Bringing together Industry Tours and the New Standards

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FLATE

Florida's Advanced Technological Education Center of Excellence

outline

- About FLATE
- Florida Standards/Common Core
- Comprehensive Instructional Systems
- Industry awareness & exposures
- Getting the best of both

NSF Advanced Technological Education

ATE CENTERS

www.atecenters.org

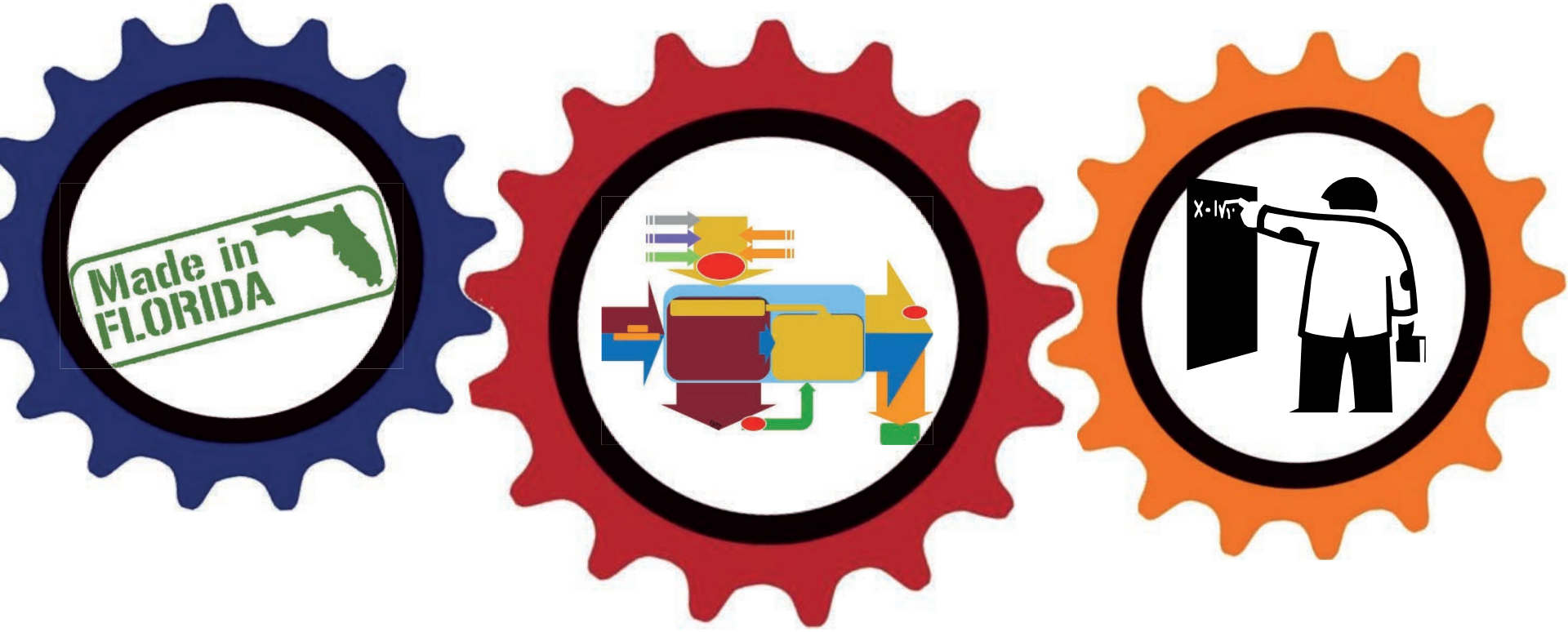
Partners with Industry for a new American Workforce

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.

Outreach◆Curriculum◆Professional Development



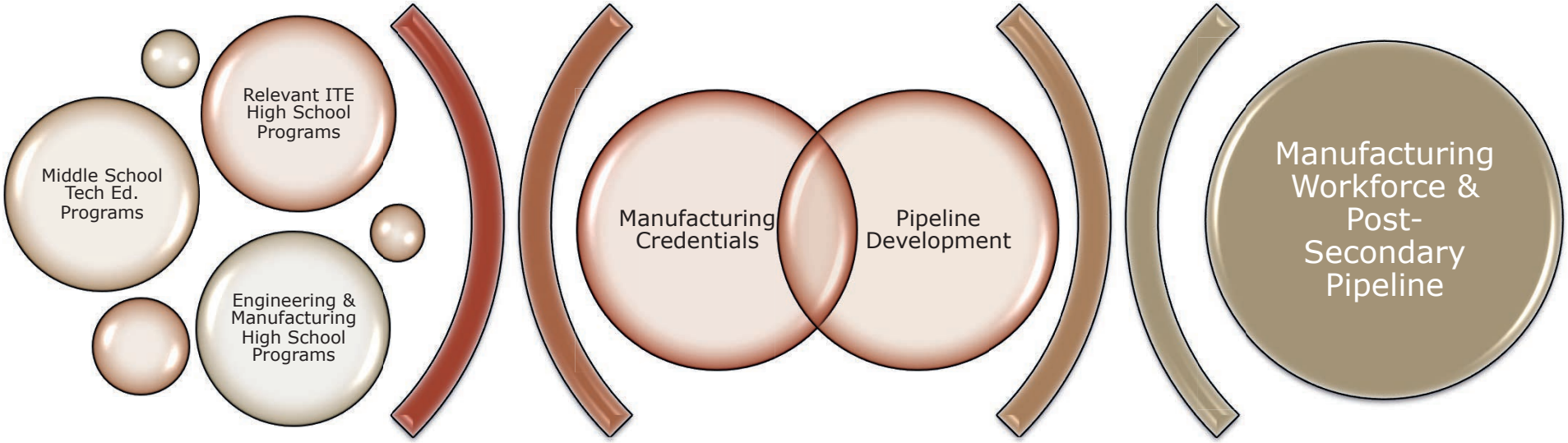
Tell Teach Train

Advancing Excellence in Engineering Technologies

Implementing new standards is one thing . . .

