Long and Winding Road

Navigating to a Cybersecurity Performance Based Education (PBE) Curriculum

Norma Colunga-Hernandez
Statewide Department Chair
✉ ncolunga-herna@tstc.edu
📞 956.364.4774

Amy Hertel
Lead Instructor
✉ amy.hertel@tstc.edu
📞 903.923.3349

TSTC
Texas State
Technical College

tstc.edu

NSF Small ATE Grant

- TSTC Online Competency-Based Education (CBE) Project

- Grant #1901776
  - Award: 2019 through 2022
  - Designated Programs
    - Cybersecurity
    - Architectural Design and Engineering Graphics (ADEG)

Performance Based Education (PBE)

- Texas State Technical College's Competency-Based Education (CBE) initiative
- Focus on mastery of Industry skills / competencies
- Self-directed
- Fully online or in a blended learning environment
  - Flips traditional lecture to online
  - Emphasis on hands-on learning in a technical lab environment

https://www.tstc.edu/performance-based-education/

- Move at a Flexible Pace
- Access Coursework Online
- Master the Skills
- Add Flexibility to Learning
- Enjoy Multiple Entry/Exit Points

tstc.edu

Tier 1 PBE Online Implementation

- Cybersecurity
  Associate of Applied Science
  (15 courses)

- Digital Forensics Specialist
  Advanced Technical Certificate
  (4 courses)

- 18 Faculty across 6 out of 10 TSTC
  Campus Locations

- Primarily Face-to-Face

BRECKENRIDGE

MARSHALL

SWEETWATER

ABILENE

NORTH TEXAS

BROWNWOOD

WACO

WILLIAMSON COUNTY

FORT BEND COUNTY

HARLINGEN

tstc.edu

Acceleration!

- COVID-19 - Spring 2020

- Conversion of all courses to Online after Spring Break!

Challenge #1: Finish SP20

Internet Connectivity - Student Access

- No Internet Access, Low speeds, Inconsistent (Satellite/Phone) connection, or Metered connections

- Solutions: Extended WiFi connection to parking lot, WiFi in public spaces (McDonald's), Grade of "Incomplete"
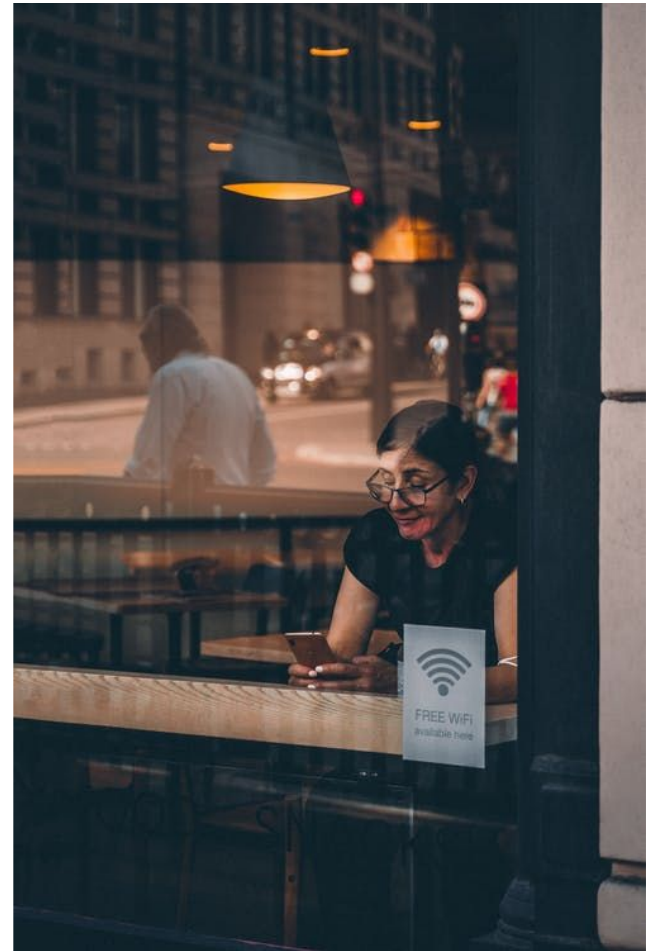
Challenge #1: Finish SP20

No Student Home PC

- Solution: CARES Funding to purchase a PC

Student PC Hardware Deficiencies

- Insufficient RAM, processor
- Single vs. dual monitors
- Solution: Remote Access via Google Remote, scaled back labs, focus on core competencies

