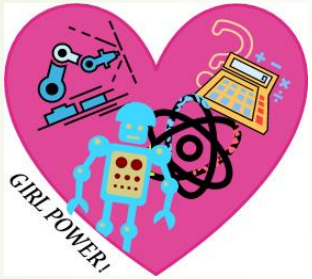
What it takes: Helping Girls find their way to Manufacturing, Industrial, and Engineering Careers



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ADVANCED TECHNOLOGICAL EDUCATION CENTER

Marilyn Barger, Ph.D., P.E., P.I. & Ex. Director

Danielly Orozco, M.Sc., Associate Director

Session 4 – 2:45 – 3:45 pm

53rd Annual FACTE Conference & Trade Show

Orlando, FL

July 16, 2019

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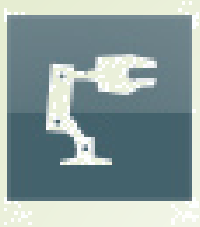

*Fl*orida *A*dvanced *T*echnological *E*ducation *C*enter

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ATE COMMUNITY

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VISION

FLORIDA FLATE ADVANCED TECHNOLOGICAL EDUCATION CENTER

Will drive Florida's world-class manufacturing workforce

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Goals & Work streams

Supports STEM Education

- K-12
- 2-Year AS. Engineering Technology (ET) Degree

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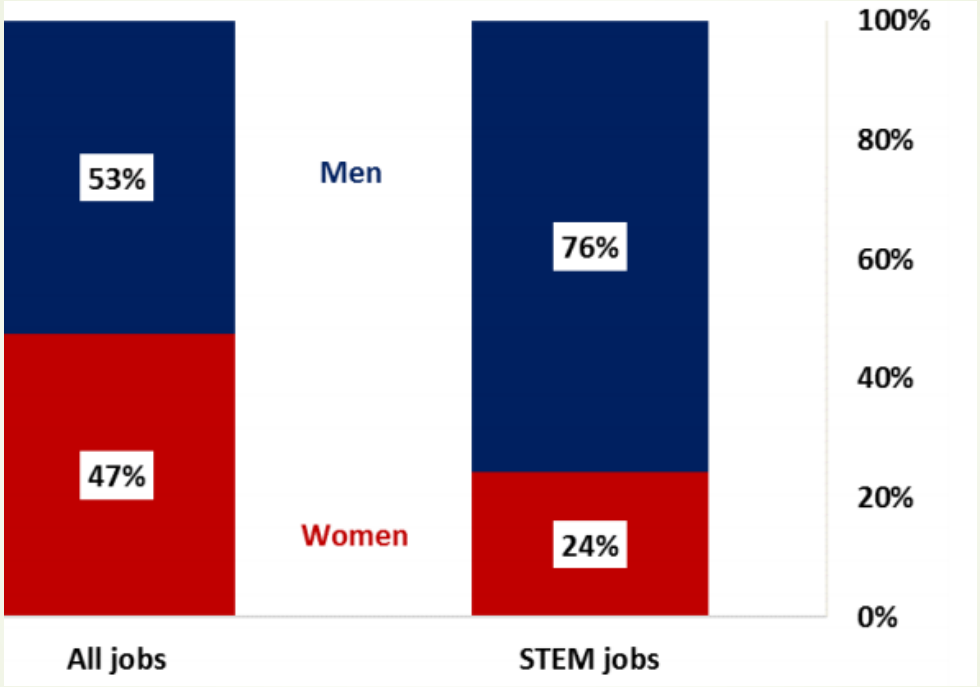
Current Situation – Women in STEM- Science, Technology, Engineering, & Math