Making them effective for All students - is quite another

building manufacturing curriculum



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

domains of curriculum design

- usability
- standards-based/generalizable
- contextual teaching & learning

Comprehension Instructional Sequence

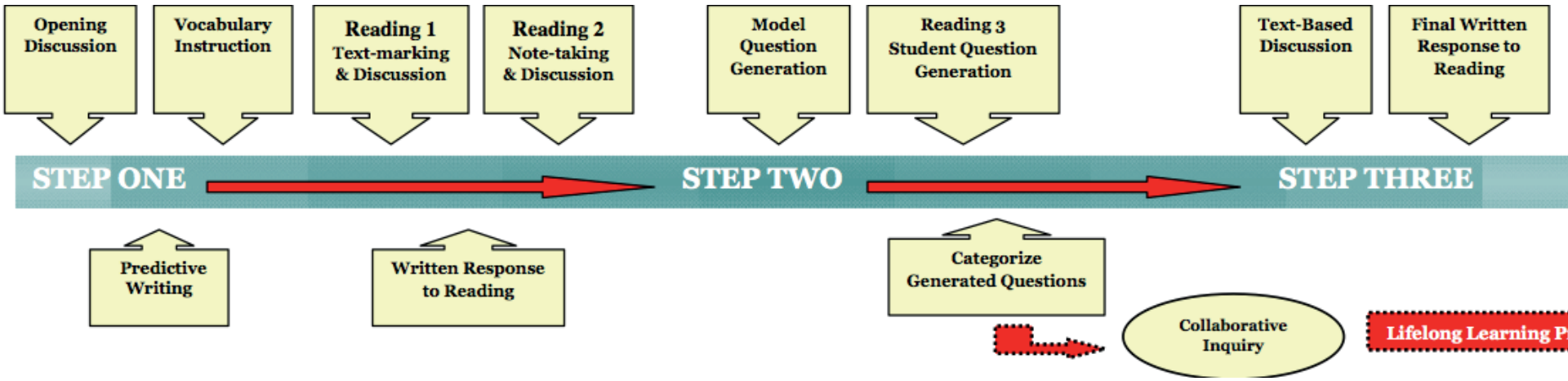
- a complex form of multiple-strategy instruction that promotes student development in reading comprehension, vocabulary, content-area knowledge, and critical thinking about complex texts
- supportive challenges in interacting with complex content-area information

Comprehension Instructional Sequence

A CIS lesson has 3 steps with integrated and sustained text-based discussions and writing used throughout.

1. It has explicit instruction in vocabulary and close reading through text-marking and directed note-taking
2. Students generate questions that launch them into collaborative inquiry, supporting the practice of lifelong learning
3. It challenges students to use text evidence to validate positions they have formed over the course of the lesson

Comprehension Instructional Sequence



Comprehension Instructional Sequence

Step One:

Read to Build Deep Comprehension

A. Teacher introduces benchmark(s), sets purpose, asks essential question(s) and reads/thinks aloud using grade-level resource while students mark text as directed.

B. Teacher poses written question and facilitates directed note taking.

Students read text, independently, in pairs, or small groups and take notes based on question presented by teacher.

C. Students compare notes in pairs or small groups and discuss similarities and differences. Teacher facilitates text discussion based on notes and directs students to use text evidence to support responses.

Step Two:

Reread and Generate Questions to Deepen Text Understanding

A. Teacher models generation of a complex question based on a section of the text, relating to a broad perspective or issue.

B. Students work individually, in pairs, or small groups to re-read text and generate their own questions.

C. Teacher facilitates text discussion using student-generated question(s).

Students respond to each other's questions, engaging in text discussion.

Step Three:

