



STEM Webinar: Cybersecurity Education 101

August 25, 2020

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QUESTIONS

patti.curtis@ed.gov



Chile 2019



STEM Websites

STEM Newsletter www.ed.gov/subscriptions

STEM Webpage www.ed.gov/STEM

ED Grants <https://www2.ed.gov/fund/grants-apply>

Submit questions to: patti.curtis@ed.gov



Presenters



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OFFICE OF CAREER, TECHNICAL
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OF EDUCATION



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NATIONAL INITIATIVE FOR
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CANYON SPRINGS HS, CA
MORENO VALLEY COLLEGE



Albert





Davina Pruitt-Mentle, Ph.D.

Lead for Academic Engagement
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(NICE)

National Institute of Standards and Technology

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- ❖ Prior to joining NICE, she was a senior researcher and policy analyst for Educational Technology Policy, Research and Outreach (ETPRO) and served as the Co-PI for the National Science Foundation (NSF) supported National Cyberwatch Center (NCC).
- ❖ Previous to NCC leadership, she served as faculty within the College of Education at the University of Maryland, College Park, and served as Director of Educational Technology Outreach within the College of Education at UMCP.
- ❖ She has spent the past 20 years conducting research on student and educator cyberawareness, and developing programs to help increase the cybersecurity workforce pipeline.
- ❖ Ph.D. in Educational Technology Policy from the University of Maryland, M.Ed in Secondary Science Education from Lynchburg College, and B.S. in Biochemistry from Virginia Tech. Prior teaching experience at four year university, four year liberal arts college, and taught high school chemistry and physics. Government contractor at Naval Research Lab testing JP5 Jet Fuels.

NICE

NATIONAL INITIATIVE FOR **CYBERSECURITY** EDUCATION

NIST
CYBER



**Davina Pruitt-Mentle, PhD, Lead for Academic Engagement,
NICE/NIST, US Department of Commerce**

About NICE Program Office at NIST

The National Initiative for Cybersecurity Education (NICE), led by the National Institute of Standards and Technology (NIST), is a partnership between government, academia, and the private sector focused on cybersecurity education, training, and workforce development. The mission of NICE is to energize and promote a robust network and an ecosystem of

cybersecurity education, training, and workforce development. NICE fulfills this mission by coordinating with government, academic, and industry partners to build on existing successful programs, facilitate change and innovation, and bring leadership and vision to increase the number of skilled cybersecurity professionals helping to keep our Nation secure.

Mission of NICE

To energize and promote a robust network and an ecosystem of cybersecurity education, training, and workforce development.

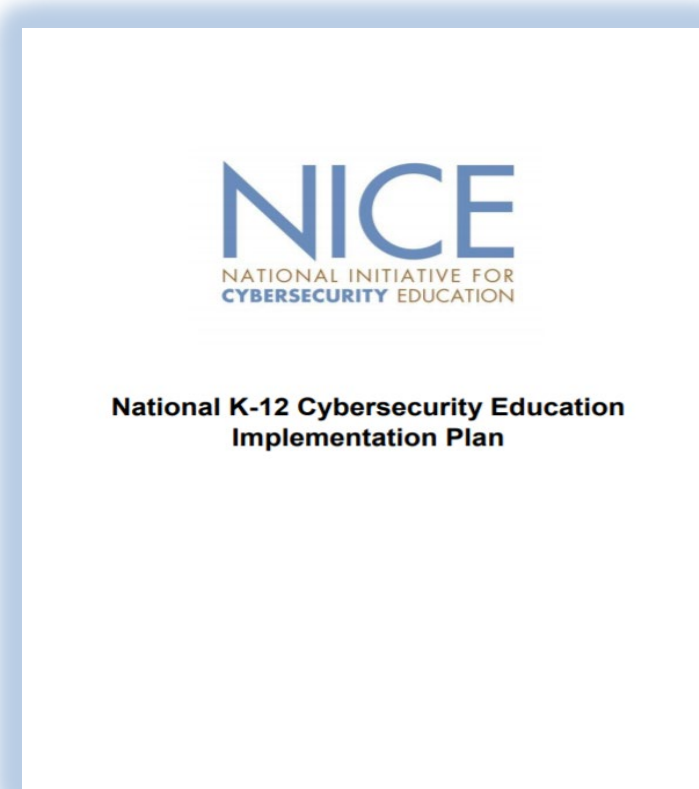


National Strategic Plan for Cybersecurity Education, Training, and Workforce Development

nistgov/nice

NICE Strategic Plan

K12 Implementation Plan



NICE Strategic Plan



GOAL #1

Accelerate Learning and Skills Development

Inspire a sense of urgency in both the public and private sectors to address the shortage of skilled cybersecurity workers



GOAL #2

Nurture a Diverse Learning Community

Strengthen education and training across the ecosystem to emphasize learning, measure outcomes, and diversify the cybersecurity workforce