Total & STEM Employment by Gender

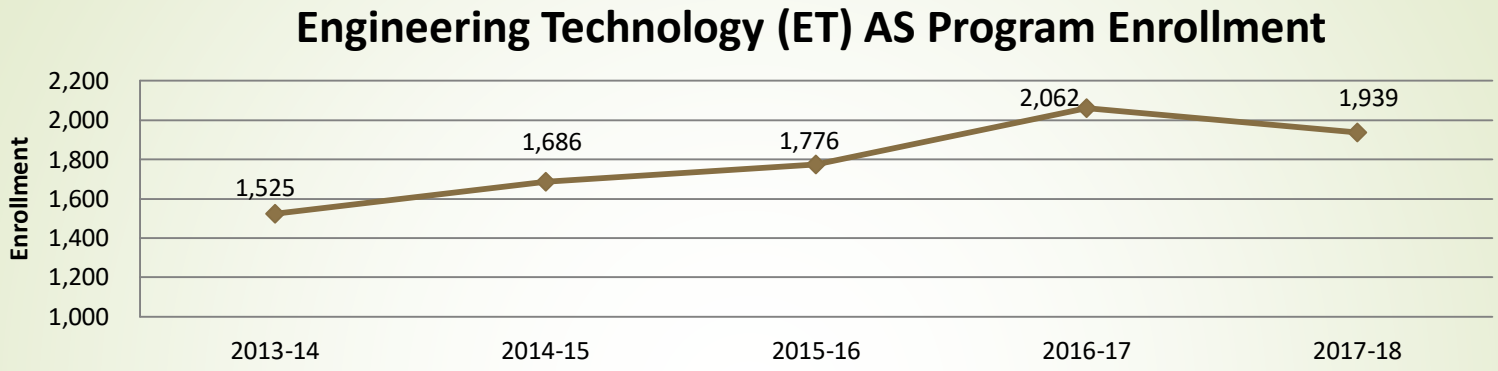


Employed persons age 16 and over

Source : Women in STEM: 2017 Update (ESA Issue Brief #06-17).

Noonan, Ryan. Office of the Chief Economist, Economics & Statistics Administration, U.S. Department of Commerce. Nov. 13, 2017. Retrieved from https://www.esa.gov/reports/women-stem-2017-update.

2017-18 FL Engineering Technology (ET) & Related Technology AS. Program Enrollment



ET & Related Technology AS Degree Program Student Enrollment	2013-14 n: 4,769	2014-15 n: 4,649	2015-16 n: 4,718	2016-17 n: 5,054	2017-18 n: 5,137
ET Technology Program % Female Enrollment	10%	10%	12%	11%	12% (238)
Related Technology Program % Female Enrollment	16%	20%	24%	27%	30% (959)
ET Technology Program % Minority Enrollment	55%	47%	46%	47%	49% (944)
Related Technology Program % Minority Enrollment	50%	52%	49%	48%	50% (1,588)

Source: FLATE 2013-2018 Florida Engineering Technology (ET) and Related Program Student Enrollment and Completion 5-Year Trend Study. January 2019. Data provided by the Florida Department of Education.

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Persisting gender barriers

- About half of all girls feel that STEM **is not** a typical career path for themselves.
- 57% of girls say that if they went into a STEM career, they'd have to work harder than a man just to be taken seriously.
- 81% of STEM girls are interested in pursuing STEM career, but only 13% say it is their first choice.

Facts

- Wrong perception of STEM careers (for men, difficult, dirty, not fun).
- Most girls want a career that they love; want to help people & want to make a difference in the world.

What to do ?

Develop successful strategies for recruiting & retaining girls into these non-traditional career pathways for women.

Successful Strategies
Recruiting & Retaining Girls

- Emphasize attributes of STEM career.

  - ✓ STEM workers play a key role in the sustained growth & stability of the U.S. economy
  - ✓ Our world depends on it.

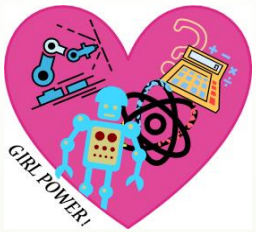
Successful Strategies, Cont.

Use appropriate messaging & imaging to

- Change wrong perception of STEM careers
- To reflect

Creativity Helping people/planet

Green Hands-on & Fun



"How to make a difference in the world"

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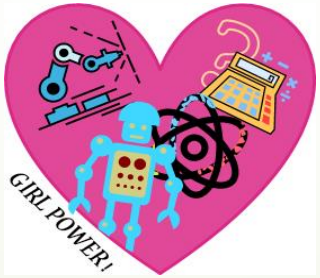
Successful Strategies, Cont.

- Provide mentors & role models that girls & women can identify with.

Role models and mentors play a powerful role in inspiring, encouraging and supporting students and young women at every stage of their STEM education and career.

Successful Strategies, Cont.

- Confirm capabilities & strengths regularly
- Encourage girls to follow their dreams
- Do what you “love”



Successful Strategies, Cont.

- Boost out-of-school & outreach programs for girls & women at all ages.

