Technology, Engineering, and Mathematics) education has risen to an all-time high. This is true for business professionals, policy makers, teachers, parents, and even students who increasingly see STEM as a promising career path. For those of us engaged in REC Foundation programs, STEM is part of our lives. In many cases, for our amazing sponsors, partners, volunteers, and staff; it is their focused mission! Thanks to all of you who give so much of your time and talent to support our organization and the young people we serve.

No longer a passing headline, STEM education is recognized as a strategic financial imperative, a national security consideration, and a promising career pathway. There is traction behind a STEM educated workforce that has become a measure of economic development potential across the globe. There is definitely momentum behind REC Foundation programs as a platform for inspiring and engaging youth in STEM. We may remember from our Physics class, momentum can be defined as “mass in motion.” How much momentum an entity has, is dependent on how big it is (mass) and how fast it is moving (velocity). Looking at it in human terms from our REC Foundation perspective, we see an exponentially growing number of students, teachers, parents, and volunteers involved in our program – we are gaining mass, if you will – year over year. At the same time, the inherent energy in our programs is also growing geometrically – we are gaining velocity. We are gaining momentum at an increasing pace! Our commitment is to continue to increase the



breadth and quality of our programs, build stronger connections between classroom and competition activities, and expand the inclusive nature of our community.

Momentum and its components of mass and velocity lack meaning without simultaneous positive effects. So, while we point with pride at the growing momentum behind our programs from elementary grades through university, and while we continually gear up for increasing acceleration, the singular focus of everyone within the REC Foundation community is ensuring the long lasting positive impact of our programs on young people.

We are witnessing increasing mass, velocity, and impact. We see a positive future – and I am honored to be a part of it!

Letter from Jason Morrella, President of the REC Foundation

Building off the momentum from last year, the REC Foundation remains committed to connecting students with experiences that engage and accelerate their interest in Science, Technology, Engineering and Math (STEM) through hands-on robotics engineering opportunities in the classroom and at competition events.

This year, in partnership with VEX Robotics, Inc., we introduced the VEX IQ Challenge – reaching students starting as early as elementary school to spark their interest in robotics and set them on a course for continued exploration of STEM. I personally helped run some new VEX IQ Challenge events and attended numerous team meetings for some of our new VEX IQ teams this season – and I’m amazed at the response from the students. They’re engaged, thoughtful and perceptive in their design concepts and approach to the competition... their boundless energy and excitement to do more and learn more is infectious to all of the adults working and volunteering to support them. Furthermore, the set of tools at their disposal is second to none – with a series of curriculum units mapped to the Common Core and Next Generation Science Standards for classroom use and an undeniably flexible, fun and affordable set of software tools. The VEX IQ Challenge has quickly taken off, reaching thousands of students in just its first year and promising much more in the year ahead.

Yet our story doesn’t end there. The VEX Robotics Competition remains the largest and fastest growing robotics program for middle and high school students across the U.S. and internationally. By every measure, we’ve exceeded our goals – growing by over 2,500 teams, offering many more new competition events, expanding the scholarship, grant, and Online Challenge offerings, and launching the virtual STEM Hall of Fame to further inspire students by honoring and recognizing those who have dedicated their time, talent, and treasure toward growing tomorrow’s STEM leaders today.



At the 2014 VEX Robotics Competition World Championship, I expect you’ll once again experience the excitement in the VEX Dome as students gather to learn and compete with robots they’ve painstakingly designed and constructed for the better part of a year. Arriving in Anaheim, just like those students, I’m overcome with a variety of emotions – pride in the reach and momentum behind the program we’ve developed, amazement in the variety of ideas and approaches the students present with their designs and strategies, excitement when I realize the many opportunities we have in front of us to further engage and inspire our students, and a deep appreciation for the time and energy the REC Foundation’s staff and the thousands of volunteers around the world contribute to provide these opportunities for our students.

In the pages that follow, you’ll gain unique perspective from students in each of our programs, hear from our Event Partners and volunteers, learn the value of the program from an educator’s perspective, and even discover the successful adoption of robotics citywide through the passion and vision of elected officials. I hope you enjoy their stories and I invite you to share this journey with us, as we continue to seek opportunities to engage with our students and accelerate their understanding and appreciation for STEM – as we will soon rely on them to be our future leaders, seeking solutions for a better world.

