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Introducing Digital Forensics Science in a Virtual Learning Environment (DFSLE)

<https://cybersleuthlab.org/>

About

Daryl Pfeif,
Founder & CEO, Digital Forensics Solutions (gotdfs.com)

Founder, Digital Security Associates (gotdsa.com)

Founding Member/COO (aka The Kernel) - DFRWS



BACKGROUND

- Women Owned Business Started in 2005 (Digiwhat?)
- Approached by increasing numbers of women and others under-represented CS / STEM for Mentorship, Career Guidance & intro to DFIR
- Unimpressed by workforce development
- Can't do everything - but can Do Something



Leadership Team

Eoghan Casey, Ph.D., Principal Investigator
Research Scientist & Partner, Digital Forensics Solutions

Daryl Pfeif, Co-Principal Investigator
CEO & Founder, Digital Forensics Solutions

Karen Peterson, M.Ed., Co-Principal Investigator
CEO, The National Girls Collaborative Project

Cassy Soden, Web & Media Senior Producer



Pilot Site Partners

CodeWorks, Baltimore City Schools, Maryland

Core Element, New Orleans, Louisiana

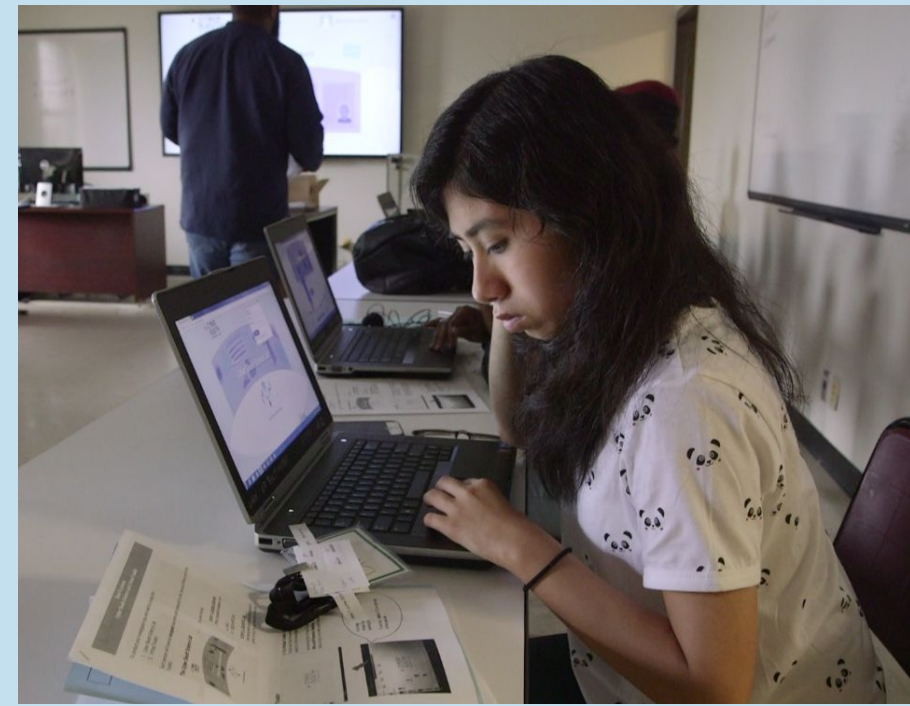
WANIC Everett School System,
Washington State