GOAL #3

Guide Career Development and Workforce Planning

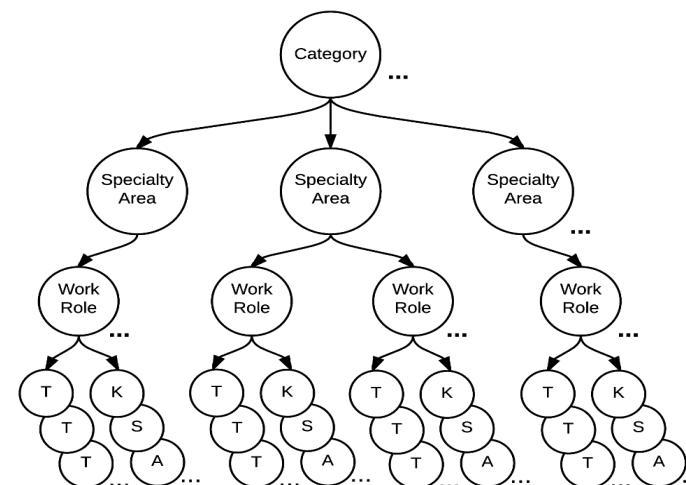
Support employers to address market demands and enhance recruitment, hiring, development, and retention of cybersecurity talent

NICE Cybersecurity Workforce Framework – NIST SP 800-181

Reference Resource for Cybersecurity Workforce Development



- **Specialty Areas (33)** – Distinct areas of cybersecurity work;
 - **Work Roles (52)** – The most detailed groupings of IT, cybersecurity or cyber-related work, which include specific knowledge, skills, and abilities required to perform a set of tasks.
 - **Tasks** – Specific work activities that could be assigned to a professional working in one of the NCWF’s Work Roles; and,
 - **Knowledge, Skills, and Abilities (KSAs)** –
 - Attributes required to perform Tasks, generally **demonstrated through relevant experience or performance-based education and training.**
- Audience:
 - Employers
 - Current and Future Cybersecurity Workers
 - Training and Certification Providers
 - Education Providers
 - Technology Providers




Increase the quantity, quality, and diversity of students pursuing cybersecurity careers

- rigorous academic programs,
- learning experiences,
- awareness and exposure to career opportunities,
- high quality teacher professional development, and
- information regarding available internship and scholarship prospects

- 1. Increase Career Awareness**
- 2. Infuse Cybersecurity Across the Education Portfolio**
- 3. Stimulate Innovative Educational Approaches**
- 4. Identify Academic and Career Pathways**

NICE K12 Sample Initiatives

						
<p>K12 Working Group</p> <p><i>Encouraging a more deliberate focus among new and existing efforts and create synergies among programs and agencies</i></p>	<p>Open Knowledge Network</p> <p>nicek12athome.weebly.com</p> <p><i>K12 Educational Materials: Content Review and Repository Recommendations</i></p>	<p>Pathways</p> <p><i>Curation of known CTE programs and educational resources and development of Toolkit of how to develop a successful CTE Cybersecurity Program</i></p>	<p>Associations /Standards</p> <p><i>Cross mapping NICE Framework and nationally recognized K12 Standards. Content analysis standardization and searchable database</i></p>	<p>Cybersecurity Career Awareness Week</p> <p><i>Inspiring and promoting awareness & exploration of cybersecurity careers</i></p>	<p>National K12 Cybersecurity Education Conference</p> <p><i>Bringing together K12 educators and those interested in K12 cybersecurity education for today's youth</i></p>	<p>Computational Literacy</p> <p><i>Defining what components, key concepts, and/or topics are needed to integrate computational literacy into STEM education at all levels</i></p>

Entertainment



Student Engagement

Main conference: Dec. 7 & 8
Pre-conference: Dec. 5 & 6
Post conference webinars
On-demand sessions
Cyber Signing Day
Keynotes:
Sylvia Acevedo, CSO, Girl Scouts of the USA
Roy Zur, CEO, Cybint
Samuel Grant, Student Keynote

Student Panel

Resources



Counselor Panel

Save the Date!

FOR A REIMAGINED ONLINE EXPERIENCE:
WEEK OF DEC 7, 2020

THE 2020
NICE K12
VIRTUAL
CYBERSECURITY EDUCATION
CONFERENCE

SPONSORED BY:
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NICE
NATIONAL INITIATIVE FOR
CYBERSECURITY EDUCATION

K12CYBERSECURITYCONFERENCE.ORG - #2020NICEK12

Morning Yoga

Digital Badges/Certificates

Virtual Exhibit Hall

Raffle Prizes

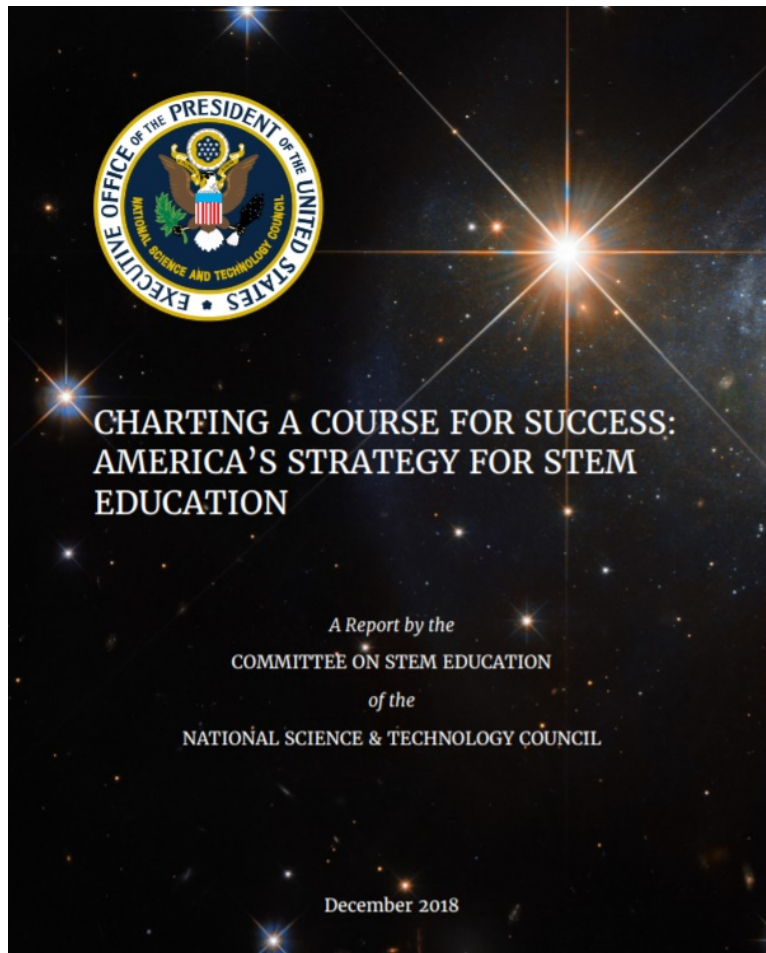


**We invite you to join us in observing
National Cybersecurity Career Awareness Week**

November 9-14, 2020

nist.gov/nice/nccaw

Build Computational Literacy



Goals for American STEM Education	5
Build Strong Foundations for STEM Literacy	5
Increase Diversity, Equity, and Inclusion in STEM	5
Prepare the STEM Workforce for the Future	6
Administration Actions Laying a Foundation for this Plan	7
Pathways to Success	9
Develop and Enrich Strategic Partnerships	9
<i>Foster STEM Ecosystems that Unite Communities</i>	10
<i>Increase Work-Based Learning and Training through Educator-Employer Partnerships</i>	11
<i>Blend Successful Practices from Across the Learning Landscape</i>	13
Engage Students where Disciplines Converge	15
<i>Advance Innovation and Entrepreneurship Education</i>	16
<i>Make Mathematics a Magnet</i>	17
<i>Encourage Transdisciplinary Learning</i>	20
Build Computational Literacy	21
<i>Promote Digital Literacy and Cyber Safety</i>	22
<i>Make Computational Thinking an Integral Element of All Education</i>	23
<i>Expand Digital Platforms for Teaching and Learning</i>	26
Operate with Transparency and Accountability	27
<i>Leverage and Scale Evidence-Based Practices Across STEM Communities</i>	28
<i>Report Participation Rates of Underrepresented Groups</i>	30
<i>Use Common Metrics to Measure Progress</i>	31
<i>Make Program Performance and Outcomes Publicly Available</i>	32
<i>Develop a Federal Implementation Plan and Track Progress</i>	33
A Strategy for National Collaboration	34
Initial Stakeholder Outreach	34

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Thank you!
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Chuck Gardner, Ed.D.

Director of Curricula

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- 1994 Graduate of the US Merchant Marine Academy
- 10-year veteran of the maritime industry
- Switched to education in 2006
- Taught middle school in Brevard County, Florida and high school in New Orleans, Louisiana
- Left the classroom in 2015 to work with CYBER.ORG in Bossier City, Louisiana



- Worked with Basset Hound rescue in Florida starting in 2005
- Have had Bassets in my house ever since, including 7 foster dogs at one point!
- Married to my high school sweetheart
- One daughter at Louisiana Tech University (Ruston, LA)
- One son at Northwestern State University (Natchitoches, LA)



