Best Practices for Integrating Industry Tours into Career Education for Manufacturing

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FLATE
Florida's Advanced Technological Education Center of Excellence

HCPS
Hillsborough County Public Schools

Impact Florida. Lead Nationally.

outline

- About us
- What is manufacturing?
- Why manufacturing education?
- Industry awareness & recruiting students
- Questions/discussion

NSF Advanced Technological Education

ATE CENTERS

www.atecenters.org

Partners with Industry for a new American Workforce

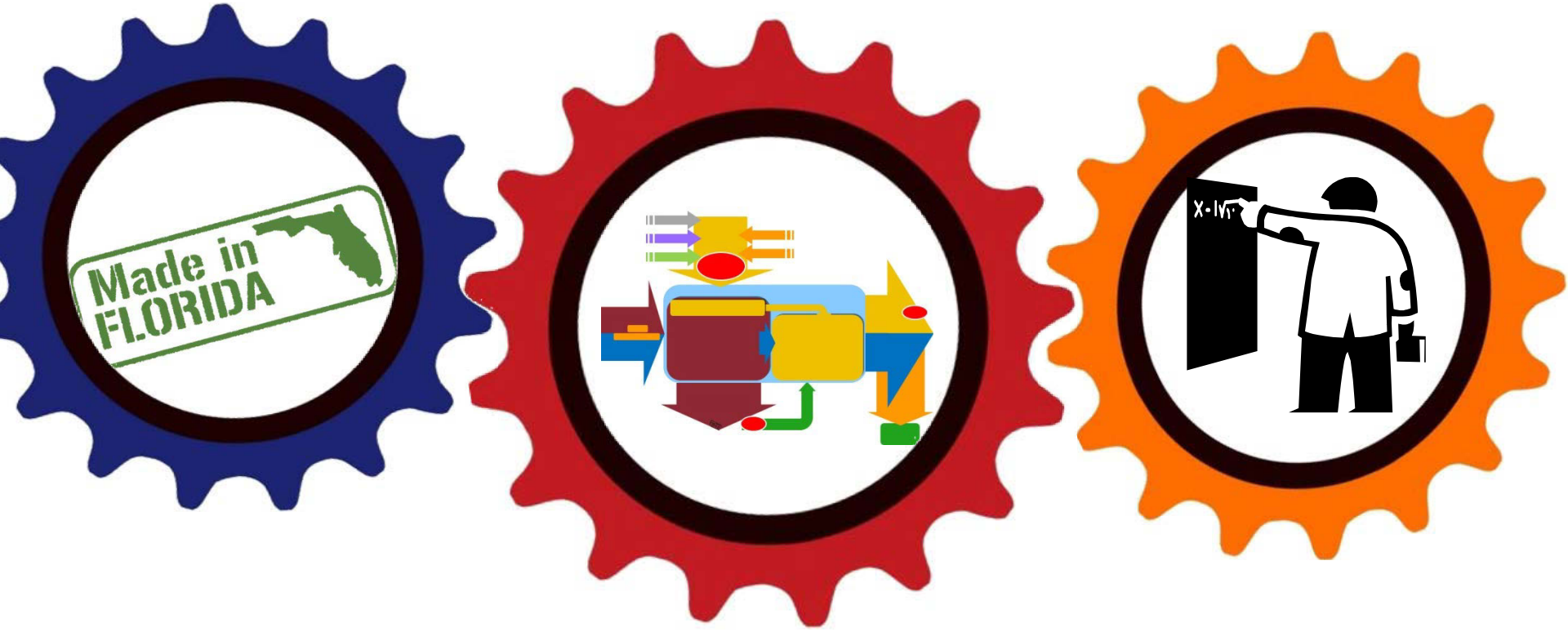
FLATE VISION

FLATE will be Florida's leading resource for education and training expertise, leadership, projects, and services to promote and support the workforce in the high performance production and manufacturing community.

Impact locally. Lead nationally.

Impact Florida. Lead Nationally.