Jason Morrella

2013-2014 Highlights

@GoArmy Photo: The @VEXRobotics competition is underway at Sunset Station #ArmyBowl #STEM pic. twitter.com/6hf2KEpMRO #ArmyStrong

Code, grease, motors and wheels:
Robot competition draws talents
of San Fernando Valley students
San Jose Mercury News, October 2013

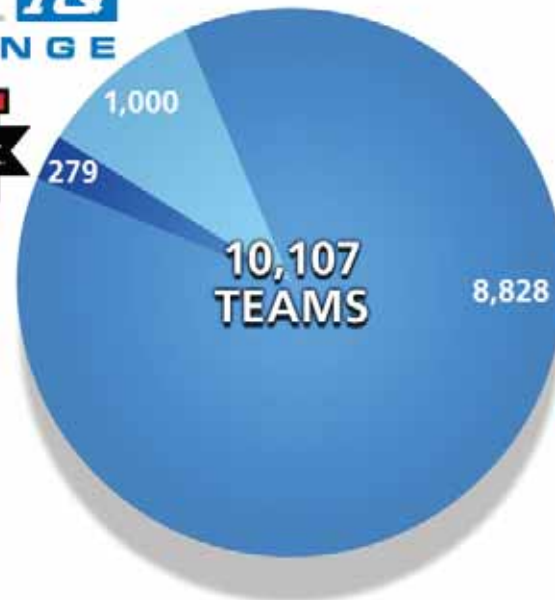
RoboDoves all-female robotics team from
Western High School competes on world stage
Technical.ly Baltimore, April 2013

Robotics Event Aims to Boost STEM Interest
Indiana Business Journal, December 2013

Robots square off at Stonybrook Middle School
Local ABC 6, Indianapolis, IN, December 2013

VEX IQ
CHALLENGE

Near North Student
Robotics Initiative
*Bay Today, Canada,
December 2013*



Students duke it out in VEX Robotics
Competition at MOST in Syracuse
The Post-Standard & Syracuse.com, January 2014

Local Students Compete
in Robotics Tournament,
Receive Grants
*Killeen Daily Herald,
Killeen, TX, December 2013*

VEX
ROBOTICS
COMPETITION

“VEX Robotics is a tremendous program that creates great learning, team work and fun while exciting young minds in STEM. As a global company, we are eager to support the expansion of VEX Robotics so more students worldwide have the opportunity to gain insight into the excitement of STEM and STEM careers and participate in this fun, yet challenging program.”

Sandra Evers-Manly, President of the Northrop Grumman Foundation

Joplin High School Students
compete in Robotics competition
KOAM TV, Joplin, MO & Pittsburgh, KS January 2014

Gaming Gave Girl
Robotics Inspiration
*Herald Tribune,
Bradenton, FL, December 2013*

50 States • 32 Countries • 38% Team Growth

VEX IQ Challenge

Released in 2013, the VEX IQ Challenge is a brand new STEM program for elementary and middle school students (ages 8-14). Students, with guidance from their teachers and mentors, use the VEX IQ robotics platform to design, build, and program a robot to solve an engineering challenge, presented in the form of a game.

In the robot challenge, VEX IQ teams collaborate to score points in Teamwork Matches and demonstrate their skills in driver controlled and autonomous Skills Challenges. In the STEM Research Project Challenge, students explore the application of a science, technology, engineering or mathematics (STEM) theme to robotics. Students then share their research findings in either a written submission or a creative oral presentation format.

In an effort to provide an integrated learning platform, VEX IQ offers a free, 12-unit curriculum, which has been developed as a companion to the VEX IQ platform. This curriculum is mapped to Common Core, Next Generation Science, and Technological Literacy Standards. The VEX IQ curriculum allows teachers to engage students meaningfully in STEM learning and help teach them valuable lessons and skills needed in today's changing world.



VEX IQ
CHALLENGE

VEX IQ Challenge:
www.roboticseducation.org/vex-iq-challenge/

VEX IQ Curriculum
www.vexiq.com/curriculum

VEX U

VEX U takes the VEX Robotics Competition to the next level by opening it up to university students (ages 18+). This exciting and fast-paced competition enables college and university teams in VEX U to build two innovative robots that work as a pair to score the most points possible in qualification matches, elimination matches and Skills Challenges.

VEX U brings together university and college students from around the world to compete throughout the year using the same annual challenge with specific modifications designed to encourage students studying the STEM fields to apply the knowledge they've gained in real-time. The modifications for robot assembly allow students to fabricate their own custom parts, design custom sensors, and add two additional motors – all of which contribute toward enhancing the students' experience and using knowledge they've gained during their course of the college career. Finally, the extended autonomous period in VEX U enables students to better understand and apply control theory and create systems that better respond. At the university level, students are also encouraged to expand their understanding and use of an engineering notebook. Many teams have found that good documentation can save them costly errors and valuable time.

VEX U places more emphasis on student achievement, community outreach, college recruitment and workforce development – all in a fun and competitive atmosphere. When school pride is on the line, matches can get intense!