Video: <https://stemforall2019.videohall.com/presentations/1620>

DFSLE Project Objectives

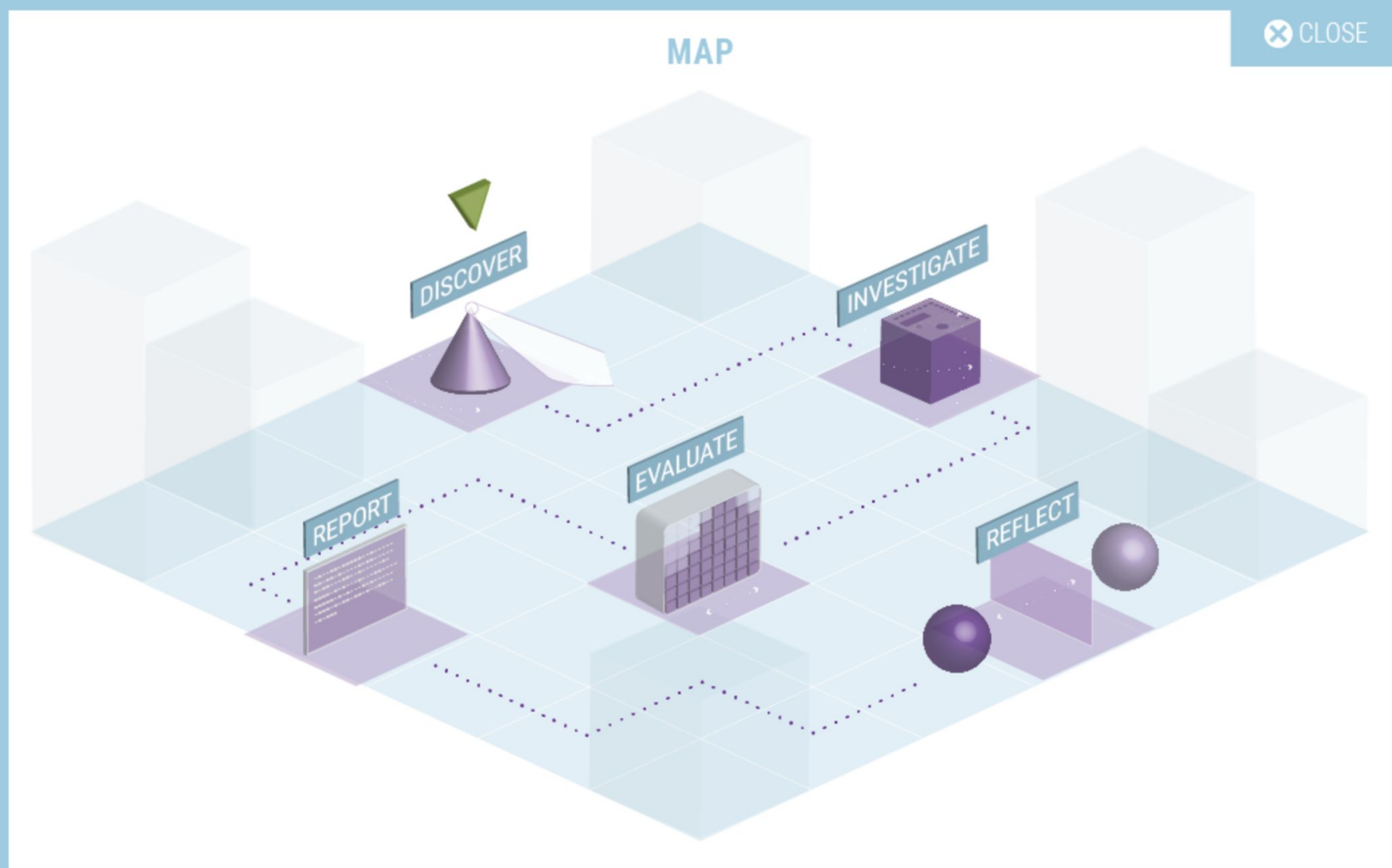
- Inspire more young women and underrepresented students to pursue education and careers in Digital Forensics and Computer Science
- Develop a STEM learning environment well suited to these students by immersing them in a process of computational thinking, scientific inquiry and problem solving in the context of **complex social issues**.
- Teach “**digital street smarts**” to help these students develop digital literacy and 21st century skills, by familiarizing them with online risks and laws, and encouraging responsible and safe behavior in a digital society.



