



# Service Learning: Education of Students in Robotics



Sam Bowlds

College Park Scholars – Science & Global Change Program, Civil Engineering  
sambowlds@gmail.com

College Park Scholars Academic Showcase, May 1, 2020

## Introduction

This practicum that I did was partaking in the scholars course CPSS240, which was the Robotics service learning class. Our class was divided into groups of around 4-5 people that each went to a different school. When we arrived at the schools, we divided the students up into as many groups so that each one of us had a certain number of students.

The class also involved doing extensive research of how different factors, such as wealth, race, or gender can affect students' education and the education of generations to come.

## Site Information:

Name of Site: Martin Luther King Jr. Middle School

Address: 4545 Ammendale Rd, Beltsville, MD 20705

Your supervisor: Timothy Reedy

The mission that we had was teaching middle school students robotics, which involved helping them learn how to build and code designs while working in teams. Some other goals were to be on time to the sites, work hard in producing good lesson plans, and help the students work well with each other and listen to us.

## Issues Confronting Site:

- The amount of traffic and difficulty in leaving UMD caused us to struggle to be on time.
- The amount of students in the classrooms made it hard to organize everything and finish everything on the lesson plans.
- Our visits to the school were unfortunately cut short due to the current situation of COVID-19. We were not able to finish the grand challenge with the students.