  - ✓ *Internships, Apprenticeships*
  - ✓ *Mentoring & Role model speakers*
  - ✓ *Scholarships*
  - ⇨✓ *All girls STEM clubs & summer camps with hands-on/fun STEM activities*
  - ⇨✓ *Tours to Colleges/Univ. & High-Tech industry*

Successful Strategies, Cont.

- Outreach programs
  - ✓ *Summer camps with hands-on/fun STEM activities*
  - ✓ *Tours to Colleges/Univ. & High-Tech industry*

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Successful Strategies, Cont.

Goal: provide students with exposure to real STEM/Hi-Tech workplaces & applications, primarily those in manufacturing.

MFG Day/Month is a celebration of modern manufacturing to inspire the next generation of manufacturers.

Successful Strategies - Industry Tours Impact

2013-2018 Florida MFG Day Industry Tours Summary Data

FL Dashboard	2013	2014	2015	2016	2017*	2018*	Total Cumulative
Counties	23	39	50	32	32	21	-
Students	2,307	3,150	4,770	4,846	5,070	5,035	25,178
Teachers	110	174	318	268	359	390	1,619
Parents	66	113	318	217	120	129	963
Student Tours	72	95	159	186	165	178	855
Student Surveys	1,286	1,496	2,076	1,764	2,202	1,237	10,061
Manuf. Employees	225	350	636	569	680	798	3,258
In-kind & Cash	>$30K	>$50K	>$145K	>177K	>$412K	>$429K	>$1,243M

Source: FLATE, Florida MFG Day Industry Tours Summary Report. January 2019.

This work is funded under grant DUE# 1204751 from the National Science Foundation Advanced Technological Education (ATE) program. Opinions and findings expressed herein are those of the authors and do not necessarily reflect the views of the National Science Foundation. © Copyright 2019 FLATE

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Successful Strategies, Cont.
MFG Day Industry Tours Impact

2018 Cumulative FL Post Tour Survey Questions	Yes Girls	Yes Boys
1. I was considering a career in advanced manufacturing before the tour.	13	253
2. My teachers have talked about advanced manufacturing with my class.	264	530
3. Today I learned about technologies used in advanced manufacturing industries and manufactured products.	450	704
4. This tour gave me new information about careers in advanced manufacturing.	436	707
5. The tour helped me understand how STEM subjects are put to work in advanced manufacturing industries.	425	656
6. I would recommend that other students have the opportunity of this tour.	431	681
7. I am now considering a career in advanced manufacturing.	169	408
Total Responses	***2,248***	**3,939**

Advanced Manufacturing Perception Impact - Question Comparison for 1. & 7.

131% - *Change for girls considering a career in advanced manufacturing before and after the tour*

61%- Change for boys considering a career in advanced manufacturing before and after the tour

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Successful Strategies, Cont.
MFG Day Industry Tours Impact

Post Tour Survey Questions	Y 2016 N: 1,764	Y 2017 N: 2,202	Y 2018 N: 1,237
	Yes Girls		
1. I was considering a career in advanced manufacturing before the tour.	*108*	*109*	*73*
7. I am now considering a career in advanced manufacturing.	*281*	*211*	*169*
Positive Impact (growth rate)	***160%***	***94%***	***132%***

Increase in the number of **Girls** considering a career in advanced manufacturing after the tour

