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

https://cybersleuthlab.org/
About

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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

CYBER SLEUTH SCIENCE LAB
Teacher Dashboard

- Manage class
- Track progress
- Group work credit
Role Models & Network Building

FabFems.org
- Role models
- Professional perspectives
- Community
- Events
- Partnerships

Share your past. Spark a future.

Find a Female STEM Role Model

Become a Female STEM Role Model
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 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”
"How do you feel you have benefited from your experience in CSSL?"
(n=48)

- I learned about computer science or digital forensics: 85%
- I had fun: 79%
- I learned about issues in cybersecurity: 75%
- I became more interested in computer science or digital forensics: 67%
- I gained skills to use in a career: 60%
- I learned how to be safe when using technology: 58%
Initial Outcomes

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

I am interested in computer science topics

I would like to learn more about careers in computer science like Digital Forensics and Cybersecurity

I am interested in digital forensics topics

I am interested in using digital forensic applications to solve problems

Digital forensics relates to what I experience in the real world

I am confident I can explain something about digital forensics to a family member or a friend

88% 98%

67% 90%

56% 88%

50% 88%

48% 81%

21% 85%
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

- Center for Cybersafety and Education
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!
The Cyber Sleuth Science Lab is a project of Digital Forensics Solutions made possible by the National Science Foundation. This material is based upon work supported by the National Science Foundation under Grant No. 1640107. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.