VEX Robotics Competition

The VEX Robotics Competition, presented by the Northrop Grumman Foundation, is the largest and fastest robotics program for middle school and high school students (ages 11-18). Each year, a new engineering challenge is presented in the form of an exciting game.

Students, with guidance from their teachers and mentors, build innovative robots in small teams and compete in qualification matches, elimination matches and Skills Challenges (driver controlled and autonomous). Students compete year-round and gain valuable life experience skills in addition to learning engineering and design principles

The season begins each year with the new competition, announced in April at the annual VEX Robotics Competition World Championship. Over the course of the summer and early fall teams begin to form, exploring early design concepts and strategizing the features their robot will need for competition. Teams vary in size, typically 4 to 10 or more students, and form at public, private and home schools and also through after school programs, such as 4-H, Scouts, Science Museums and sometimes just a few friends and parent mentor.

At the same time the teams come together, a dedicated group of event partners and volunteers learn the new competition as well and begin to set event dates for the fall. By mid-September through November, the competition schedule takes shape and a variety of leagues and scrimmages also take place. As the season progresses, teams meet regularly either in school or afterschool to perfect the robot's functionality and prepare for competition. As teams compete, they attend a series of local, state and regional events seeking to qualify for the VEX Robotics Competition World Championship.



VEX
ROBOTICS
COMPETITION

VEX Robotics Competition:

www.roboticseducation.org/vex-robotics-competitionvrc/

Similar to VEX IQ, VEX Robotics offers a number of curriculum resources for middle and high school students to enrich the learning experiences and provide educators with tools they need to integrate the program into the learning day. The current curriculum offerings include:

- *Analytical Integrated Math (AIM)*
- *Autodesk VEX Robotics Curriculum*
- *Carnegie Mellon Robotics Academy*
- *intelitek's Robotics Engineering Curriculum*
- *Project Lead the Way*

New this year, VEX Robotics and the REC Foundation introduced an engineering notebook for students to document the design, construction and iteration of a classroom or competitive robot.

The VEX Robotics program also offers educators the opportunity to run classroom competitions as a co-curricular activity. The classroom competition options ensure that all students, regardless of location or resources, experience the thrill and excitement of building and competing with their robots while learning essential STEM subject matter. The program is designed so that a single teacher can offer the competition aspect as part of their daily classroom activities.

Teamwork, perseverance, and dedication are all at the heart of the VEX Robotics Competition, while the competitive atmosphere drives students to settle for nothing less than the best!

Online Challenge

The REC Foundation regularly offers students an opportunity to participate in a variety of Online Challenges, which encourage competition without added travel expenses. The Online Challenges engage students in varying aspects of robot or engineering design, creativity, essays and video production. The Online Challenge awards and prizes are presented at the annual VEX Robotics Competition World Championship.

The Online Challenge sponsors include: EMC Corporation, the FUTURE Foundation, the Texas Workforce Commission, and VEX Robotics. The complete list of the 2014 Online Challenges are:

- *EMC Corporation® Robotics Team/Club Website Challenge*
- *FUTURE Foundation Robot Construction Challenge*
- *VEX® Robotics Game Design Animation Challenge*
- *VEX® Robotics Competition Promote Award*
- *REC Foundation STEM Educational Video Challenge*
- *VEX® Robotics Essay Challenge*
- *Texas VRC Online Challenge*
- *The Sustainable Design Challenge*



REC Foundation
Online Challenges:
www.robotevents.com

OR

www.roboticseducation.org/online-challenges/

Scholarship Program

The REC Foundation Scholarship Program was established in 2013 at the VEX Robotics Competition World Championship and has grown over the last year to include a number of new scholarship offerings from both public and private universities and the private sector. The focus of the program is to ensure that students participating in competitive robotics programs have clear pathways to advance their education and prepare for a future career in the STEM fields.

The Scholarship Program currently features well over 75 scholarships valued at more than \$1.65 million. More information about the Scholarship Program is available at:

www.roboticseducation.org/scholarships



online
CHALLENGE

82 Scholarships (valued at \$1,728,000)

STEM Hall of Fame

The REC Foundation established the STEM Hall of Fame to recognize and honor the exceptional accomplishments of individuals and teams who come together to support student engagement and achievement in science, technology, engineering and mathematics (STEM).