Pedagogical Framework

Based on the Investigate & Decide Learning Environment model

- Cognitive apprenticeship
- Goal-based scenarios
- Problem-based learning
- Role-model guidance
- Peer collaboration
- Computational thinking



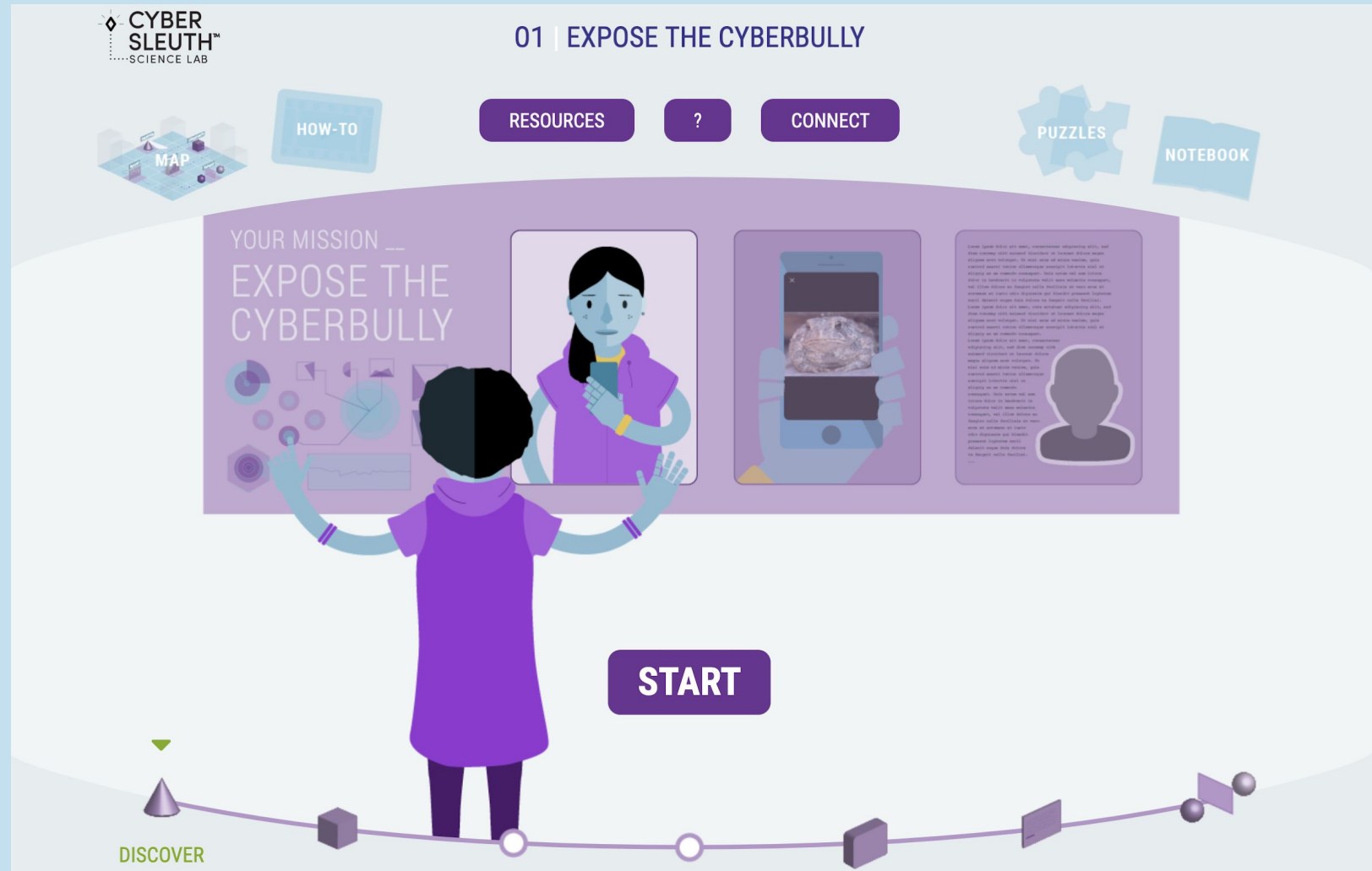
Virtual Laboratory

Engaging, age-appropriate, life-relevant investigative missions

- Deleted photo recovery
- Cyberbullying
- Embarrassing photo
- Account hijacking

