Future of Work Caucus

October 15, 2020



Caucus Project Team

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part of the Florida Caucus Agenda 1:00 p.m. - 3:00 p.m. Welcome, house/engagement rules Welcome and Opening remarks Industry 4.0 overview and video NSF Project Goals and Overview **Questionnaire Summary Results** Skills discussion - 10 minute each on 5 skill areas Wrapping up, final Q and A, Next steps



Caucus Protocols

- Enter your name and organization in the chat window when you log in
- Stay muted while others are talking
- Use chat freely
- Participate in the polls
- Stay focused on Caucus objective
- Use raise hand function if you have something to say
- Download chat at the end of the meeting for any resources/files posted
- The Caucus will be recorded, and a link distributed to attendees within a few days



Opening Remarks

• Kevin Carr, CEO FloridaMakes, Inc.

 Henry Mack, Chancellor Florida Department of Education Career and Adult Education

• Ray Aguerrevere, FloridaMakes Board Chair and Vice President, Custom Metal Designs



Industry 4.0: A manufacturer's perspective

By Ray Aguerrevere



Industry 4.0 Technologies

Horizontal and vertical system integration

Nine Technologies Are Transforming Industrial Production

Source: BCG analysis.

Manufacturing jobs will change more than most sectors

Size of bubble indicates % of time spent in US occupations

Ability to automate (%)									
0		50				100			



Contract Manufacturer Case Study: Augmenting the Operator and Automating Quality Control





Results

60% 🗸

Quality Issues



Production Yield

Time-to-value

4 Weeks

"Now we have real-time insights that let us optimize even low volume production runs"



Caucus Project Overview



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Caucus Grant:

Technician Future of Work Issues Caucus for Florida Community Colleges and Manufacturers

(NSF ATE #1939173)

GOAL: Identify technologies in Florida's small to medium manufacturers that directly contribute to Florida's technicians' skills gap.

Objective 1: Develop specifics for Caucus execution

Objective 2: Project summary report with recommendations

Objective 3: ATE project reports





National Science Foundation Advanced Technological Education Program

With an emphasis on two-year Institutions of Higher Education (IHEs), the Advanced Technological Education (ATE) program focuses on the education of technicians for the high-technology fields that drive our nation's economy.

This NSF program involves:

- Partnerships between academic institutions (7-12, IHEs) and industry
- promotes improvement in the education of science and engineering technicians
- the ATE program supports
 - curriculum development;
 - professional development of college faculty and secondary school teachers;
 - career pathways;
 - technician education research

For NSF ATE, it is expected that projects will be faculty-driven and courses and programs credit bearing.



www.nsf.gov/ate

Engineering

Engineering Technology

Planning	Doing
Researching new ideas	Applying existing "state of the art"
Innovating	Implementing
Concept-oriented	Application-oriented
Theoretical	Practical and "hands-on"
Calculus based	Algebra based
Develop new processes	Apply new processes
Open-ended and futuristic	Specific and current
Required for registration as P.E. in all states	Required for registration as P.E. in most states (FL allows)
Can require period of internship due to emphasis on fundamentals and theory	Usually ready to work due to emphasis on current practice in industry
Graduate studies widely available	Graduate studies increasingly available
Jobs in engineering design	Jobs in applied engineering and production

Caucus Grant Activities



Future of Work for Technicians Questionnaire

Open 3+ weeks

Responses

- Company (College)
- Industry sector/college program
- County
- Name
- Number employees/number of graduates
- Future of Work Skills (select top 5 of 15 skill areas in 4 technology areas)
- Number of future technician hires and students graduating
- Level of anticipated technician hires (entry, mid, high level)
- Importance of Industry Credentials and which credentials



133 manufacturers (of >2000 invitees)

• 26 college educators (of 50 invitees)



Summary Questionnaire Responses





Google map of Responses



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133 Manufacturers

ile

10

26 Colleges



The Florida College System (FSC)









Number of Employees & Number of A.S. ET Graduates



Level of New Hires and New Grad Positions

Choose all that apply: Entry Level, Mid Level, High Level





Manufacturer: Industry Credentials

Are industry certifications held by new hires important to you?



Educators: Industry Credentials

Are industry certifications held by your graduates important to your industry partners?







Parking Lot: Question for Another Day

Are industry certifications held by your graduates important to your industry partners?

> **25 Responses** YES: 58% NO: 42%

Are industry certifications held by new hires important to you?

