Developing STEAM Programs for Middle School Girls Through Community Collaborations
Design and Engineering Technology educator at Mary Ellen Henderson Middle School

Collaborative team leader of the career and technical education (CTE) department for the Falls Church City Public School System (VA).

President-Elect of Virginia Technology and Engineering Educators Association (VTEEA).
To share a few examples of how the Falls Church City community identified a need and worked productively to overcome barriers that hindered female students from pursuing STEAM-related courses.
Key Factors - Research

Middle school years are “an essential formative and transactional period for students”

(Christenson, Knezek, Tyler-Wood, and Gibson, 2014)

The middle school years are “important for improving girls’ overall persistence in STEAM fields as most girls begin to lose interest in science and mathematics during early adolescents.

(Christenson, Knezek, Tyler-Wood, and Gibson, 2014)
“Presences of mentors and role-models are instrumental in the recruitment and retention of females in engineering careers”
(Bayerle and Scanlon, 2017)

“It is “ok” to have “average’ individuals currently working in STEAM professions to serve as mentors”
(Codiroli and McMaster, 2017)
Creating strong community collaborations is a cornerstone of career and technical education programs.

The STEAM program at Mary Ellen Henderson Middle School focuses on combining school and community resources to promote career exploration opportunities and mentorships with the goal of inspiring long-term interest in STEAM-related careers.
Course Structural and Organizational Management

6th Grade
Introduction to Technology

- Putting things into motion
  - Technological Inventions and Innovations
  - The Designed World
  - Technological Systems

7th Grade
Inventions and Innovations

- Pieces are in place
  - Invention and Innovation of the Designed World
- Systems are moving
  - Design and Creativity
  - Technology and Society

8th Grade
Television and Media Production
Fundamentals of Robotic Design

- Brain building
  - Robotics/TV Fundamental
  - Engineering and Design
  - Applications
Envision Experience

Envision is a leading experiential learning organization offering students an opportunity to explore their career and life interests.

Their partnerships include:
• Envision Experience offers after-school STEAM enrichment to Henderson students at no cost.
• Envision has offered girls-only enrichment sessions as well as sessions devoted to English Language Learners.
• Henderson serves as a beta site to test new programs and equipment that are eventually included in their National Youth Leadership Forum (NYLF) summer career exploration programs offered at various locations across the country.
• Students have had the opportunity to participate in hummingbird design challenges, introduction to forensics, disaster triage, and emergency medicine modules using virtual reality.
Envision Experience - CADD
Envision Experience – Emergency Medicine
Envision Experience - Hummingbird
Envision Experience - Hummingbird
Envision Experience – VEX Robotics
MarkOn Solutions

Markon Solutions is national consulting company, headquartered in Falls Church. Markon’s commitment to the schools includes the involvement of many employees.

Their partnerships include:
• Working with middle school girls to increase awareness of STEM careers
• Helping FCCPS plan a pilot student intern program and hosting GMHS student intern and extern
• Participating in the Henderson Family STEAM Night and Career Fair
• Sponsoring the Falls Church Education Foundation Annual Gala and Run for the Schools, where they won the “largest team” award as well as “fastest team” award.
# October

<table>
<thead>
<tr>
<th>Activity/Skill</th>
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<tbody>
<tr>
<td>ASCE Club Kick-off</td>
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<tr>
<td>Dream Big Video – Part I</td>
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<tr>
<td>Bridge Activity I -- Build a bridge that holds 100 pennies using 1 sheet of paper</td>
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<th>Materials</th>
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<tr>
<td>5-6 rolls of pennies</td>
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<tr>
<td>Standard Copier Paper</td>
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<tr>
<td>Markers to decorate</td>
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<tr>
<td>Dream Big Kit – DVD or stream</td>
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**Theme:** _Introduction_/ Dream Big

**MYP Character Trait:** __Inquirer__

**Problem/Challenge**
- How did you get to school?
- How do we impact our world?
- What questions should we ask?
- What does an engineer look like?

**Notes:**
First meeting should be fun, engaging, but also simple enough that the kids can go home with something they made. – possibly LED card or small circuit project

**Community Clean-Up Events (Spring and Fall)**
Join in the fun to make the city beautiful! In the spring and fall, volunteers work together to clean up the city. Volunteers meet at the Community Center, are organized into teams, and assigned to work areas throughout the city. City staff distributes trash pickers, trash bags, recycling bags, gloves, and reflective vests. Perfect for community groups (Boy Scouts, Girl Scouts, etc.), church groups, families, or individuals.

Register or More Information: [Chris McGough, Solid Waste Coordinator](mailto:Chris.McGough@CityofAlexandria.com), 703-248-5456 (TTY 711) (Fall) Saturday, October 13 at 10:00 a.m.
Other Collaborations
Questions? More Information?

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