Running a Robotics Club in Elementary School

THE WINONA EXPERIENCE

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Winona Elementary School

WAYS TO INSPIRE CONFERENCE

Saturday, September 29 , 2018

Pioneering Robotics

"Kids today need to be digitally savvy, and that means having the capacity to create and collaborate with digital technologies."

Sheila Rhodes

https://www.orion.on.ca/news-events/blog/nurturing-digitally-savvy-kids-at-uoit

The Early Days - A Little History of Robotics at Winona

- Began in 2002 – no experience required!
- Train the Trainer – 6 teachers in 6 elementary schools
- LEGO Mindstorms – RCX Platform
- Aquabots
- Robotics Challenge, Sheila Rhodes
- Cooperative Learning
- Setting and Lessons: Multiple classrooms extending down a long hallway, limited contact and interaction between students, isolated and non-collaborative, testing on the hallway floor, build your own robots from scratch, lessons in structural instability

http://www.stemcentric.com/rcx-tutorial/

Robotics Invention System

Early LEGO Days:

LEGO RCX Robotics

Circa 2002

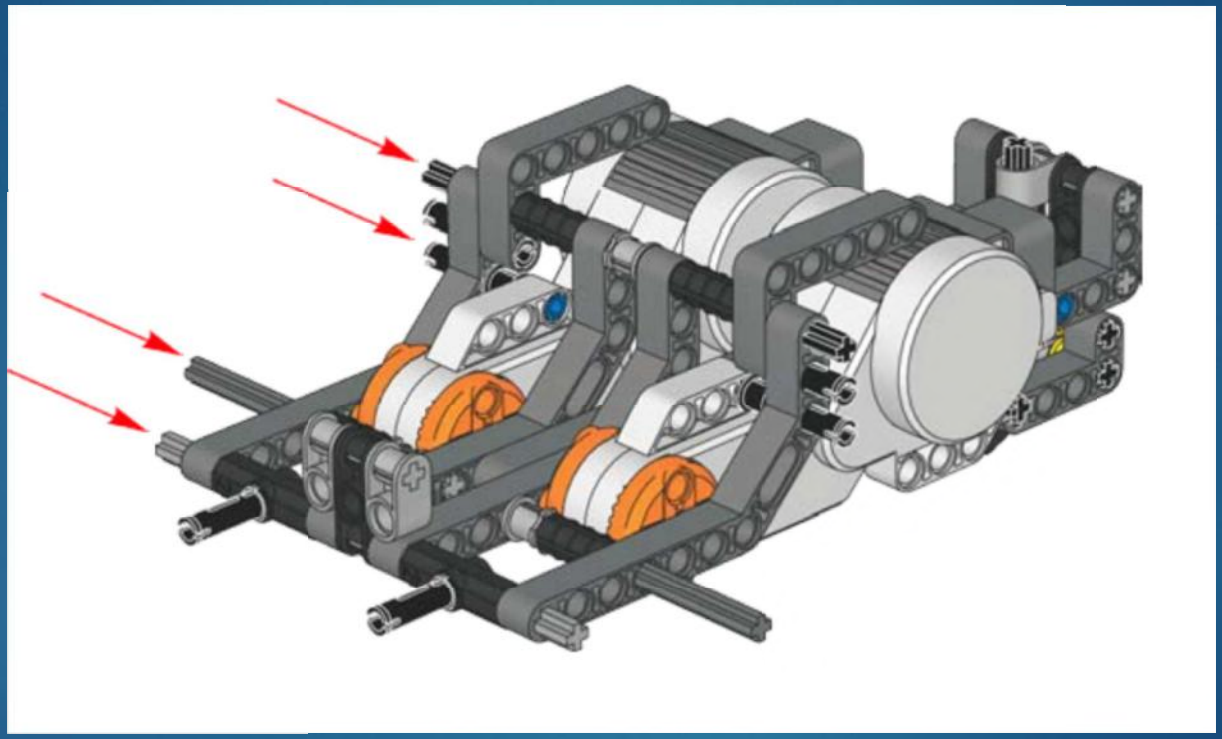
Past Platforms Used at Winona: LEGO Mindstorms RCX