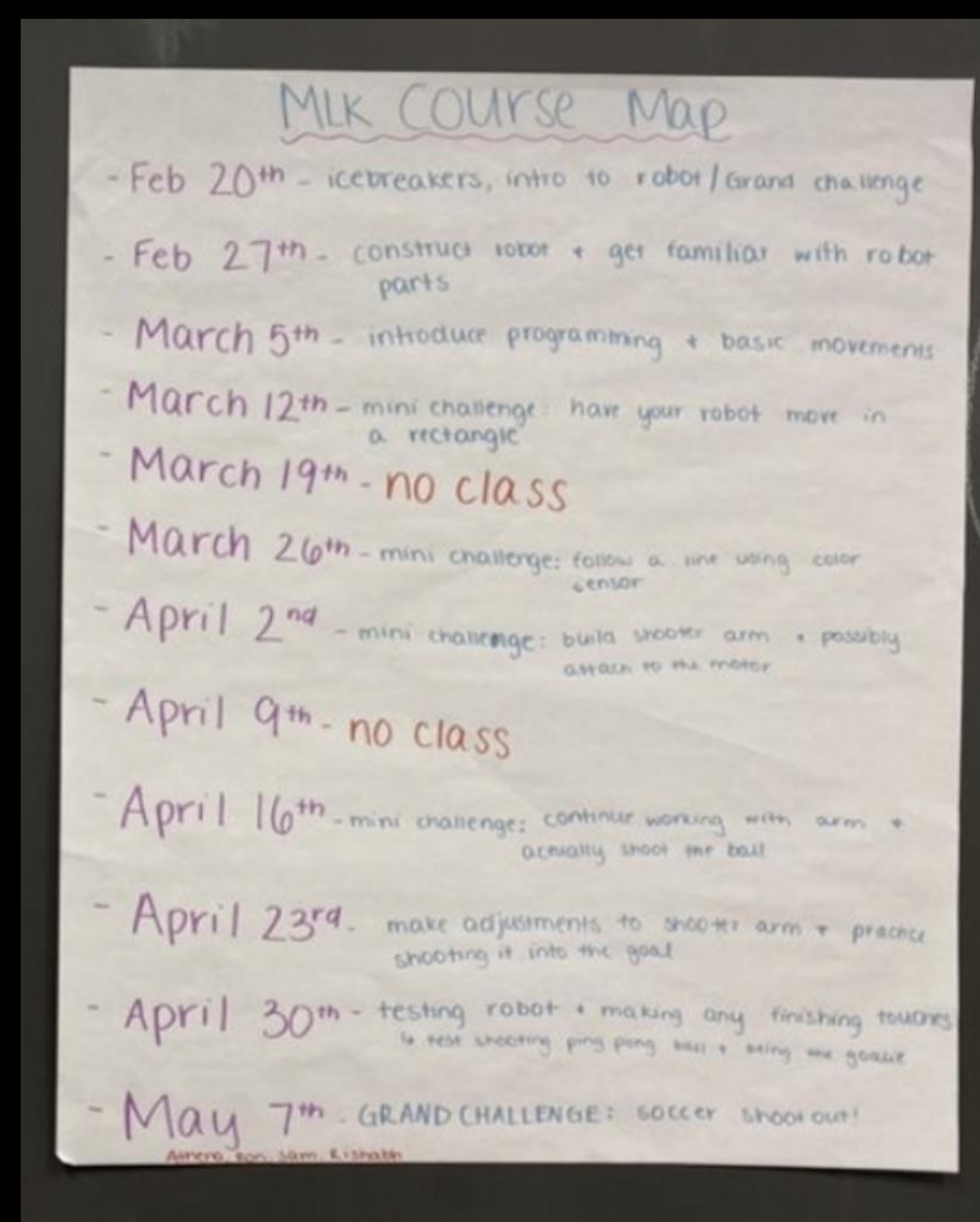
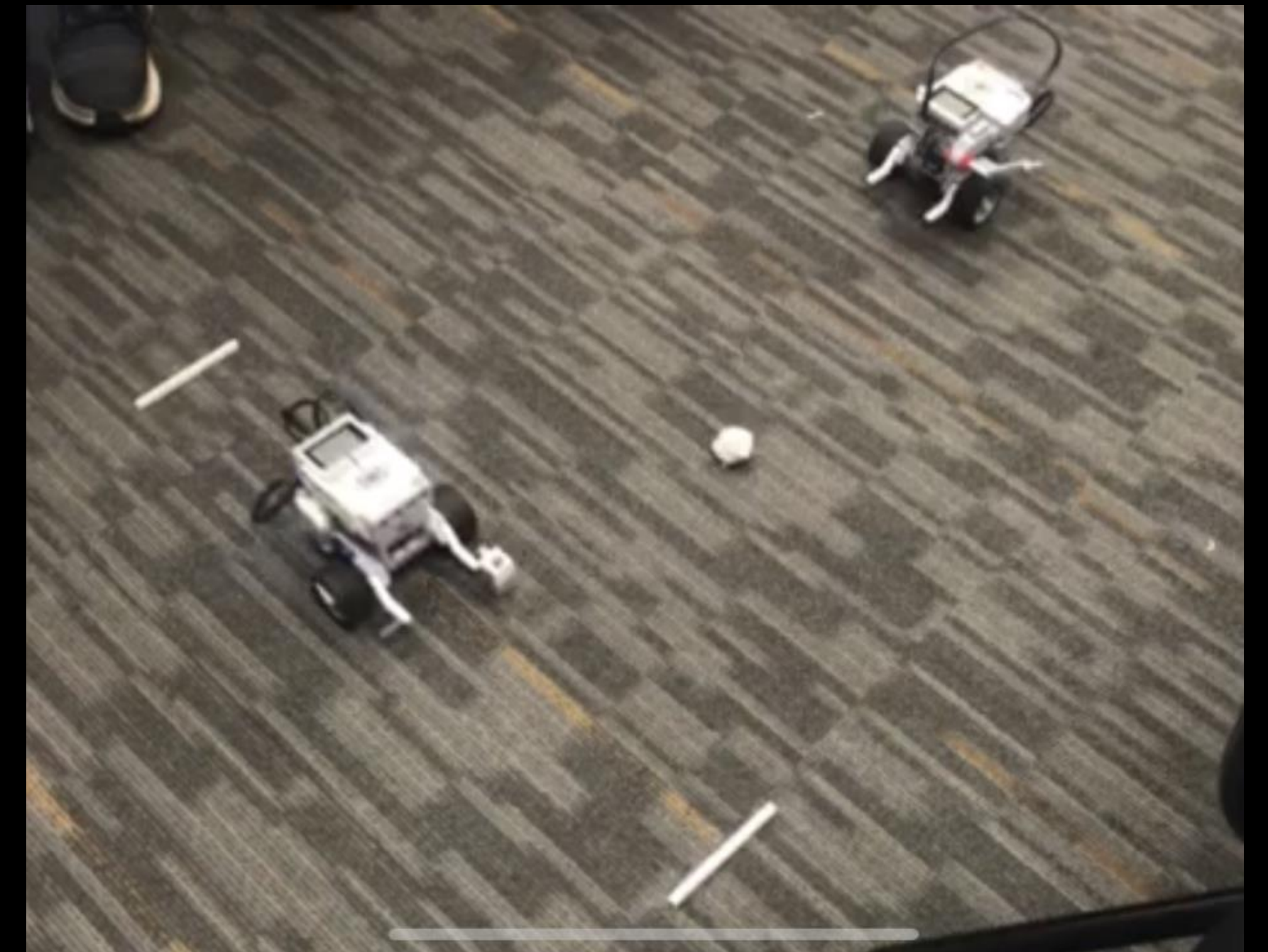
## Discussion:

