

BRICCS Workshop 2021: Preparing Technicians for the Future of Work

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Preparing Technicians for the
FUTURE OF WORK





The Project's Role

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

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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.

The New Foundational Skills of the Digital Economy: Developing the Professionals of the Future, Burning Glass/Business Higher Education Forum, 2018.



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)

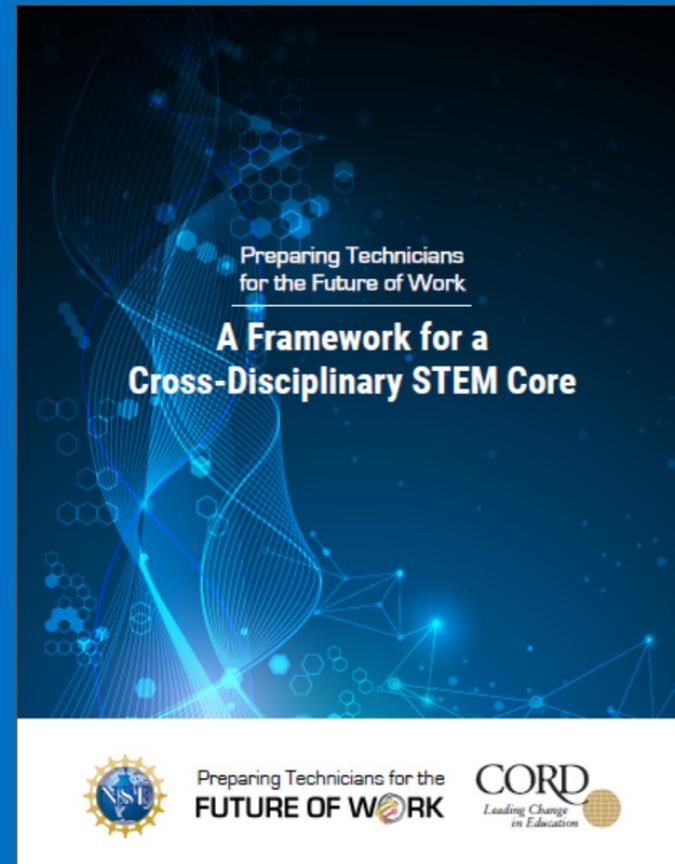
Essential Skills in Business Knowledge and Processes



- 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	ADVANCED DIGITAL LITERACY	BUSINESS KNOWLEDGE AND PROCESSES
<p>Manipulating and interpreting data to resolve issues and using Excel and other common software proficiently to accomplish tasks</p>	<p>Understanding digital communications and networking, cybersecurity, machine learning, sensors, programming, and robotics at a higher than introductory level</p>	<p>Understanding the value chain and business practices of an enterprise and applying principles of ethical adoption of new technologies</p>
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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



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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



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*Leading Change
in Education*

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Your Goals. Your College.


**UPSKILL
HOUSTON**
An Initiative of the Greater Houston Partnership

 **GREATER HOUSTON
PARTNERSHIP.**
Making Houston Greater.

Gulf Coast Regional Convening

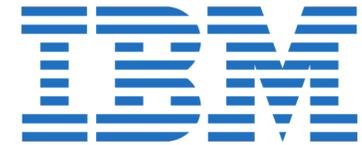


- Each participating college district has a large service area. Together they stretch from the extended Houston metropolitan area north and south and all the way to the coast
 - San Jacinto College
 - College of the Mainland
 - Lone Star College

INEOS
Olefins & Polymers USA



aggreko



AECOM



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**