Read to Use Text Evidence to Validate Responses

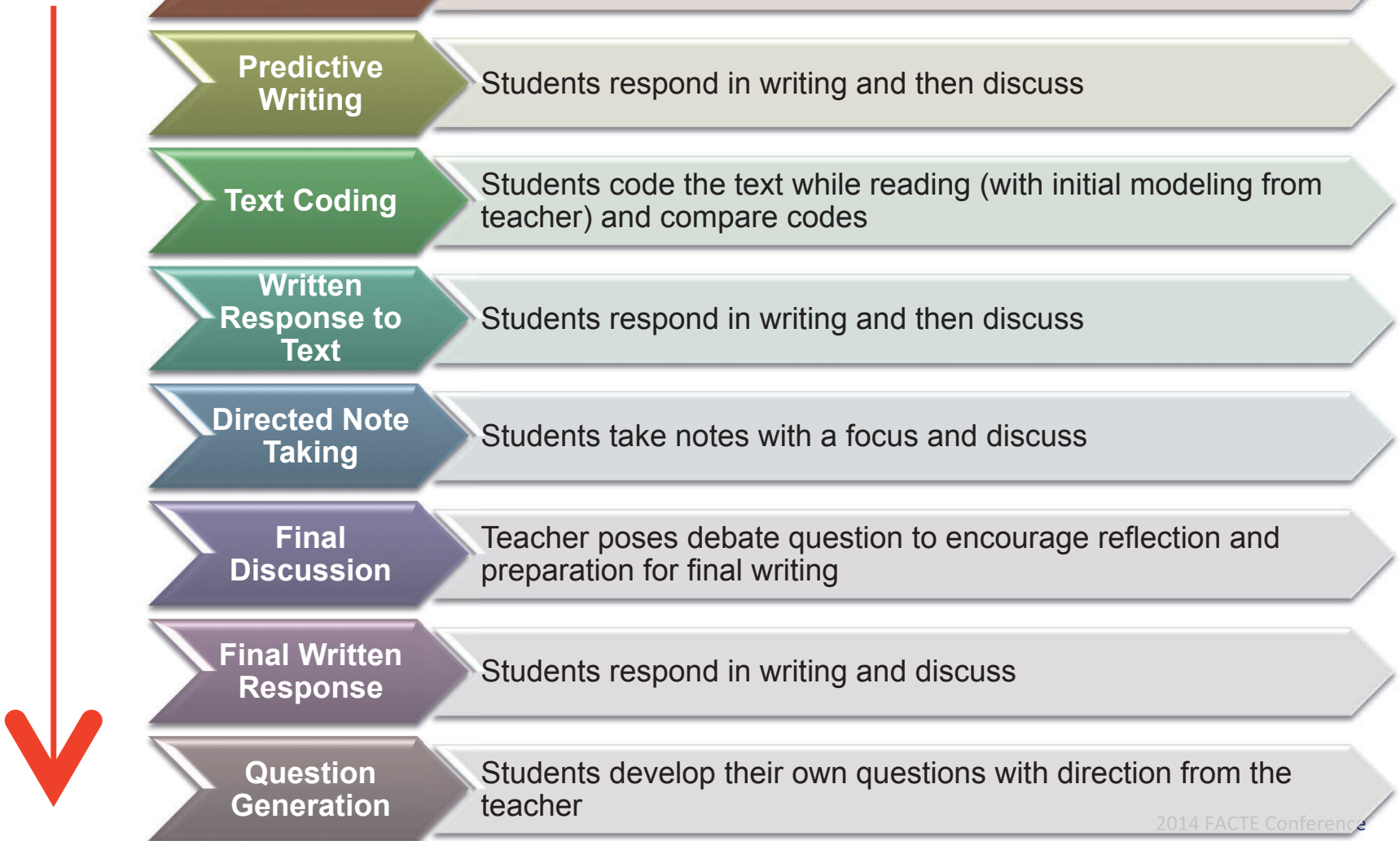
A. Teacher posts a written question aligned to the cognitive complexity of FCAT and models how the text supports answering the question using a graphic organizer.

B. Students respond to question using the graphic organizer and support their response with text evidence and share their answers.

C. Teacher facilitates discussion, asking students to support their response with text evidence. Students look at original answers and can change their answer based on new evidence or keep their answers the same and add additional information to support their answer.

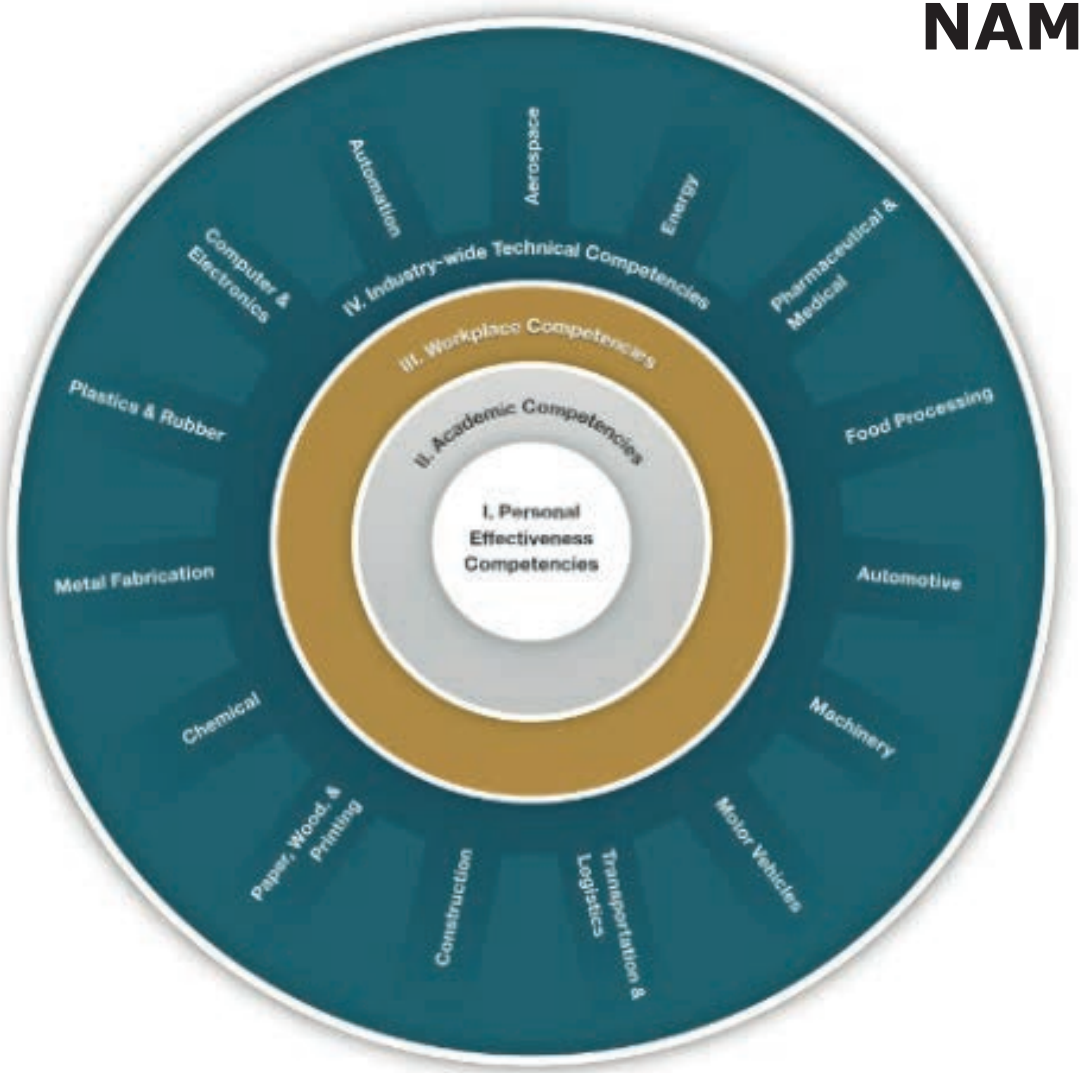
CIS: Comprehension Instructional Sequence