CYBER.ORG

THE ACADEMIC INITIATIVE OF THE CYBER INNOVATION CENTER



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Overview Briefing

Dr. Chuck Gardner

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August 2020



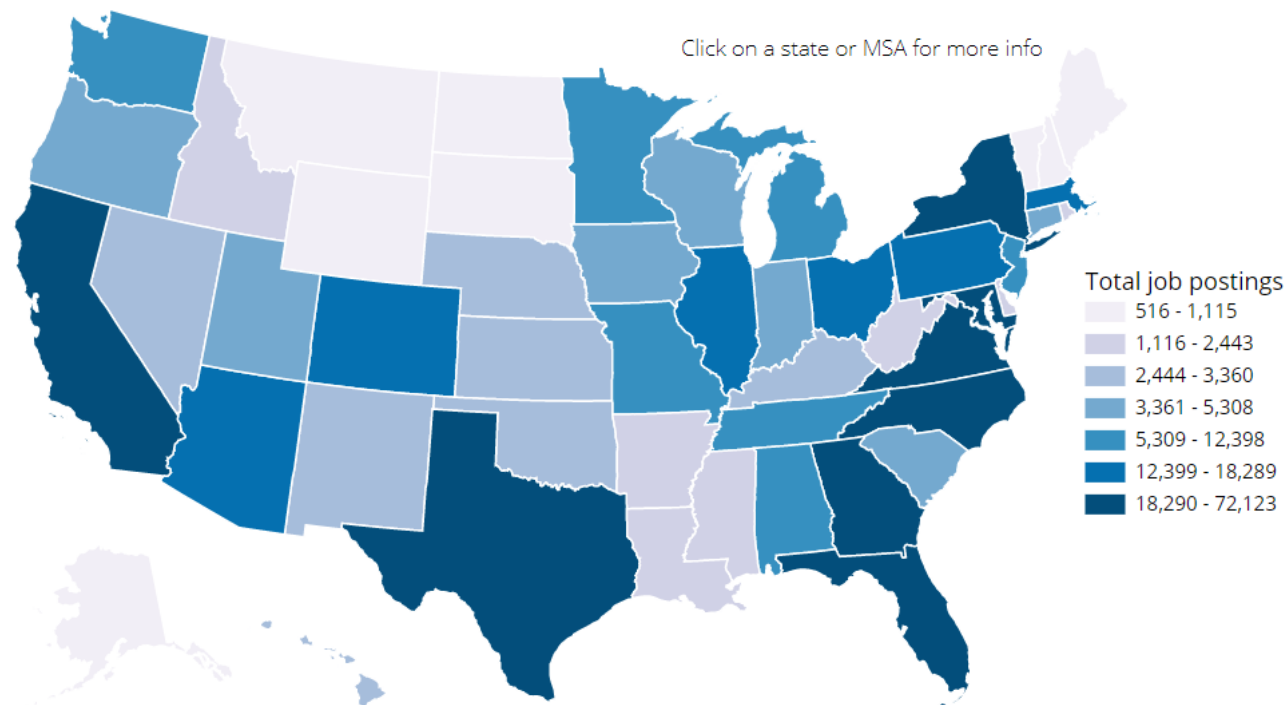
THE WHY

Critical Cyber Workforce Shortage

Our national security and economic stability depends on us solving it.

- Employers are desperate for cyber degree program graduates.³
- **504,316 cybersecurity job vacancies** (Oct. 2018- Sep. 2019)¹, and the shortage continues to grow²
- Cybercriminals now responsible for **billions in losses per year** and **state-sponsored hacking groups** posing an ever-greater threat.³

Cybersecurity Supply/Demand Heat Map
Total Job Openings

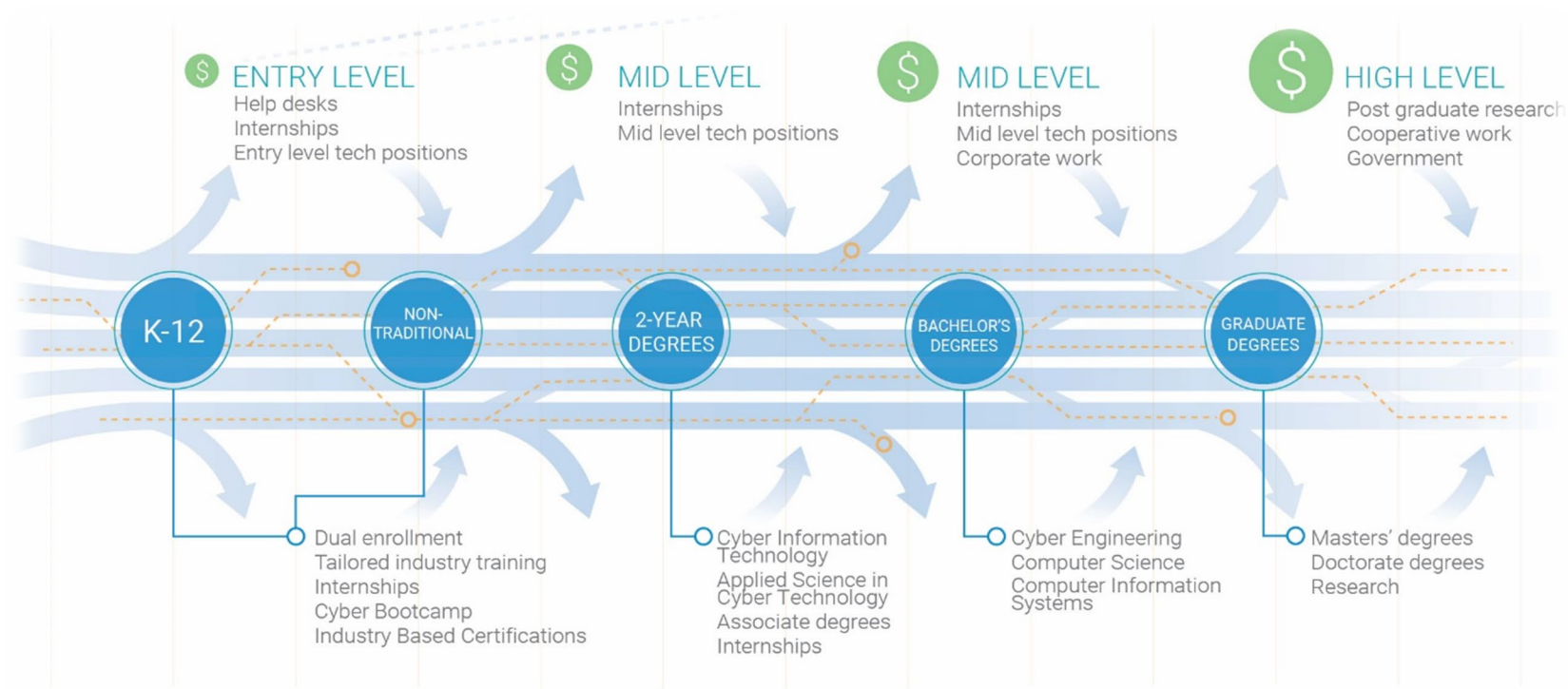


1 CyberSeek.org
2 Supporting the Growth and Sustainment of the Nation's Cybersecurity Workforce. https://www.nist.gov/sites/default/files/documents/2018/07/24/eo_wf_report_to_potus.pdf
3 The Cybersecurity Workforce Gap. William Crumpler & James A. Lewis. https://csis-prod.s3.amazonaws.com/s3fs-public/publication/190129_Crumpler_Cybersecurity_FINAL.pdf

THE WHAT

Workforce Development Programs

The solution for solving this workforce crisis is developing a capable national workforce, bolstered by a dependable pipeline of individuals entering that workforce at every level of education.