The STEM Hall of Fame features seven areas to pay tribute to different aspects of STEM education, professions and support:

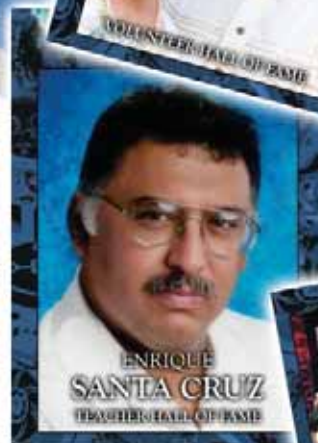
STEM Hero: Exceptional and celebrated leaders who are generous in the contributions they make to young people. (2013 Inductees: Lt. Gen. Thomas Bostick, Daniela Rodriguez & Steven Sanghi)

Teacher of the Year: Educators who are passionate about learning and show true leadership and dedication to their students. The Teacher of the Year inductees were nominated by the students in their program with detail on how the teacher inspires, motivates, and educates them in an enthusiastic and challenging atmosphere. (2013 Inductees: Melissa Fernandez & David Kelly)

Mentor of the Year: Role models in areas such as academics, hands-on skills, life skills and both individual and team achievement who are recognized by their team members and peers as having helped students achieve goals that were seemingly out of reach. (2013 Inductees: Pat Fairbank & Stephen Saddler)

Volunteer of the Year: Identified by their infectious enthusiasm, dedication, and results-oriented approach focused on engaging as many students as possible in a variety of STEM activities. (2013 Inductees: Jim Musil, Roger & Martha Proulx)

Team Excellence: Recipients of the Team Excellence Award – the highest honor awarded at the annual VEX Robotics Competition World Championship. These teams are shining examples of dedication, hard work, and teamwork who exemplify the most well-rounded VEX Robotics program.



World Champions: Winners of the World Champion Award are teams that comprise the winning alliances in each Competition Division. They represent diverse team alliances from elementary school through middle and high school, as well as in colleges and universities. They represent states, provinces, regions and countries from around the world.

Partner of the Year: Well-recognized and respected organizations with vision, passion, and missions clearly aligned with advancing STEM. (2013 Inductee: Chevron Corporation)

Each inductee in every Hall has demonstrated the highest level of commitment, passion, achievement, and impact on STEM education, aiding the development of the next generation of scientists, technologists, engineers, and mathematicians. We hope that by recognizing the accomplishments of these outstanding individuals, teams, and organizations, we will highlight shared success, creative efforts, best practices, and role models.

Most important, we believe that celebrating members of the STEM Hall of Fame will inspire and motivate the thousands of young people engaged in the REC Foundation's robotics programs. More information about these and many other past inductees of the REC Foundation STEM Hall of Fame is available at:

www.roboticseducation.org/stem-hall-of-fame

VEX IQ Profile

The VEX IQ Challenge is a STEM program for elementary and middle school students who, with guidance from their teachers and mentors, use the VEX IQ robotics platform to design, build, and program a robot to solve an engineering challenge, presented in the form of a game.

Now in its first full season VEX IQ has grown to approximately a thousand teams in 35 states. New Jersey is one of the most active states participating in VEX IQ, so we recently discussed the program with Ben Mitchell, the Director of Garden State Robotics. This organization helps organize VEX IQ and VEX Robotics Competitions in New Jersey. Ben is a former high school robotics competitor who went on to become an Engineering and Design Technology teacher for a New Jersey high school.

Question: What are some practical things you've learned this season that you might pass along to others who are coordinating VEX IQ events?

Ben Mitchell: We found that the length of our competition should mirror that of a school day – or even shorter, if possible. We planned our competitions to run from 9A.M. to 2-3P.M. Younger students get tired after the five or six hour mark. It's best to end while students are excited but not exhausted. In addition, we found that giving students name tags encourages them to talk with one another, and this also makes it easier for volunteers to call students by name to get their attention. Our head referee for VEX IQ, Elisa, wears silly hats and costumes – it puts the kids at ease. It's hard to be intimidated by someone wearing a hat that looks like Kermit the Frog. So kids feel more relaxed to ask questions and interact with volunteers.

Question: Do you think there's a good chance a lot of these students will continue competing in robotics beyond VEX IQ?

Ben Mitchell: Definitely. Two folks that that have started the large number of VEX IQ teams in



New Jersey are Chris and Davin from Robot Revolution. Their program is actually integrated all the way up through middle school and high school. I'm really looking forward to seeing what these kids will be capable of after almost a decade of robotics experience before even entering high school. I think we'll see an unprecedented level of sophistication in construction, programming, and strategy as the IQ students of today continue to participate and eventually move onto the VEX Robotics Design System Platform.

Question: What are other educators and parents telling you about their experience with VEX IQ?