Successful Strategies, Cont.
MFG Day Industry Tours Impact

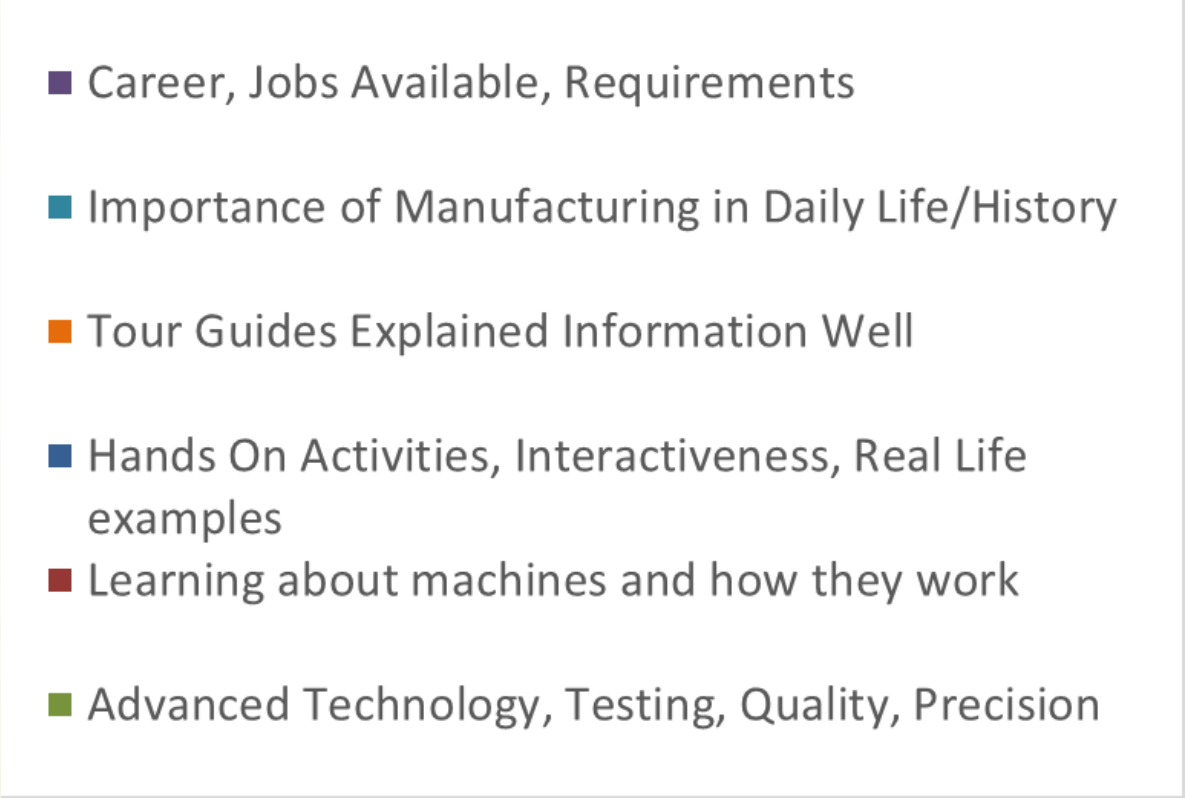
"What did you like most about the tour?" 2016 Girls' comments

- *"I enjoyed learning about the process of making a product that helps our country!*
- *"It helps me understand more about the STEM world"*
- *"It was very educational, we saw samples of what the machines make as a visual representation and it was really cool to see what they make"*
- *"We saw how the machine works"*
- *"I liked the fun environment & enjoyed learning about devices in manufacturing. I found it really interesting since I had never been in a manufacturing company"*

Successful Strategies, Cont.
MFG Day Industry Tours Impact

"What did you like most about the tour?"

2016 Responses
Grouped by Themes



Successful Strategies, Cont.
MFG Day Industry Tours Impact

2016 MFG Day- Industry Tour - Girls' Survey Responses, n=450
"What did you like most about the tour?"

2,076 - Total student participants

1,110 - Total comments by Themes/Categories (450 Girls and 660 Boys)

