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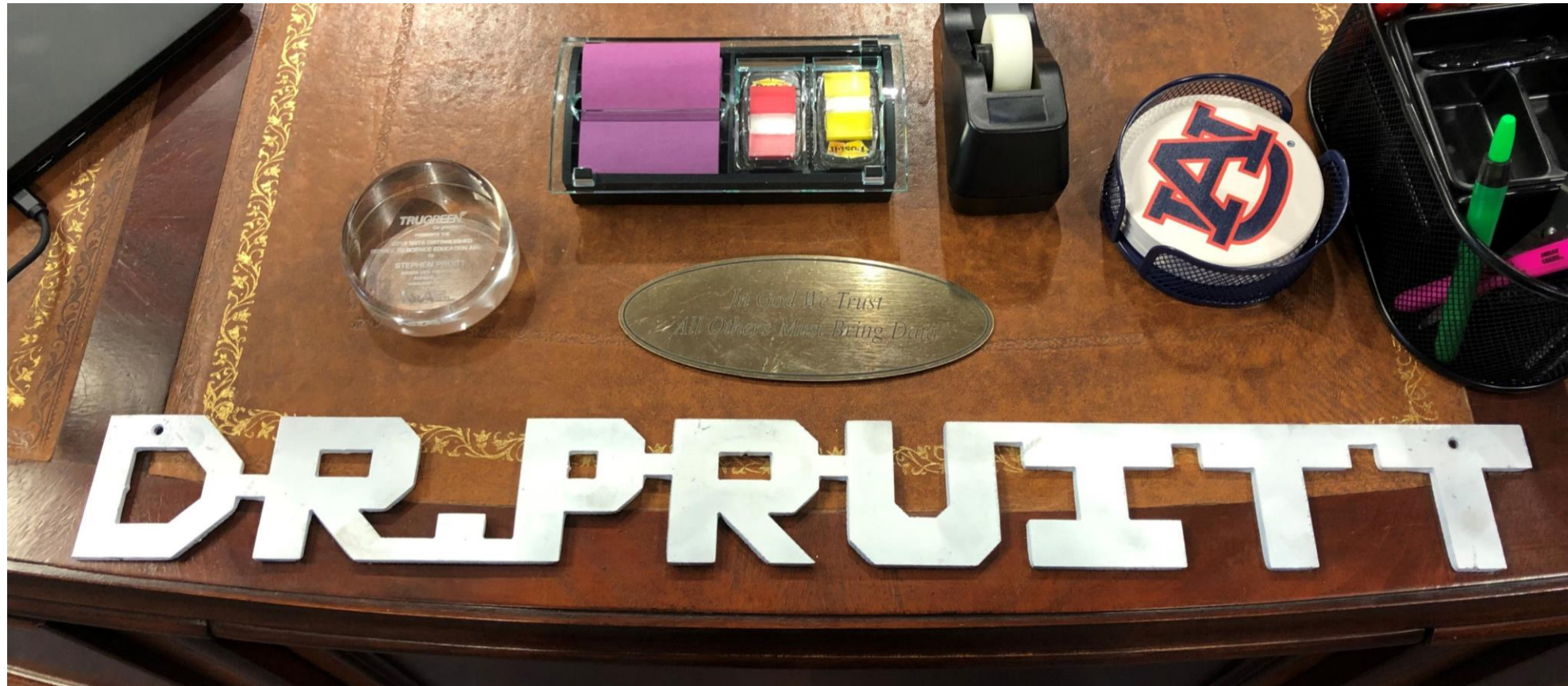
Encouraging Science Based Economic Development Through Regional Education Programs