Brandy Meetze



MERGE: standards & manufacturing education

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

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 – manufacturing** (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 Tours

5,000 students

250 tours

100 facilities

tours

change perception

relevant

applied STEM

new career opportunities

high-skill, high wage futures

tours: student surveys

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 im…

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.

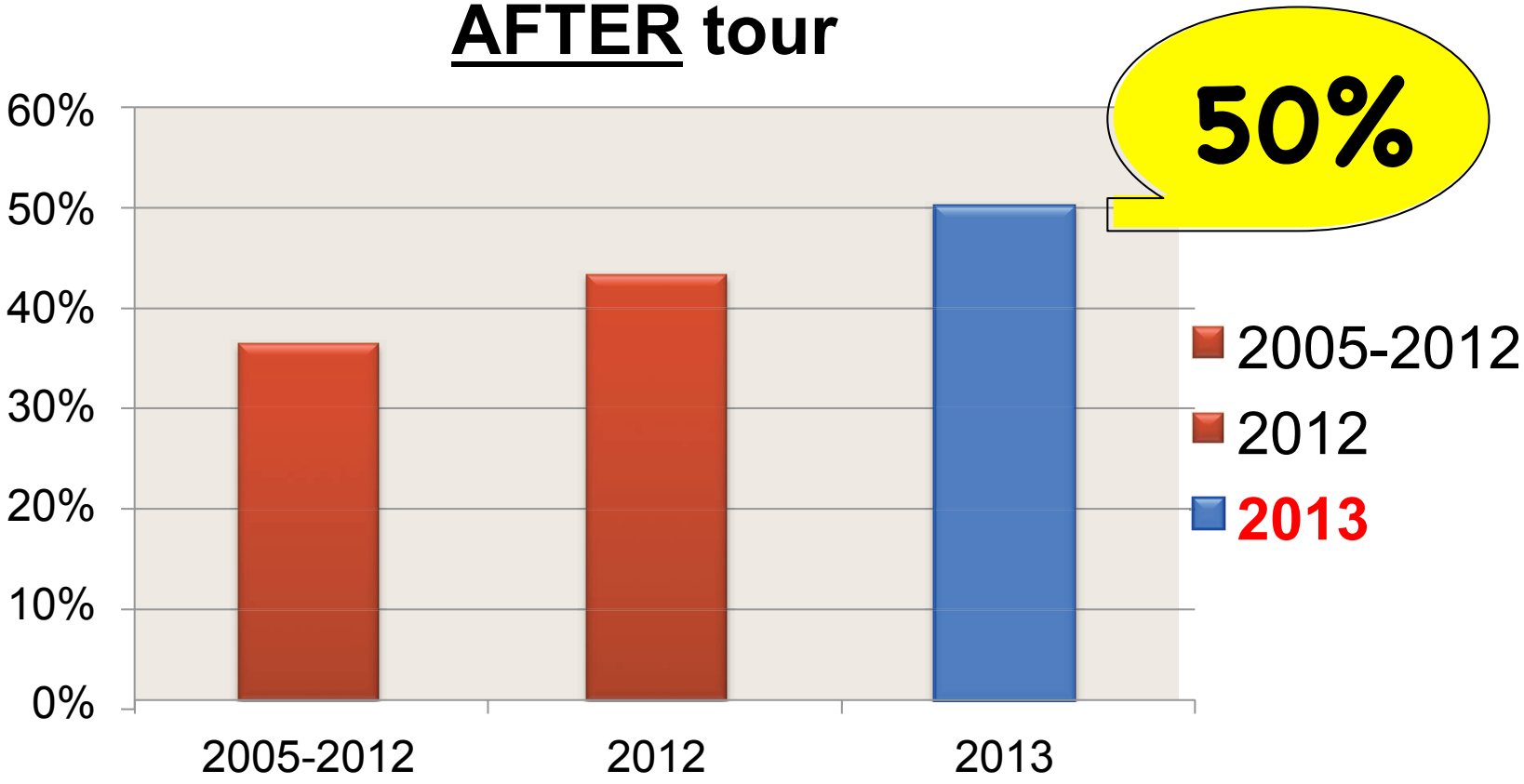
tours: student surveys

survey says...