Past Platforms Used at Winona: LEGO Mindstorms NXT

http://stjosephsjarrow.co.uk/lego-nxt-robot-programming/

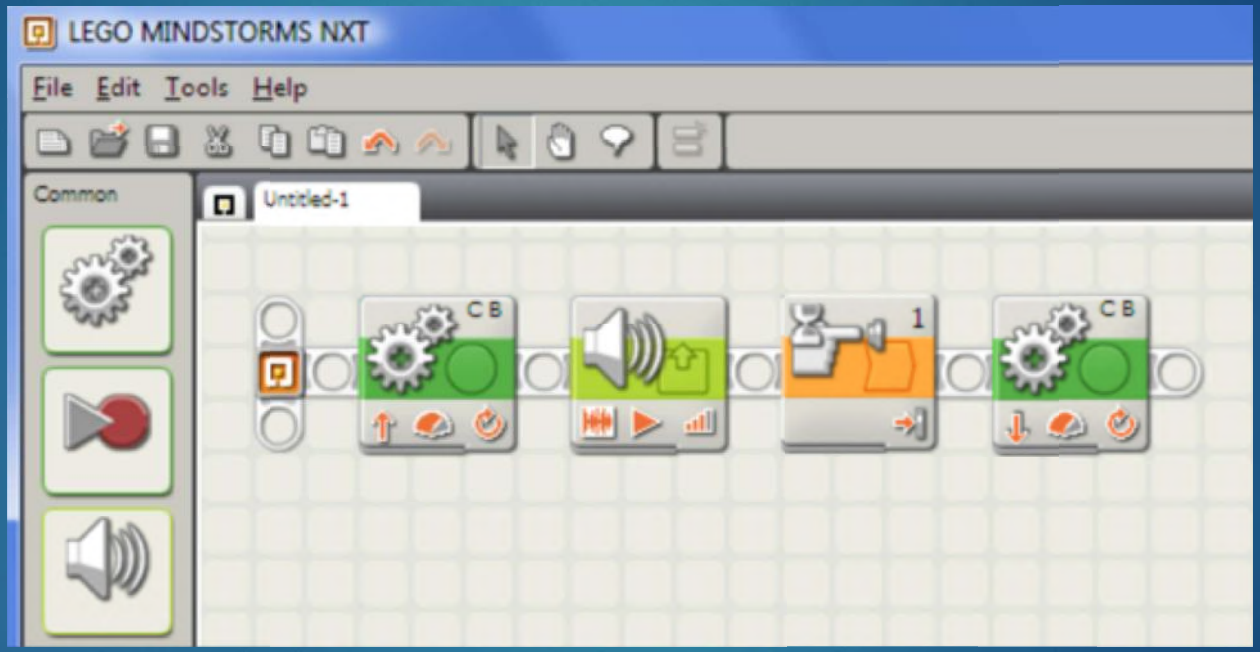
http://www.conrad.com/ce/en/product/190613/LEGO-8547-MINDSTORMS-NXT-20-D

Building Robots from Plans **



http://www.education.rec.ri.cmu.edu/content/lego/building/build_shows/taskbot.pdf