The Fourth Industrial Revolution – Science Is The Hub

Stephen L. Pruitt, Ph.D.
President

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Anniversary

Push This Button



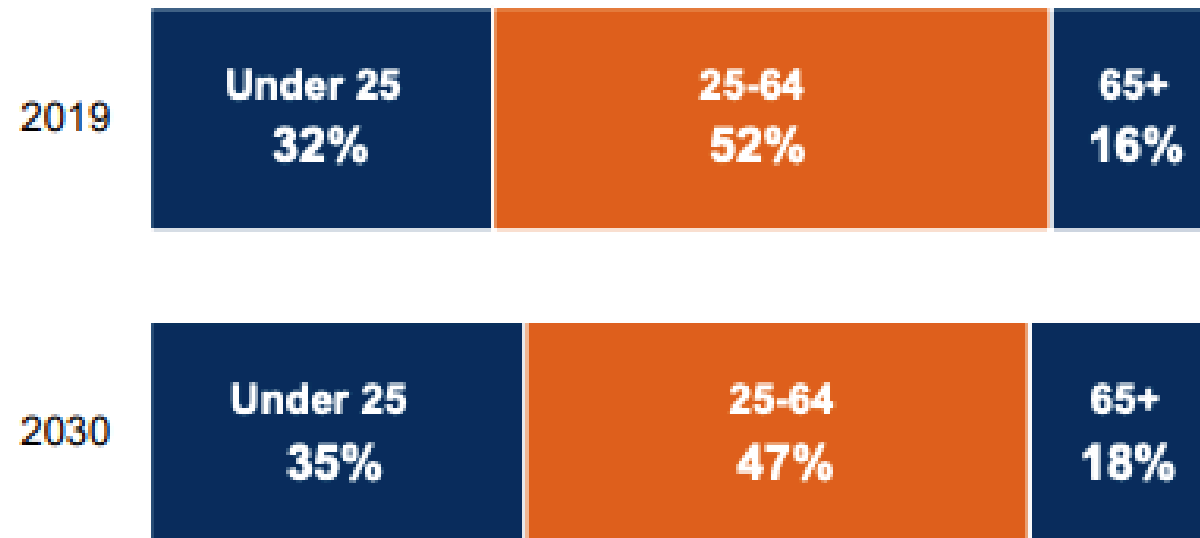
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Education Economics and Future Workforce

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A More Dependent Population

By 2030, for every 53 dependent people in SREB states there will be just 47 working-age adults to provide for them.



Notes: Working-age is 25 to 64. Percentages may not add to 100% due to rounding.

Source: SREB Fact Book, U.S. Census Bureau

Current Demographic Profile of the Region

Category	SREB	USA
Overall Population	124,717,934	329,725,481
Male	49.3%	49.5%
Female	50.7%	50.5%
Race: White	65.9%	68.2%
Race: Black or African American	18.9%	12.6%
Race: American Indian and Alaska Native	0.7%	0.8%
Race: Asian	3.6%	5.7%
Race: Native Hawaiian and Other Pacific Islander	0.1%	0.2%
Race: Some Other Race	3.9%	5.6%
Race: Two or More Races	7.0%	7.0%
Hispanic or Latino (of any race)	18.3%	18.4%

Workforce Participation and Education Levels

Category	SREB	USA
Labor Force Participation Rate and Size (civilian population 16 years and over)	62.0%	63.4%
Prime-Age Labor Force Participation Rate and Size (civilian population 25-54)	81.1%	82.5%
No High School Diploma	11.2%	10.3%
High School Graduate	26.7%	25.3%
Some College, No Degree	20.5%	20.1%
Associate's Degree	9.1%	9.3%
Bachelor's Degree	20.6%	22.0%
Postgraduate Degree	11.9%	13.1%
Poverty Level (of all people)	13.9% 16,927,192	12.6% 40,661,636

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Unprepared and Unaware

Upskilling the Workforce for a Decade of Uncertainty

February 2019

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Policy Brief | June 2019

The SREB Region's Economic Outlook

The Potential Impact of Automation and AI

Many American workers find themselves in a continuous struggle to keep up with advances in automation and artificial intelligence that could potentially displace them from a growing list of occupations. Nearly every day articles and online videos highlight new technologies. We learn about machines being tested to deliver packages to homes autonomously. A robotic interviewer in Sweden now questions job applicants in an attempt to eliminate human bias from the hiring process. And researchers are working on an ocular implant for humans to record everything their eyes see during the day.

