Defining Workforce Education’s Impact on Economic Development and Innovation

The Hidden Innovation Infrastructure (HII):
The Role of Economic Development in Technician Education in the Changing Future of Work (NSF ATE: 2026262)

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Outline

• HII Project Overview
  Goals, Objectives, Key Activities
  Research Plan, Methods
  Conceptual Model
  Grantee Review Findings
  Case Study Colleges
• Case Study Overview: Daytona State College
• Discussion and Questions
Study Goals & Objectives

• Uncover how ATE’s development of the technician workforce through innovation in community college technician education programs contributes to economic development.

• Develop a better conception of how community college technician education contributes to economic development in terms of skill development and support of the innovation ecosystem.

• Develop measures of how technician skill development contributes to firm-level innovation and productivity and regional economic development.
Key Project Activities

- **National Analysis of ATE and Community College Technician Education**
  - Review of Past and Current ATE Grants
  - Quantitative analysis of trends and impacts

- **Regional Case Studies of Community College Technician Education in Manufacturing in Regions and Firms**
  - In-depth Interviews
  - Employer Surveys
Economic Development

All the activities that seek to promote economic activity in a region, state, or country

Inclusive economic development refers to access to economic growth for all actors in an economy is an important lens for economic development

Geographic focus can include national, state, regional, or local; for community colleges, it is often regional
Community Colleges & Economic Development

Collaborative and Inclusive Approaches

Community College Activities
- Education and Training Programs
- Business Support
- Regional Engagement

Economic Development Outcomes
- Skilled and Inclusive Workforce
- Productive, Innovative, and Inclusive Firms
- Productive, Innovative, and Inclusive Regional Ecosystems
Community College Economic Development Activities

**Education and Training**
- Courses & programs aligned with local workforce needs
- Customized training

**Business Support**
- Entrepreneurship training; small-business incubation and assistance
- Opening up facilities for use by local companies
- Technology transfer
- Applied research

**Regional Engagement**
- Conducting economic scans
- Participation in local economic planning/policymaking
- Assistance in attracting employers to the region
- Convening regional stakeholders
Grantee Review Methods

- Analysis of EvaluATE survey data, 2010, 2018

- Interviews with ATE grantees:
  - Selection based on review of grant abstracts and recommendations from advisory board and former project officers; 39 grantees invited for interview
  
  - Interviews conducted with 28 respondents from 23 grantees, including national & regional centers, and projects

  - Conducted Mar. – Nov. 2022 via Zoom

  - Transcribed, summarized, reviewed for themes, completed structured analysis template
Grant Focus

• Most grantees are focused on workforce development.

• Few grantees intentionally articulated economic development goals.

• Most ATE centers did focus on economic development goals.
Collaborations with external organizations

• Collaborations **Industry associations** provide various kinds of support

• **Four-year institutions** promote innovation, provide subject matter expertise

• **High schools** are a pipeline to the workforce and can connect to underrepresented populations

• 2 levels of collaboration emerged
  • Participating
  • Leading
Activities related to Economic Development

- Providing small business **incubation** and **entrepreneurship**.
- Generating **economic research** to support economic development.
- Working with universities to generate **innovative uses of technology**.
- Coordinating efforts with industry to **promote student hands-on learning**.
- Conducting outreach to **high-need communities** to promote inclusive economic development.
- Participating in **new employer recruitment** to a region.
- **Convening regional stakeholders** both workforce and economic development stakeholders.
In-Depth Regional Case Studies

Focused on 2 Advanced Manufacturing Programs at 8 sites

- AZ: Pima and Mesa
- OH: Columbus State and Lorraine
- WI: Gateway Technical College
- FL: Daytona State College

DATA COLLECTION

- College and program documents
- Quarterly Meetings
- Virtual interviews of college personnel
- Site visits with interviews including industry partners
FAME Program at DSC

NCATC35 Conference
September 22, 2023
# Fast Facts about DSC

## Enrollment 2022/2023

<table>
<thead>
<tr>
<th>Campus</th>
<th>Headcount</th>
<th>FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Technology College</td>
<td>1,956</td>
<td>482.3</td>
</tr>
<tr>
<td>Daytona Beach</td>
<td>18,587</td>
<td>8,010.5</td>
</tr>
<tr>
<td>DeLand</td>
<td>1,813</td>
<td>425.2</td>
</tr>
<tr>
<td>Deltona</td>
<td>1,413</td>
<td>327.7</td>
</tr>
<tr>
<td>Flagler/Palm Coast</td>
<td>1,142</td>
<td>358.4</td>
</tr>
<tr>
<td>New Smyrna Beach/Edgewater</td>
<td>765</td>
<td>111.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20,702</td>
<td>9,715.6</td>
</tr>
</tbody>
</table>

* Total headcount does not equal the sum of the campuses because individual students take courses on more than one campus.