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

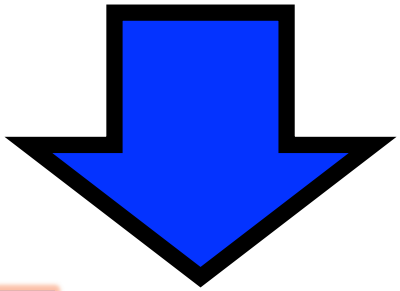
tours: student surveys

% considering manufacturing career AFTER tour



tours: impact

what we have



activity data

tours: impact

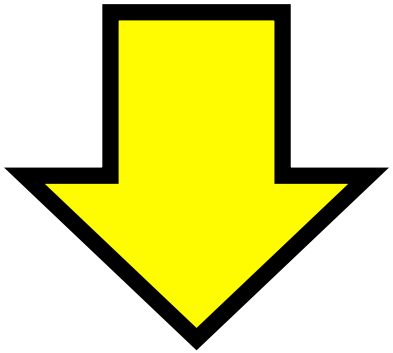
Do what you ♥ in a manufacturing career

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"

Tours: impact

what we want



more impact

tours: impact & learning

what we want

high impact

tours: impact & learning

tours & literacy

impact

tours: impact & learning

"quick & dirty"

low impact

long & detailed

high impact

tour lesson plans with embedded literacy

sample lesson plans

Technology Education Curriculum
Recommended for 7th - 10th grade

Assembly

Day 1	Research company tour host
Day 2	Read selection & vocabulary
Day 3	Tour with directed note taking
Day 4	Review all & write

lesson plan: company host profile

Company Profile

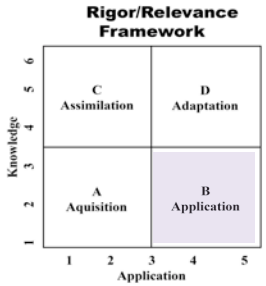
Student Name: _____ **Date:** _____ **Period:** _____

Directions: Using the internet or the specific company website to answer the following questions for the company you will be visiting.

1. What is the name of the company you will be visiting? _____
2. When and where was the company started?
3. When the company first started did it make products differently than it does now, if so what was different?
4. What products does the company make now?
5. Who is the customer for this company?
6. What manufacturing processes does the company use to make its products?
7. What quality control measurements does the company take to make sure their products are to specifications?
8. What are two technical jobs available at the company and what education/skills would be needed for that job?

lesson plan: page 1

Technology Education Curriculum
Recommended for 7th - 10th grade
Teacher Lesson Plan



INDUSTRIAL & TECHNOLOGY EDUCATION
Career & Technical Learning Activity - CTLA

Lesson Objectives & Student Expectations
Rigor/Relevance Framework: B
Length of lesson: 4 class periods

The student will:
1. Explore the history of the assembly line process.
2. Identify how manufacturing assembly has been made more efficient.
3. Analyze the affect new technologies have on the modern assembly line process.

Common Core Standards Addressed

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

Crude	Efficient	Hydraulic	Innovation	Leisure
Monotonous	Productivity	Precise	Specialization	Standardize

Standards alignment

Key vocabulary terms

lesson plan: page 2

Teacher Sequence To Present Lesson ***Day 1 of 4***

Est. Time (minutes)	Description of Teacher Action	Notes
5	Bell work activity - Have students answer the question then review the answer.	Use the Assembly power point to guide your lesson.
10	Have students come up with a plan of how to quickly assembly 100 mechanical pencils. Have students do a think pair share to address the question.	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 "Ford Assembly Line" article 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 "H" if something is describing the history of assembly lines. Mark "M" if something is modern methods or new technology. Mark "E" if something is referencing making things more efficient.	Prepare copies ahead of time
10	Have students answer the questions from the text.	
5	Have students clean up and complete a daily reflection.	Do any type of reflection, ex. Exit slip, daily reflection log, discussion, or answering a question.

Hook

Text coding

Written response

Student Procedures To Do This Lesson ***Day 1 of 4***

1. Begin Bellwork activity per teacher's directions.
2. Participate in Bellwork discussion.
3. Plan out how to assemble 100 mechanical pencils.
4. Answer the discussion question.
5. Review vocabulary terms and mark paragraphs in the article.
6. Read the article and answer questions.

lesson plan: reading

Ford Launched the Modern Assembly Line a Century Ago and Changed Society

The assembly line cut the amount of time it took to assemble a Model T from 12.5 hours to just 93 minutes.

Oct. 7, 2013 **Agence France-Presse**

1 DETROIT - It began on Oct. 7, 1913, when engineers constructed a crude system using a rope and winch to pull a Ford Model T past 140 workers in a sprawling new factory dubbed the Crystal Palace.