As companies continue to incorporate new technologies, making machine learning and robotics common in almost all workplaces, more and more working adults need to adapt to computerized work activities. Many need to move into new jobs raising their skill levels, or they will be out of a job altogether. According to SREB's *Unprepared and Unaware: Upskilling the Workforce for a Decade of Uncertainty*, adults with the lowest levels of skills — typically those with a high school credential or less — are most vulnerable to these changes.



If states and industry leaders do not act quickly to prepare employees for these workplace transformations, 18 million or more adults will find themselves in low-paying positions or out of a job and increasingly reliant on public services. Businesses will struggle to fill middle- and high-skilled positions. Children — future workers — will face similar struggles and likely be unprepared for future positions, worsening these problems for states and businesses.

This brief was prepared by Meagan Crowe, policy analyst, under the leadership of Jeff Gagné, director of policy analysis, and Joan Lord, vice president of education data, policy research and programs.

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Percentage of the Workers that are Vulnerable During the Pandemic in Each Top 5 Industry



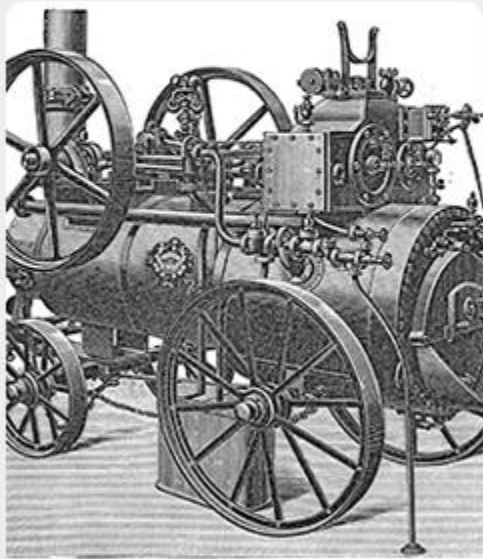
...together, they make up almost one-third of the total workforce in Georgia.

4th Industrial Revolution

FIRST

Mechanical Production

steam, water



1784: First power loom

SECOND

Mass Production

electricity



1870: First assembly line

THIRD

Digital

IT, Electronics



1969: First programmable logic computer

FOURTH

Cyber physical systems

physical, digital, biological



Today: Robots learning from humans

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Is STEM Critical To Success in the 4th Industrial Revolution?

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Most Fields Rely (or Will) on STEM

Health Care



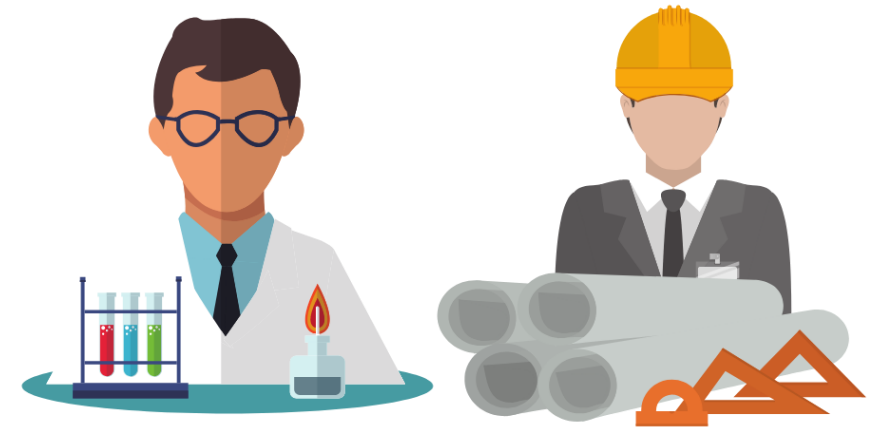
- Doctors
- Nurses
- Lab Techs
- Med Assts

Skilled Trades



- Plumbers
- Electricians
- Carpenters
- Mechanics

White Collar Professionals



- Scientists
- Architects
- Engineers
- Psychologists

Most of the
50 million workers
in the region will be
affected by automation
in the coming decades