## Program 2022/2023

<table>
<thead>
<tr>
<th>Program</th>
<th>Headcount</th>
<th>FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baccalaureate</td>
<td>1,797</td>
<td>854.9</td>
</tr>
<tr>
<td>Associate of Arts</td>
<td>7,207</td>
<td>5,386.8</td>
</tr>
<tr>
<td>Associate of Science</td>
<td>3,189</td>
<td>2,042.1</td>
</tr>
<tr>
<td>Certificate</td>
<td>1,919</td>
<td>1,255.5</td>
</tr>
<tr>
<td>GED</td>
<td>265</td>
<td>27.4</td>
</tr>
<tr>
<td>ESOL</td>
<td>601</td>
<td>92.9</td>
</tr>
<tr>
<td>Adult Basic Education</td>
<td>379</td>
<td>56.0</td>
</tr>
</tbody>
</table>

* Program is the program the student has declared at the end of the Drop/Add period for each semester enrolled.

## Special Populations 2022/2023

<table>
<thead>
<tr>
<th>Population</th>
<th>Headcount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Enrollment</td>
<td>2,916</td>
</tr>
<tr>
<td>Veterans</td>
<td>1,445</td>
</tr>
<tr>
<td>Athletes</td>
<td>281</td>
</tr>
</tbody>
</table>

## Student Profile 2022/2023

<table>
<thead>
<tr>
<th>Race</th>
<th>College</th>
<th>Adult Ed</th>
<th>Cont. Ed</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>55%</td>
<td>26%</td>
<td>46%</td>
</tr>
<tr>
<td>African American</td>
<td>13%</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>22%</td>
<td>53%</td>
<td>9%</td>
</tr>
<tr>
<td>Asian</td>
<td>3%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Two or more Races</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Unknown (Not Reported)</td>
<td>2%</td>
<td>3%</td>
<td>33%</td>
</tr>
</tbody>
</table>

* Total percentage of students does not add up to 100% because some students report multiple race/ethnicity.

## Financial Aid 2022/2023

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Awards</th>
<th>Percentage of Students</th>
<th>Number of Students</th>
<th>Dollars Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants</td>
<td>19,447</td>
<td>34.1%</td>
<td>6,209</td>
<td>$26,509,332.83</td>
</tr>
<tr>
<td>Loans</td>
<td>6,901</td>
<td>15.7%</td>
<td>2,859</td>
<td>$10,805,723.43</td>
</tr>
<tr>
<td>Scholarships</td>
<td>2,836</td>
<td>8.2%</td>
<td>1,501</td>
<td>$3,274,376.55</td>
</tr>
<tr>
<td>Work Study</td>
<td>184</td>
<td>0.7%</td>
<td>130</td>
<td>$323,679.89</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29,368</td>
<td>58.7%</td>
<td>10,699</td>
<td>$40,913,121.70</td>
</tr>
</tbody>
</table>

* Total number of students and percent does not equal the sum by financial aid type because most students receive more than one type of aid.

## Degrees & Certificates Awarded 2022/2023

<table>
<thead>
<tr>
<th>Degree</th>
<th>Number Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baccalaureate</td>
<td>416</td>
</tr>
<tr>
<td>Associate of Arts</td>
<td>1,457</td>
</tr>
<tr>
<td>Associate of Science</td>
<td>566</td>
</tr>
<tr>
<td>Certificate/EPI</td>
<td>858</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,297</td>
</tr>
</tbody>
</table>

## Personnel (Fall 2022)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>234</td>
</tr>
<tr>
<td>Staff</td>
<td>571</td>
</tr>
<tr>
<td>Administrators</td>
<td>61</td>
</tr>
<tr>
<td>Adjunct Faculty (Part-time)</td>
<td>539</td>
</tr>
<tr>
<td>Female</td>
<td>756</td>
</tr>
</tbody>
</table>