One of the main topics of our class, CPSS240 was regarding how race or wealth can impact education. We got to see that firsthand at the school we went to, which was around 90 percent minority students and most of them had free and reduced lunch. The school was a little overcrowded, and it was interesting to see how this affected the students and their education.

I personally feel that we had a big impact on the students in creating positive education experiences that can help motivate in school. Whenever our group entered the classroom the students would be very excited and ready for the lessons. In the future, I would want to research more about ways that we can support more funding to lower income area schools and ways that schools with minority students can get better education.

## Activities:

Each class planned a grand challenge that the students would do throughout the semester. In our class, the grand challenge involved having the robots have a soccer shootout, with one robot being able to move to the ball hit it into a goal and the other blocking.



To help with the timeline of the project, we created a course map and planned mini challenges that the students would do during different weeks that were part of the overall goal. (left)

Each week we had to prepare lesson plans that we thought would help teach the students and also align with the goals of the project. (below)



## Acknowledgments:

I want to acknowledge Professor Timothy Reedy, for organizing and planning this service-learning class, and Dr Holtz and Merck for helping me through my two years in the scholars program.

| CPSS 240: ROBOTICS CURRICULUM BASED LESSON DESIGN TOOL                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GROUP MEMBERS: Jazmin Argueta-Rivera, Ron Chavala, Josh Farkas, Rishabh Karamth, Athena Kresker, Rohit Krishnagopal, Asjad Tufail, Lesly Zouanitcha, Sam Bowlds                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DATE/ WEEK OF 3/02/2019                                                                                                                                                                                                                                           | (WEEK 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SCHOOL: MLK Jr MS                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| CONTENT AREA                                                                                                                                                                                                                                                      | ACTIVITIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Goal: Big Idea Concept: (General topic to be covered)                                                                                                                                                                                                             | HOW will you teach the Content? (Group, strategies, accommodations, content variation, etc.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Finish building the robots and begin learning the EV3 software.                                                                                                                                                                                                   | <ul style="list-style-type: none"><li>Ask your group about something fun they did in the past week as a conversation starter</li><li>Have the students take out however much they have of their robot from the kit and finish building it as a team</li><li>Open up the EV3 program on the computer and give a mini tour of the program to the students</li><li>During this new learning experience make sure to go slowly and be aware of any student who has a question</li><li>Answer any questions the students may have about the program or the robot and explain it succinctly to the entire group</li><li>Begin putting together a simple program to prepare for the first Mini Challenge</li><li>When time is up, make sure students pick up all the parts of the robot and put everything back in the kit</li></ul> |
| Grade Level Expectation Objective: (What are you going to teach?)                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"><li>SWBAT recognize a fully assembled model of a Lego robot</li><li>SWBAT become familiar with the EV3 software and its abilities</li><li>SWBAT learn how computer program commands can generate movements in a robot</li></ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Anticipatory Set:                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ask students if they have used other computer programs in the past.                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ask students about a trick they would like to see the robot do.                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Assessment/Evaluation: How will students SHOW what they have learned?                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| At the end of the lesson students should have their robot built entirely. Ask students to name the different sensors of the robot. Ask students to restate what commands we began to program onto the robot.                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Have students think about what sequence of code they will want their robot to use for the first Mini Grand Challenge.                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Technical Vocabulary:                                                                                                                                                                                                                                             | Command, program, sensors, coding, software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Reflections & Researching Strategies:                                                                                                                                                                                                                             | Due to the spiraling nature of the inquiry objectives, these objectives will be retaught and revisited as the students work towards mastering each sensor and preparing for the Grand Challenge. Guided practice will allow for determinations to be made and teaching adjusted accordingly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Robotics kits, sensors, Brain, computer, power, markers, etc.                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |