Going Deeper in Literacy and Math and Using Advanced Pathways to Integrate Them With Career Studies

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Using Literacy-Based Assignments to Advance Achievement in English/Language Arts, Social Studies, Science and CTE classes

SREB's Work in 12 States

Gene Bottoms

Sandra Carter

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Median Percentage of Young Adults (age 25-34) Holding an Associate Degree or Higher in SREB States

SREB States	**37%**
United States	**40%**

Median Percentage of Eighth-Graders in SREB States Proficient and Above in Reading and Math

	Reading	Math
SREB States	30%	27%
United States	33	32

Source: NAEP Assessment 2015

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Median Percentage of Students in SREB States Meeting ACT College-Ready Benchmarks

	SREB	U.S.
English	58%	64%
Reading	41	46
Science	32	38
Math	36	42
Met all four	22	28
Percentage of students taking ACT exams	69	59

Source: ACT Assessment, 2015

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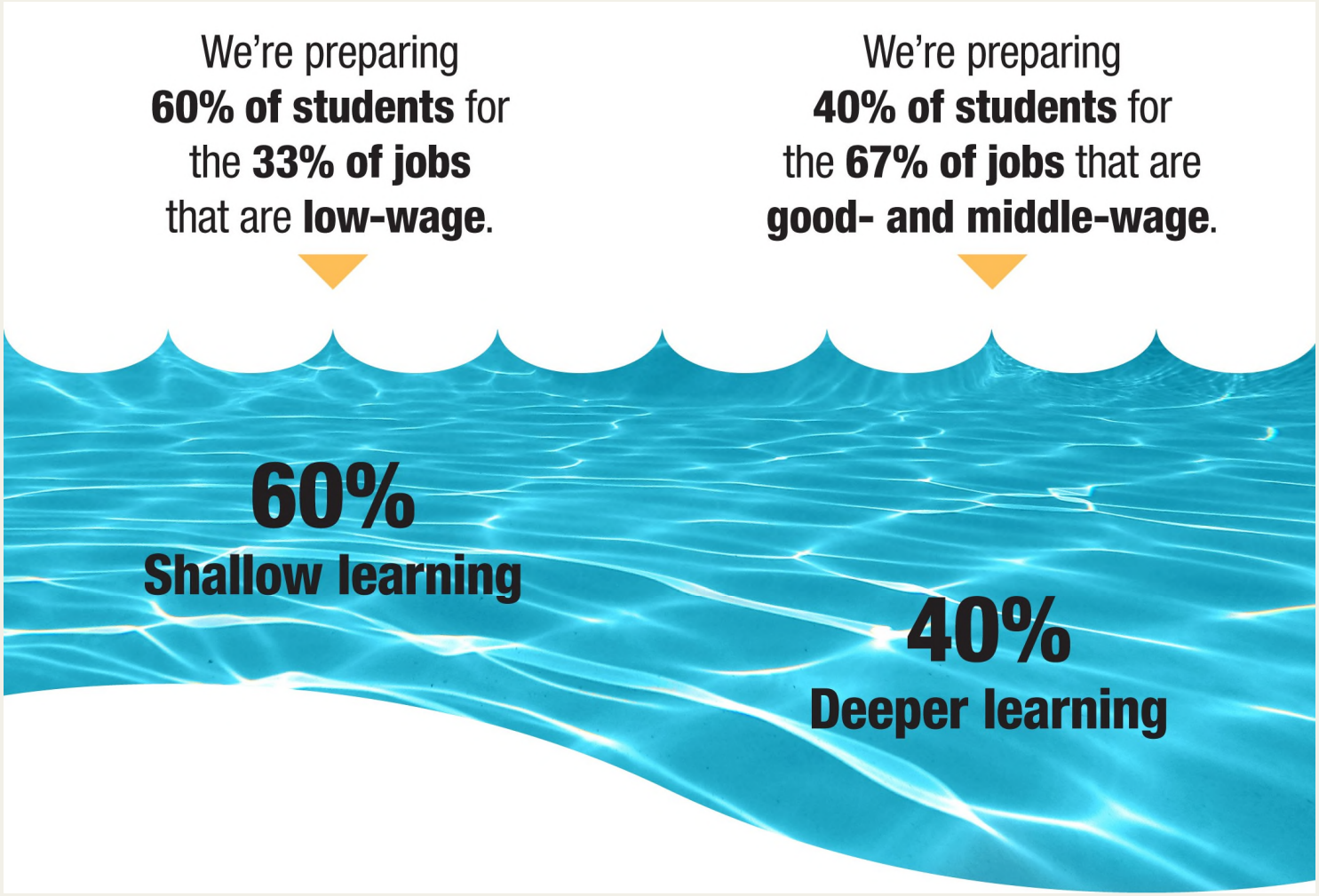