If state and business
leaders do not act

18
million

workers and their
children could be unemployable or
stuck in low-wage jobs:
**an endless cycle
of poverty**

This multigenerational cycle, combined with rising workforce skill demands,
means more workers of all educational attainment levels will be:



unemployed or
underemployed

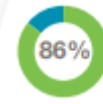


earning incomes below
the poverty level



reliant on
state services

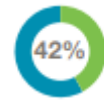
Just 5% of jobs are completely automatable, but
44% of all work activities have automation potential.
In the **top 5 industries** the potential is often greater:



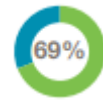
Production



Transportation



Sales



Food Preparation
& Serving



Office &
Administrative

Note: The top five industries employ the most people.

37%
workers
highly vulnerable
to rising workforce
skill demands

59%
vulnerable workers
employed in the
top 5 industries
in 2016

Business & industry
will need increasing
numbers of workers
with middle & high
skills

Are students prepared?

Parents today: **25 to 44 year-olds**

37% had a high school credential or less in 2017

Of 8th graders whose parents had no education after high school



36% were **below Basic** on NAEP **reading** and



48% were **below Basic** on NAEP **math**

These percentages were just

22%



32%



for students whose parents had
some education beyond high school

Pre-Pandemic Total Automation Potential

Work activities in the Top 5 Employing Industries (2014-2030)

In the industries that employ the most people, automation potential is often greater:



Food Preparation
and Serving



Sales and
Related



Production
Occupations



Office and
Administrative



Transportation and
Material Moving

Percentage of the Workers that are Vulnerable During the Pandemic in Each Top 5 Industry

The **percentage of vulnerable workers** varies by industry:



...together, they make up almost one-third of the total workforce in the SREB region.