Outreach◆Curriculum◆Professional Development



Tell Teach Train

Advancing Excellence in Engineering Technologies

Hillsborough County Schools

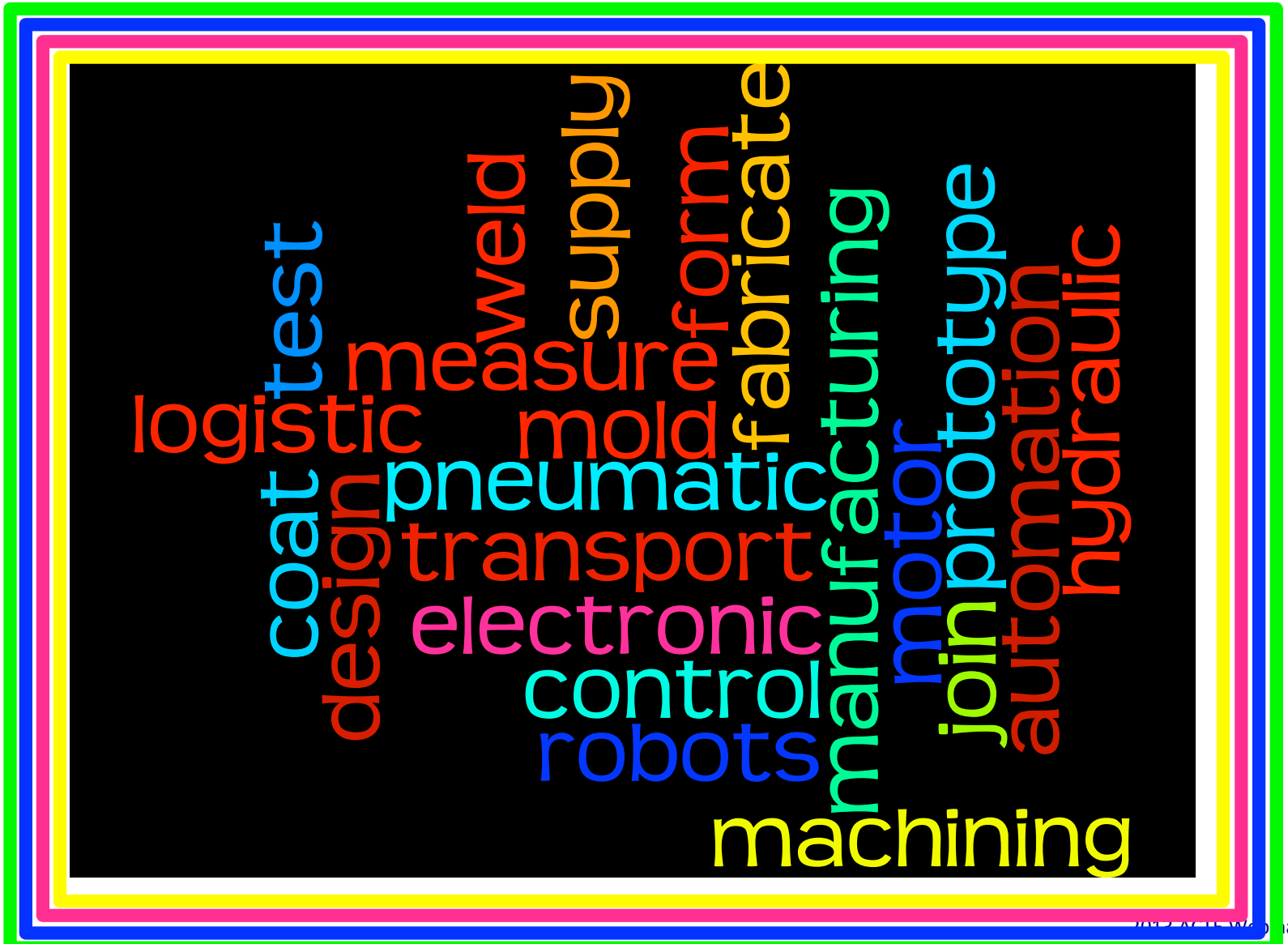
8th Largest School District

- 201, 363 Students (2013-2014)
- 18, 177 CTE Middle School Students
- 27, 630 CTE High School Students
- 1525 Career Center Students
- 433 CTE Charter School Students
- 17, 383 Industrial and Technology Education Students

- 48 Middle Schools
- 27 High Schools

Hillsborough County PUBLIC SCHOOLS Excellence in Education

what is manufacturing?



what is manufacturing?

When we think of manufacturing – we think of **PRODUCTION** – how things are made

Manufacturing is a process that takes raw **materials** and **turns** them into products. It implies **mass production**, as in making products by **hand** or with the help of **machinery**.

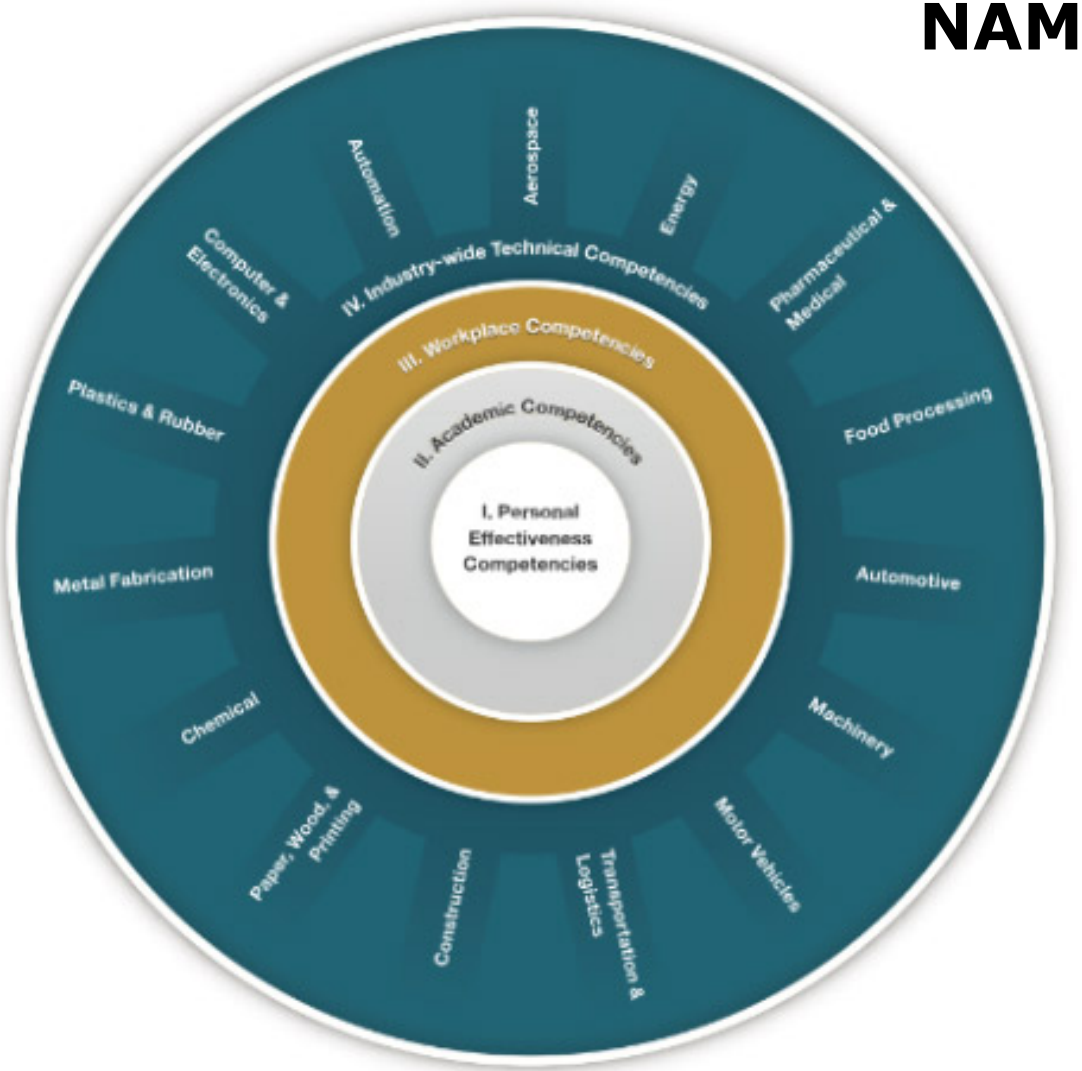
MANUFACTURING is changing raw or processed materials into products people can use or just want! This includes cell phones, computers, jeans, orange juice, jewelry, cosmetics, cars…you name it. Everything is manufactured and **YOU** could be part of the action!

what is manufacturing?