## Tuition 2022/2023

<table>
<thead>
<tr>
<th>Type</th>
<th>In-State</th>
<th>Out of State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Degree (per credit)</td>
<td>$79.22</td>
<td>$311.18</td>
</tr>
<tr>
<td>Baccalaureate Degree (per credit)</td>
<td>$191.79</td>
<td>$550.43</td>
</tr>
<tr>
<td>Vocational Certificates (per voc credit)</td>
<td>$68.53</td>
<td>$276.00</td>
</tr>
<tr>
<td>Adult Education (per student)</td>
<td>$30.00</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

## Population (2022 Bureau of Economic and Business Research)

<table>
<thead>
<tr>
<th>Location</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flagler County</td>
<td>124,202</td>
</tr>
<tr>
<td>Volusia County</td>
<td>572,015</td>
</tr>
<tr>
<td>Florida</td>
<td>22,276,132</td>
</tr>
</tbody>
</table>

## Unemployment Rates (June 2023)

<table>
<thead>
<tr>
<th>Location</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flagler County</td>
<td>3.6%</td>
</tr>
<tr>
<td>Volusia County</td>
<td>3.2%</td>
</tr>
<tr>
<td>Florida</td>
<td>3.0%</td>
</tr>
<tr>
<td>U.S.</td>
<td>3.6%</td>
</tr>
</tbody>
</table>
FAME - AMT

• Federation for Advanced Manufacturing Education
  – Advanced Manufacturing Technician program
  – Originated with Toyota (ca 2005 in KY)

• Employer chapter partners with a local college

• FL Sunshine Chapter with support of the VMA, first chapter in Florida

• VCS has been instrumental to recruitment
Connections with Industry

• Volusia Manufacturers Association
  – Education Committee
  – FAME program, Sunshine chapter

• Work Experience Coordinator (Perkins)
  – Co-op placement
  – Industry Advisory Board

• Work Based Learning Advisor (Title III)
  – FAME & CET student support
• Career Source
• Chamber of Commerce
• Team Volusia
• Volusia County
• Southeast Volusia Manufacturing & Technical Coalition
• Tech Corridor
• Regional economic development
Advanced Manufacturing Technician (AMT)
Program Status

Community Colleges = 31
Universities = 4
States = 13
AMB Program Active ○
Employers engaged ~ 300

KEY: AMT PROGRAMS & FAME CHAPTERS
1. Bluegrass CTC / KY FAME-Bluegrass / Georgetown, KY
2. Danville CTC / KY FAME-Bluegrass / Danville, KY
3. BridgeValley CTC / Toyota / South Charleston, WV
4. Vincennes University / IN FAME-Princeton / Vincennes, IN
5. Island CC / Toyota / Tupelo, MS
6. Alamo Colleges / TX FAME-Alamo / San Antonio, TX
7. Jackson State CC / TN FAME / Jackson, TN
8. Calhoun CC / AL FAME-1 / Decatur, AL
10. State Tech College of Missouri / MO FAME / St. Charles, MO
11. Gateway CTC / KY FAME-Northern Kentucky / Florence, KY
12. Elizabeth Town CTC / KY FAME-Lincoln Trail / Somerset, KY
14. Somerset CTC / KY FAME-Cumberland / Somerset, KY
15. Owensboro CTC / KY FAME-Owensboro / Owensboro, KY
16. Southeastern Ky CTC / KY FAME-Sky FAME / Franklin, KY
17. Hopkinsville CTC / KY FAME-West / Hopkinsville, KY
18. West Kentucky CTC / KY FAME-West / Paducah, KY
19. Maryville CTC / KY FAME-Northeast / Maryville, KY
20. Henderson CTC / KY FAME-Kendle / Henderson, KY
21. Northwestern State Univ. & Central Louisiana Community Technical College / GeauxFAME / NATCHITOCHES, LA
22. University of Arkansas at Monticello at Crosscut
AR FAME / Crosscut, AR
23. Tyler Junior College / TX FAME-Tyler / Tyler, Texas**
24. Owens CC / OH FAME-OH FAME / Findlay, OH**
25. Wallace State CC / AL FAME-2 / HANCEVILLE, AL**
27. Gadsden State CC / AL FAME-East / GADSDEN, AL**
28. Midlands Technical College / SC FAME-Columbia / Columbia, SC**
29. Richland College / TX FAME-Dallas Region / Garland, TX**
30. Daytona Beach State College / FL FAME-Sunshine / Daytona Beach, FL**
31. TBD / IN FAME-Central Indiana / Indianapolis, IN**
** = In active start-up process
• Students enrolled in the AS Engineering Technology
• Each student interviewed and sponsored by a local company
• Work 3 days/week, attend class 2 days/week
  – Cover FAME topics and college courses
• Progress as a cohort over 5 terms
• Meet academic and attendance expectations
• Each semester has a theme
  – MCE-1 (Safety Culture)
  – MCE-2 (Visual Workplace Organization/5S)
  – MCE-3 (Lean Manufacturing)
  – MCE-4 (Problem Solving)
  – MCE-5 (Machine Reliability)
• Professional Behaviors are reinforced throughout the curriculum
Skills & Competencies