BUILDING A
**CYBER
WORKFORCE**

THE TRACK TOWARDS A ROBUST CYBER WORKFORCE BUILDS UPON A COALITION OF K-12 EDUCATION, TWO-YEAR & FOUR-YEAR COLLEGES & UNIVERSITIES IN ORDER TO MAXIMIZE ECONOMIC, WORKFORCE, & CYBER DOMINANCE.



THE HOW CYBER.ORG Solution

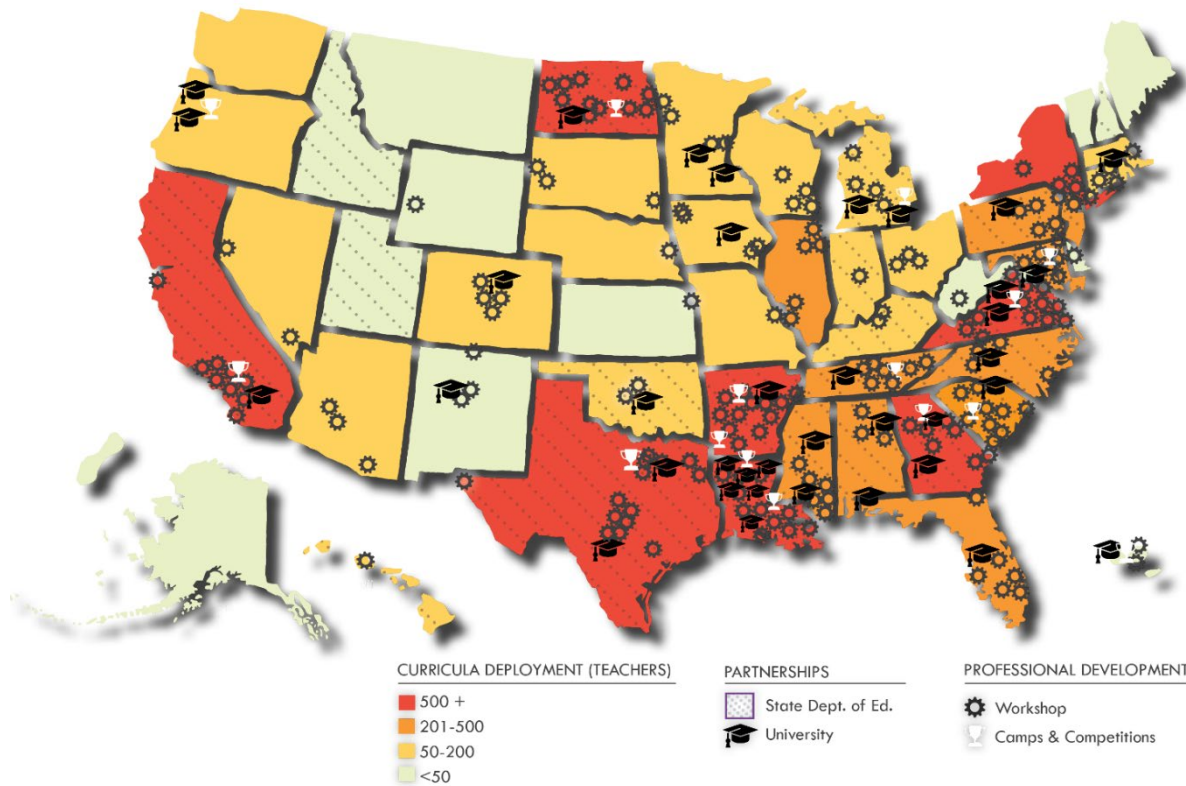
*We believe that the solution starts with reshaping K-12 education to include **cyber career awareness, curricular resources and professional development.***

- Develop and distribute K-12 cyber resources
 - Curriculum and partner projects like Palo Alto Networks Cyber ACES, Girl Scout Cybersecurity Badges, Career Profile Cards
- Empower K-12 educators through train-the-trainer model
 - Specialize in equipping teachers with curricula and training as we cannot reach all K-12 students directly, teachers are our force multipliers. Train-the-trainer model.
- Scalable Program Model
 - CYBER.ORG's replicable program model allows for continued national expansion through multi-level K-12 education engagement.



THE HOW

CYBER.ORG Curricula and Professional Development



CYBER.ORG's Content and Curricula is the vehicle by which we reach students with cyber education and training as well raising cyber career awareness

Strategic Curricula & Professional Development Partners



Pathway Opportunities for High School Students

Year 1

Year 2

Year 3

Year 4

Computer Science Track

Cyber Literacy 1

Cyber Literacy 2

Adv Math

Computer Science
(AP CSP)

Cybersecurity Track

Cyber Literacy 1

Cyber Literacy 2

Cyber Science

Cybersecurity
(based on VACR)

Elective Opportunities

Computational Thinking

Cyber Society





Lindsey Vincent, Ed.D.