Define by manufacturing careers

O*NET OnLine

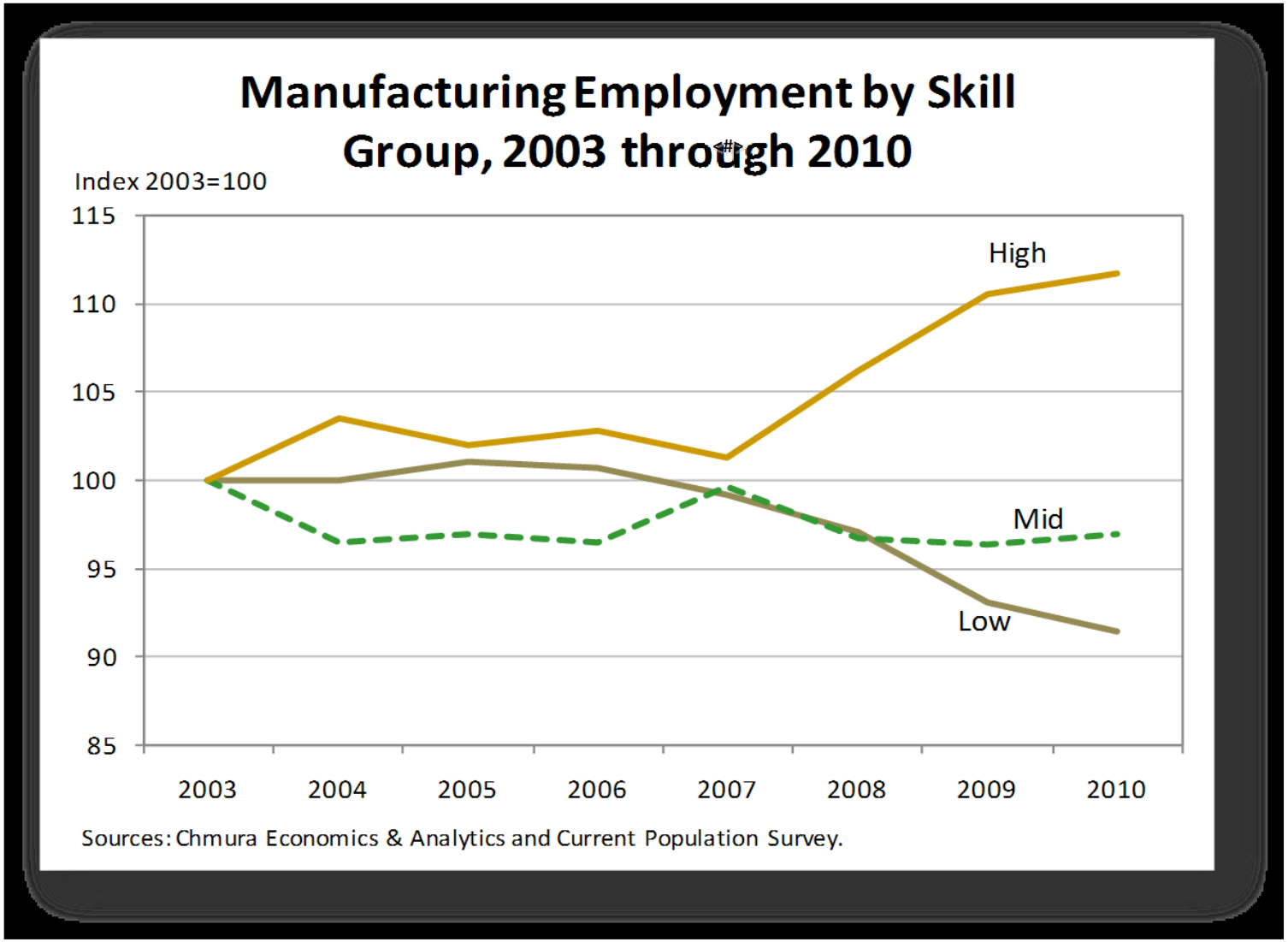
what is manufacturing?



