

North Dakota's K-20W Initiative  
Every Student. Every School. Cyber Educated.

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Great State of North Dakota  
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## Executive Summary

North Dakota's K-20W Initiative is designed to prepare every student to succeed in a digital world.

K-20W, the code name for "Kindergarten through PhD and Workforce," involves 40+ public and private sector partners, including K-12, higher education, workforce development, military, state government and industry partners committed to providing training, resources, educational tools, and professional development in computer science and cybersecurity with a goal of "Every Student. Every School. Cyber Educated."

Why? Technology is changing every industry and every job. Prioritizing these skills will help organically grow our workforce and set students up to succeed, regardless of career path.

As State Superintendent of Public Instruction Kirsten Baesler has stated, "To fully obtain 21st century skills and knowledge, today's students should have a basic understanding of how to use and test an algorithm, how the internet works, how to create an app, and how to develop computational thinking. It is this computational thinking which allows students to look at problems differently, and to develop problem-solving skills that can be applied to any field, for any problem."

The statewide whole-of-government approach is creating momentum through dozens of opportunities for students and teachers to learn valuable skills beyond 'technology' – including problem-solving, communication and teamwork – and providing a foundation for a world where the jobs of tomorrow don't exist yet.

For instance, many in-demand jobs, particularly in the data analytics and [digital marketing spaces](#), didn't exist ten years ago, and according to several sources, cybersecurity itself has a virtually zero percent unemployment rate.

And the workforce gap is predicted to grow. Cybersecurity Ventures predicted 3.5 million unfilled cybersecurity jobs by 2021, up from an estimate of 1 million by Cisco in 2014. This is why North Dakota's leaders are focused on creating opportunities to organically grow a workforce that can help students and citizens pursue fulfilling careers, while supporting continued economic growth.

Team ND is excited to share the story of the K-20W initiative and the growing enthusiasm and commitment to cybersecurity education and training throughout the state.

## Project Narrative

### Concept, Significance and Impact

North Dakota has received accolades as a great place to live, work and do business – our workforce is highly engaged, industries from agriculture and energy to the Unmanned Aerial Systems (UAS) sector are thriving, and we have a phenomenal ecosystem of public and private sector partners committed to growing our state’s economy and supporting our students and workforce.

We also have our eye on the prize: in a world where virtually every industry is being impacted by technology, we are growing our economy and helping set students up for success with a focus on computer science and cybersecurity education.

These foundational skills will help students become savvy digital citizens, while providing a foundation that will benefit them in any profession.

The jobs of today and tomorrow involve significant emphasis on technology skills, which is why North Dakota is pursuing a comprehensive, statewide approach to computer science and cybersecurity (CCS) education and workforce training, with a goal of “Every Student. Every School. Cyber Educated.” The “K-20W” Initiative reflects a whole-of-government approach to helping students and businesses compete and succeed in a global economy.

In fact, a recent [Executive Order by the President](#) emphasizes the cybersecurity workforce as a ‘strategic asset that protects the American people, the homeland, and the American way of life,’ and supports development of cybersecurity skills and capabilities to help ‘advance our national and economic security.’

One of the key ingredients to the overall momentum and success of the initiative so far has been support from state leaders. This includes the state Superintendent, chancellor and other higher education leaders, governor, information technology executives, military leaders, Cabinet leaders, as well as numerous industry and public sector stakeholders.

As a former Microsoft executive and entrepreneur, Gov. Burgum is passionate about positioning the state’s students and economy for success, saying, “Students will use their newfound skills in whatever career path they choose. It’s exciting to see the level of engagement from across the state with regard to learning 21st century skills such as cybersecurity. These kinds of innovative learning opportunities help students solve real-world problems, gain new skills and work as a team to accomplish goals.”

Technology expertise is also essential in a world where every state is competing nationally and globally for talent and capital. Regardless of career path, giving students at all grade levels access to integrated curricula, coding, robotics and similar programs creates a fun, meaningful learning experience that can also open the door to rewarding careers.

North Dakota was recently recognized in a Brookings Institute Report for being a center of economic vitality, described [in this recent article](#). Indicators include: wage growth of 2.3% a year, compared with .8% for the rest of the country. 80.9% of the state's working-age population is working, second only to Minnesota, and GDP per capital rose at 3% a year, the fastest in the country, with productivity growing at a 'sizzling' 2.4% annually.

These all illustrate a strong economy and continued leadership in key sectors. But they also illustrate why we need to promote computer science and cybersecurity education and training. The applications and opportunities are endless:

- Precision agriculture relies on connected sensors and equipment to identify levels of moisture, crop growth, soil nutrients and other factors with pin-point accuracy, helping farmers be more efficient and increase production.
- The energy industry is benefitting from technologies that are expanding our access to shale, natural gas and other natural resources, while improving safety and environmental protections.
- Unmanned Aerial Systems (UAS) and counter UAS efforts in the state are booming, with demonstrable benefits in everything from wind turbine inspection, to high-res crop photography (a key element in precision agriculture) to private sector and military opportunities globally.
- Small and rapidly growing business like [Co-Schedule](#) and [Protosthetics](#) have chosen North Dakota because of our tech-friendly ecosystem and ability to recruit and retain talent.

And our students have every opportunity to continue to help North Dakota lead and pursue high-paying, rewarding career fields that are increasingly reliant on technology expertise. But our challenge is clear. By the numbers:

### **Cybersecurity:**

Cybersecurity has virtually zero unemployment. According to Cyberseek.org there are approximately 301,873 cybersecurity job openings in the U.S., and Palo Alto Networks projects the number of cybersecurity job openings worldwide will be 6 million by 2019.