Ben Mitchell: They really like that it's easy to use, so kids can take things apart and try things out – if it doesn't work, they can take it apart and try something different. They really like the programming language as well – students pick it up relatively quickly. Parents and teachers really like VEX IQ because it is a very accessible platform that can be used to teach mathematical concepts, scientific concepts, and computer science, and it does so in a way that is engaging and fun and doesn't break the bank.

Question: What would you tell parents considering enrolling their kids in a VEX IQ program?

Ben Mitchell: It's not just about the robot. People get the impression when they hear "robotics" that it's just an engineering activity. In addition to STEM, competitive robotics is a way for students to learn communication skills, negotiation, and problem solving – all vital skills no matter what field you wish to pursue, not just engineering. The best way I've found students to learn is through discovery – adults are there to model and lay a foundation – the nature of the design process to be recursive, and the nature of children to be curious can really work in complement, and students really get into it. Parents should get used to hearing about robots around the dinner table.

Team: 5225A, E-Bots PiLons, Oakville, Ontario, Canada

Members: Amanda Rampertab, Jeremy Eichhorn, Ed Schmidt, Pranali Rathi, Anthony Meola, Sam Rasmussen, Ella Rasmussen, Jacob Rampertab, Chris Lyons

Mentor: John Catricala

The Excellence Award is the highest honor presented at the VEX Robotics Competition World Championship each year. These teams design and build high-quality robots and excel in many other areas as well. They are shining examples of dedication, hard work, and teamwork. Teams winning the Excellence Award exhibit graciousness in competition, community outreach, and positively impact not just their team members, but also the local and global VEX Robotics community.

The 2013 VRC Excellence Award was given to team 5225A, the E-Bots PiLons from Ontario, Canada. We learned more about the PiLons from their mentor, John Catricala.

Question: John, could you tell us about the members of team 5225A? How you formed and what roles are important?

John: We've been involved in the VEX Robotics Competition for the past two years and are still overwhelmed with the success the team has had. Our students really enjoy programming, which I think helps us stand apart and often get an early start on the competition season. Each of our team members has at least a dual role and usually many more. For example, Sam is our animator, website developer, and promote video producer, Anthony handles strategy and a variety of programming tasks, while Ella is our head programmer, operator and one of our team managers. We require all our new members to rotate through the roles on the team and learn from our more senior members.

Question: What part of the program do the students enjoy most?

John: These students are always looking for ways to improve their robot to see how they can better perform in the challenge. Our robots are always in flux, in a state of redesign. In fact, as a team, we especially enjoy sharing our knowledge of the



Awards:

2013 World Championship Excellence Award

program with others and learning from each other. They have helped start up several new teams as well and really enjoy being a part of the larger robotics community where they volunteer their time with younger students interested in learning about robotics.

Question: How did the team react when they learned they were the recipients of the 2013 Excellence Award at the World Championship?

John: The team was really surprised to receive the Excellence Award last year. They had no idea and for them the competition really isn't about the prize or the final outcome. Of course, they do give thought as to how they might encourage the judges and referees to consider them and seek opportunities to showcase their skills, but it's really just another aspect of the challenge that they enjoy. They strive to do their best day in and day out. They just don't give up and consistently challenge each other to excel in all aspects of the program.

Question: As the team's mentor, what's been most rewarding for you?

John: Engaging students in robotics to further their passion and interest in careers in technology has literally become a fulltime job for me. I retired from leading IT at Canada's largest mutual fund company to pursue teaching robotics about 6 years ago and never looked back. The VEX program is so multi-faceted that the students I work with literally never have a dull moment – from design, prototyping, programming, testing to animation, strategy and much more, there's something for everyone. What I find most compelling though is the opportunity to impact a student's life in such a meaningful way. I watch the students on our team find their passion and have received calls from their parents thanking me for helping them find their way. It's such a rewarding experience – I can't imagine doing anything else!

REC Foundation Student Ambassador Pilot Program

Team: The Cavalry, Team 169, The Haverford School

Student Ambassadors: Chris Williams, Jonathan Paras, Dean Manko and Evan Kuritzkes

Team Faculty Lead: Megan Connolly, Director of Technology, The Haverford School,
2012 Teacher of the Year, REC Foundation STEM Hall of Fame

The pilot of the REC Foundation's Student Ambassador Program was a uniquely successful part of the 2013 VEX Robotics Competition World Championship. The program was developed to connect middle and high school participants with STEM professionals from business, education, and government--giving students an up close and personal opportunity to be inspired to pursue STEM education and career pathways. At the same time, our sponsor and partner representatives welcomed the opportunity to engage with articulate, smart, and passionate young people who could explain the VEX Robotics Competition program and its impact on teams, schools, and individual students. The pilot proved to be an exciting and catalytic "win-win" for both students and professionals.