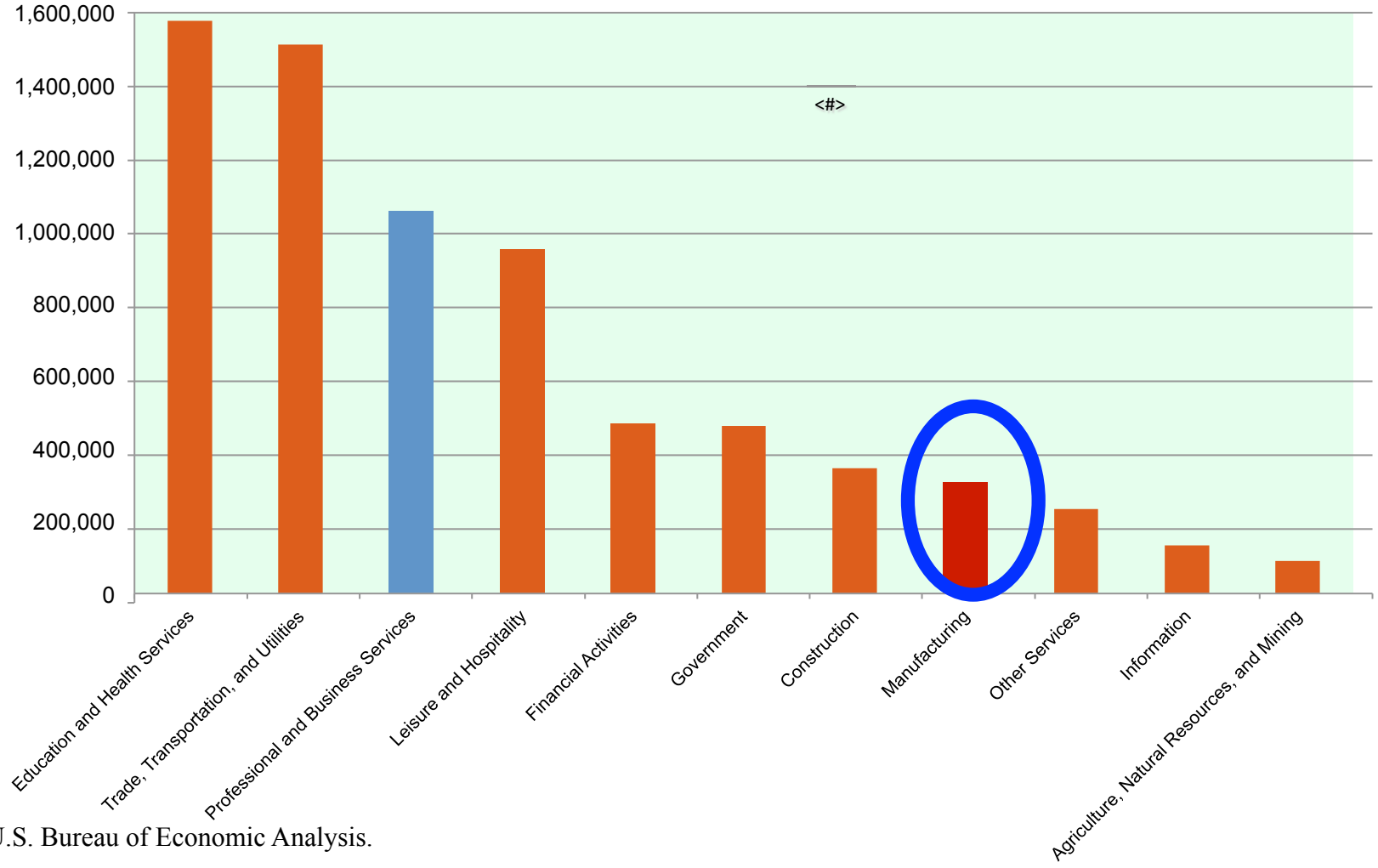
NAM: National Perspective

Automation
Aerospace
Energy
Pharmaceuticals & Medical
Food Processing
Automotive
Machinery
Motor Vehicles
Transportation & Logistics
Construction
Paper, Wood, & Printing
Chemical
Metal Fabrication
Plastics & Rubber
Computer & Electronics

WHY? manufacturing jobs require higher skills



adv Manufacturing is the 8th largest Florida employer



Source: U.S. Bureau of Economic Analysis.

advanced manufacturing is a economic driver

- Florida Manufacturing Establishments: **14,324**
- Manufacturing Employment: **306,800**
- **$36.7 billion** of the total state output
- Percent of Florida exports: **85%**
- Manufacturing Average Annual Compensation: **$62,859** (54.8% higher than other sectors)

Source: U.S. Bureau of Economic Analysis.

national skills gap snapshot

- **82%** of manufacturers report a moderate or serious skills gap in skilled production workers
- **74%** of manufacturers report that this skills gap has negatively impacted their company's ability to expand operations
- **69%** of manufacturers expect the skills shortage in skilled production to worsen in the next 3-5 years
- **5%** of all jobs in manufacturing unfilled due to lack of qualified workers

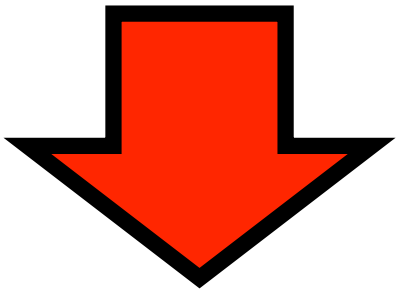
roadmap for manufacturing education

- **Integrated academic and technical** learning pathways
- More **focus on STEM** (Science, Technology, Engineering and Math) education
- More **integrated career and education pathways** to higher education and lifelong learning
- Integration of nationally portable, industry-recognized **credentials** aligned to educational programs
- **Deep engagement** of industry with education

industry awareness & recruiting students

industry awareness & student recruitment

partners & plans



impact

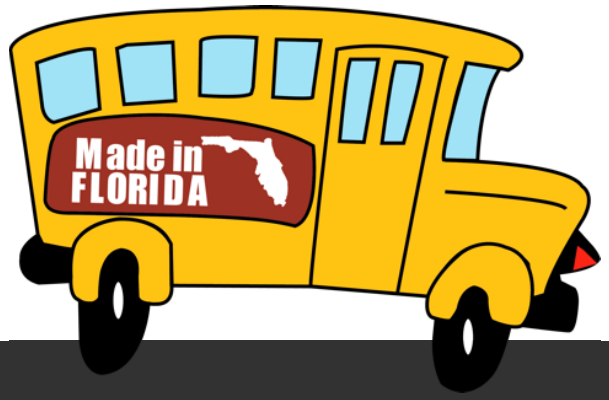
Industry awareness & recruiting students

Industry Tours

4,000 students

200 tours

55 facilities



polling question

1. What should be a main goal for industry hosting students?

   a. Student exposure to the industry
   b. Community outreach for advocacy reasons
   c. Desire to "give back" to the community
   d. Other
   e. All of above

industry awareness & student recruitment

survey says...

Post-Visit Survey –Manufacturing Related Technologies

We hope you liked the "Made in Florida" Tour. Now, tell us what you think.

Instructions: Read the statements carefully. Circle one best answer for each question.

Scale: 5 = Strongly Agree (Yes)
4 = Agree
3 = Neither Agree nor Disagree
2 = Disagree
1 = Strongly Disagree (No)

5 4 3 2 1	1)	I heard or saw employees describe their work.
5 4 3 2 1	2)	The workers looked like they enjoyed their work.
5 4 3 2 1	3)	I found that the work they described was interesting.
5 4 3 2 1	4)	I will need knowledge of science and math for my future work.
5 4 3 2 1	5)	I would be interested in technical work in industry.
5 4 3 2 1	6)	I would be interested in an engineering technology career.
5 4 3 2 1	7)	I would enjoy a career in advanced manufacturing.
5 4 3 2 1	8)	I understand the impa…

Thank you very much for your feedback! It helps us make future tours better.

