Background and Objectives

**STEM**

- STEM is an acronym for science, technology, engineering and math
- America’s need for STEM professionals is increasing with the spread of technology
- President Obama made it a priority to increase STEM education
- America is deficient in students pursuing careers in STEM fields
- America is deficient in teachers skilled in STEM subjects

**VEX IQ**

- VEX IQ is a subset of robots developed by VEX Robotic Design System’s purpose is to integrate STEM into early education
- Original robotic platform was Clawbot
- VEX robots are highly customizable
- VEX robots are programmable in EasyC, ROBOTC and MPLab

**Research Objectives**

- Develop a course that will provide middle school teachers with the skills necessary to teach programming, math, science, problem solving and robotics to their students
- Provide middle school teachers with the confidence to use the course material to encourage students’ interest in STEM fields
- Make it possible for teachers to incorporate the material into their own courses
- Make teachers aware of the importance of robots in society
- Make teachers aware of the value of robots in STEM classes

Method

**Class**

- The class was held at Cleveland State University Campus in Fenn Hall
- The class was June 1-4, 2015
- The class ran from 9:30 AM to 3:30 PM each day
- About 15 middle school teachers from the Cleveland Municipal School district participated

**Course Layout**

- The first day was dedicated to building the VEX IQ Clawbot
- The second day was an overview of the sensors and their capabilities, as well as an introduction to basic programming
- The third day introduced the class and the wireless controller, and helped the teachers solve a few basic problems
- The fourth and final day the teachers were required to solve more difficult problems and discuss their solutions with the rest of the class

**Problems**

- The first problem we presented on the last day was to write a program for the Clawbot to build a stack of color cubes
- The second problem that we presented was to guide the robot along a green path using nothing but robot sensors

**Outcome**

- Out of 11 surveys taken by the teacher participants:
  - 9 were very satisfied with the course
  - 8 would recommend the course to other teachers in their school district
  - A few cited lack of funding for VEX as the reason for their less-than-perfect reviews

**Future Work**

- Meet with teachers throughout the school year to monitor their progress and expand their robotic skills
- Expand the training to include more teachers from more schools
- Help Teachers integrate robotics into their classrooms

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