Built-in data collection

- Summative questions
- Backend activity logging



Virtual Toolkit

Remote Desktop

- Dedicated student VMs
- Cloud hosted

Digital forensic tools & scenario datasets

- Autopsy
- Magnet
- MSAB

The screenshot shows a Microsoft Remote Desktop window. On the left, a virtual desktop environment is visible with icons for 'Recycle Bin', 'Mission 0', 'Autopsy', 'Mission 1', 'AXIOM Explorer', 'Mission 2', 'XRY Viewer', 'JPEGsnoop', and 'FTK Imager'. On the right, a web application interface is displayed. It has a top navigation bar with 'File', 'Tools', 'Process', and 'Help'. Below this is a 'FILTERS' section with dropdown menus for 'Evidence', 'Artifacts', 'Content types', 'Date and time', 'Tags and', 'Keyword lists', 'Skin tone', and 'Media categories'. The main content area is titled 'EVIDENCE (107)' and contains a table with evidence items. The table has columns for 'Identifier' and 'Co'. The first row is highlighted in blue and shows the identifier '12028486096' and 'ID'. The second row shows 'James Lee' and 'Full'. The third row shows '13153165956' and 'ID'. The fourth row shows '12532608067' and 'ID'. The fifth row shows '(202) 848-6096' and 'Pho'. The sixth row shows '+13153165956' and 'Pho'. The seventh row shows 'Mom' and 'Full'. The eighth row shows 'Mom' and 'Give'. The ninth row shows 'James' and 'Give'. The tenth row shows '(253) 260-8067' and 'Pho'. The eleventh row shows 'Miles Thomas' and 'Full'. The twelfth row shows 'Miles' and 'Give'. The thirteenth row shows 'Sarah Jackson' and 'Full'. The fourteenth row shows 'Sarah' and 'Give'. The fifteenth row shows '12028486096' and 'Sen'.