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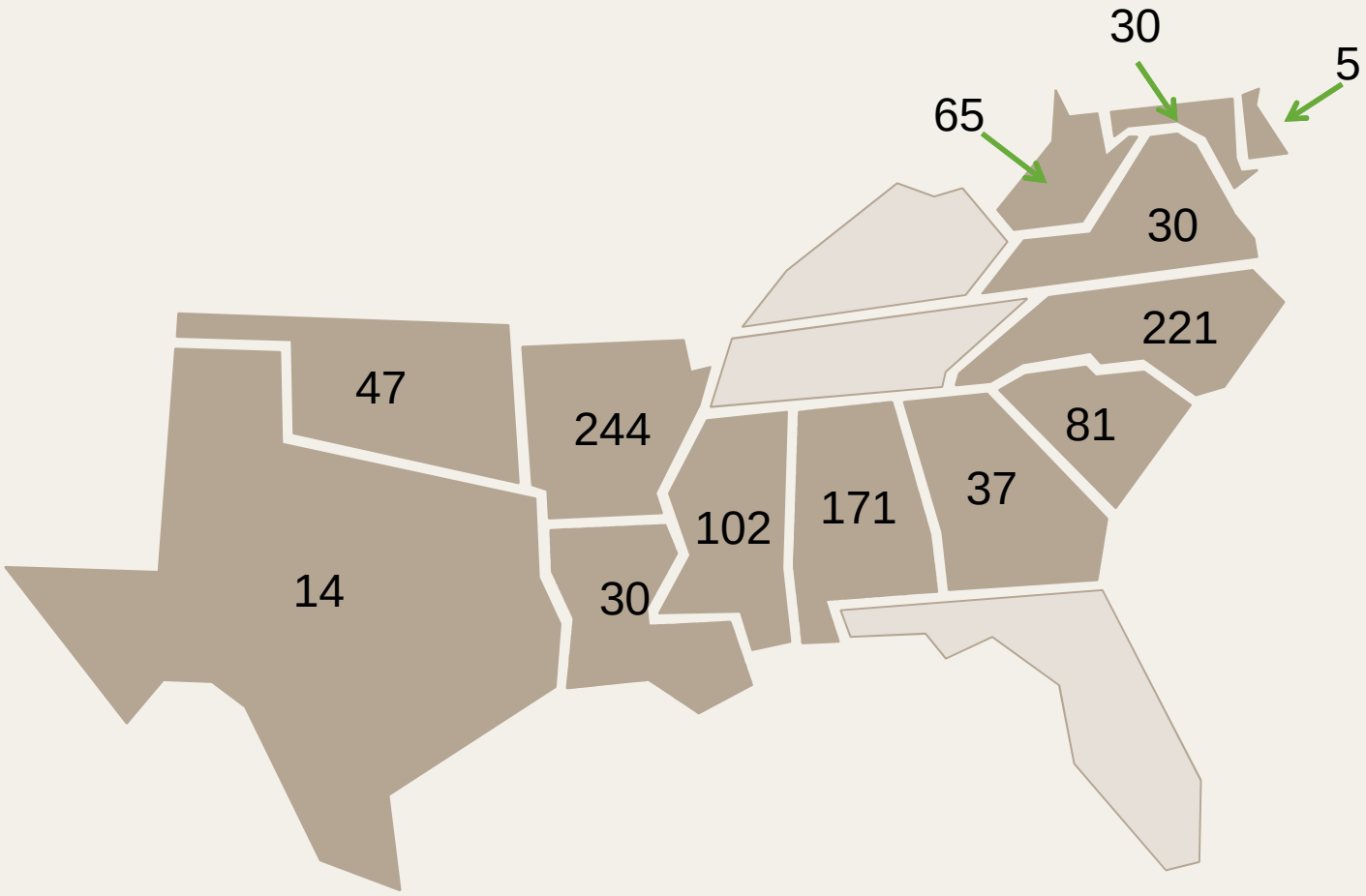
Number of Schools Participating in Literacy and Math PD — 2016-2017



Note: FL, KY, TN are direct investment states. SREB is not targeting these states for LDC/MDC state rollout.

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Five Elements of SREB's PD for Literacy and Math

1. Develop capacity of teachers
2. Develop district/regional trainers.
3. Conduct classroom observations and provide feedback.
4. Engage principals in literacy/math PD
5. Provide web-based courses to support spread

SREB Three-Year PD Plan

- **Year 1** — four literacy and two math teachers per school, eight days of PD
- **Years 2 & 3** — spread literacy-based assignments and formative assessment lessons (FALs) to all teachers
- **Years 1, 2, 3** — provide special PD for principals
- **Years 1, 2, 3** — provide special PD for local trainers

Literacy Goal

- Increase students' abilities to comprehend and analyze grade-level texts and related documents and express their understanding orally and in writing in all subject areas.

Focus of SREB Literacy Professional Development Involves

- Teachers using a planning process to:
  - Develop three or four major assignments in science, social studies, English/language arts, and career and technical education (CTE).
  - Engage students in applying literacy standards (reading, writing, speaking) to master content standards in academic and CTE courses.

Science-Based Literacy Assignment

- How has the spread and treatment of infectious diseases evolved over the last 100 years?
  - After reading informational texts related to microbiology, write an essay that compares the differences in the spread and treatment of infectious diseases over the past 100 years.
  - Support your discussion with evidence from the texts.

Greta Browning and Jacki Clark, ninth-grade science teachers
Table Rock Middle School, Burke County, North Carolina

Literacy-Based Agriculture Assignment
Where's the Beef?

- Should consumers purchase beef products that have antibiotics, hormones or additives?
  - After reading primary and secondary texts, write an argumentative essay to address the question and argue your position concerning the production practices of the beef industry.
  - Support your position with evidence from texts. Be sure to acknowledge competing views.

Toby Craver, agricultural teacher
Oden High School, Oden, Arkansas

Literacy-Based Social Studies Assignment
Presidential Power

- What are the powers of a U.S. president in the Constitution, and did the president you are researching implement policies in accordance with the powers granted, or did he expand his powers beyond the Constitution?
  - After researching multiple primary and secondary sources on presidential powers and on your chosen president, write an essay and compare your president's policies to the Constitution and argue whether he expanded his powers or followed the Constitution.
  - Support your position with evidence from your research.

Jennifer Stillwell, social studies teacher
Logan High School, West Virginia

Literacy-Based Social Studies Assignment
Weaponry Impact on War

- How did technological developments in weaponry impact the course of World War I?
  - After researching at least four informational articles from teacher-selected sources and your own selected articles, write an argumentative essay and explain the impact that technology advances in weapon design had on WWI.
  - Argue which weapon designed during WWI played the biggest part in the outcome of the war. Support your position with evidence from the texts.

Carissa Blair and Christy Chelnutt, social studies teachers
Rudd Middle School, Jefferson County Public Schools
Alabama

What Teachers Say About The Literacy Professional Development

"Before literacy professional development, teachers never expected students to prepare a written product other than to take a test. It was about teaching to the test. Literacy-based assignments enable teachers to raise their expectations of what students can do. The result is students are doing the work and learning more."

Juliana Coleman, curriculum supervisor
Jefferson County Schools, Alabama

What Teachers and Principals Say About The Literacy Professional Development

"I thought I did not have time to do this, because I had content to cover before the state biology exam. My feelings have changed drastically. My first unit focused on a very hard concept. I was surprised at how well my students responded to the assignment. They asked deeper questions and scored better on their unit exam than any previous group I taught."

Linda Harvard, science teacher,
Greene County High School, Mississippi

What Teachers and Principals Say About the Literacy Professional Development

"It has made teachers rethink their assignments and instructional strategies. They are now planning with the end in mind. Teachers are making sure they are 'bringing students along' and not giving up on them."

"The biggest change is that students have taken ownership and want to give their best. They are more interested in turning in quality work."

Dana Snyder, principal

Lincoln County High School, Hamlin, West Virginia

What Teachers and Principals Say About the Literacy Professional Development

"Creating literacy-based assignments has enabled me to teach my students the skills required to read grade-level texts and to paraphrase the information learned into their own words. For example, my sixth-grade students were academically behind my last class of sixth-graders. They were able to do the background research and to construct a solar oven. This was because I took time to provide them with skills to read the materials and synthesize the information into a work plan."

Katrinia Zimmerman, CTE teacher,
Turrentine Middle School, North Carolina

AP Test Scores in AP History
Campbell County High School, Tennessee

	AP Scores by Level				
	1	2	3	4	5
2012 Baseline Yr.	80%	20%	0%	0%	0%
2013 Started PD	35	40	15	10	0
2014 Continued PD	27	43	30	0	0
2015 Completed PD	16	12	44	20	8

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Sandra Carter

Assistant Superintendent
Curriculum and Instruction

Stanly County Schools, North Carolina

Students' Perceptions of Literacy-Based Assignments

My teacher assigned me to:	SREB Trained	Non-SREB Trained
HS/CTE — create written papers that demonstrated my content knowledge — monthly	47%	17%
HS/SS — create written papers and cite evidence from multiple sources — monthly	50	11
HS/SCI — complete a written assignment based on an experiment conducted — a few times a year	74	47
MS/ELA — asked to compare and contrast information from different texts — often	54	35

Teachers' Perceptions of Instructional Shift Using Literacy-Based Assignments with School Leadership Support

	Supported Teachers	Non-Supported Teachers
Adopted strategies to engage students in reading grade-level texts and using writing to demonstrate understanding of content	89%	75%
Literacy-based assignments and students' achievement on state assessments	54	32

Assignments to Advance Students' Math Reasoning, Understanding and Application Skills

SREB's Work in 12 States

Gene Bottoms

Karen Gray

Math Supervisor

Jefferson County Schools, Alabama

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Math Goal

- Advance students' mathematical fluency and their abilities to understand, reason and apply math concepts to solving multistep problems

Focus on SREB's Math Professional Development Involves Teachers

- Identify the math topics to be taught during the next six weeks.
- Select formative assessment lessons (FALs) aligned to math topics.
- Leave each workshop with a plan to launch a formative assessment lesson.

Emphasis on Math Practices

- Give math assignments that require students to struggle with the problem.
- Facilitate students' conversations using mathematical vocabulary.
- Ask students to justify and illustrate mathematics understandings.
- Engage students in explaining strategies for solving problems.
- Connect math to real-world applications.

A Teacher's Reflective Journey About SREB's Math PD

- Student: "I honestly don't know nothing."
- Teacher: "I was amazed at what my students did not understand."
- Teacher: "I grouped students by levels of understanding and gave them a problem to solve."
- Teacher: "My students who normally struggle with math told the principal exactly what they were learning and doing."
- Teacher Reflection: "Were the best students just simply good at memorizing procedures?"
- Lesson Learned: "Give students challenging assignments, ask good questions, students can solve the problem."

What Teachers Say About the Math PD

"I really like the math formative assessment lessons.

They are student-centered and students are able to understand math concepts more deeply as they discuss and share solutions with one another.

It is the way we should be teaching if we are truly concerned about students' knowing and understanding."

Ellen Tolbert, math teacher
Macon County School District, Alabama

What A Principal Says About the Math PD

"By modeling instructional practices tailored to state college- and career-readiness standards, this PD calmed teacher anxiety about more rigorous standards and instilled confidence that students can reach them.

The math strategies have been a great success at Sheridan High School. Our classrooms have moved from traditional math instruction to a collaborative environment where students are completely engaged in learning.

The PD is the best we have ever experienced. Our teachers loved it!"

Rodney Williams, principal
Sheridan High School, Arkansas

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What Teachers Say About the Math PD

"My instructional delivery is quite different now that I use the formative assessment lesson."

Rather than teacher-led lectures and demonstrations, my students are now taking more responsibility for their own learning.

I am asking questions and engaging my students in productive struggle rather than telling them how to do it."

Toni Canizaro, algebra and geometry teacher
Raymond Freshman Academy, Mississippi

What Teachers Say About Math PD

"Throughout the formative assessment assignments, students are engaged in a productive struggle that causes them to really think about the math as opposed to following a rote procedure."

Ashley Bryan, math teacher
Vicksburg High School
Mississippi

What Teachers Say About the Math PD

"Teachers are able to see the big picture in mathematics that the formative assessment lesson (FAL) is trying to communicate.

It helps teachers to see how different students learn. It helps teachers to step back and let more students actively learn."

Beth Newman, instructional coach
Orange County, North Carolina

Structure of Formative Assessment Lessons (FALs)

- Students complete an assessment task.
- Teachers review student work and write feedback questions.
- Students work in pairs to complete FALs.
- Teachers ask questions until students solve the problems on their own.

Example of Middle Grades FAL

Optimizing Coverage: Security Cameras

6th grade

- Standards
  - Understand ratio concepts and use ratio reasoning to solve problems.
  - Solve real-world and mathematical problems involving area, surface area and volume.

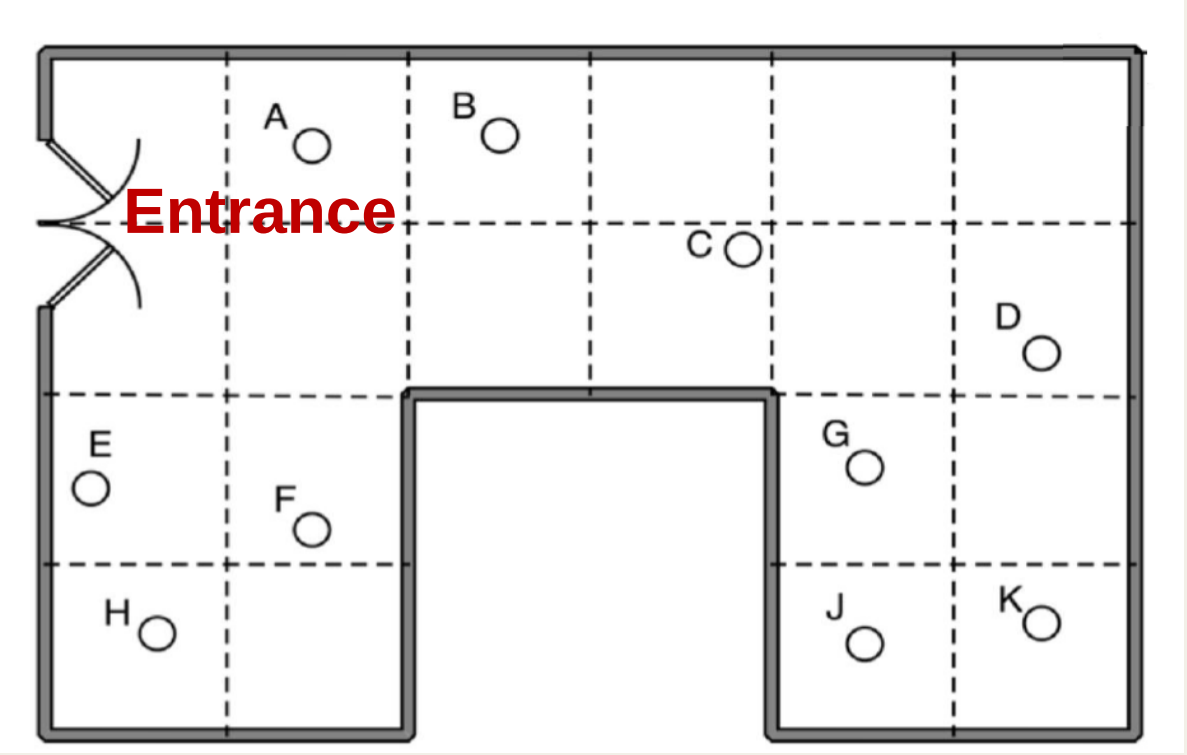
Optimizing Coverage: Security Cameras

In this lesson students will:

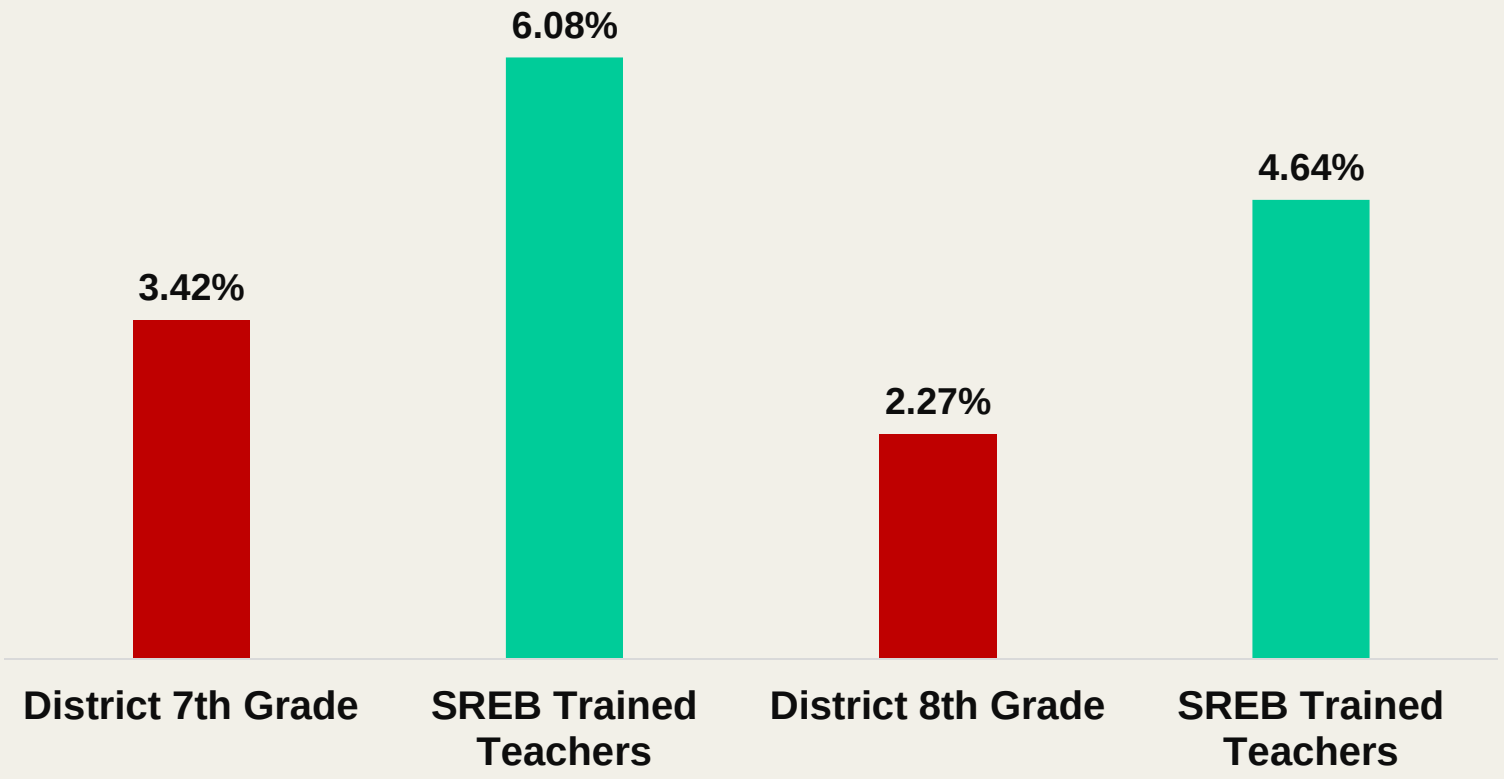
- Analyze a realistic situation mathematically.
- Construct sight lines to decide which areas of a room are visible or hidden from a camera.
- Find and compare areas of triangles and quadrilaterals.
- Calculate and compare percentages and/or fractions of areas.

Optimizing Coverage: Security Cameras

- Show the best place for the camera so it can see as much of the shop as possible.
- Explain how you know this is the best place.