- Former High School English Teacher
- Certified Biology Educator
- Certified Adult Educator
- Associate Dean, Research, Outreach, and Innovation in the College of Education
- Director, Science and Technology Education Center



LOUISIANA TECH

UNIVERSITY®

Cyber Education Certificate Program

Dr. Lindsey Vincent | lbkv@latech.edu

Dr. Chuck Gardner | chuck.gardner@cyber.org



CYBER.ORG
THE ACADEMIC INITIATIVE OF THE CYBER INNOVATION CENTER

The Cyber Education Certificate

- A 1-year online program through the College of Education at Louisiana Tech University consisting of 4 courses:
 - History of STEM and cyber education: An educational perspective
 - STEM methods of instruction for cyber learning
 - Cyber literacy
 - Cyber-related project- and problem-based instruction for STEM practitioners
- Based on classroom content that was developed by CYBER.ORG and faculty from LA-Tech's College of Engineering and Science and College of Education.



Details about the Certificate Program

- A 1-year cohort program that typically starts in the fall
- Grants CEU's and graduate course credits for your professional development
- Scholarship funds currently available through the Office of Professional Education Outreach in the College of Education but are limited.
- For more information or to register for the fall cohort by September 1:
 - Contact Erika Jones (erikaj@latech.edu) , or email scitec@latech.edu



Additional Collaborative Cyber Ed Efforts with SciTEC and CYBER.ORG

- Development of National Cyber Ed. Standards
- Student and Teacher focused programming for state and partnership grant awards through the USDOE's GEAR UP opportunity
- NSF NOYCE Cyber Teach Award
- NSF Includes
- Development of Computational Thinking Curriculum
- Development of Drone Flight Afterschool Curriculum with the Boys and Girls Club, UTeachTech, and AE Phillips Laboratory School
- Expansion of Impact through the Louisiana Board of Regents SCILS STEM Center



The Science & Technology Education Center (SciTEC) at Louisiana Tech University is an active outreach program of the College of Education organized to serve the surrounding school systems and communities.

CYBER.ORG

History of STEM and Cyber Ed

- The important events and thinkers in STEM and cyber education
- Cyber career and education paths
- STEM + cyber projects and curricula
- Developing a cyber lesson plan



STEM Methods of Instruction for Cyber Learning

- How our current students learn
- Alignment of STEM courses and cyber activities
- Overview of PBL for cyber instruction
- Integrating literacy with STEM cyber instruction
- Cyber security and safety



Cyber Literacy

- Technology for cyber instruction: robotics, programming, and electronics
- Integrating the humanities with cyber and STEM
- Critical cyber literacy – passwords and cyber-bullying
- Legal issues related to cyber



Cyber-Related PBL Instruction for STEM Practitioners

- Effective use of PBL with a cyber focus
- Effective use of design thinking with a cyber focus
- Instructional tools and methods of unconventional engagement
- Project implementation, assessment, and evaluation



- 2019-2020 recipient of the North Dakota Governor's Innovation in Education Award for Excellence in Building Leadership
- 2020 recipient of the Presidential Cybersecurity Educator's Award
- Contributes to state-wide educational technology-based initiatives
- Helps develop robust, relevant, and equitable academic programming
- Four Bear is a connected educator and may be found via LinkedIn or Twitter @NDNEducation



Kara Four Bear
Superintendent
Eagle Butte Public
School District
Eagle Butte, SD

**STEM/Cyber Education Focused
Curriculum & Development**

Phase I: 2017-2018 Building the Foundation

Planting the Seeds of Innovative Practices, “What if...?”

- ANSEP Dissemination Team: Research Opportunity - Alaska Native Science and Engineering Program
- Culture Shift – Continuous, Ongoing – Facilities, Practices, Mindsets - MTSS Professional Development
- Initial Core Instructional Team (returning) Inter-curricular and STEM Specific Training - NMSI Workshops, NSTA STEM Forum
- Valley City State University (VCSU) Summer STEM Academy – Cohort I (pilot project)



Phase I: 2017-2018 Building the Foundation

*Planting the Seeds
of Innovative
Practices...*

“What if...?”

Phase I: 2017-2018 Building the Foundation
Planting the Seeds of Innovative Practices...
“What if...?”



Phase II: 2018-2019 Developing the Structure

Strengthening the Roots...We are each part of the TEAM!

- Culture Shift – Continuous, Ongoing – Facilities, Practices, Mindsets, Stakeholders - MTSS Professional Development (cont.); NICERC Training (#20); currently working through the Cognia process to become an Cognia STEM certified program/school.
- Development of Depts. and Inter-curricular Collaborations – STEM Academy core class, development of a 6th grade computer class with a “ND DPI Choice Ready Initiative” theme, the integration of Microsoft Suite skill-building, careers exposure, and cyber-security education utilizing the NICERC Computer Science and CyberSecurity Curriculum; the subsequent redesign of our MS curriculum to include authentic and creative inter-curricular planning and learning, and 21st Century skills in action
- Creative Scheduling, Interventions, and a Boost in Computer/Technology Supports: Implementation of the NICERC curriculum, Microsoft Suite skill-builders, additional computer carts, expansion of software exposure and use for students and staff, acquiring classroom sets of STEM technology learning supplies/tools, and the addition of a SmartLab EOY
- Stakeholder and Community Partnerships – STEM Saturdays, Chess Club, Stakeholder Input Community Meetings, Family Nights, and strategic planning to meet the desired views and/or recommendations of stakeholders
- VCSU Summer STEM Academy – Cohort I, Cohort II, and the addition of another District’s Middle School Cohort I
- District-Wide and Building Impacts: Development of a Computer Science class to benefit MS and HS students utilizing the Microsoft TEALS & CODE.org curriculum, a developing alignment of a district-wide curricular pathway for STEM education (K-12), MS participation in NASA education projects, MS participation in regional STEM and medical field youth workshops, an increased showing of MS students involved in Science Fairs at the local, Tribal, and State levels, and the Integration of the ND DPI Choice Ready Initiative at the MS level starting in grade 6

