

immersive robotics

Girls Involved in Robotics Learning Simulations

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Introduction

Project GIRLS, a Foundational project in the Societal Impact theme, proposes to broaden participation of middle-school Latina girls in CS and robotics with an immersive narrative of helping people affected by a natural disaster.



Year	Control Group	Experimental Group
2	Girls learning robotics	Girls learning robotics immersed in a narrative of hurricane relief
3	Mixed boys and girls learning robotics	Mixed boys and girls learning robotics immersed in a narrative of hurricane relief

Research Questions

Do immersive experiences improve girls' learning and interest in computer science and robotics?

Does working in all girl vs. mixed gender groups affect girls' learning and interactions in robotics?



Broader Impacts

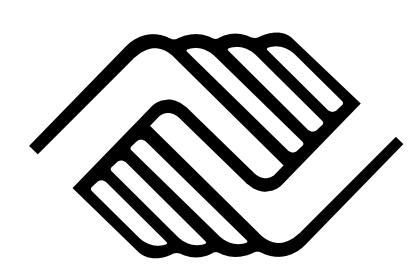
Test robotics curriculum immersed in a narrative to engage girls	Broaden participation by engaging under-represented students in CS and robotics
Hurricane Maria scenario engages Puerto Rican students serving 60-70 Latina girls	Based in Holyoke, MA with 45% Puerto Rican population and 29% poverty rate

Project Partners

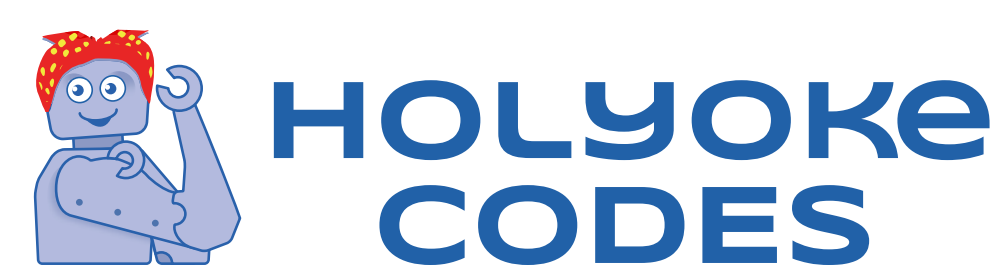
UMassAmherst
College of Education



A program for girls aged 5-18



A year-round after school program



An education and outreach program of the non-profit MGHPC



Project location in Holyoke, MA

Methodology

Data Collection

- Pre/Post
 - Self-Efficacy
 - Career Interest Survey
 - Content Tests
- Field Notes
- Observational Case Studies
- Individual Interviews

Data Analysis

- ANCOVA
- Group Differences in Content, Self-Efficacy, and Interest
- Qualitative Analysis
 - Role of Co-robotics in Society
 - How Girls Work Together
 - How Girls and Boys Work Together

Curriculum

Co-robotics Activity	CS and Robotics Concepts
Robot movement	Robotics terminology, sequential coding
Robot navigation with sensors to pick up supplies and deliver them following a line	Sensors, conditionals, and loops
Using controllers to fly drones with video feeds	Flight and video concepts
Programming drones to fly in a grid pattern to develop a map of destinations	Conditionals, loops, mapping concepts
Program robots to detect and avoid obstacles while navigating to destinations	More complex looping and selection with sensors
Final challenge with robots, drones, and students working together	Co-robotics concepts and programming

Immersive Experience

Experimental group will be motivated by an immersive narrative of a hurricane first response team and discuss social and ethical issues in co-robotics.

The co-robotics activities will include first responder, search and rescue, and infrastructure assessment scenarios.

Timeline

	Year 1 9/18-8/19	Year 2 9/18-8/19	Year 3 9/18-8/19
Phase I - Develop Curriculum and Assessment			
Development of co-robotics curriculum			
Development of immersive simulation			
Development of pre/post content test			
Pilot aspects of curriculum in Holyoke Codes workshops			
Create and update project web site			
Revise curriculum and update assessments			
Phase II - Conduct Experiment			
Recruit participants, collect informed consent/assent			
Control and experimental groups with Girls Inc.			
Control and experimental groups with Boys & Girls Club			
Conduct data collection and perform data analysis			
Phase III - Disseminate Results			
Prepare and submit conference proposals			
Make curriculum available on web site			