Gains in Math Scale Scores Among SREB-Prepared and Non SREB-Prepared Math Teachers 2015-2016



Source: Jefferson County School District, Scantron Performance Series

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Karen Gray

Math Supervisor

Jefferson County Schools, Alabama

Teachers' Perceptions of Instructional Shift in Math Instruction Based on School Leadership Support

Teachers report that:	Supported Teachers	Non-Supported Teachers
Using FALs enabled them to focus on students' math understanding	82%	62%
Collecting information from FALs allow them to adjust their instruction	68	35
Using math practices learned raised students' achievement on state assessment	68	47

Students' Perceptions About Their Math Classroom Experiences in SREB- and Non-SREB Trained Teachers

Students reported classroom experiences	SREB Trained	Non-SREB Trained
MS — often had to explain how I solved a math problem	65%	48%
MS — often had to justify reasoning for solving a math problem	69	49
MS — often grouped with students who had similar math skills	51	39
HS — often solved real-world math problems in Algebra I	48	33

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Integrating Literacy and Math Into Advanced Career Pathways

Gene Bottoms

What is Advanced Career?

Advanced Career (AC) is eight ready-to-implement curricula made up of four courses each.

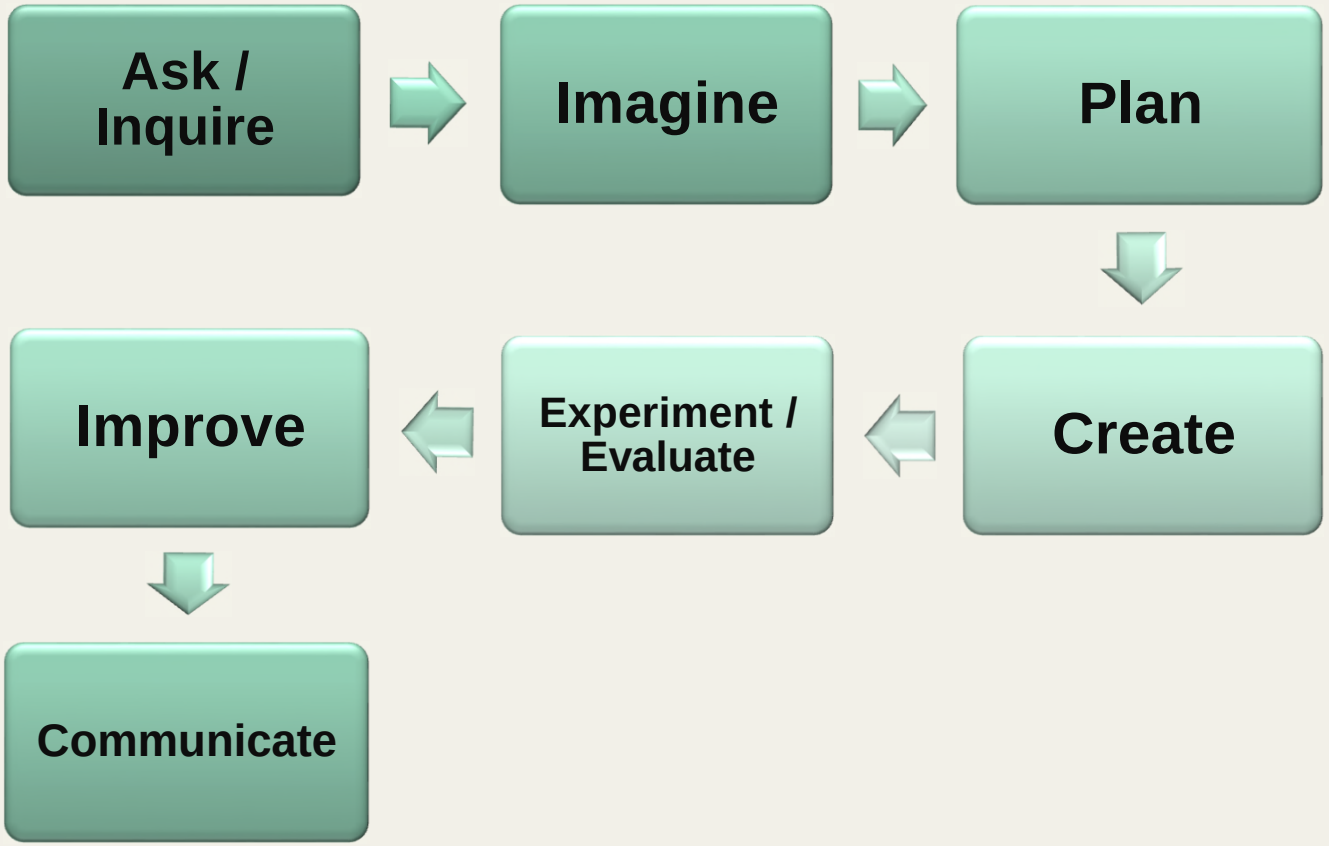
Courses focus on preparing students for college and careers by engaging them in applying academic and technical knowledge and technology to complete work-related assignments.

Why Develop the Advanced Career Curricula?

- Prepare students for a double purpose.
- Model assignments that require students to apply a blend of — academic, thinking, technical, technology and team skills.
- Introduce students to career opportunities (often unknown to them).
- Create career pathway programs of study that blend a college-ready core with career studies.

Anatomy of an AC Project

Students apply the seven-step Engineering Design Process (EDP) to complete each project.