Programming Software for LEGO NXT**



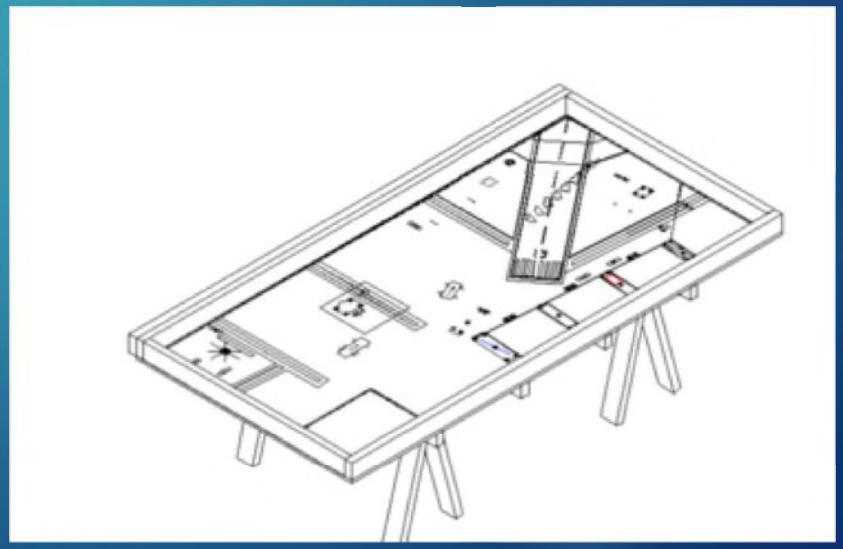
http://www.education.rec.ri.cmu.edu/previews/nxt_products/nxt_video_trainer/partial_product/

Green City Challenge

- Resource available through Spectrum-Nasco.
- Environmental Stewardship theme-based Robotics challenge
- A series of challenges used to develop robotics skills
- Kit includes props for challenge – wind turbine, solar panels, dam, etc.
- Students work at own pace to complete challenges.
- Differentiation of challenge levels.
- Includes mat that fits regulation Robotics table.
- Can be used to train for First LEGO League.