2 Henry Ford launched the modern assembly line in a suburb of Detroit a century ago -- and helped spark a radical transformation of both manufacturing and society.

3 By drastically reducing the cost of production with standardized parts and more efficient assembly, Ford (IW 500/8) was able to bring the luxury, convenience and freedom of the automobile to the masses.

4 Other industries soon adopted the innovation and today, everything from cereal to caskets is made on assembly lines.

5 "It had a huge, huge impact," said Stephen Burnett, a professor with Northwestern University's Kellogg School of Management. Standardization led to lower costs, higher quality and more reliable products.

From Hours to Minutes

6 Most critically, the assembly line cut the amount of time it took to assemble a Model T from 12.5 hours to just 93 minutes.

Text coding

lesson plan: directed note taking

Directed Note-Taking

"Ford Launched the Modern Assembly Line a Century Ago and Changed Society"

Guiding Question: How do new machines, like robots, create changes to the assembly line in manufacturing products?

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.	Assembly Process	Machines Used	Jobs People Do	Improving Efficiency or reducing costs

Guiding question

Directed notes

lesson plan: writing

Pre-Reading – What process would you use, if you had to make 100 mechanical pencils in the shortest amount of time possible?

Post Reading – Using Textual Evidence

1. What two factors allowed Henry Ford to reduce the cost of production?

2. How did the assembly line change the way people worked and lived?

3. What new technological innovations have made manufacturing even more efficient?

Directions: Write your answer to the question using information you learned from the article, in your discussion and on your tour. Be sure to use information from the text to justify your answer. Be sure to use complete sentences and correct punctuation and grammar.

Reflection

How do new machines, like robots, create changes to the assembly line in manufacturing products?

lesson plan: rubric

Student Name _____
Class Period _____ **Date** _____

Essay Grading Rubric

Category	4 Points	3 Points	2 Points	1 Point
Focus & Details	There is one clear, well focused topic. Main ideas are clear and are well supported by detailed and accurate information.	There is one clear, well focused topic. Main ideas are clear but are not well supported by detailed information.	There is one topic. Main ideas are somewhat clear.	The topic and main ideas are not clear.
Organization	The introduction is inviting, states the main topic, and provides an overview of the paper. Information is relevant and presented in a logical order. The conclusion is strong.	The introduction states the main topic and provides an overview of the paper. A conclusion is included.	The introduction states the main topic. A conclusion is included.	There is no clear introduction, structure, or conclusion.
Word Choice	The author uses technical words and phrases. The choice and placement of words seems accurate, natural, and not forced.	The author uses technical words and phrases. The choice and placement of words is inaccurate at times and/or seems overdone.	The author uses words that communicate clearly, but the writing lacks variety.	Jargon or clichés may be present and detract from the meaning.
Sentence Structure, Grammar, Mechanics, & Spelling	All sentences are well constructed and have varied structure and length. The author makes no errors in grammar, mechanics, and/or spelling.	The author makes a few errors in grammar, mechanics, and/or spelling, but they do not interfere with understanding.	The author makes several errors in grammar, mechanics, and/or spelling that interfere with understanding.	The author makes numerous errors in grammar, mechanics, and/or spelling that interfere with understanding.