Team #169, The Cavalry, agreed to participate in the pilot. Comments from the team's faculty lead and two participating students are excerpted below.

Question: First off, will you tell us a little about the Haverford Robotics Team and how you came to participate in the VEX Robotics Competition?

Megan: Several years ago, I was teaching a computer science class for our school and one of my students approached me about a robotics program he was interested in. He was determined that we should participate. I told him if he could secure a grant to finance our program, then we would give it a try; so, imagine my surprise when he secured a grant! That was the start of our robotics program. Today, we have about 60 Haverford students in the program competing in the VEX Robotics Competition and the VEX IQ Challenge.

Question: What did you think when you first heard about the REC Foundation's Student Ambassador Pilot Program? What were your impressions of the program?

Megan: I was excited for my students -- they are so passionate about robotics and completely in their 'comfort zone' when they get a chance to talk about the work they do. I knew they would appreciate a chance to express themselves and share their love for robotics with adults - particularly the kind of adult who they might seek to emulate someday. Of the students we selected to



participate, I had a middle school student, two high school juniors and one senior. The older students, who were looking ahead to college and careers, especially benefitted from the experience and the opportunity to speak with adult role models, heroes and mentors.

Question: Chris and Jonathan, what was the most rewarding aspect of being a Student Ambassador for you?

Chris: I feel that both meeting with sponsors and providing tours was very rewarding. It was interesting to talk with them and learn about the various organizations they represented. I also enjoyed showing people around the venue and explaining the game to them. It was interesting to see their reactions and field questions about the game and our program. Speaking to industry professionals definitely furthered my interest in certain subjects too. Overall, being an Ambassador was a great opportunity!

Jonathan: The informal nature of the program in its pilot year fostered more organic interaction with scientists, engineers, and industry leaders. It was an honor to express my excitement for the program directly to the people who make activities possible. I hope that in future, students are able to learn more about the people and organizations that make events like the VEX Robotics Competition World Championship possible.

In closing, the 2013 Student Ambassadors, including the Haverford students, helped us launch what we believe will be a great avenue of student engagement.

Team: VEX U, Purdue University

Members: Javid Habibi, graduate student, pursuing master in Computer Science & Stephen Carlson, undergraduate student, Electrical Engineering

Question: What led you to establish a VEX U team at Purdue University?

Both: We were both involved in robotics in middle school and high school and although we mentored younger teams, we missed robotics and hoped to establish a team to start applying the new concepts we were learning in college.

Question: The Purdue VEX U robotics team is student-led. How did you go about convincing the faculty to let you establish the team and what support does Purdue provide?

Javid: Like many colleges and universities, Purdue has a clear process to follow to create a special interest group, which is how we were able to establish the team. At this point, the team is very independent and majority of our work is student led. Purdue supports us by providing space to work and enabling us to host local high school and college robotics competitions on campus. It's been a great experience and we're excited to be able to compete and participate in the VEX U program.



Question: Could you tell us more about how you've each gone on to apply the knowledge you're gaining through your college coursework?

Stephen: Sure, throughout my middle and high school years I was involved in electrical engineering and I thought that's what I would go on to study in college. With VEX U, I gained more exposure to autonomous programming and began to investigate all the different programming languages. It wasn't long before I started to write my own customized platforms. With these competitions, especially in programming skills challenges, every millisecond counts. I wanted a platform that would enable us to use more advanced algorithms to improve our performance. The result has been fantastic and we released the program in August and shared it with teams on the VEX Forum. I would estimate that there are about 60 teams using it today.

Question: How has your experience with VEX U been different than other programs you've been involved in?

Javid: The most rewarding experience with the VEX U team is the ability to bring together students from all different engineering backgrounds and work together to solve a problem, just as we will do in our future careers. In college, we're divided by our course of study, but when we get together as a team we leverage our strengths and together come up with some interesting solutions.

Stephen: Through VEX U, I've actually been able to focus on areas that in the past I wouldn't have considered. VEX U really provides an end-to-end experience. From setting requirements, to the design process, fabrication and finally production, I've been able to apply a lot of the knowledge I've gained at school and experience real-world application.



Awards: Team #: BLRS

**2013 World Championship
Innovation award**

2nd place in programming skills

2012 Vex All Star Challenge

**Tournament Finalist
Judges Choice Award**

Teacher: Dan Zavaleta, Desert Vista High School, Phoenix, AZ

Teachers are the backbone of the many curricular and extracurricular STEM programs across the U.S. In fact, the VEX Robotics Competition, whether offered in school or afterschool, wouldn't be possible without the support and dedication of many teachers who quickly see value in offering hands-on, sustainable and affordable options to engage their students in STEM learning and careers. The following is snapshot of one such educator in Arizona.