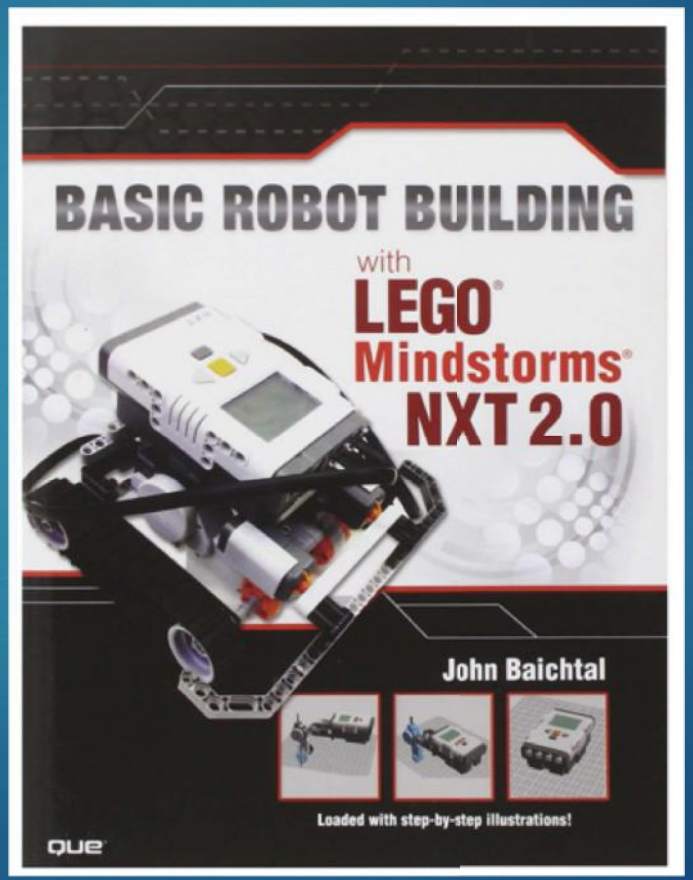
Building a Robotics Table

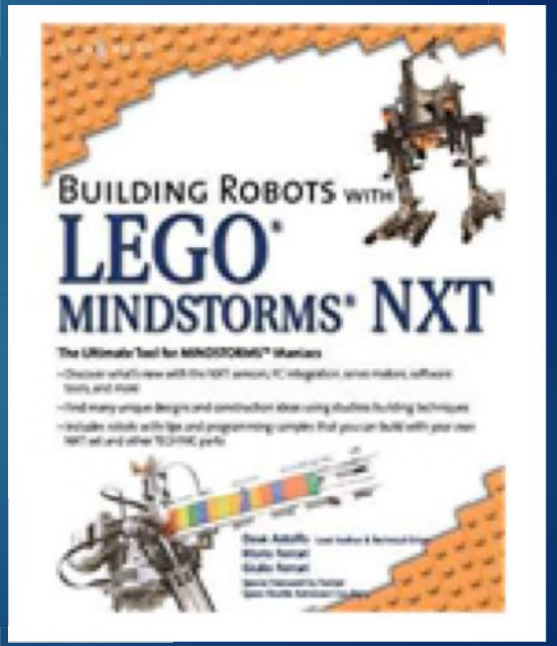
- First Lego League Tables
- Instructions for Building a Table… (also found in package)
- http://www.firstinspires.org/sites/default/files/uploads/resource_library/fll/table-build.pdf



Other Resources

Books





LEGO Mindstorms Supplier

Spectrum Educational Supplies

Winona's primary "Go-To" supplier for LEGO kits and materials

2018 Grades 1-8 Elementary Science and Technology Catalogue

https://drive.google.com/file/d/1kw66f5DvWN7znHek6Eadzfyx9Cj79_27/view

Current LEGO Robotics Technology

EV3 Systems

http://www.bonniesembroideryetc.com/wp-content/uploads/2016/02/build-better-robots-with-lego-mindstorms-education-ev3-slj-intended-for-lego-mindstorms-ev3-building-instructions.jpg

LEGO Pricing… (2018 Spectrum)

Education EV3 Core Set with Software – $429.95

Winona's LEGO Setup

Winona has 8 NXT kits.

Seven used for partner work.

One kit reserved as a parts kit

Why?

- Replacement parts in case of missing, lost components
- Also useful for adding onto base kit
- NXT brick (Robotic microcomputer encountered issues and require replacement)
- No maintenance available on defective NXT bricks

Other Equipment and Storage Needs

- Stanley Parts Organizers
- Parts bins
- Separate "mini" bins to store each model in progress
- TIP: Label each mini-bin and matching base kit with names of students working on that particular robot. Avoid any mixing of parts.
- Power bars
- Robotics table or field
- Computers – desktops, laptops – must have adequate hard drive space to be able to load and store software.

Other Points to Consider

Consider high costs of constant upgrading of equipment

Recommendation:
Stick with one platform and use it until it conks out.
Just getting started? Latest technology is worth considering.

Benefits of previous version technology:
Available parts, books and resources, familiarity with summer camps and programs, students may own kits at home.

Winona's Experience with NXT is a case in point.

Other Sources for Kits and Parts

- Commercial Retailers – hobby shops, specialty toy stores
- LEGO.com
- Kijiji
- eBay - definitely bargains to be had
- Donations – Kits lying dormant at home
- Be careful about cast-offs that might not be compatible – boxes and boxes of unused parts – Cupboard Clutter…

Carnegie Mellon University – Robotics Institute

Introductory Video

http://education.rec.ri.cmu.edu

Robotics Academy and Robotics Institute

http://education.rec.ri.cmu.edu/lego/getting-started/

- Offers professional development for teachers including online courses
- Offers excellent training software options

Fast Forward …
HWDSB – New Directions 2015 and beyond

VEX IQ

VEX Robotics at Winona
- now in its 4th year…

www.vexrobotics.com

modkit.com

Winona's Robotics Club

Why Run a Club? Why After School?

Time for Set-up and Take Down.
Availability of Mentors.
Extended Time to Explore, Learn.
Minimal Distractions.
Offered to All Grade 7 and 8 students.
Expanded Reach.
Curriculum Implications.
A sense of belonging.
Reaching a unique student niche.

Pros… No Cons!