Challenge #1: Moving Forward - Summer 2020-21

ITSC 1325 - PC Hardware
- Assemble, troubleshoot, and upgrade a PC
- Solution: PC Building Simulator from Galaxy of Games - $20

ITNW 1325 - Fundamentals of Networking
- Assemble and troubleshoot network cables and drops
- Solutions
  - Student purchased toolkit - $40
  - "Fake" Ethernet drops (RJ45 ⟷ Keystone)
  - Student Video Submission(s) - Creating and testing cable

ITSY 2330 - Intrusion Detection
- Live Malware Analysis on separate physical network
- Solution: Virtual Machines not connected to NIC

Challenge #1: Moving Forward - Summer 2020-21

ITNW 2355 - Server Virtualization
- Resource-intensive Virtual Machines with ESXi and Hyper-V
- Solution: Remote Access via Google Remote and AnyDesk on Fort Bend and Waco campuses

ITSY 2359 - Security Assessment and Auditing
- VMs attacking and scanning each other for Pen Testing and vulnerabilities identification
- Need for nested virtualization and Kali Linux
- Solutions:
  - Temporary bare metal environment hosted at Fort Bend and Harlingen campuses
  - Terminal server jump station into virtual apps being hosted by VMware
  - Accessed via a VPN

tstc.edu

Challenge #1: Moving Forward - Summer 2020-21

## ITDF 2420 - Digital Forensics Collection

- Hardware-based write blockers to produce forensically sound images of computers and USB drives
- Solution: Software-based write blocker via Registry

Challenge #1: Moving Forward - Summer 2020-21

ITNW 2321, ITNW 2312,
ITSY 2301

- Cisco switches, routers, and firewalls
- Lower-level solution: Cisco Packet Tracer
- Upper-level solution: NETLAB+
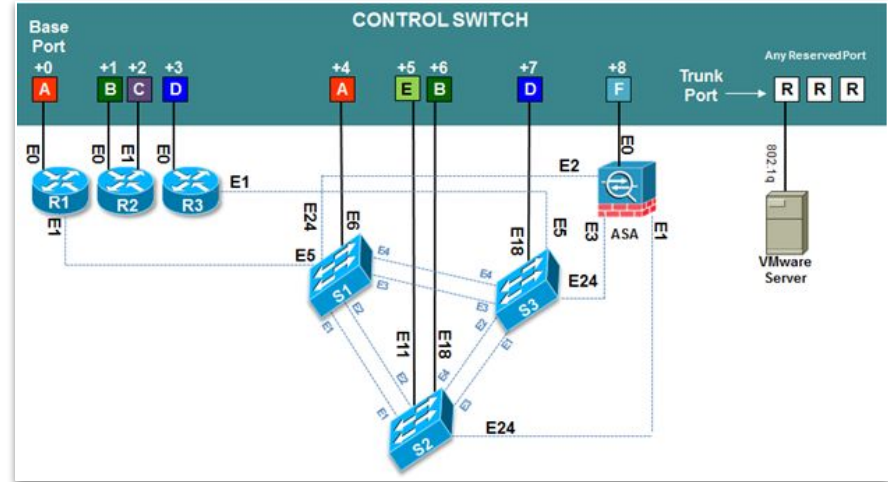
16 PODs
- 1 Cisco 3750X Switch
- 2 Catalyst 2690 Switches
- 3 Cisco ISR 4321 Routers
- 1 Cisco ASA 5506-X Firewall