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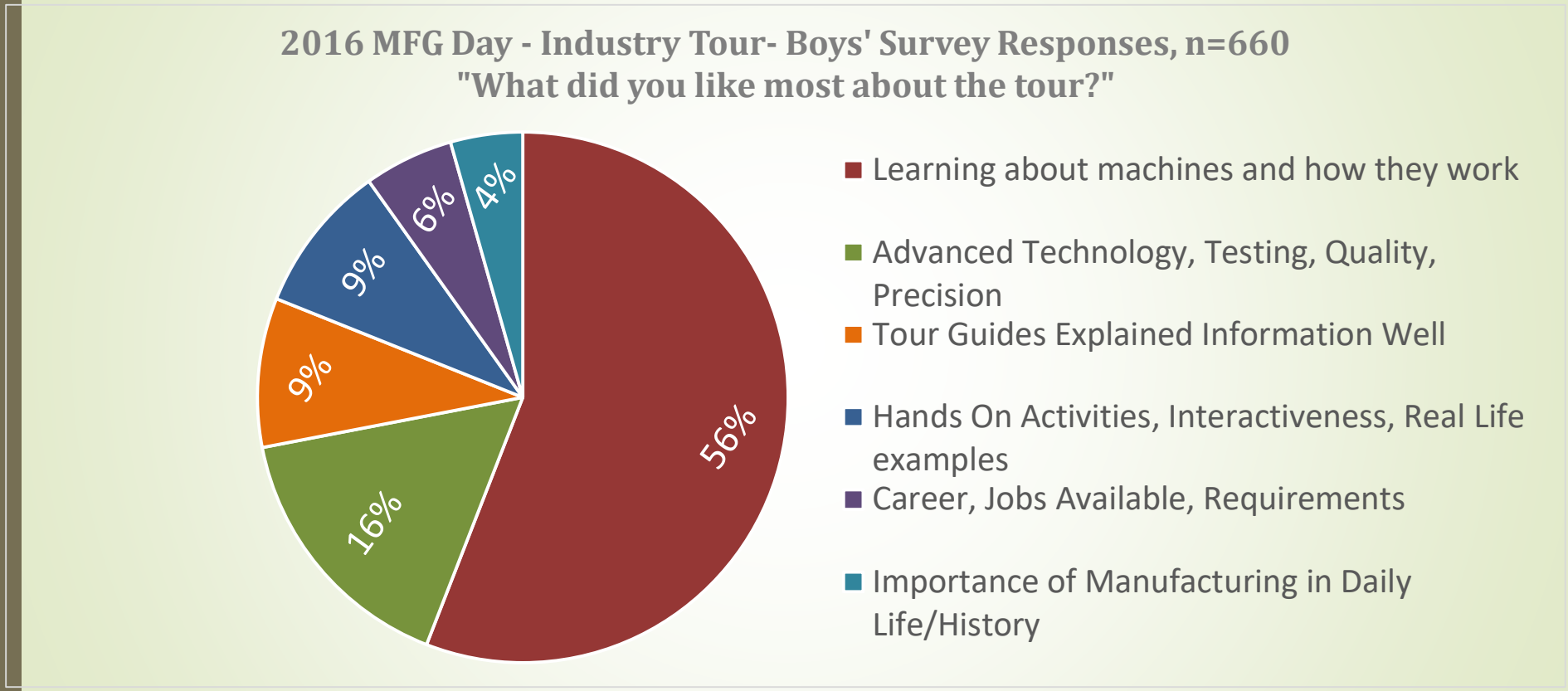
Successful Strategies, Cont.
MFG Day Industry Tours Impact



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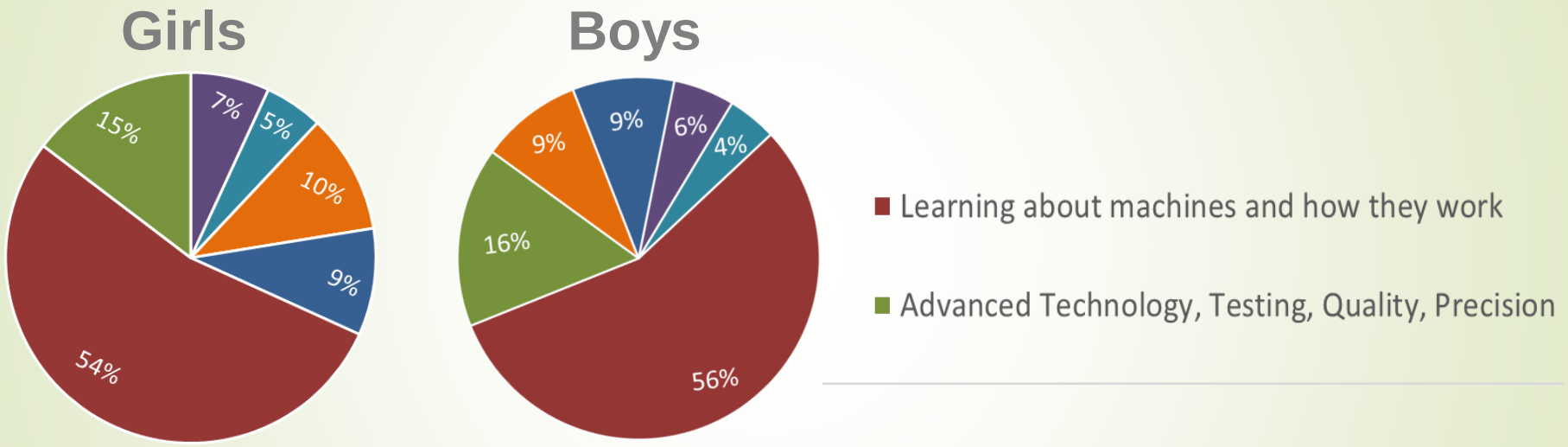
Successful Strategies, Cont.
MFG Day Industry Tours Impact