- Discovery learning
- Cooperative and collaborative
- Theme-based
- Non-competitive
- All may participate
- Partners/ Teambuilding
- Fun, learning and respect
- Students become experts
- Show and tell with parents
- High School Mentorship Opportunities
- 2056 Regional competition – Culminating Trip for Robotics Club

VEX IQ Pricing

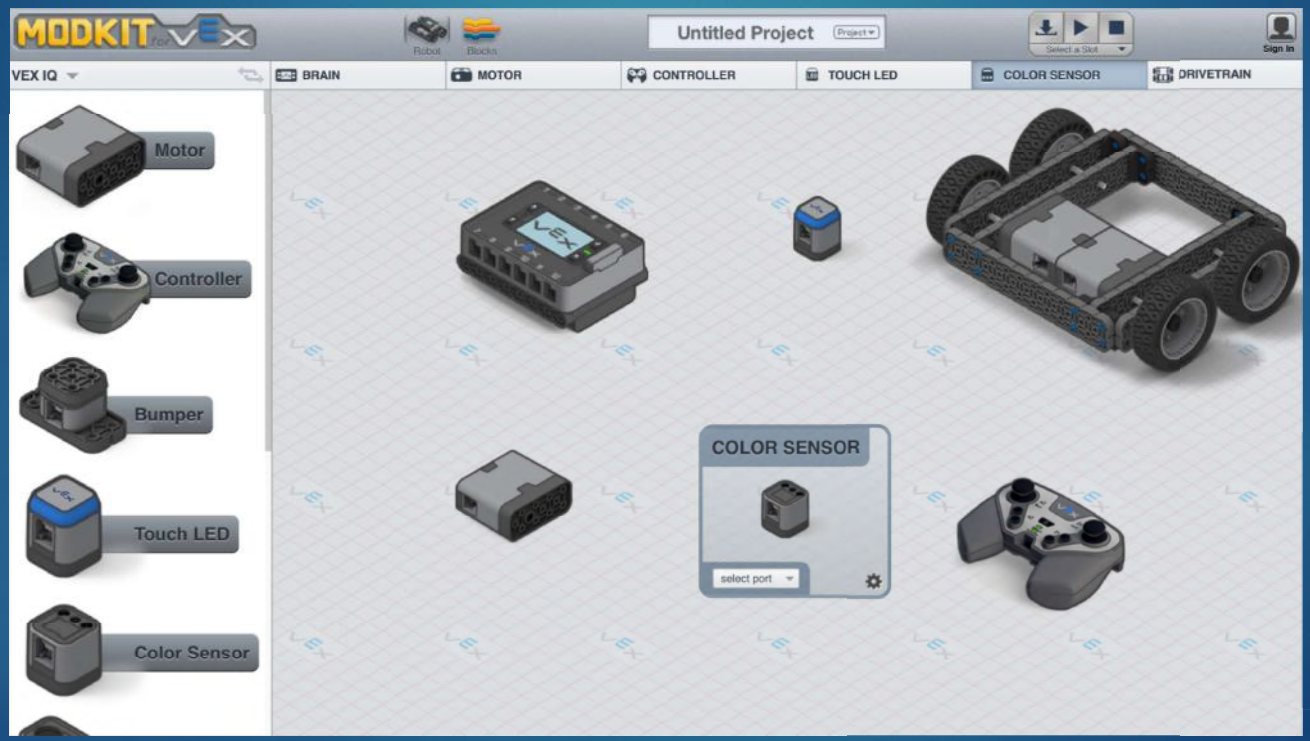
iDESIGN solutions
Technology Sales, Support, and Service