10: I was considering a career in manufacturing before the tour.

13: I am now considering a career in manufacturing or related technical industries.

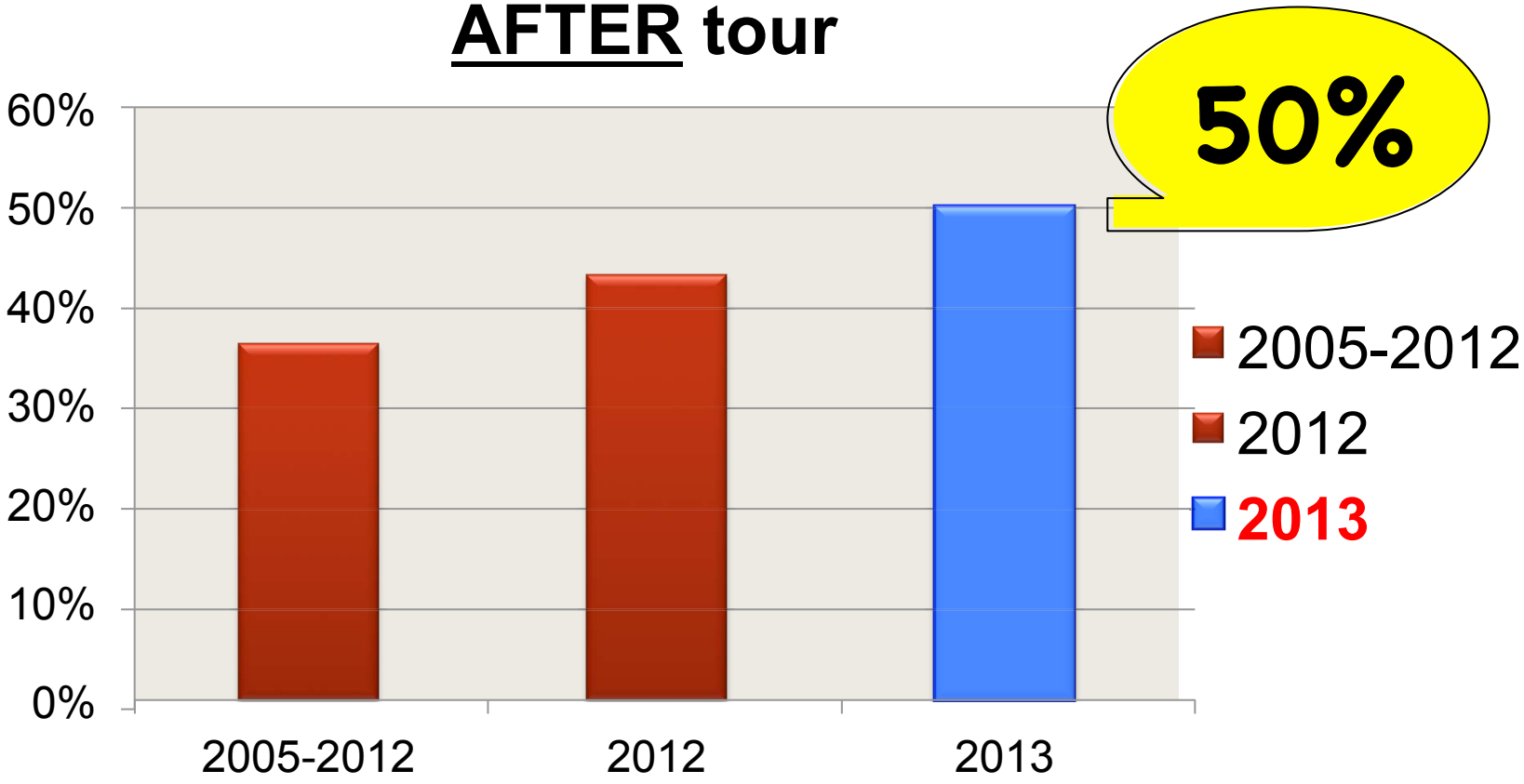
career awareness & student recruitment

survey says…

when	n (students)	strongly agree/ agree	relative to cumulative
2012	335	43%	+7%
2005-2012	2,292	36%	

industry awareness & student recruitment

% considering manufacturing career AFTER tour



industry awareness & student recruitment

what we have

activity data

Do what you ♥ in a manufacturing career

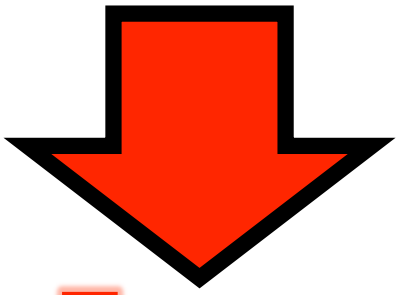
Aviation & Aerospace	Pa[illegible]g, Beverage, [illegible] & Pharmaceuticals
Medical Devices & Equipment	Machining & Product Fabrication
Transportation & Logistics	Leisure & Ent[illegible]
Electronics, Computers & Electrical	Product Design & System Integration

quick & "dirty"