> **133 Responses** YES: 36% NO: 64%





Skills Data Analysis 1-minute Overview Video



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Manufacturers (133)

(21 Colleges)

20%

30% 40%

50%

60%

Autonomous Robots;

Programming System Integration Repair

Simulation;

Perform Root Cause Analysis

Participate in Planning & Evaluation Processes

Compare & Contrast Process Alternative

Recommend new situations & their effects on process response to change

Participate in developing existing & new products & operations

Industrial Internet of Things;

Ethernet Communication (M2M); Record and store data

Additive/Subtractive & Advanced Materials;

3D CAD and printing/prototyping CNC programming Precision Manufacturing Fabrication

Testing (destructive /non-destructive



Manufacturers (133)

(21 Colleges)



Compare & Contrast Process Alternative Recommend new situations & their effects on process response to change Participate in developing existing & new products & operations **Industrial Internet of Things; Ethernet Communication (M2M); Record and store data** Additive/Subtractive & Advanced Materials; **3D CAD and printing/prototyping**

Precision Manufacturing

Testing (destructive /non-destructive

Manufacturers (133)

(21 Colleges)





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Industrial Internet of Things;

Ethernet Communication (M2M); Record and store data Additive/Subtractive & Advanced Materials;

> 3D CAD and printing/prototyping CNC programming Precision Manufacturing

> > Fabrication

Testing (destructive /non-destructive

(21 Colleges)

1,5

Manufacturers (133) (21 Colleges) **Autonomous Robots:** 52% 34% (18% difference) Programming 38% (18% difference) 56% **System Integration** System Integration System Integration Repair as a needed skill as a taught skill Simulation: **Perform Root Cause Analysis Participate in Planning & Evaluation Processes Compare & Contrast Process Alternative** Industry related skills gap **Recommend new situations & their effects on** process response to change High demand Participate in developing existing & 51% 12% (39% difference) A skill that basically is **Develop** existing new products & operations and new products not being taught at all **Industrial Internet of Things;** & operations as **Ethernet Communication (M2M);** needed skill **Record and store data Additive/Subtractive & Advanced Materials;** Low demand 36% 60% (24% difference) **3D CAD and printing/prototyping** A skill that is taught at 3D CAD/ prototyping **CNC** programming 12 colleges across as a needed skill **Precision Manufacturing** Florida Fabrication **Testing (destructive /non-destructive** 50% 40% 50% 60% 20% 30% 40% 30% 20%

Autonomous Robots;

Programming System Integration

Repair

Simulation;

Perform Root Cause Analysis

Participate in Planning & Evaluation Processes

Compare & Contrast Process Alternative

Recommend new situations & their effects on process response to change Participate in developing existing & new products & operations Industrial Internet of Things; Ethernet Communication (M2M); Record and store data Additive/Subtractive & Advanced Materials; 3D CAD and printing/prototyping CNC programming Precision Manufacturing Fabrication

Questionnaire Skills Questions

For Manufacturers:

In the following technologies and their related skill sets, please select the top 5 technician skills below that will be impacted by emerging technologies you plan for your company within the next 5 years

For Educators

In the following technologies and their skill sets, please select the top 5 technician skills that you feel will be impacted by emerging technologies for your service area within the next 5 years

Summary Skills Results

TECHNOLOGY and SKILLS SETS

Autonomous Robots: Programming

Autonomous Robots: System integration

Autonomous Robots: Repair

Simulation: Perform root cause analysis

Simulation: Participate in planning and evaluation processes

Simulation: Compare & contrast process alternatives

Simulation: Recommend new situations & their effects on process responses

Simulation: Participate in developing existing & new products & operations

Industrial Internet of Things: Ethernet Communication (M2M)

Industrial Internet of Things: Record and store data

Additive/Subtractive & Advanced Materials: 3D CAD & printing, prototype

Additive/Subtractive & Advanced Materials: CNC programming

Additive/Subtractive & Advanced Materials: Fabrication

Additive/Subtractive & Advanced Materials: Destructive/non testing

Summary Skills Data - Questions

• Which skills were selected more often by manufacturers? • Which skills were selected more often by educators? • Which skills were selected <30% by both? • Which skills were selected by both over 30% Which skills had big gaps of manufacturers > educators? • Which skills had big gaps of educators over manufacturers?

Summary Skills Results

TECHNOLOGY and SKILL SETS	% MANUFACTURERS	% EDUCATORS	% DELTA
Autonomous Robots: Programming	34	52	18
Autonomous Robots: System integration	38	56	18
Autonomous Robots: Repair	15	24	9
Simulation: Perform root cause analysis	39	40	1
Simulation: Participate in planning and evaluation processes	36	24	12
Simulation: Compare & contrast process alternatives	24	20	14
Simulation: Recommend new situations & their effects on process responses	30	20	10
Simulation: Participate in developing existing & new products & operations	51	12	39
Industrial Internet of Things: Ethernet Communication (M2M)	22	28	6
Industrial Internet of Things: Record and store data	36	60	24
Additive/Subtractive & Advanced Materials: 3D CAD & printing, prototype	39	48	11
Additive/Subtractive & Advanced Materials: CNC programming	33	48	15
Additive/Subtractive & Advanced Materials: Fabrication	42	36	6
Additive/Subtractive & Advanced Materials: Destructive/non testing	30	20	10

5 Skills Discussions

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Future of Work Caucus

Thank You

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