A = 16 - 14
B = 13 - 11
C = 10 - 8
D = 7 - 5

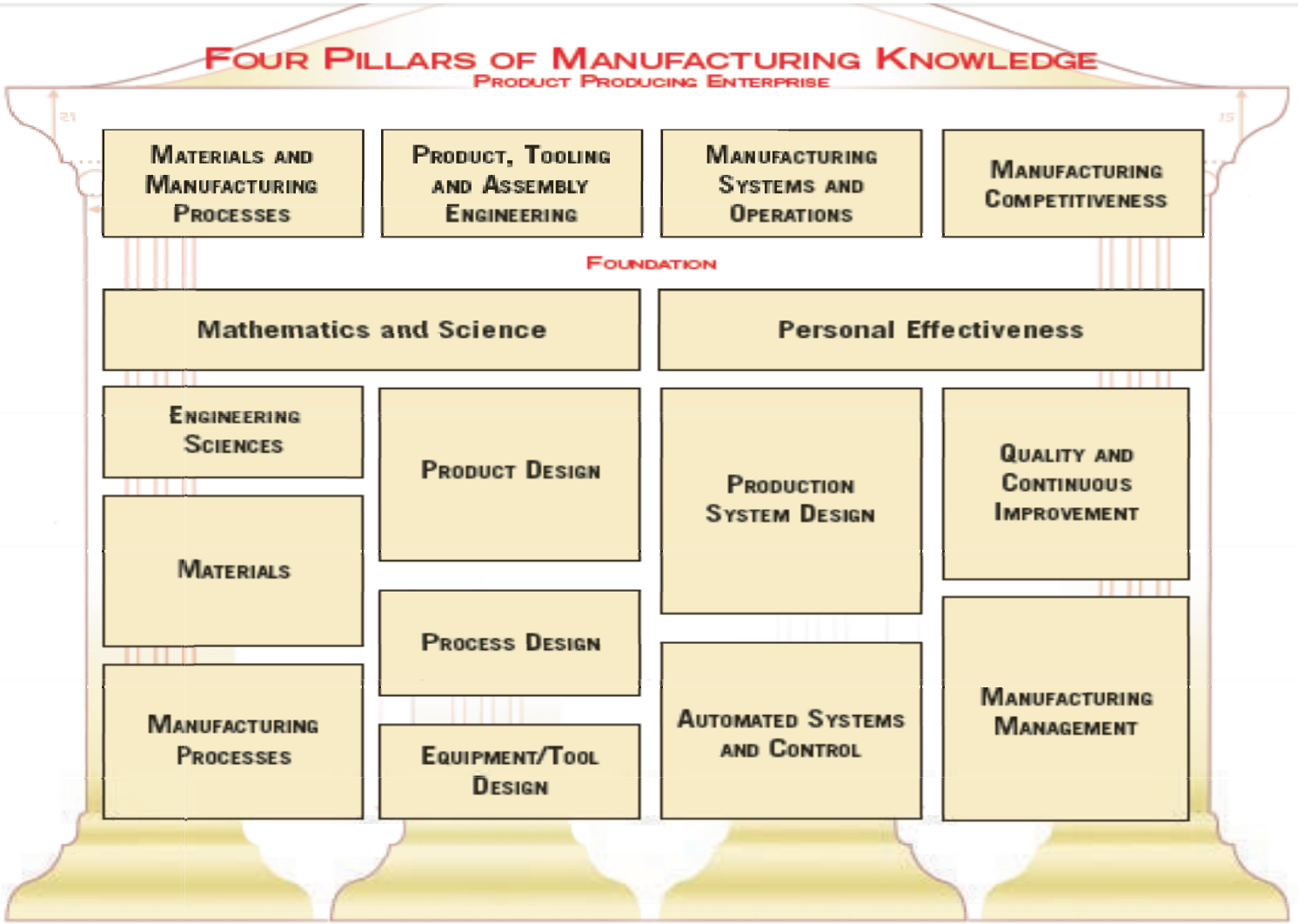
contextual teaching & learning

- **Creating a connection between text and real life application**

- **Students evaluate their observations in preparation for a written reflection on the fourth day of the CIS lesson**

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

standards based instruction



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

final written response & questioning

Research

Read

Tour

Write

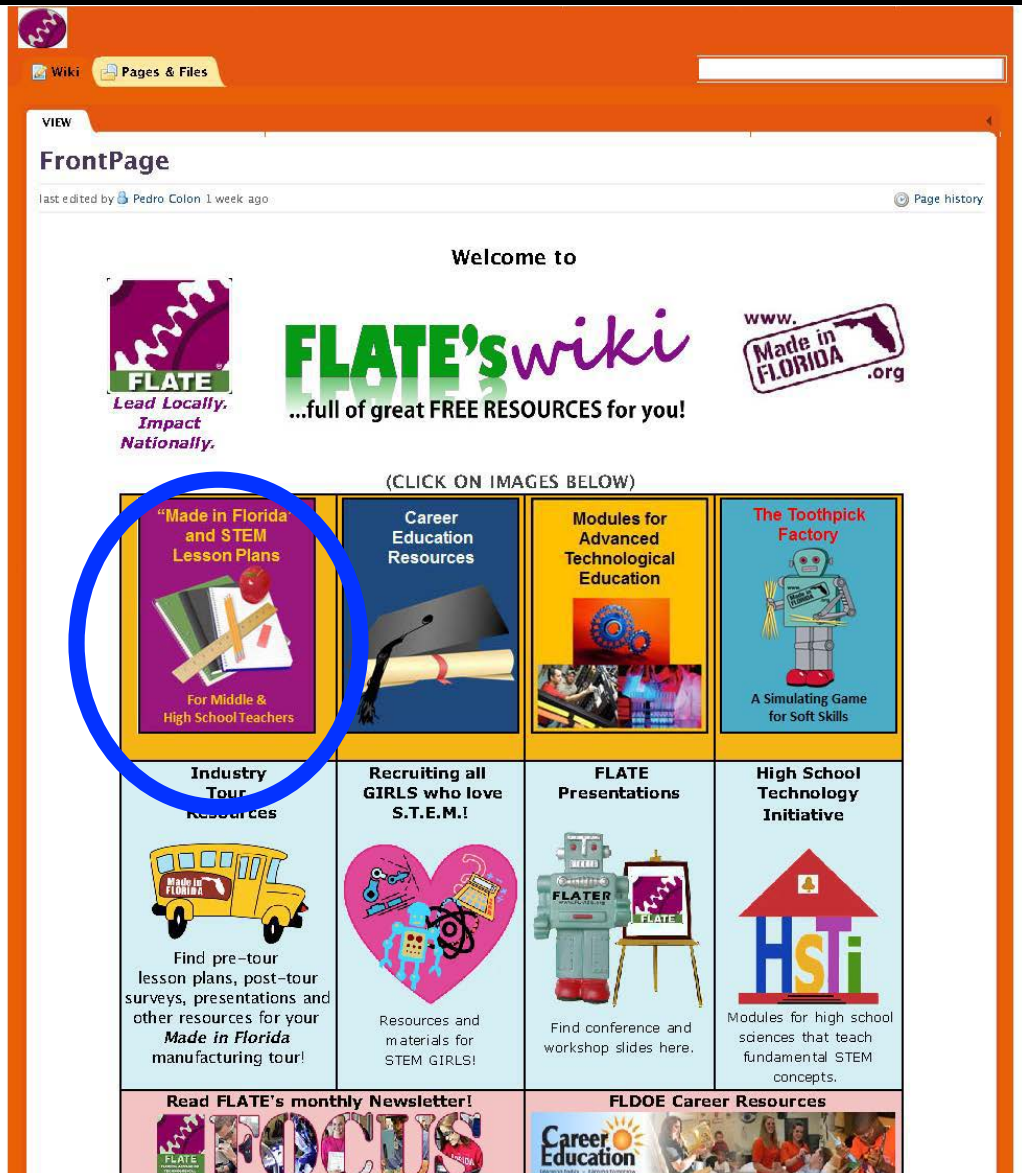
Students compile their experience to create a written statement/reflection