Dan Zavaleta can't imagine himself in any other profession, noting that each day of his 32-year teaching career he's had fun. "I knew I wanted to teach at a young age. There were a number of teachers who inspired me along the way," said Dan.

As the lead engineering teacher at Desert Vista High School, Dan enjoys sharing the practical application of engineering concepts with his students, which naturally led to his interest in offering students access to a variety of in school and afterschool activities. From robotics to solar car competitions, Dan and his students have experience with a wide variety of hands-on engineering challenges.

When a colleague introduced Dan to the VEX Robotics Competition two years ago, he was immediately drawn to the program's flexibility and the integration of engineering, physics, mathematics and communication skills. The program at Desert Vista is offered both as a curricular and extracurricular program. This season, Dan offers the classroom competition experience to four classes he teaches and has seven VEX Robotics teams.



"It's the best thing that I've found to introduce students to practical STEM education concepts," said Dan. "Through the VEX Robotics Competition, my students are attending competitions with designs they've developed and will continue to rework throughout the season. That's what I really enjoy, watching my students improve upon their design after each competition."

He also requires students to keep an engineering journal and finds that this reinforces the critical thinking and writing skills they develop.

"When my students work on the torque and speed of their robot they see the application of physics concepts they acquired in the classroom. Immediately they're hooked; they're excited about learning, and become self-motivated."

Event Partner: VEX Robotics & VEX IQ Challenge in South Korea

J.C. Woo, PhD, Professor Emeritus of Physics at Seoul National University, explained that it was his passion and interest in robotics that led to establishing the VEX Robotics Competition and VEX IQ Challenge in South Korea, which began officially just last year during the 2012-2013 season. Dr. Woo spoke to us about the growth and direction of the programs in South Korea.

Question: What sparked your interest in the VEX Robotics Competition?

Dr. Woo: I learned about the VEX Robotics Competition through a variety of teachers and volunteers in the California area, who I met through my professional career. I was interested in VEX Robotics as an opportunity to add to our school's hands-on science project offerings. VEX Robotics involves many aspects of practical as well as intuitive scientific concepts, while attracting and enhancing students' interest in science, technology, engineering, arts and mathematics (STEAM).

Question: South Korea's involvement nearly doubled from last season to include 30 teams both in VEX IQ and VRC. What has the impact been on the schools and education system for those participating in the VEX Robotics Competition?

Dr. Woo: The VEX Robotics Competition in Korea is taught in English and therefore is taught both as a program for more advantaged students who understand English and as an introductory program for those students with limited understanding of English.

Still, despite the language barriers, I've seen the program grow with both groups of students and have personally encouraged more training for our teachers by inviting American teachers to provide workshops to our staff each year.

I believe that the combination of presenting a program to two distinct audiences combined with proper teaching training and support has led to the growth we've seen over the last two years.



Students and teachers all love the program and say that VEX is far more interesting, attractive, and challenging than other programs they've experienced. It has been a contributing factor to the program's immediate success here. Everyone enjoys the combination of team play and collaboration – so far the competition games have been very well received.

Question: South Korea also piloted the VEX IQ Challenge this year. Could you comment on your experience with VEX IQ so far?

Dr. Woo: We held a VEX IQ Challenge Camp in January 2014 and were pleasantly surprised to have 60 students attend the camp. All the participants had a great time. They enjoyed assembling and programming the robots and also appreciated the scientific instructional curriculum components.

Question: How do you see the program evolving in South Korea in the coming year?

Dr. Woo: I anticipate that we will continue our efforts to expand the program by inviting teachers from U.S. to help train our staff on more advanced aspects of the program.

The JH Science Academy and Chosun Newspaper Education Division are planning to more ambitiously promote both the VEX Robotics Competition and the VEX IQ Challenge, with slightly more emphasis on VEX IQ because the elementary students are more open to English instruction and the program is more accessible.

I also expect that given the success of both programs, we will start to provide the teaching material and educational resources in Korean to increase access for the public schools.

Sponsor Profile: Chevron

Global Social Investment Specialist: Janet Auer

The 2013-14 season is the third that Chevron has been a global partner and major sponsor of the VEX Robotics Competition. In 2013, Chevron was selected as the REC Foundation's Partner of the Year, for dedication not only to VEX Robotics, but also to STEM education worldwide, and the company became the newest member of our Partners Hall of Fame.

In addition to the VEX Robotics Competition World Championship, Chevron supports several VRC state championship events and has also enabled the development of 45 new teams this year. Janet Auer, a specialist in Global Social Investment at Chevron, answered some questions about the company's commitment.