2016 MFG Day - Industry Tour, Girls & Boys' Survey Responses
"What did you like most about the tour?"



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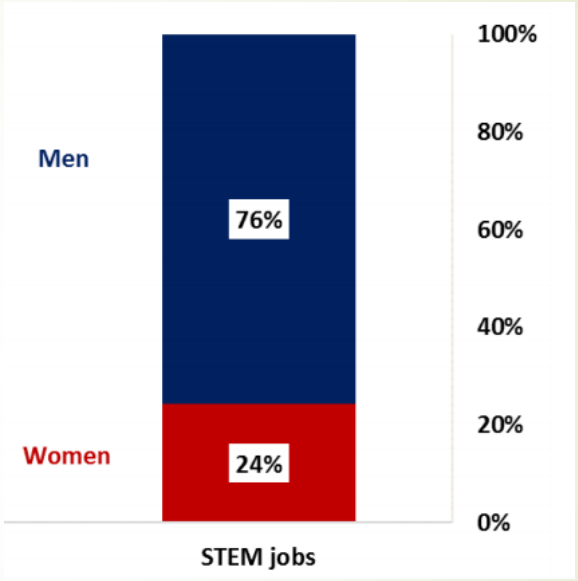

What to do ?

Employed persons age 16 and over

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Noonan, Ryan. Office of the Chief Economist, Economics & Statistics Administration, U.S. Department of Commerce. Nov. 13, 2017. Retrieved from https://www.esa.gov/reports/women-stem-2017-update.

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Resources

MANUFACTURING Institute

Women in Manufacturing

swe Society of Women Engineers

sweNEXT

STEP AHEAD

MWM Million Women Mentors®

Advancing Women and Girls in STEM Careers Through Mentoring

STEM VILLAGE

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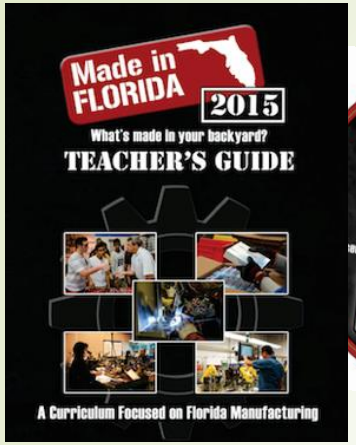
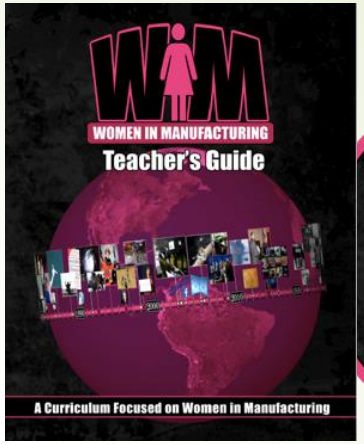
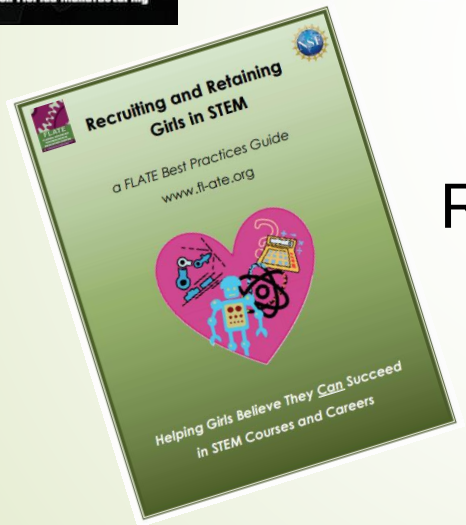
Resources, Cont.







Recruiting & Retaining Girls in STEM

FLATE Best Practices Guide

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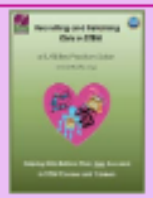
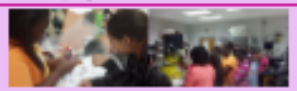
Resources, Cont.