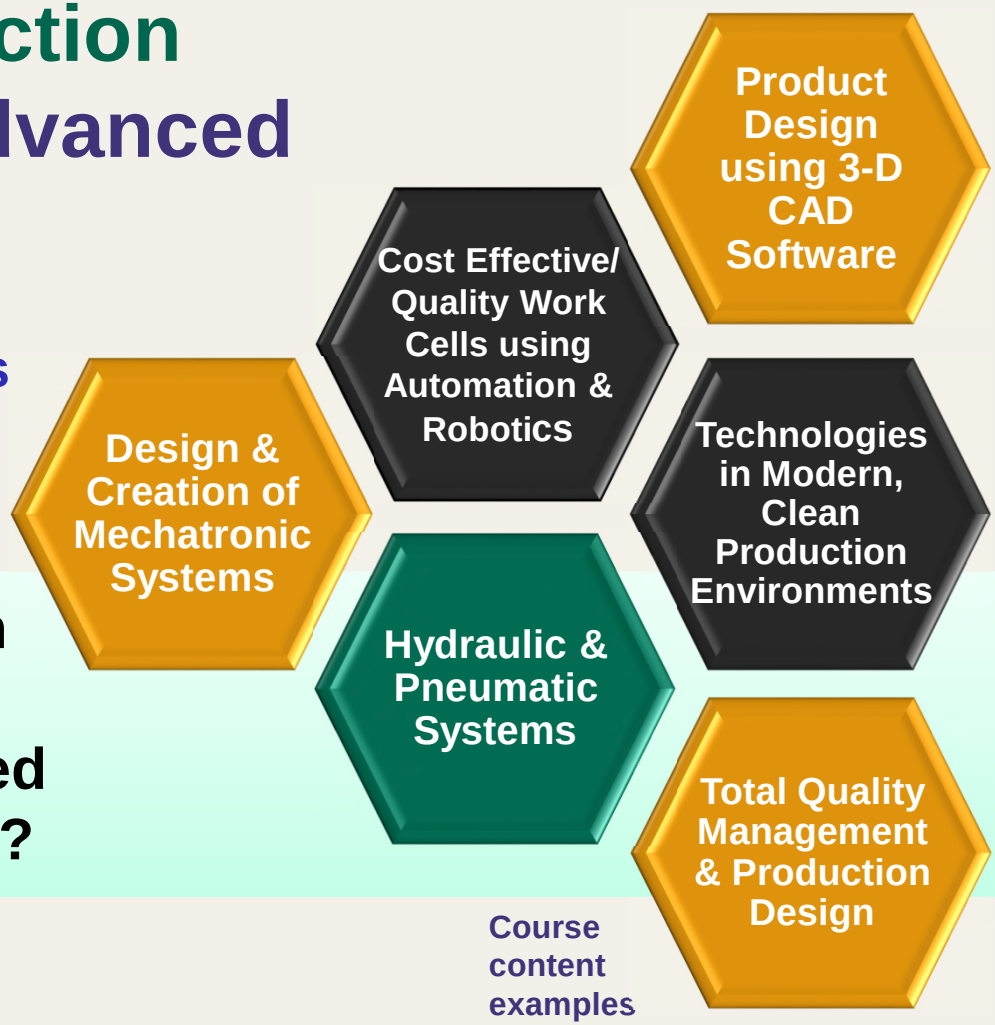


Advanced Career

Integrated Production Technologies (Advanced Manufacturing)

Projects Engage Students in Solving Real-World Challenges

EQ. How can we design a logic control process to improve an automated manufacturing process?