industry awareness & student recruitment

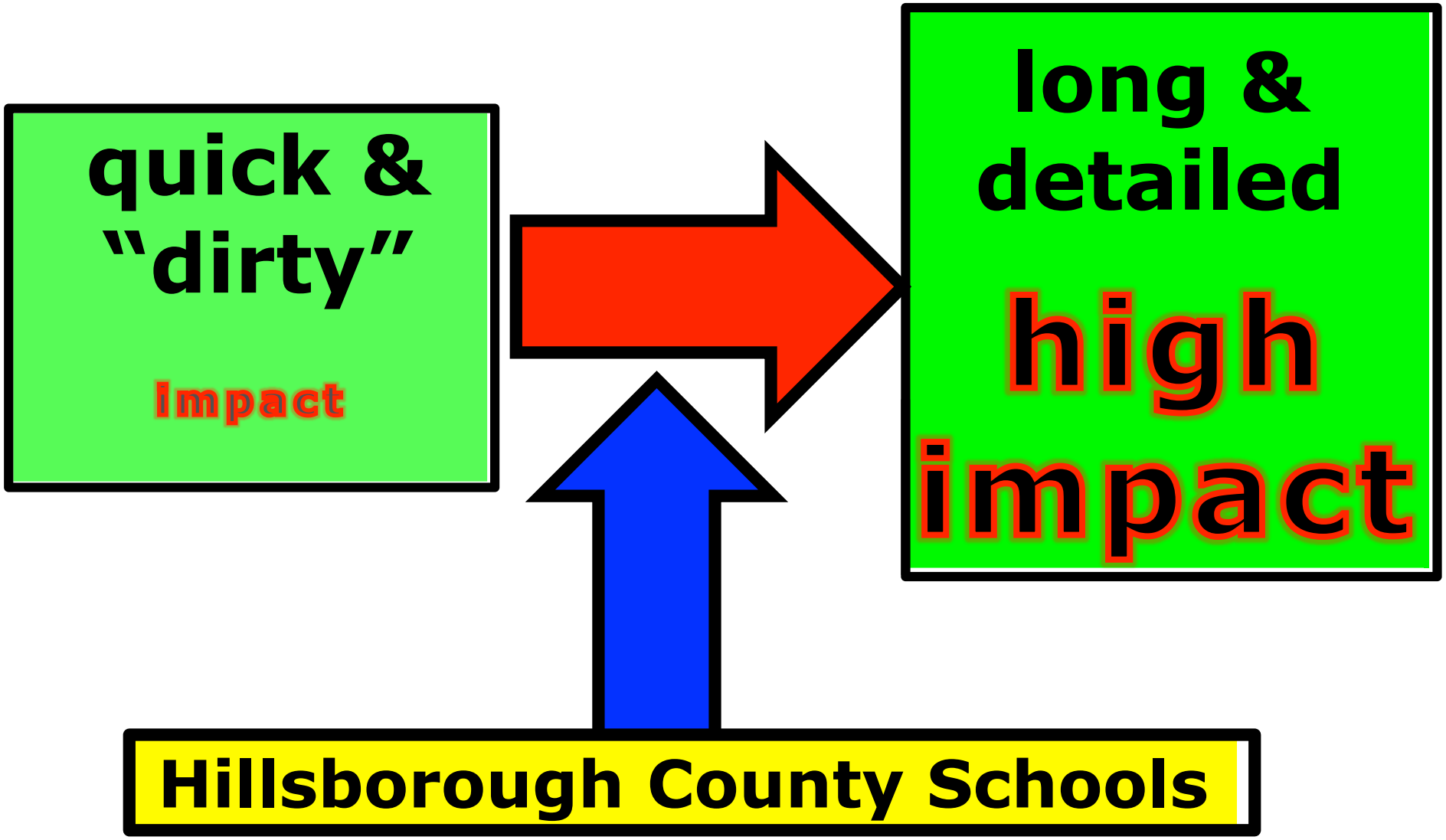
industry awareness & student recruitment

what we want



high impact

industry awareness & student recruitment



polling questions

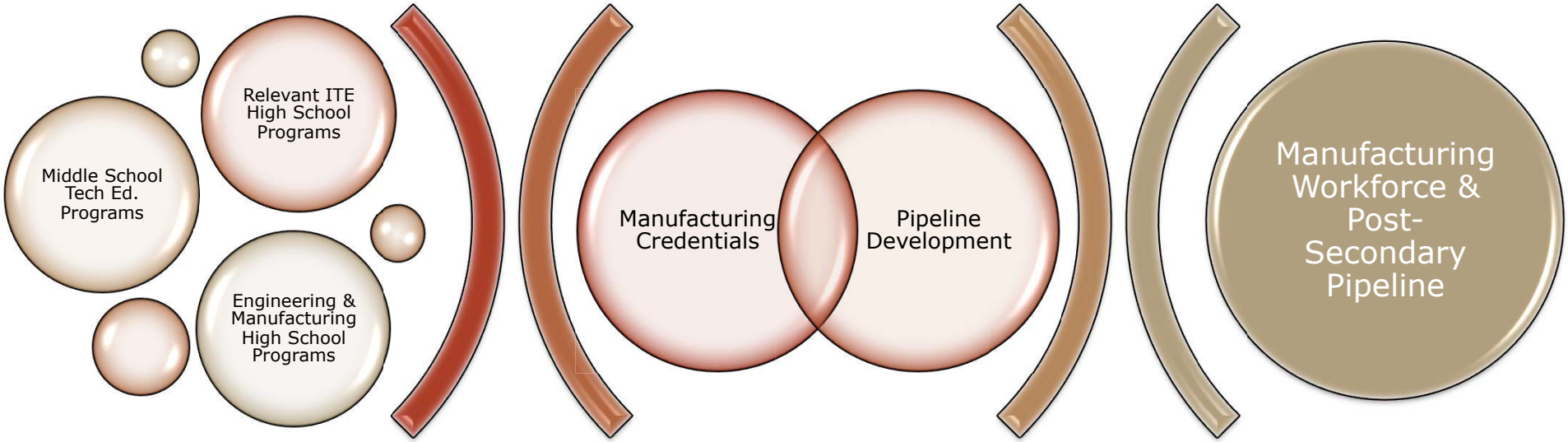
2. Does your educational system use lesson plans to prime students for field trips? (Y/N)

3. Have you participated in a field trip that included a lesson plan component? (Y/N)

4. To you require/insist that teachers use lesson plans during field trips? (Y/N)

Impact Florida. Lead Nationally.