Students discuss their statements by generating questions and using evidence (text and tour) to support their opinions

manufacturing focused CIS lessons

- Additive Manufacturing
- Assembly
- Automation
- Design
- Electronics Assembly
- Quality
- Subtractive Manufacturing/Maching
- Welding

FLATE's wiki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For Middle & High School Teachers
Career Education Resources
Modules for Advanced Technological Education
The Toothpick Factory
A Simulating Game for Soft Skills
Industry Tour Resources
Find pre-tour lesson plans, post-tour surveys, presentations and other resources for your Made in Florida manufacturing tour!
Recruiting all GIRLS who love S.T.E.M.!
Resources and materials for STEM GIRLS!
FLATE Presentations
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High School Technology Initiative
HSTi
Modules for high school sciences that teach fundamental STEM concepts.
Read FLATE's monthly Newsletter!
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Career Education

Thank you!

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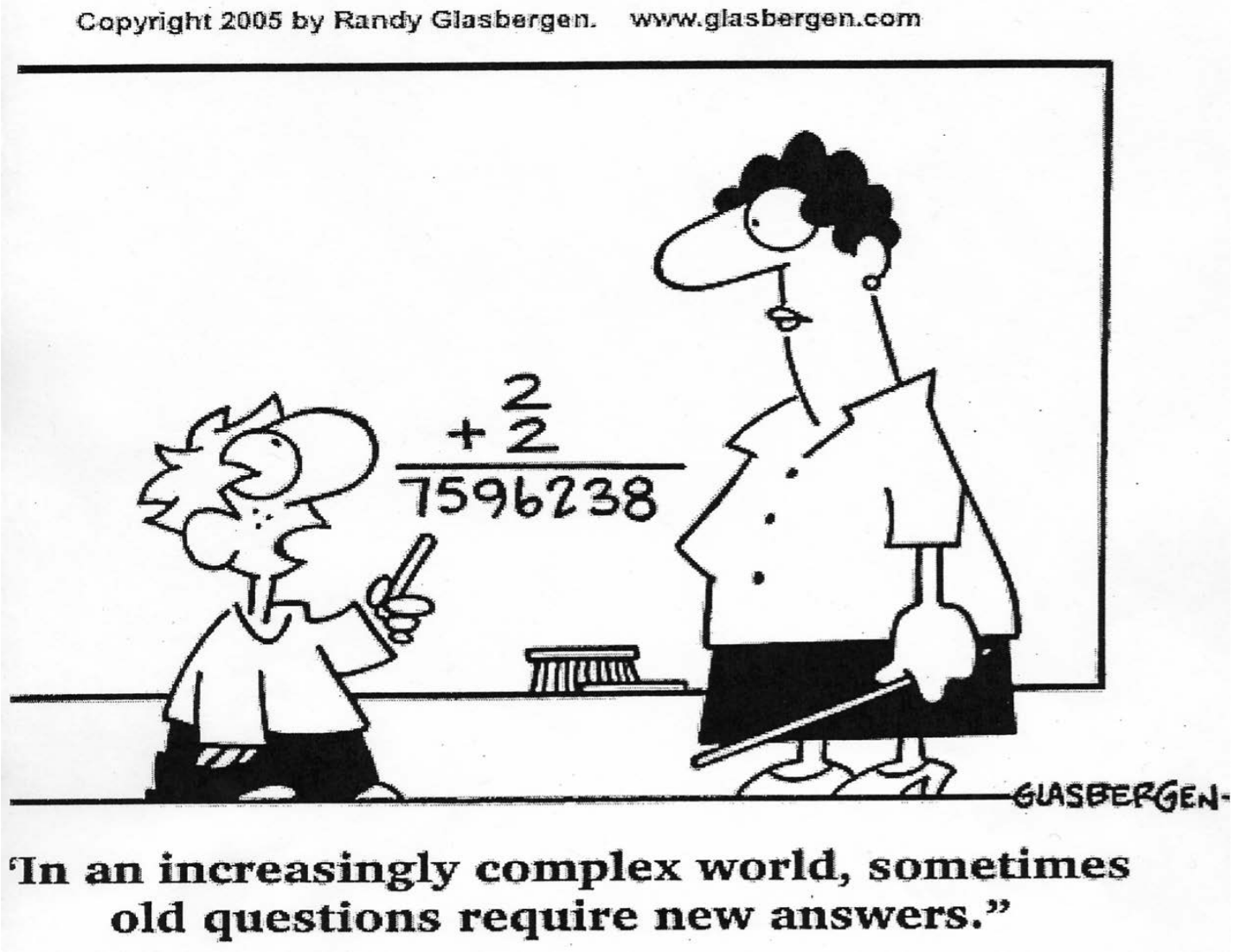

"In an increasingly complex world, sometimes old questions require new answers."