Reimaging STEM



Year in Review – STEM Job Postings

306.6k
Total

76
Occupations

34.5k
Locations

35.4k
Employers

689
Certifications

2k
Hard Skills

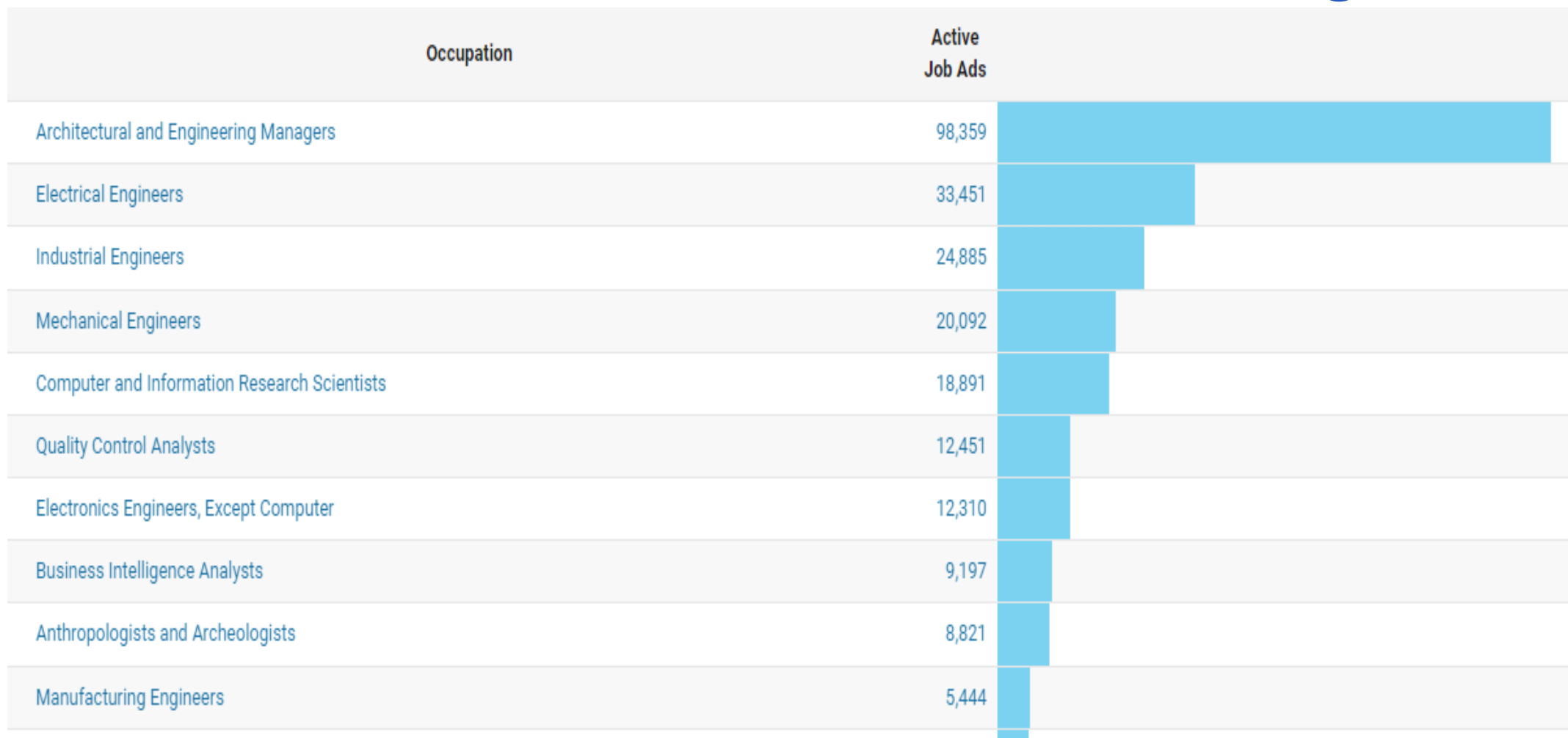
109
Soft Skills

119.2k
Job Titles

6
Education Levels

582
Programs

9
Job Types



Year in Review – Manufacturing Job Postings

614.6k
Total

148
Occupations

71.4k
Locations

81.6k
Employers

570
Certifications

2.1k
Hard Skills

109
Soft Skills

197.7k
Job Titles

6
Education Levels

432
Programs

9
Job Types

Occupation	Active Job Ads
Maintenance and Repair Workers, General	207,014
First-Line Supervisors of Mechanics, Installers, and Repairers	64,975
First-Line Supervisors of Production and Operating Workers	60,451
Production Workers, All Other	52,375
Inspectors, Testers, Sorters, Samplers, and Weighers	22,354
Purchasing Agents, Except Wholesale, Retail, and Farm Products	17,012
Welders, Cutters, Solderers, and Brazers	15,824
Electrical and Electronic Engineering Technologists and Technicians	10,856
Machinists	10,014
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	8,984

STEM Career Cluster-10 Year Forecast

Occupation	Current Employment				10 Year Forecast		
	Empl	Median Ann Wages ²	LQ	Online Job Ads ³	Total Demand	Empl Growth	Ann % Growth
Data Scientists	57,757	\$106,500	0.90	2,026	65,389	25,044	3.7%
Statisticians	11,812	\$104,400	1.00	1,049	11,825	3,884	2.9%
Computer and Information Research Scientists	13,826	\$130,300	1.13	4,752	13,328	3,631	2.4%
Industrial Engineers	106,577	\$98,700	0.84	8,563	78,427	16,862	1.5%
Mechanical Engineers	83,690	\$98,800	0.75	5,472	59,576	11,607	1.3%
Electronics Engineers, Except Computer	37,990	\$115,200	0.92	4,144	26,009	4,750	1.2%
Mathematical Science Occupations, All Other	1,540	\$73,200	0.90	40	1,150	191	1.2%
Science, Technology, Engineering & Mathematics (CTE Cluster)	828,928	\$105,300	0.91	75,919	647,473	103,023	1.2%
Chemical Engineers	9,075	\$121,300	1.18	628	5,999	1,040	1.1%
Biochemists and Biophysicists	5,990	\$93,100	0.47	163	5,107	602	1.0%