Hillsborough County Schools



Existing Aligned District Programs → **Critical Components of Curriculum Design** → **Program Goals**

polling questions

5. Have you heard of the Comprehensive Instructional Sequence (CIS) lesson plan? (Y/N)

domains of curriculum design

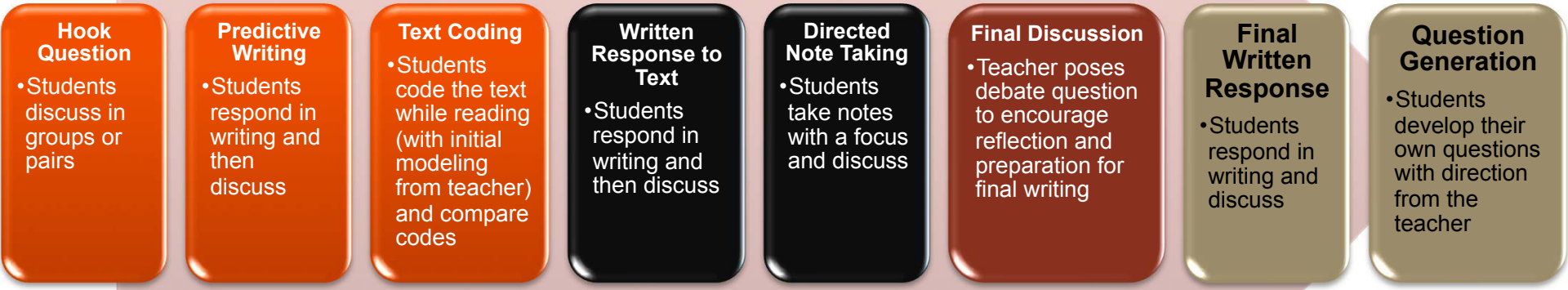
Usability

Standards Based/Generizable

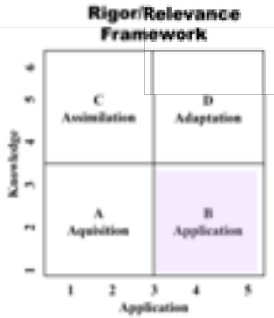
Contextual Teaching/Learning

Usability - Brandy Meetze

Use of accepted standard: Comprehensive Instructional Sequence



Technology Education Curriculum
Middle School
Teacher Lesson Plan



INDUSTRIAL & TECHNOLOGY EDUCATION
Career & Technical Learning Activity - CTLA

Lesson Objectives & Student Expectations

Rigor/Relevance Framework: B
Length of lesson: 3 class periods

The student will:

1. Discover uses of metrology in manufacturing.
2. Identify variations of quality measurements used in manufacturing.
3. Analyze the types of equipment used in metrology.

Common Core Standards Addressed

CCSS ALIGNMENT

Benchmark#	Description
LACC.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts.
LACC.68.RST.1.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions
LACC.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LACC.68.WHST.1.1	Write arguments focused on discipline specific content
LACC.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.

Key Vocabulary Terms

Accuracy	Metrology	Optical	Calibration
Precision	Retrofitting	Fabrication	

Materials & Supplies Needed For This Activity

Article, portfolio/notebook paper, Teacher PowerPoint, Projector, Student worksheets.

Teacher Sequence To Present Lesson *Day 1 of 3*

Est. Time (minutes)	Description of Teacher Action	Notes
5	Bell work activity - Have students answer the question then review the answer.	Use the Quality Measurements power point to guide your lesson.
10	Show students the video about metrology in our world. Have students do a think pair share to address the question, "What measurements of your world do you take on a daily basis?"	Prepare groups ahead of time
5	Review vocabulary words with students	Prepare word boards or add words to your word wall
15	Hand out the article "Metrology Market Expected to Reach $720M by 2018" and student worksheets. Prepare students for reading by explaining the text marking process and that students will read the article silently marking the portions of the article. Mark "P" if something is describing a process, Mark "$" if something is describing financial information, Mark "T" if something is describing specific industries. Allow students time to read the article.	Prepare copies ahead of time
10	Have students answer the questions from the text. Review answers with the students.	
5	Discuss with students the process of taking notes while on the trip using the directed note taking worksheet.	Collect students note taking worksheets to pass out when on the field trip.

