BRICCS Workshop 2021:
Preparing Technicians for the Future of Work

Hope Cotner, President & CEO
Ann-Claire Anderson, Vice President - Special Projects
Center for Occupational Research and Development
Enable the NSF-ATE community (2-year colleges) to collaborate regionally with industry partners, within and across disciplines, on the transformation of associate degree programs to prepare US technicians for the work of the future.
The Project Goals

**Goal 1:** Empower community colleges to prepare technicians for the work of the future.

**Goal 2:** Promote regional collaboration between community colleges and industry to determine the technical demands of work of the future.

**Goal 3:** Support Regional Networks focused on technician education for the work of the future.

**Goal 4:** Foster adoption of the cross-disciplinary STEM core to maximize impact on technician education.
What’s Happening?

- Nature of work changing at unprecedented speeds
- Technology advancements in machine learning, AI, IoT, and robotics eliminating some jobs, creating others
- Technicians sit at the center of much of this disruption
- Education must keep up
- Our students’ career paths will evolve
Job Categories – Globally Increasing Demand
97 Million by 2025

- Data Analysts
- AI/Machine Learning Specialists
- Big Data Specialists
- Digital Marketing Specialists
- Process Automation Specialists
- Digital Transformation Specialists
- Information Security Analysts
- Software and App Developers
- Internet of Things Specialists
- Project Managers

World Economic Forum, Future of Jobs, 2020
What does this mean for the role of the technician?

As jobs come to be redefined by new modes of work, the result is a hybridization that mashes together skills from disparate domains and demands greater breadth and flexibility of the workforce.

Are there specific knowledge and skill areas that will help “future proof” STEM Technicians?

The Cross-Disciplinary STEM Core:
Skill Area 1: Data Knowledge and Analysis
Skill Area 2: Advanced Digital Literacy
Skill Area 3: Business Knowledge and Processes
Essential Skills in Data Knowledge and Analysis

- Computational thinking *
- Data analysis *
  - Statistics
  - Analytics tools *
  - Data visualization *
- Data literacy/fluency *
- The data management life cycle

- Data management
  - Data storage
  - Spreadsheets *
  - Data modeling
  - Databases
  - Query languages
  - Data backup and restoration
Essential Skills in Advanced Digital Literacy

- Automation/robotics
  - Human-Machine Interface *
- Digital literacy/fluency*
  - Cloud literacy
- Network/device communication*
- Security controls*
- Basic programming

- Artificial Intelligence/machine learning
- Digital twins
- Edge computing
- Network architecture
- Function block diagram programming
- Internet of Things (IoT)
Essential Skills in Business Knowledge and Processes

- Communication *
- Continuous process improvement *
- Ethics *
- Lean processes *
- Customer focus/ Stakeholder analysis *
- Business cycles
- Supply/demand
- Logistical chains

- Entrepreneurship
- Market trends
- Return on Investment (ROI)
- Risk management
- Entrepreneurship
- Blockchain
- Vertical and horizontal integration
- Overall Equipment Efficiency (OEE)
A Framework for a Cross-Disciplinary STEM Core

**DATA KNOWLEDGE AND ANALYSIS**
- Manipulating and interpreting data to resolve issues and using Excel and other common software proficiently to accomplish tasks
- Analytics tools
- Computational thinking
- Data analysis
- Data backup and restoration
- Databases
- Data fluency
- Data life cycle
- Data management
- Data modeling
- Data storage
- Data visualization
- Query languages
- Spreadsheets
- Statistics

**ADVANCED DIGITAL LITERACY**
- Understanding digital communications and networking, cybersecurity, machine learning, sensors, programming, and robotics at a higher than introductory level
- Artificial intelligence/machine learning
- Automation/robotics
- Basic programming
- Cloud literacy
- Digital fluency
- Digital twins
- Edge computing
- Function block diagram programming
- Human-Machine Interface (HMI)
- Internet of Things (IoT)
- Network architecture
- Network communication
- Security controls

**BUSINESS KNOWLEDGE AND PROCESSES**
- Understanding the value chain and business practices of an enterprise and applying principles of ethical adoption of new technologies
- Business cycles
- Blockchain
- Communication
- Continuous process improvement
- Customer/stakeholder analysis
- Entrepreneurship
- Ethics
- Lean processes
- Logistical chains
- Market trends
- Overall Equipment Efficiency (OEE)
- Return on Investment (ROI)
- Risk management
- Supply and demand
- Vertical and horizontal integration

PreparingTechnicians.org
How can we integrate new foundational knowledge and skills into STEM technical programs?
Processes for Incorporating the Cross-Disciplinary STEM Core Topics into Technical Programs

- Prioritize Topics
- Determine Integration Points
- Develop Real-World Scenarios
- Provide Faculty Development
- Support Systemic Change
How can we integrate new foundational knowledge and skills into STEM technical programs?

Exploration through Regional Convenings of community college educators and industry partners
Regional Convenings are...

Cross-sector, cross-discipline educator + employer forums with the goal of creating sustainable regional networks that integrate the project-identified cross-disciplinary STEM core into technician education programs.
Gulf Coast Regional Convening

- Three consecutive Fridays at lunchtime
- 90-min web meeting with regional speaker, national speaker, and breakout room discussions
- One topic from the cross-disciplinary STEM core per meeting: digital literacy, data analysis, business knowledge and processes
- Multi-sector, multi-discipline representation
- Attendance numbered 26-35
Each participating college district has a large service area. Together they stretch from the extended Houston metropolitan area north and south and all the way to the coast

- San Jacinto College
- College of the Mainland
- Lone Star College
Vision for Our Work with Regions

**Coalesce** multi-discipline, multi-sector stakeholders

Support the **future skilled technical workforce** within regional economies

**Expand and accelerate** effective practices

Develop, adopt, refine, and implement **regional recommendations** for STEM technicians
What happened next?
Convening Follow-up: Regional Sectors Analyzed

- Aerospace and Aviation
- Biomedical Technologies
- Construction and Maintenance
- Manufacturing
- Maritime Services
- Process Technology
Texas Gulf Coast Regional Convening

Over 6 weeks, core group conducted regional follow-up interviews with industry

Identified critical needs

College administrators
Workforce education
Technical faculty
Economic development

Regional industry:
Aerospace
Petrochemical
Construction
Manufacturing
Maritime
Aviation
Key Findings

- Technology has changed the way most industries function today and will function in the future.
- Technology is providing the ability for companies to be more efficient.
- All employees will need to be digitally literate in all sectors with varying degrees of mastery depending on the sector and tasks required of the technician.
- With the ability to collect digital data, the need to be able to analyze that data is becoming more critical.
Critical Needs

Community College Petroleum Industry Working Group (a Regional Network)

Direction for Professional Development and Instructional Materials