Manufacturing Career Cluster-10 Year Forecast

Occupation	Current Employment				10 Year Forecast		
	Empl	Median Ann Wages ²	LQ	Online Job Ads ³	Total Demand	Empl Growth	Ann % Growth
Wind Turbine Service Technicians	6,501	\$58,100	1.32	159	10,699	3,353	4.2%
Medical Equipment Repairers	27,207	\$53,800	1.08	612	32,174	5,506	1.9%
Computer Numerically Controlled Tool Programmers	7,571	\$61,800	0.70	363	8,825	1,444	1.8%
Semiconductor Processing Technicians	5,618	\$40,500	0.53	42	7,563	1,005	1.7%
Industrial Machinery Mechanics	175,422	\$60,300	1.14	1,394	173,184	28,572	1.5%
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	11,488	\$88,800	1.14	280	11,911	1,715	1.4%
Aerospace Engineering and Operations Technologists and Technicians	4,562	\$72,400	1.07	244	5,021	651	1.3%
Food Batchmakers	42,210	\$35,500	0.65	85	70,735	4,977	1.1%
Electrical, Electronic, and Electromechanical Equipment Assemblers, Except Coil Winders, Tapers, and Finishers	77,156	\$40,000	0.71	1,453	92,359	7,164	0.9%
Radio, Cellular, and Tower Equipment Installers and Repairers	5,252	\$61,200	1.07	423	5,996	473	0.9%

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Changing Approach

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Engineering Challenge

Engineer and construct a platform that supports the mass of a full bottle of in a stable position as far above the table top as you can.

Materials:

- 1. Two sheets of paper*
- 2. One full water bottle*

STEM Challenge

Engineering challenge: Build a stable paper tower to support a water bottle

1. Engineer and construct a platform that supports the mass of a full bottle of in a stable position as far above the table top as you can. (Materials: Two sheets of paper and one full water bottle)
2. Develop a model (free body diagram) to show the forces acting on the water bottle to cause it to be stable on the tower.

Group Discussion

3. Use conceptual and mathematical models to communicate differences in the net forces between the systems that caused the phenomenon.

Individual Performance (SSW)*

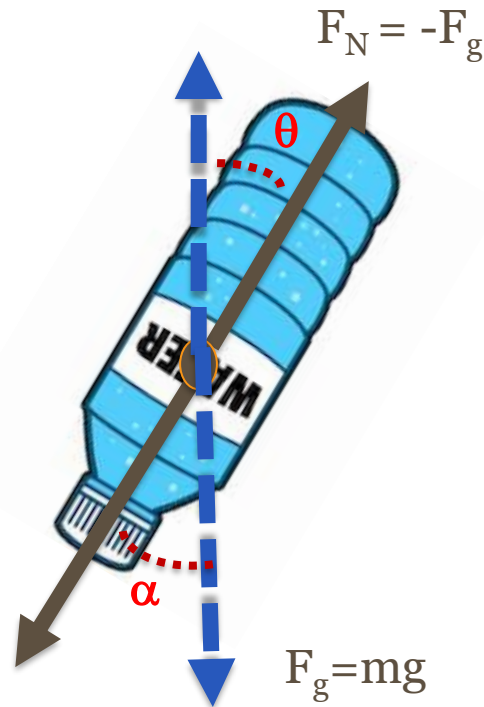
4. Revise the design of the tower and write an explanation for how the sum of the forces acting on the water bottle system are more stable.

Free Body Diagram

If the bottle is completely vertical, force of gravity is equal to the normal force. Since the ends of the bottle are vertical, there are no additional calculations needed to properly model the balanced forces.



Free Body Diagram



If the bottle is tilted, force of gravity is still equal to the normal force. However, forces acting on a bottle at an angle must be considered in the model. Since the bottle is not moving, the forces are balanced, but we must explain those balanced forces by converting forces acting at an angle to vertical forces.

$$F_N + F_g = 0$$

$$F_N = F_g + \sin\theta F_g$$

$$F_g = -F_g + \sin\theta F_g$$

Applying science Learning Beyond the Classroom

Provide students with a forum to share phenomena that are related to stability in a system.



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