Phase II: 2018-2019 Developing the Structure *Strengthening the Roots..We are each part of the TEAM!*



Phase II: 2018-2019 Developing the Structure *Strengthening the Roots---We are each part of the TEAM!*



Phase II: 2018-2019 Developing the Structure *Strengthening the Roots...We are each part of the TEAM!*



Phase III:2019-2020 Strengthening the Framework

Cultivating Our Garden...We are ALL Learners and grow as a TEAM!

- Evaluate, Adjust: Culture Shift – Continuous, Ongoing – Facilities, Practices, Mindsets, Stakeholders - PBIS Program Launch
- Evaluate, Adjust: Development of Departments and Inter-curricular Collaborations - STEM SmartLab Launch, National Junior Honor Society (NJHS) Launch
- Evaluate, Adjust: Participation in the National Science Competitions, NASA competitions, and other student competitions, STEM Camp – Cohort I, Cohort II, Cohort III
- Evaluate, Adjust: Stakeholder and Community Partnerships – Increased Parental Involvement, MS Parent Booster Group
- Evaluate, Adjust: Instructional Team Inter-curricular and STEM Specific Training - Ongoing NICERC Training, EduTech Training,
- **Cognia/Cognia STEM Certification Goal

Phase III:2019-2020 Strengthening the Framework *Cultivating Our Garden...We are ALL Learners and grow as a TEAM!*

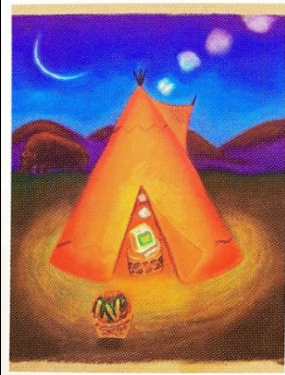


Phase III: 2019-2020 Strengthening the Framework *Cultivating Our Garden..We are ALL Learners and grow as a TEAM!*



It truly does take a village..thank you to our partners in education and beyond for your support of our learners and our mission.

- Cyber.org
- EduTech ND
- Microsoft ND & Microsoft TEALS Program
- Alaska Native American Science & Engineering Program
- ND Center for Distance Education
- Creative Learning Solutions SmartLab
- ND Department of Public Instruction
- ND United Teacher Organization
- ND University System – Valley City State University, Minot State University
- ND County Extension Offices
- Governor Burgum’s ND K20-W Initiative Team
- US Department of Education
- Staff, students, families, and our community!



NDNEducation

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Thank you!

Kara Four Bear


@NDNEducation
Striving for Educational Excellence & Equal Opportunity for
Native Nations

Professional Development / Consulting
Career Training / College Preparation



**MORENO VALLEY
UNIFIED SCHOOL DISTRICT**
EXCELLENCE ON PURPOSE
SHINING BRIGHTER



Powered By 



Donna Woods is a high school, dual-enrollment ICT/Cybersecurity Educator (20 Yrs.) at Canyon Springs HS in Moreno Valley, California. She also serves as the Academic Relations Manager for SynED/Cyber-Guild supporting and facilitating collaborative efforts between industry partners, community colleges, high schools, and legislative leaders throughout California and the US.

She is thoroughly dedicated to strategic mission and vision of NICE K12, ensuring equitable access to all students who endeavor to pursue viable ICT/Cyber careers. Mrs. Woods has been recognized for her dedicated work through receiving the Riverside County CTE Educator of the Year (2016); 61st Assembly District Women of Distinction Award (2018); Riverside County Model of Academic Excellence/Cyber Academic Pathway (2019); and the inaugural 2019-2020 Presidential Cybersecurity Educator's Award.



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EXCELLENCE ON PURPOSE
SHINING BRIGHTER

Cyber Education for All, by All

A new perspective on why
Cyber Education matters

Donna Woods
August 25, 2020

Workforce ICT/Cybersecurity

Quick Facts

3.5 Million Jobs Globally

U.S. Total Workforce 922,720
Job Openings 507,924

All Industry Sectors
are Impacted with ICT
Workforce Demand

Destructive Attacks Up 102%

PowerGrid, Supply Chain,
IoT, Emergency Services

Dark Web Economy in
now the 3rd Largest
Economy in the World
Up 900% in 3 Years

31 Billion Connected Devices

Personal, Home, Work

3% of the World's
Population are still not
connected to the Internet

"Cyber-Security is much more than a matter of IT."

- Stéphane Nappo
2018 Global CISO of the Year

Strengths

Weaknesses

Opportunities

Threats



S.W.O.T Analysis

Since Cybersecurity is our collective responsibility, how can we make a difference in our classroom?

Personal **S.W.O.T** Analysis



Our Collective Cyber Ed Focus



Cyber Hygiene

Practices and steps that users of computers and other devices take to maintain system health and improve online security.



Digital Citizenship

Developing the skills and knowledge to effectively use the Internet and other digital technology, especially in order to participate responsibly in social and civic activities.



National Movement

Equips K-12 teachers with cybersecurity curricula, framework, and education tools.