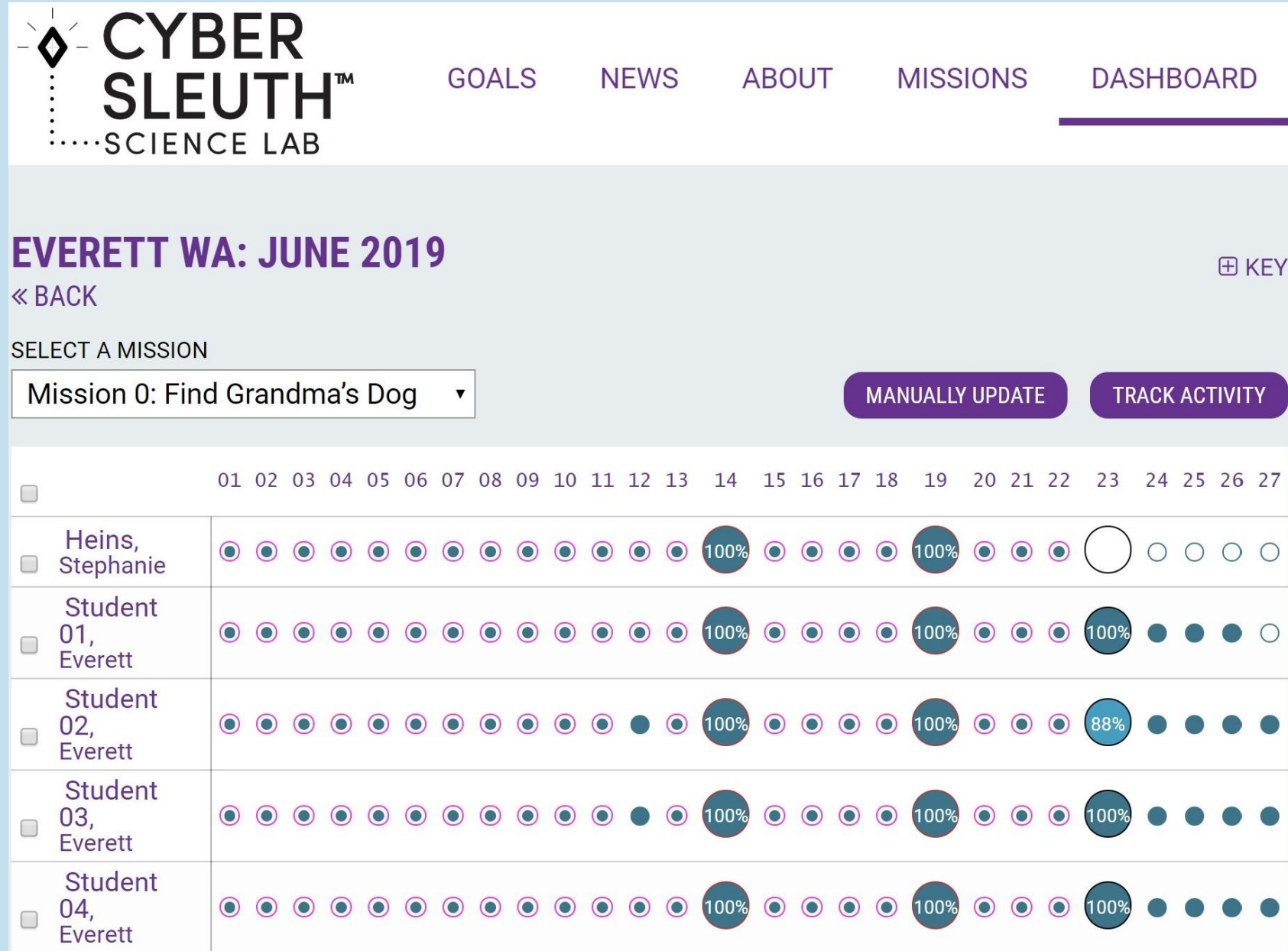
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Mom	Give
James	Give
(253) 260-8067	Pho
Miles Thomas	Full
Miles	Give
Sarah Jackson	Full
Sarah	Give
12028486096	Sen