Girls STEM Resources

WOMEN IN MANUFACTURING	NEW! Women in Manufacturing Video, Interviews & Lesson Plans
	Best Practices Guide: Recruiting and Retaining Girls in STEM
Recruiting Girls for STEM Pathways Webinar This webinar looks at "what works" from the unique perspective of teachers in the field at progressive levels of education: Elementary, Middle, High School, and College programs and outcomes.	Webinar Slides
	Girls ONLY Summer Camps 2013-2014
	Recruiting Girls for STEM Pathways Workshop June, 2013
	The Manufacturing Institute "Women in Manufacturing" Web Resources & STEP Awards

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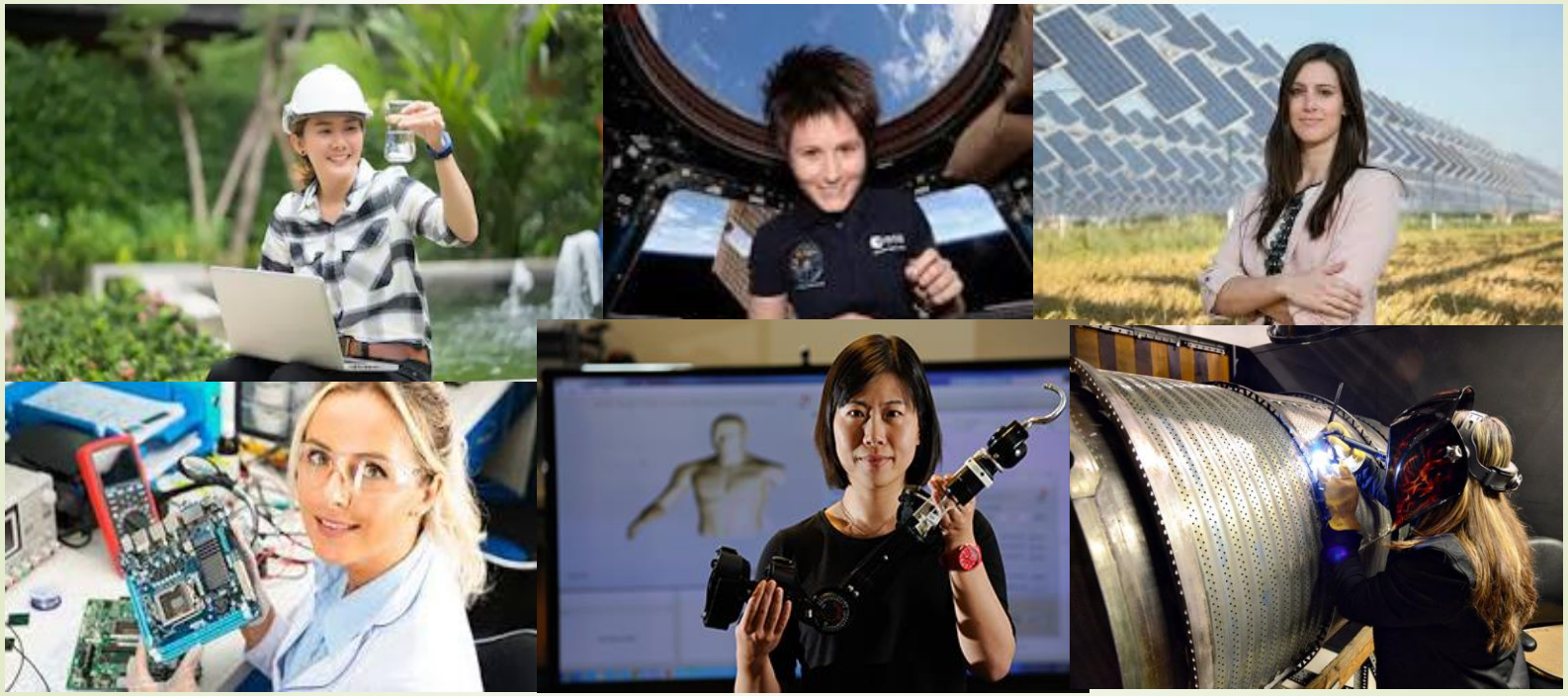
Summary

- Identify successful strategies that work.
- Consistent Implementation of any strategy is key
- Use resources available

Inspire, Encourage & Support young women in STEM careers



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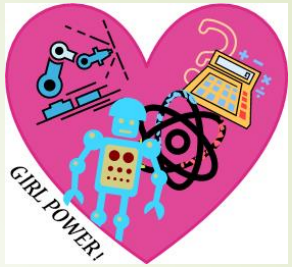
Thank you!



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