Equity-Minded

Perspective or mode of thinking exhibited by practitioners who call attention to patterns of inequity in student outcomes.



Current & Relevant

Appropriate to the current time, period, or circumstances; of contemporary interest



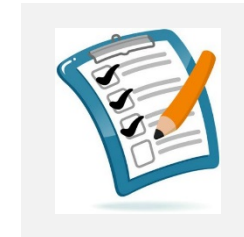
Remote Learning?

Cyber Education in All Curriculum

A Teacher Leader thinks *Beyond* the Walls of their classroom, to see what their *Impact* can be



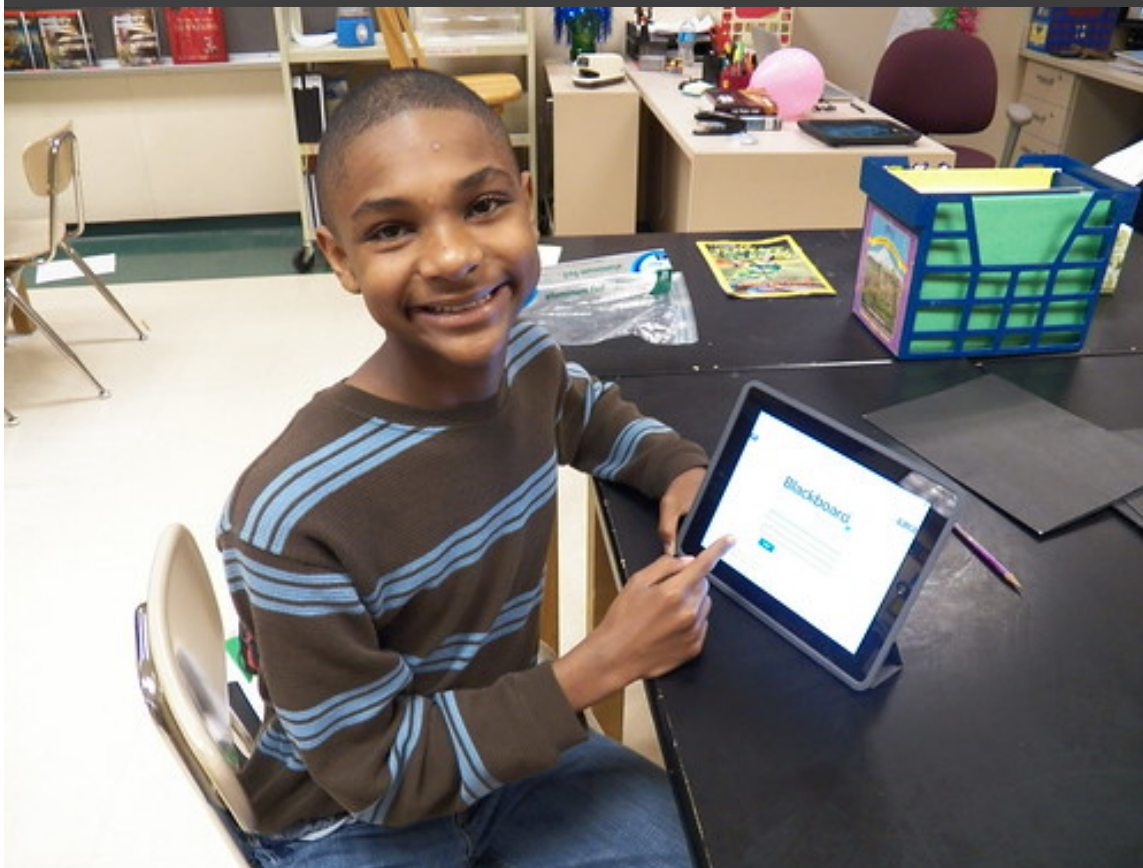
Prioritized



Planned



Purposeful



Classroom to Homeroom

Free Tools & Resources for Every Educator



NICE K12

<https://www.nist.gov/itl/applied-cybersecurity/nice>



Cyber-Guild

<https://cyber-guild.org/>



Cyber A.C.E.S. Program

Activities in Cybersecurity Education for Students

Cyber A.C.E.S

<https://start.paloaltonetworks.com/cyber-aces.html>



iKeepSafe

iKeepSafe

<https://ikeepsafe.org/>

You Make a Difference

Cybersecurity & Equity in Education

National Survey & Report

<https://cyber.org/news/state-cybersecurity-education-k-12-schools>

Equity In Virtual Learning - Dr. Frank Harris III and Dr. J. Luke Wood

<https://www.niu.edu/keepeteaching/workshops/equity-in-virtual-learning.shtml>

Key Points:

Be Intrusive; Be Relational; Be Culturally Relevant & Affirming;
Be Community Focused; Be Race Conscious



Sources

- <https://cybersecurityventures.com/jobs/>
- <https://www.bls.gov/ooh/computer-and-information-technology/home.htm>
- <https://www.cnbc.com/2020/07/29/cybercrime-ramps-up-amid-coronavirus-chaos-costing-companies-billions.html>
- <https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide/>
- <https://techjury.net/blog/how-many-iot-devices-are-there/#gref>
- <https://review42.com/internet-of-things-stats/>
- <https://ikeepSAFE.org/>
- <https://cyber-guild.org/>
- <https://www.nist.gov/itl/applied-cybersecurity/nice>
- <https://start.paloaltonetworks.com/cyber-aces.html>



Questions/Discussion

Email questions to: patti.curtis@ed.gov



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