Question: Why has Chevron become such a strong supporter of STEM education programs?

Janet: As one of the world's largest integrated energy companies, Chevron conducts business around the globe. Wherever we operate, we take our partnership with the community seriously. Our goal is to support initiatives that create mutual benefit and lead to shared progress. We use our global resources, determination and ingenuity to meet today's complex energy challenges. Many of Chevron's efforts to improve education are focused in the areas of science, technology, engineering and math (STEM).

Question: What is it about the VEX Robotics Competition that is unique in meeting Chevron's educational goals?

Janet: Chevron likes to see its investment linked together so that they are cohesive and give students multiple access points to quality programs and activities leading to STEM careers. VEX aligns very well with both Project Lead the Way (PTLW) and the Next Generation Science Standards (NGSS).



Chevron is also interested in aligning its funding with design standards and VEX meets these standards as well. Additionally, VEX combines classroom learning and practical application in after-school and competitive environments, similar to what students will need to do in a work environment.

Question: Chevron received the REC Foundation Partner of the Year award at the 2013 VEX Robotics World Championship event. To you, what is the most impressive part of this event?

Janet: The number of countries represented was amazing, and brought out the true meaning of being part of a global world. It is great to see people coming together in such an elaborate and exciting setting, and so unique for a non-sporting event to attract so many kids – even an all girls team from Europe. The event has such great diversity, with no boundaries to cultural exchange.



Human Energy®

Government

In November of 2013, 88 teams from around Indiana gathered at Bankers Life Fieldhouse to compete at the second annual City of Indianapolis VEX Robotics Championship. We recently spoke with Indianapolis Mayor Greg Ballard about what getting students invested in STEM education means for Indianapolis.

Question: Mayor Ballard, what sparked your interest in the VEX Robotics Competition?

Mayor Ballard: I attended a robotics match at Southport High School and was impressed by the excitement of the students and their engagement in an extracurricular activity with such a tangible application to future opportunities. I immediately recognized the workforce implications. I wanted all Indianapolis students to have access to this kind of program. It took a few years to get there, but I'm pleased we did. We went with the VEX program because it is a great, cost-efficient platform to introduce robotics to teachers and students. It is manageable in the classroom and can be easily integrated into curriculum.

Question: Indianapolis now boasts well over 100 teams. What's been the impact of the program on the city schools and education system?

Mayor Ballard: Because of the growth of the city's robotics competition, more than 700 students have access to learning experiences they would not otherwise. And the number of programs just continues to grow. These students acquire life skills and lessons, like problem solving, critical thinking and collaboration. I see this as an investment for their future. It's about connecting students to opportunities they do not know exist. Without the growth of the robotics competition, many of these schools would not be able to offer the program in such a robust way. I also wanted the winning trophy to be bigger than any athletic trophy in a school, and it is. That's a point of emphasis and pride to me.



Question: The city also hosted its first STEM Fair in conjunction with the VEX Robotics Competition. How was that event received?

Mayor Ballard: The STEM Fair was a great addition this year. We were able to truly make the championship a community event. More than 30 booths were set up outside the competition and made available to the general public. It was very helpful for the students as well. The interaction of the STEM partners with the students helped tie the robotics program to exciting real-world applications. Students could mentally connect their own robotics projects to things like a police squad bomb robot, a solar car from Purdue University, a real race car used by Chip Ganassi Racing and DNA bracelets from Roche Diagnostics. That is the kind of experience that draws students in and sparks their interest beyond the classroom.

Question: How do you view the future and long-term gains for the city through involvement in programs like VEX Robotics?

Mayor Ballard: To be competitive in an information-age economy, we must deliver an information-age education. While it is fun to watch the matches at competitions, there really is a larger purpose behind getting students involved. If we are going to change the way we train our workforce, we have to spark students' interest in those fields. Programs like VEX Robotics really change the way students think and problem solve, which I think will lead to better career skills.

Sponsor & Partner Recognition

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The Robotics Education & Competition Foundation seeks to increase student interest and involvement in science, technology, engineering and mathematics (STEM) by engaging students in hands-on, sustainable and affordable curriculum-based robotics engineering programs across the U.S. and internationally. The REC Foundation develops partnerships with K-12 education, higher education, government, industry and the non-profit community to achieve this work.

REC Foundation: Inspiring students one robot at a time

www.roboticseducation.org / www.robotevents.com



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Volunteers

The amazing, talented, and dedicated volunteers, teachers and mentors are the true unsung heroes of this program. The REC Foundation is extremely grateful for their generosity, passion, and tireless support.

Our volunteers have given their time, talent and treasure to ensure that students across the U.S. and globally have access to meaningful and enriching robotics engineering programs.