tstc.edu

Challenge #2: Student Software Licensing

Azure for Education
- Word, Excel, Visio

Kivuto
- VMware Workstation Pro
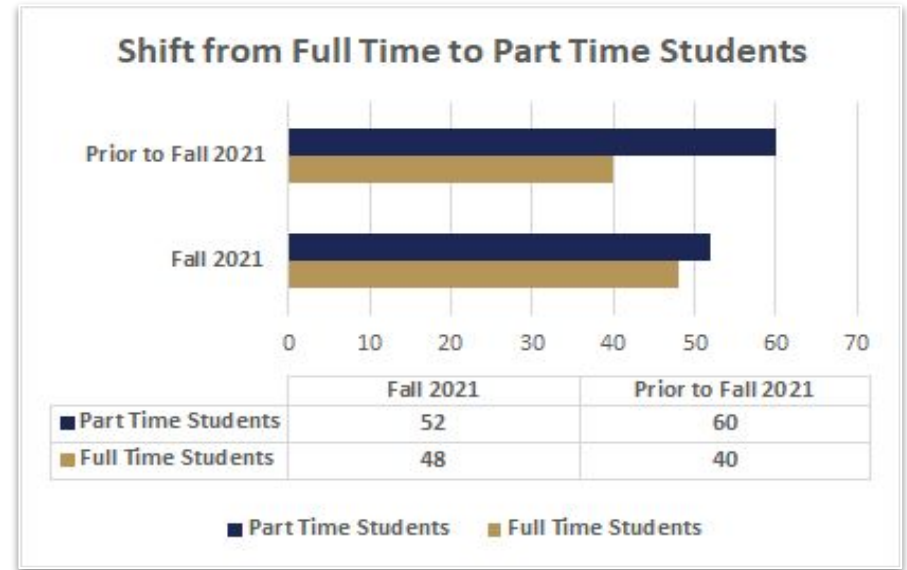- VMware vCenter
- VMware ESXi

AccessData/Exterro
- Forensics Toolkit (FTK) Suite taught only on Waco campus with licensing dongle
- Converted to Virtual CMStick

tstc.edu

Challenge #3: Student Engagement

Notable Changes to student availability

- Pre-COVID
  - Face-to-face: 2 days a week, 3 hours each day per course

- Post-COVID
  - Shift from full-time to part-time
  - Working additional hours, Working additional jobs, altered work schedules

Shift from Full Time to Part Time Students

	Fall 2021	Prior to Fall 2021
■ Part Time Students	52	60
■ Full Time Students	48	40

■ Part Time Students   ■ Full Time Students

Challenge #3: Student Engagement

Unified Support Model

- Google Meet/WebEx "office hours"
  - Two hour blocks
  - Monday - Friday 8am to 8pm

- Instructor Availability spreadsheet
  - Contact any Subject Matter Expert (SME)

- Slack Workspace
  - Channel for each course as well as Career Services, announcements, tutoring, and with a coach
  - Popular on nights and weekends

	Monday		Tuesday	
Instructor	Lecture/Lab		Instructor	Lecture/Lab
8:00 AM			8:00 AM	
Doug Peters	Open Lab		Doug Peters	Open Lab
Joel Bryant	Open Lab		Daniel Follis	Open Lab
Daniel Follis	Open Lab		Tim Janssen	ITSY-2301
Jan Nesmith	Open Lab		Joel Bryant	Open Lab
Tim Janssen	ITSY-2359			
10:00 AM			10:00 AM	
Alan Sulak	ITNW2312/2321		Doug Peters	Open Lab
Doug Peters	Open Lab		Keith Kooyman	Open Lab
Keith Kooyman	Open Lab		Jan Nesmith	Open Lab
Jan Nesmith	Open Lab		Tim Janssen	Open Lab
Tim Janssen	Open Lab		Carol Scheler	Open Lab
Carol Scheler	Open Lab		Linda Shorter	Open Lab

Challenge #3: Student Engagement

- Cyber Student Resource Site [Internal]

CYBERSECURITY
Student Resources

CONNECT	ENGAGE	SOFTWARE	TECHNOLGY	VIDEOS	PBE POLICY
Connect to Instructors for Questions or Assistance on Course Assignments -- or Just General Tech Talk	Use mymail credentials for Cyber Slack Channel -- Engage with your Peers, Instructors, or Enrollment Coaches	Access Course Software and ISOs for Lab Assignments	Review Hardware/ Technology Requirements	View "How to" Tutorials & Videos	Review Grading and Mastery Assessment Policy

Challenge #4: Instructor Nervous Breakdown(s)

- Re-engineering/re-designing courses with time constraints
    - Rewriting labs, lectures, and recording videos [real time]

- Identification of CME/SME Teams for development
    - Instructor collaboration (Google Chat and Google Meet)

- Instructional Designers hired
    - Continuous Process, Quality, Course Improvement
    - LMS Transition- Moodle/Canvas

- Instructor student availability
    - *No longer 8 to 5*
    - Flexible schedule

Questions?

THANK YOU!

MORE INFORMATION

- Performance Based Education @ TSTC
  The next level of performance education at TSTC
  https://www.tstc.edu/performance-based-education/

- TSTC NSF Project
  https://bit.ly/tstc-nsf

- Cybersecurity Program
  https://www.tstc.edu/programs/cybersecurity/

tstc.edu