VEX IQ Super Kit $429

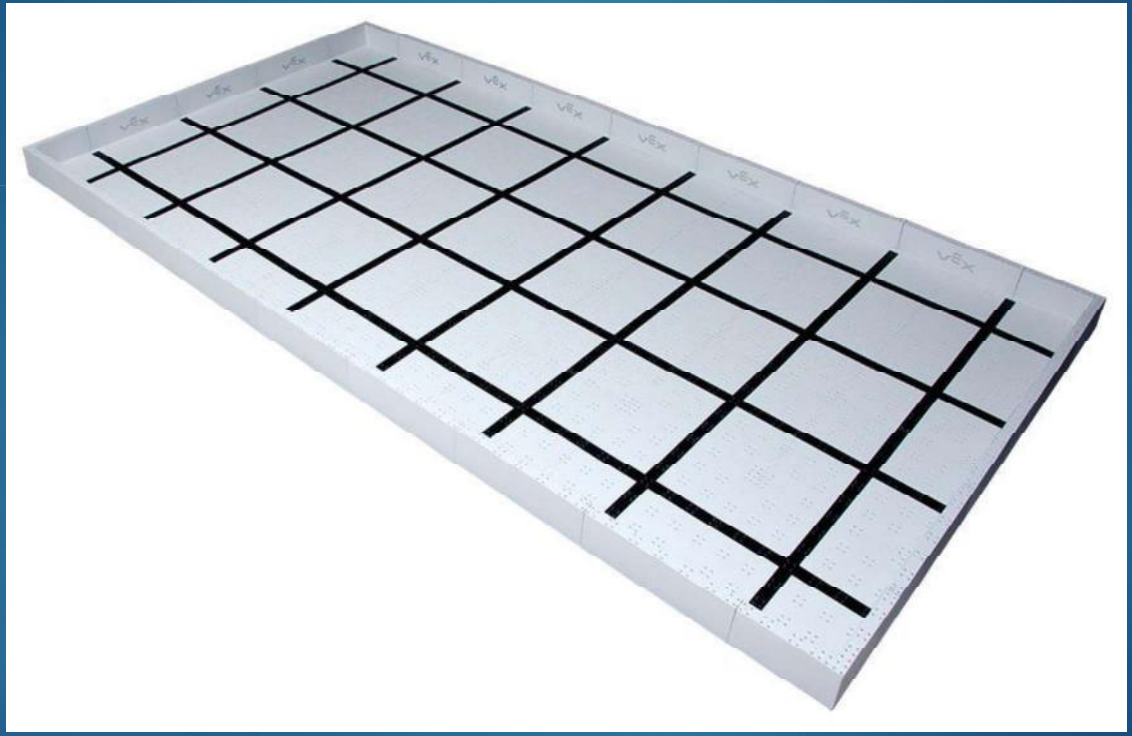
Playing Field $259.98

Free Modkit Software available online.

Modkit for VEX
– drag and drop software



VEX Field and Modkit Application



www.vexrobotics.com

Schedule and Blocking

Currently offering 5 Robotics Blocks After School.

Two or Three 9-Session Blocks for Grade 7s.

Two Blocks 9-Session Blocks for Grade 8s.

Begins in September, continues to end of March.

Each block is 9 sessions long.

A session runs from 3:00 to 4:30 p.m.

Setting – Where Do We Meet?

Computer Pod Outside Science Classroom

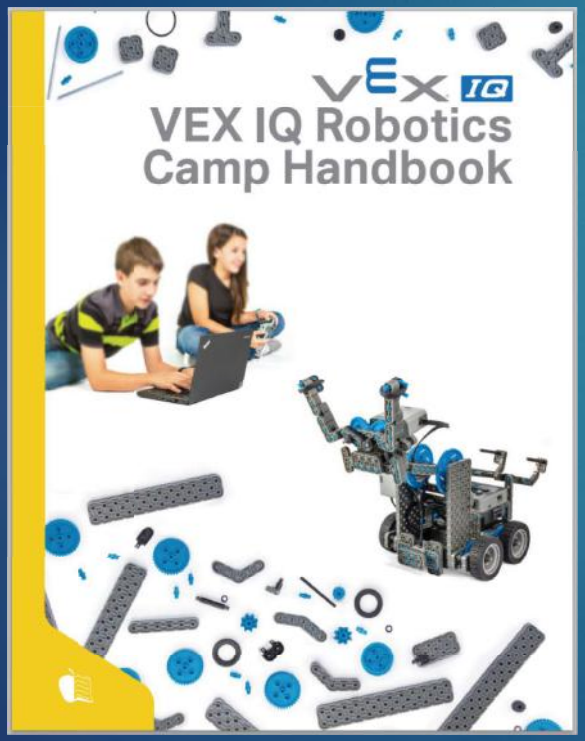
- Allows for easy access to stored robots, kits and parts in classroom cupboards
- Robotics table is also stored in pod. VEX field is collapsible for easy storage.
- Batteries are recharged in science room after each session
- Need to be careful about number of people joining and space – 7 pairs of students plus 1 teacher plus 2 mentors means that there may be at least 17 people in the pod at a time. Tight confines for a small group.