HOOK

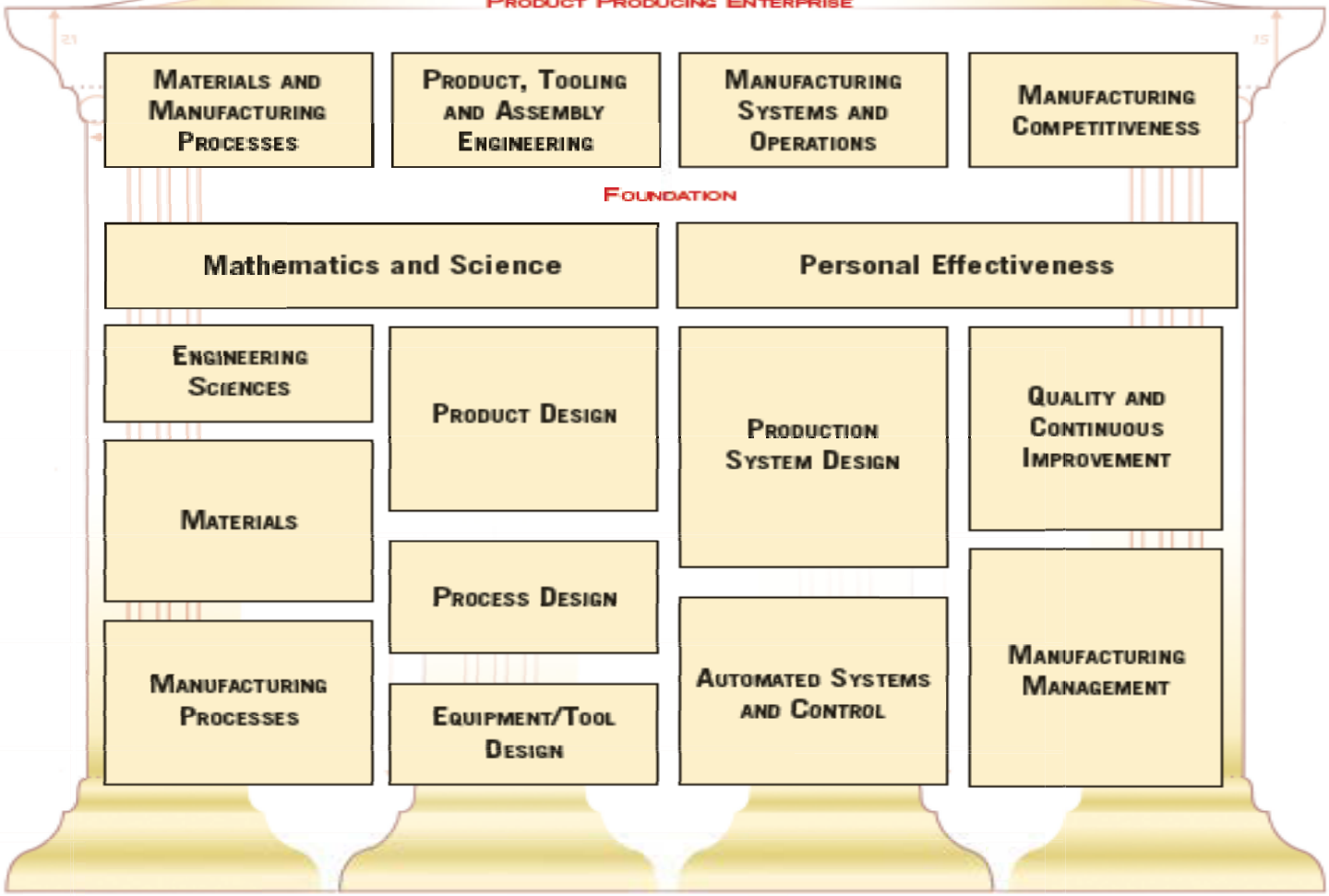
TEXT CODING

WRITTEN RESPONSE

Student Procedures To Do This Lesson *Day 1 of 3*

1. Begin Bellwork activity per teacher's directions.
2. Participate in Bellwork discussion.
3. Watch the metrology video.
4. Answer the discussion question.
5. Review vocabulary terms and mark paragraphs in the article.
6. Read the article and answer questions.

on



THE FOUR PILLARS OF MANUFACTURING KNOWLEDGE PROVIDES A MODEL OF FUNDAMENTAL KNOWLEDGE FOR MANUFACTURING PRACTITIONERS.

contextual teaching and learning

- **Creating a connection between text and real life application**
- **Students evaluate their observations in preparation for a written reflection on the third day of the CIS lesson**

Ideally, the tour would be augmented with students actually using a machine to create their own product – resources!

Directed Note-Taking

"Quality Measurements"

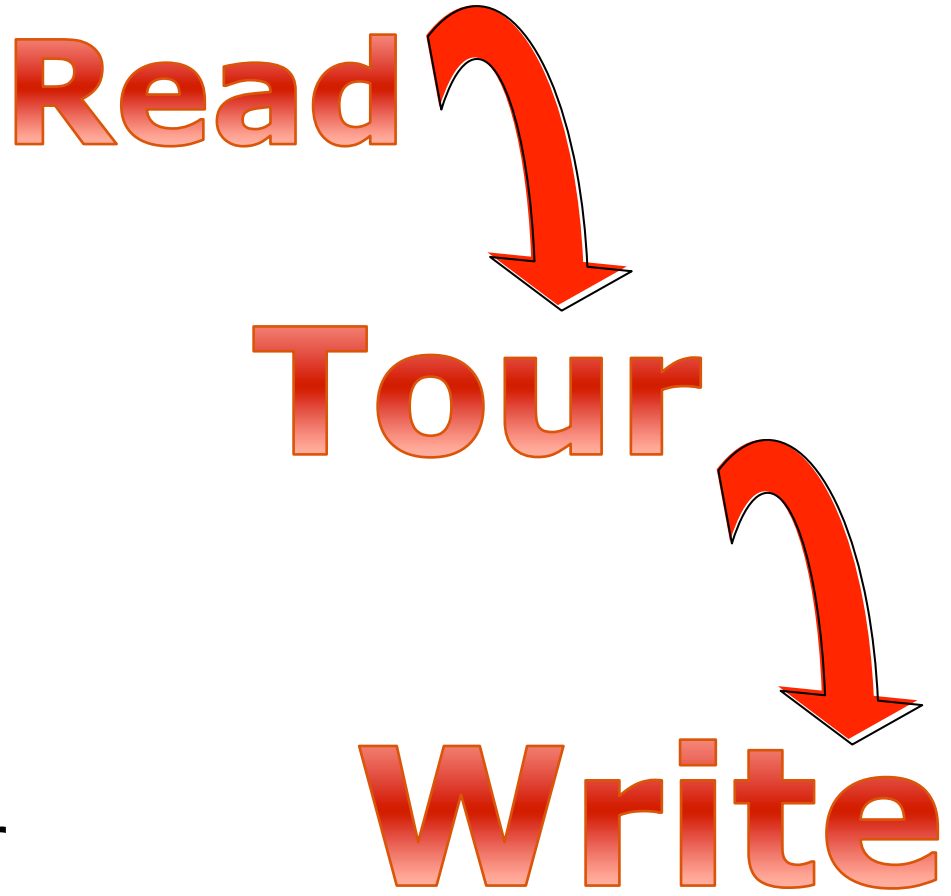
Text from… Metrology Market Expected to Reach $720M by 2018

Guiding Question: According to the text and your tour, how is metrology used at the company?

Paragraph Number	Evidence from Tour (check box)	Write your notes from your reading and tour in the rows below, check the appropriate boxes based on the type of observation you make.	Measuring Tools (Check boxes)	Personnel Training	Types of measurements	Helps ensure product quality

final written response and questioning

- Students compile their experience to create a written statement/reflection
- Students discuss their statements through the generation of questions and using evidence (text and tour) to support their opinions



assessments and preliminary data

- Students are assessed on their comprehension of the content and tour information through the use of a rubric
- Students also complete a student perception survey to determine the effect of the lesson/field trip on students compared to traditional field trips

Thank you!

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