Teacher Dashboard

Manage class

Track progress

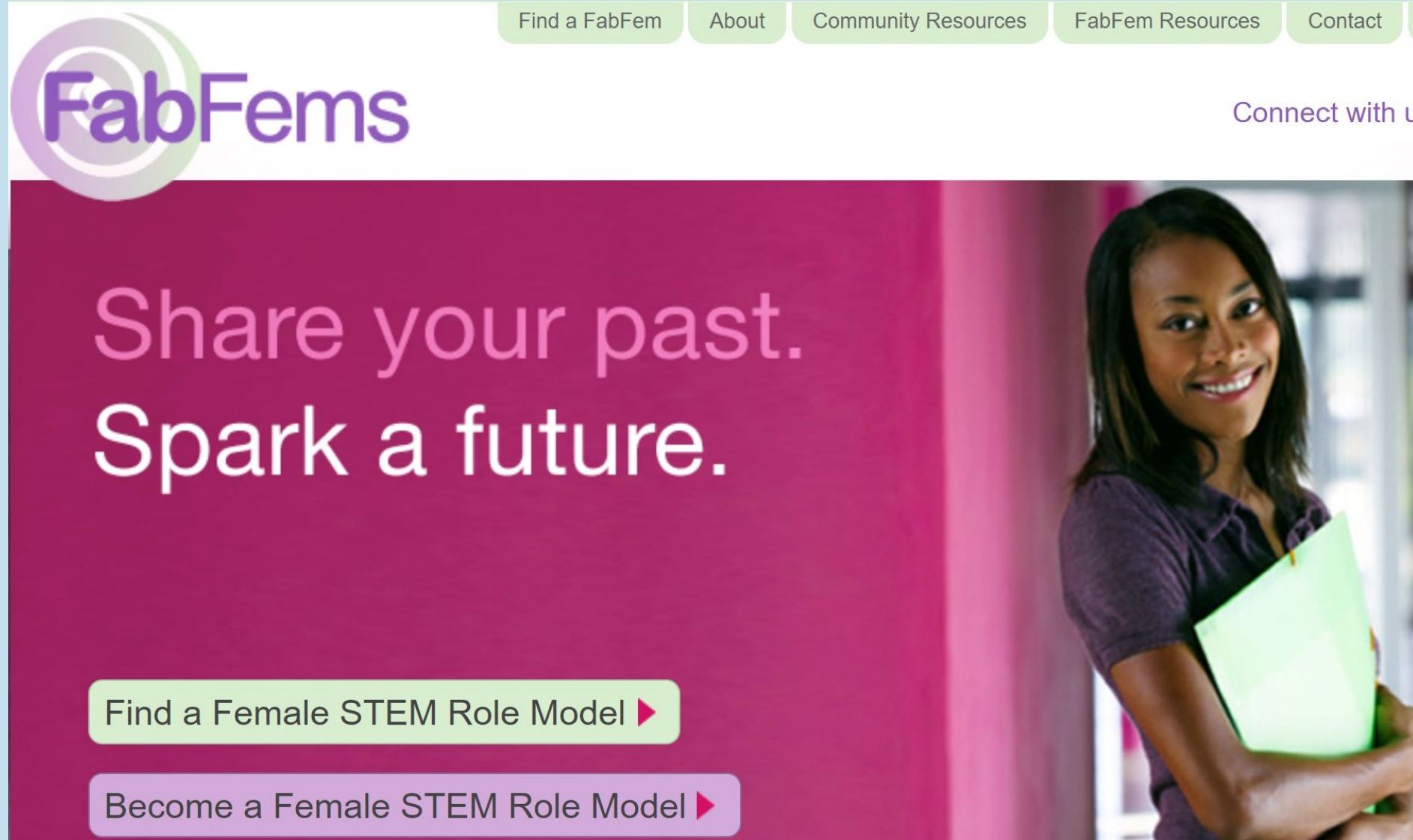
Group work credit



Role Models & Network Building

FabFems.org

- Role models
- Professional perspectives
- Community
- Events
- Partnerships



Career Vision Quest

Students explore their future possibilities by asking themselves

Who am I...

What kind of problem do I enjoy solving...

What activities do I enjoy doing

What resources do I need to get where I want to be...

Education & Career Resource Guides

Growing compilation of potential opportunities for students

Educational programs, scholarships, certificate programs, etc.

Career pathways

Professional Organizations & Events

Fundamental Forensic Science Concepts

Themes

- Forensic science principles
- Protect yourself personally and professionally
- Mathematics concepts
- Forensic processes and activities
- Handling digital evidence
- Conclusions and reports

Principles of Effective Design & Instruction

1. **Engage** - give them a reason to care
2. **Enculturate** - foster a sense of belonging
3. **Immerse** - situated cognition & realistic context
4. **Guide** - cognitive apprenticeship & scaffolding
5. **Practice & Iteration** - case-based reasoning
6. **Synthesize** - build a logical argument
7. **Communicate** - report writing and testimony
8. **Reflect** - consider pros, cons and broader societal impact

Casting students in the role of investigators supports these principles

Summer of 2018, Baltimore, MD

Working with CodeWorks in Baltimore in the summer of 2018 we introduced 79 students to Digital Forensics in the the Cyber Sleuth Science Lab beta version.

CodeWorks Teachers were trained and taught the week long class with support from trained Cyber Sleuth Facilitators.