**Advanced Manufacturing Technician Program**

**Associate Degree in Applied Science**

**TOYOTA MAINTENANCE FUNDAMENTAL SKILLS**

<table>
<thead>
<tr>
<th>1st Semester</th>
<th>2nd Semester</th>
<th>3rd Semester</th>
<th>4th Semester</th>
<th>5th Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>Selected by FAME (companies) for best work preparation: Math, English, Public Speaking, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Core Areas</td>
<td>FOUNDATION: MATH/MEASUREMENT/TECHNICAL DRAWINGS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MULTISKILLS: ELECTRICITY/PLC/ROBOTS/FLUID POWER/MECHANICS/FABRICATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAPSTONE: SYSTEM INTEGRATION/INDUSTRIAL TROUBLESHOOTING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Experience Program</td>
<td>Production Experience (Be the Customer)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skilled Technician Introduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skilled Technician Capability Building (Serve the Customer)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Culture</td>
<td>Continue practice of activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing Core Exercises</td>
<td>Visual Workplace Organization (5S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continue practice of activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lean Manufacturing (TPS-M)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continue practice of activity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CHARACTERISTICS WHEN HIRED**

- Communication and critical thinking skills
- Multiskilled Technical Foundation
- Poor experience and hands-on skill
- Good safety practice on hire
- 5S understanding and practice on hire
- Lean thinking and practice on hire
- Problem solving thinking and use on hire
- Understanding of maintenance practice on hire
- Excellent worker behavior on hire

**Internship**

- Communication and critical thinking skills
- Multiskilled Technical Foundation
- Poor experience and hands-on skill
- Good safety practice on hire
- 5S understanding and practice on hire
- Lean thinking and practice on hire
- Problem solving thinking and use on hire
- Understanding of maintenance practice on hire
- Excellent worker behavior on hire
Employer Roles/Responsibilities

• Actively Track Progress

• Regularly check to ensure that the FAME student is on track with their company side plan

• Regularly check with their trainers and mentors if they are developing satisfactorily

• Regularly check with their school leaders to confirm their performance and progress there

• Address problems as soon as they occur
Eligibility Requirements

- Be 18 years of age by program start date
- Have a Standard High School Diploma or GED
- Be a US citizen or eligible for work in the US
- Meet placement test score requirements (must be college ready)
- Commitment to remaining drug-free
- Complete the Daytona State College Admissions Application
- Complete the FAME Application
- Schedule the Placement Test
- Submit Academic Transcripts
- Apply for Financial Aid
Impact of FAME

• Opened opportunity to include more manufacturing lab assignments
• Hands-on experience with different types of production processes
• Updated PLC equipment and robots
• Knowledge and skills learnt in classroom applied at workplace with employers cooperation
FAME impact on Employers

• Staff to ensure growth and proper oversight
• Cost of additional employee
• Time to train
• Benefit of implementing what is learned in class
• Benefits of learning across multiple departments
Current Status

• First cohort graduated – 100% employed
• Two cohorts (Tue/Thu, Mon/Wed)
• Primarily HS graduates (85%)
  – Attrition first term
  – Math skills (COVID effect)
• Students that persist get permanent job offers
Questions/Comments
Project Team Contacts

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Visit our project website: https://sites.rutgers.edu/eerc-hii/