Developing a Pipeline from Elementary School to Career: Building the STEM workforce of the future

Chad Knights, Provost of Information & Engineering Technologies
Josh Labrie, Director of NOVA SySTEMic
Northern Virginia
• Diverse
• Highly Educated
• NOVA Data Analytics
• Tech Corridor
• Data Centers
• Micron $3B investment
• Amazon

Northern Virginia Community College (NOVA)
• Largest Public Institution in Virginia with 6 campuses.
• 2\textsuperscript{nd} Largest Community College in the USA with over 73,000+ Students.
• 900 FT Faculty, 2,000 Adjunct
• 160 Degrees & Certificates
Our K-12 Partners

8 School Districts

Alexandria City
Arlington County
Falls Church City
Fairfax County
Loudoun County
Manassas City
Manassas Park City
Prince William County

About 1/3 of the public school students in Virginia are in NOVA’s service area.

• 418,872 students
• 303 ES, 68 MS, 64 HS, and more

Top 3 School Divisions in Size

• FCPS – 10th Largest in USA
• PWCS – 6,274 Teachers, 2nd in VA
• LCPS – Fastest Growing, 3rd in VA
NOVA’s STEM Outreach Program

• History & Funding
• Challenges
  • Scope: STEM, STEAM, STEM-H
  • Rate of Change and new IT areas
  • Regional Demand & Size
  • Fitting in with 8 school divisions and community based programs

Where to Start?

Academics are the schools business. Pathways for dual enrollment already existed.

• STEM Camps
• STEM Competitions
STEM Camps – Defining the Partnership

- Memorandum of Understanding
- Financial Considerations
- Space Utilization
- Responsibilities Identified

- Joint Marketing
- Skills Desired
- Targeted Population
- Define Success in Advance
Why STEM Camps can be a Win-Win-Win

For Families & Students
- Educational at the cost of daycare.
- Skill development through project-based learning
- Low risk and low cost exploration of STEM, just a 1 week commitment.
- Elementary through high school.
Why STEM Camps can be a Win-Win-Win

For School Districts

• Additional educational opportunities for students.
• Paid professional development for teachers.
• Bridge to Technical Education.
• Supplement, not taxing.
Why STEM Camps can be a Win-Win-Win

For Community Colleges
- Community Engagement & Marketing
- Can be held on campus or have camp finale on campus.
- Bridge between K-12 students and teachers to campus and faculty.
- Showcase of workforce partnerships.
- College student employment.
Summer Camp by Topic

STEMCAMP Participation 2018

<table>
<thead>
<tr>
<th>Topic</th>
<th>Enrollment %</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM ES</td>
<td>3%</td>
</tr>
<tr>
<td>CODING ES</td>
<td>7%</td>
</tr>
<tr>
<td>VEX IQ ROBOTICS</td>
<td>15%</td>
</tr>
<tr>
<td>STEM MS</td>
<td>9%</td>
</tr>
<tr>
<td>ARDUINO</td>
<td>9%</td>
</tr>
<tr>
<td>CSI</td>
<td>2%</td>
</tr>
<tr>
<td>APP DESIGN</td>
<td>3%</td>
</tr>
<tr>
<td>VEX ROBOTICS</td>
<td>22%</td>
</tr>
<tr>
<td>ROCKETRY</td>
<td>7%</td>
</tr>
<tr>
<td>CYBER SECURITY</td>
<td>17%</td>
</tr>
<tr>
<td>CYBER SECURITY ADV</td>
<td>4%</td>
</tr>
<tr>
<td>PRE-HEALTH</td>
<td>1%</td>
</tr>
</tbody>
</table>
Defining Success

STEM & Coding Elementary

FEMALE 50%

MALE 50%
Summer Camps
Discussion & Questions
History with VEX

AFA CyberPatriot

Introduce Video
STEM Competitions: Recreating the Sports Infrastructure

- Regional in nature, beyond county & city boundaries.
- Participants vary
  - Subset of schools
  - Community Groups
- Typically, Extra- or Co-curricular
Community College Support

- Mentor Training
- Volunteer Training
- Event Partner Training
  - 2010: 5 Event Partners
  - 2018: 30 Event Partners
- Centralized Equipment
Regional Growth of Competitions

Growth of VEX Events in Northern VA

- **NOVA Service Area**
- **Outside NOVA**

Number of VEX Events vs. Year (2012-2018):}

- **Northern VA (NOVA Service Area)** shows a steady increase in the number of VEX events from 2012 to 2018.
- **Outside NOVA** remains relatively stable with a slight increase over the same period.
STEM Competition Support

School Division

• Specialized training for teachers and schools.
• Provides support for a typically small subset of students/schools.
• Hosting competitions as a fundraiser for team(s).

Community College

• Mentor & Teacher Training connects College with K12 teachers and students.
• Regional Equipment for competitions allows opportunity for grants/sponsorship.
Transition Co-Curricular to Academic

- Summer Camps
- Mentor & Teacher Workshops
- STEM Competitions
- Skills Courses
  - Dual Enrollment
  - Summer Credit
- Summer Camp Training
- Teacher PD
- Transition Co-Curricular to Academic
Beyond Camps & Competitions

Co-Curricular to Curricular Inclusion

- 1 PLTW Gateway to Technology (GTT) MS in 2011
- 18 PLTW GTT MS in 2014
- 1700% Increase

Elementary STEM Programs -> Middle School PLTW -> HS STEM Programs & Academies -> College Enrollment & Degrees
Additional Support & Programs

Provide Regional Support
- Education Foundation Boards
- CTE/STEM Advisory Board
- Content Expert
- Chambers of Commerce
- Community Events
- Local Government

Outreach Programs
- STEM Camps
- STEM Competitions
- STEM EXPOs
- STEMinars
- STEM Internships
Discussion & Questions