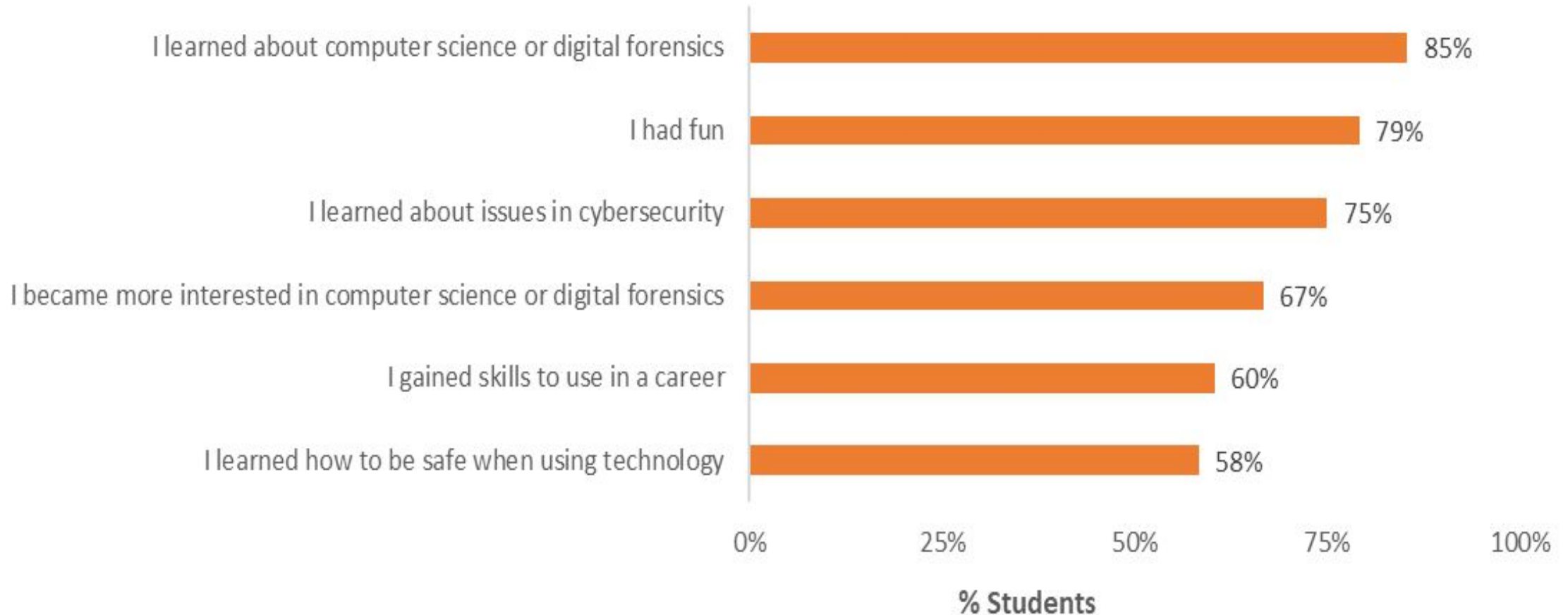
“I enjoyed recovering all of the text message conversations and figuring out what happened and why it happened.”

“I enjoyed learning and using the different applications like Autopsy and JPEGsnoop.”

“The Lab report, it was really engaging and it made me feel like the work I did was useful and professional”