Block Sessions

- Session 1 – Introduction, Building a First Robot
- Session 2 – Introduction to Programming
- Sessions 3 – 7 – Training Modules – Forward, Reverse, Turning, Sensors, Following a Black Line;
- Green City Challenge (LEGO) or Inquiry Exploration (VEX)
- Session 8 – Parent Open House
- Session 9 – Parts Re-organization (Vital step! Don't neglect this)

New Robotics Program Opportunities

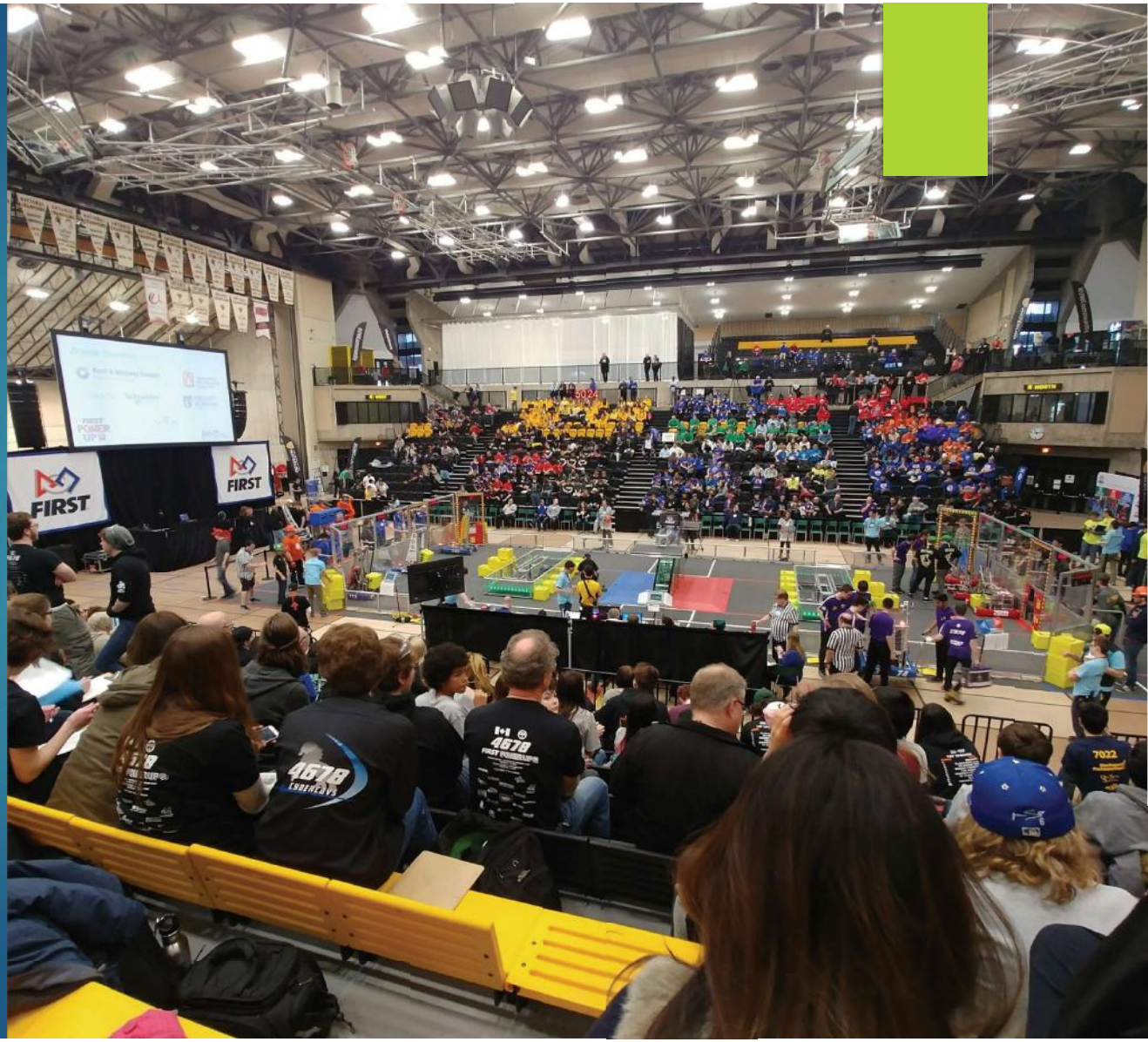
New Robotics Program Opportunities



Culminating Robotics Club Trip - March

On multiple occasions, we have travelled to the University of Waterloo or the Hershey Centre in Mississauga to watch Orchard Park's 2056 Robotics team compete.

Lots of Winona student alumni help to form the OP team. Great opportunity to share with parents and students the possibilities to continue Robotics beyond Grade 7 and 8.



Accessing Funds

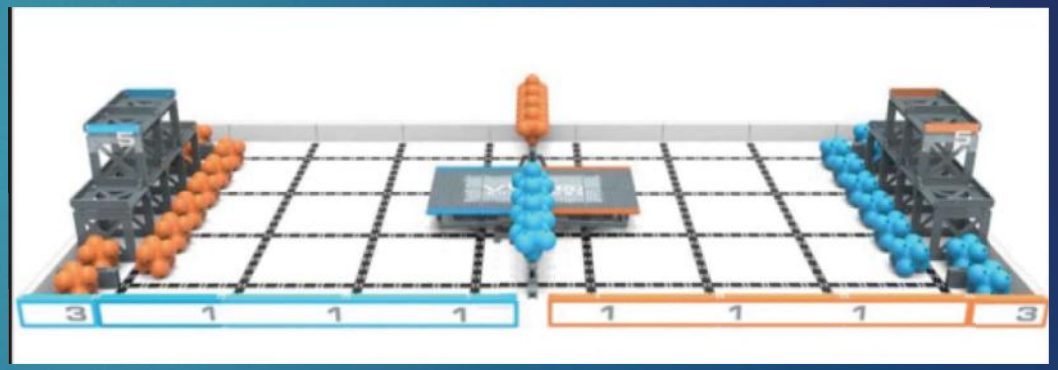
- School Council Contributions
- School science budget
- Slush funds - $5.00 per student
- Generous parents
- Corporate donations

Using Symbaloo to Archive Resource Sites for VEX

VEX IQ Board Level Challenge

The current HWDSB Initiative to encourage elementary schools to explore STEM Robotics Technology …

Supported by OP's Team 2056.



http://www.robotshop.com/en/viqc-crossover-full-field-game-elements-kit.html

2016 – 17 VEX Crossover Challenge

16 HWDSB Schools Participated
High Energy, Excitement, Teamwork & Cooperation

2017-18 HWDSB Ringmaster Challenge

Nearly 30 HWDSB schools participated.

Ringmaster Demonstration…

Contact for HWDSB Robotics

Dave Weir, Elementary Student Success Teacher (dweir.commons.hwdsb.on.ca)

Questions? Needing More Information?

Feel free to contact me by email.

My school email address is pmenican@hwdsb.on.ca.

Please feel free to drop by if you wish to see the Winona Robotics club in action after school.