### **Computer Science:**

There are more than 570,000 computing jobs open nationwide.

It is projected that there will be 1.4 million computer science (CS)-related jobs by 2020, yet U.S. college graduates are expected to fill less than a third of those jobs.

Data from the Bureau of Labor Statistics show that by 2020 there will be 1.4 million new computer science jobs, but only 400,000 computer science students.

The number of computer science jobs, according to Code.org, is growing at a pace two times the national average for job growth.

## **In North Dakota:**

There are approximately 721 open computing jobs, yet we have only 162 CS graduates within the state. (Source: [Code.org](https://code.org))

The “K-20W” Initiative team is a collaborative effort with dozens of partners who are providing resources and training to teachers, administrators, parents and students. Planting seeds of curiosity around technology and nurturing those interests from grade school through high school and post-secondary training will help create a 21st century technology literate workforce.

## Partnerships

That is why strategic alliances with organizations including the National Integrated Cyber Education Research Center (NICERC), Microsoft TEALS (Technology Education and Literacy in Schools), Code.org, and the National Center for Women & Information Technology (NCWIT) are instrumental to success. These partnerships amplify our ability to reach rural and urban areas of the state with computer and cyber science training, certification and classroom resources while connecting the state to broader, national dialogue on these key issues.

These partnerships have yielded significant capacity in professional development and classroom resources, including:

- \$150K classroom equipment to teachers who complete NICERC training; EduTech was also the first organization nationally to be certified as NICERC state training partner;
- Microsoft TEALS was implemented in 14 schools and builds on the state’s TechSpark partnership, which includes a \$50,000 grant and partnership with Learning Forward North Dakota that is helping build professional learning standards and best practices via EduTech’s delivery of the Code.org, NICERC, and Microsoft training platforms to support the growth and development of computer science education across the state;
- Minecraft events were held in 4 locations with over 70 N.D. educators and in-classroom support from EduTech Minecraft experts;
- CSTA (Computer Science Teacher Association) <https://www.csteachers.org/> Chapter currently being established in the state;
- ND EduTech is expanding tribal partnership for CCS and STEM:
  - New Town Middle School is a pilot STEM school and K-20W partner;

- Turtle Mountain Tribal Community College partnership included a 2-day high school teachers and student cybersecurity exploration of computer science and 2-day virtual opportunity for teachers as follow up with two professional learning credits.

We recognize that to compete locally – and globally – we need to create a technology literate workforce that can compete and succeed in the 21st century economy.

North Dakota is not only a great place to live, work and do business – it's leading the way in innovative education and a future-facing approach to helping our students and communities thrive well into the future.

## Impact

There have been significant accomplishments since the initiative launched with a group of twenty participating organizations in Jan. 2018.

- As of March 2019, EduTech (the Educational Technology arm of the state's IT team) has provided dozens of training sessions for more than 1,800 participating teachers (\*aggregate number, doesn't represent unique attendees) focused on computer science and cybersecurity, including NICERC, Code.org, and Minecraft in Education workshops.
- The state's overall goal is to train 700 teachers across the state on computer science and cybersecurity resulting in one trained teacher for every 160 public school students.
- The Department of Public Instruction is implementing newly drafted [computer and cybersecurity science standards](#) - the first in the nation to emphasize cybersecurity.
- Higher education institutions are creating new degree and apprenticeship opportunities, including a partnership between Bismarck State College and Palo Alto Networks that will grow the college's Cybersecurity and Computer Networks Program.
- North Dakota State University has new cybersecurity education focus in its PhD program, and along with Bismarck State College, was recently designated a Center of Academic Excellence in Cyber Defense by NSA and Homeland Security.

Additional highlights include:

- In the state's first year participating in the SANS Institute's Girls Go CyberStart and College Fast Track programs, [310 girls from 28 schools participated](#) – the highest per capita participation out of 26 states overall.

- For Cyber Fast Track, the college version of the program, 10 out of 69 participants are women, and 10 of the 69 advanced to the quarterfinals in the game with a chance to win \$2.5 million in scholarships.
- North Dakota State University in Fargo hosted a GenCyber Camp for high school students (funded by NSA and NSF) in 2018 and is also slated for June and August 2019 (along with a camp at Bismarck State College. UCodeGirl, a Fargo-Moorhead based 501©3, is also hosting “Crack the Code: Tech Camp for Girls”);
- Partnership with Palo Alto Networks is helping [BSC to grow its Cybersecurity and Computer Networks Program](#).
- EduTech hosted a Technology Showcase during the 2019 Legislative Session, highlighting 10 schools that are leaders in Computer Science and Cybersecurity innovative education, and providing valuable interaction with legislators and students. The K-20W team is also actively promoting and supporting Robotics/STEAM clubs throughout the state.
- ND Center for Distance Education (North Dakota’s virtual school) is offering new online courses in cybersecurity.
- Focus on promoting women in technology and cybersecurity through partnerships with Microsoft TechSpark, uCodeGirl and Girls Go CyberStart participation, among other efforts including MindShift and non-traditional workforce pipelines.
- North Dakota hosted what is believed to be the first simultaneous, statewide Hour of Code in Dec. 2018 with 5,000 students from 100 schools K-12 and higher ed) participating.
- These accomplishments amplify our ability to reach rural and urban areas of the state, including North Dakota’s > 120,000 students, and provide training to help recruit and retain workers for the state’s more than 1,100 computer-related job openings.

Computer science and cybersecurity aren’t fads. They are foundational skills in the 21<sup>st</sup> century economy. North Dakota’s K-20W initiative is creating awareness, inspiring a grassroots movement, and building capacity towards the goal of Every Student. Every School. Cyber Educated.