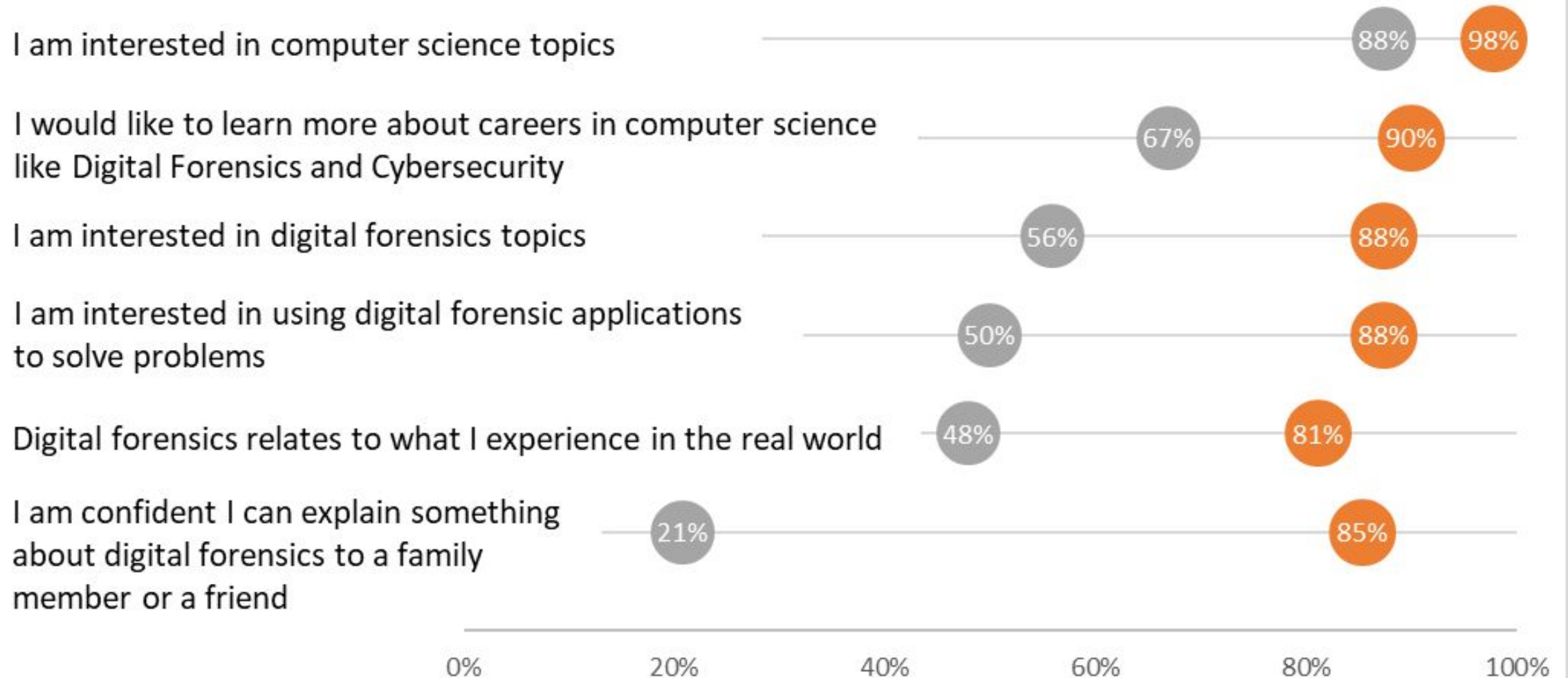
Initial Outcomes

"How do you feel you have benefited from your experience in CSSL?"
(n=48)



Initial Outcomes


Students Who Agree or Strongly Agree Before and **After** CSSL (n=48)



What's Next...

- Module Development
- Teacher Professional Development Enhancement
- Baltimore, Summer 2019
- Everett, Washington, 2019
- Research Results





Why teach
Digital
Forensics and
Cybersecurity?



3.5 *million*

Unfilled job openings in
CyberSecurity by 2021

- Forbes, August 9, 2018



In 2017...
WOMEN made up

11%

of the CyberSecurity workforce

Next Steps

- Recruiting role models!!!!
- Recruiting facilitators and trainers
- Developing partnerships
- Broadening participation
- Adding more modules & more professional development
- Adapting CSSL for other audiences



Thank you for letting us share the innovative Cyber Sleuth Science Lab project with you!



QUESTIONS ? PLEASE CONTACT:

Daryl@CyberSleuthLab.org

SPECIAL THANKS TO:



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