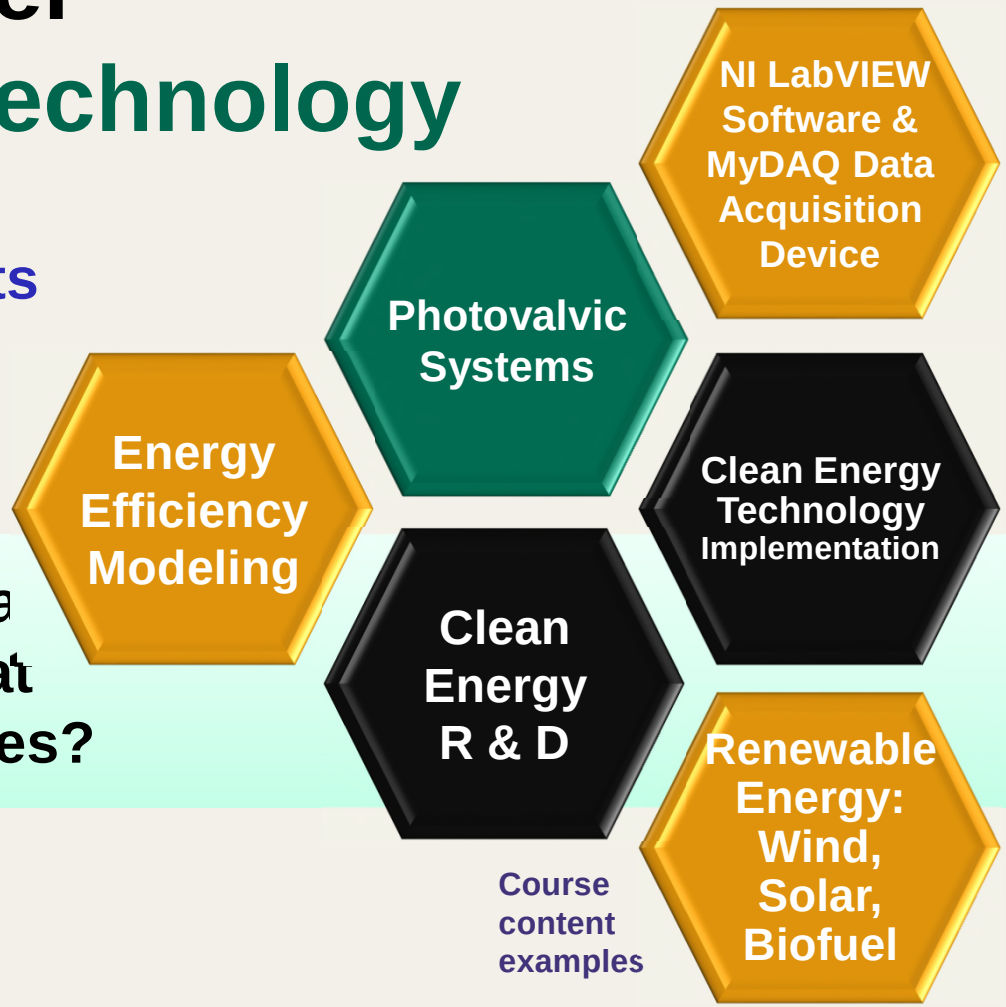


Course content examples

Advanced Career
Clean Energy Technology

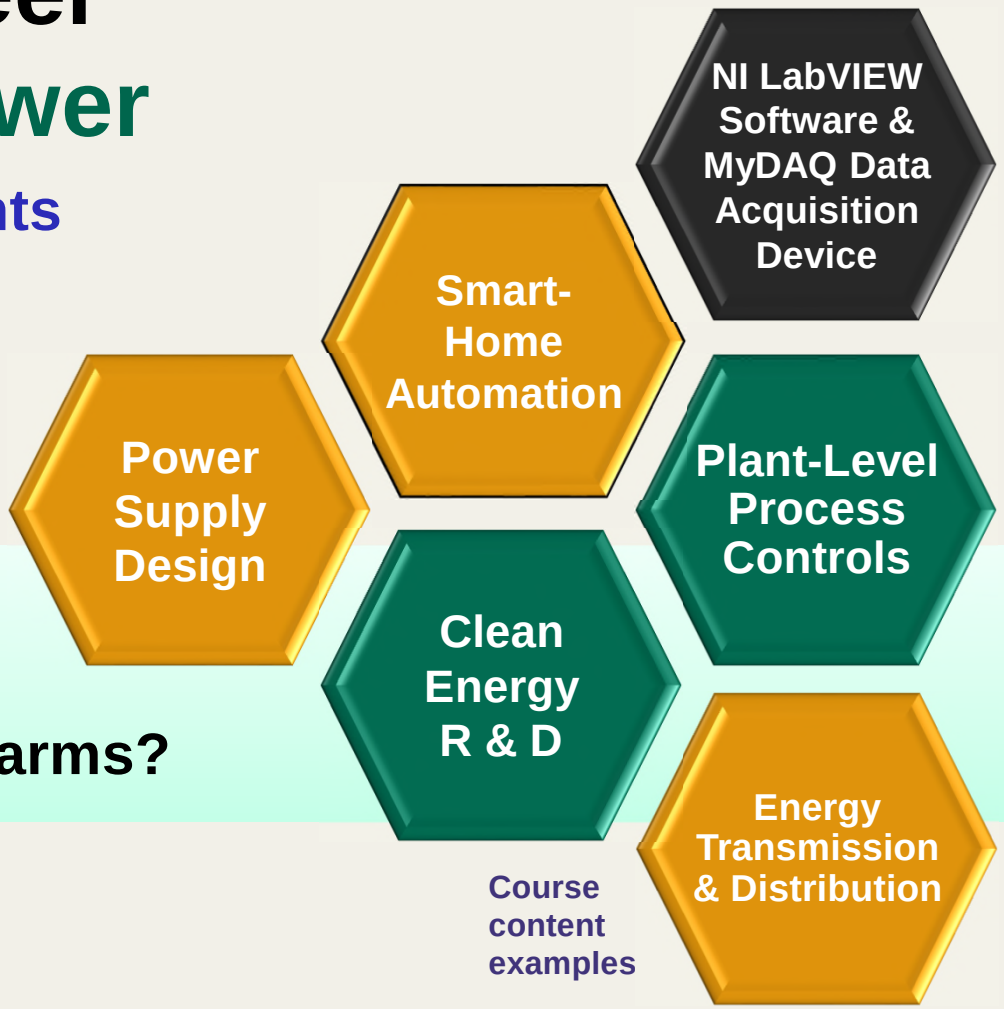
Projects Engage Students in Solving Real-World Challenges

EQ. How can we design a device to use radiant heat to heat water in our homes?



Advanced Career
Energy and Power

Projects Engage Students in Solving Real-World Challenges



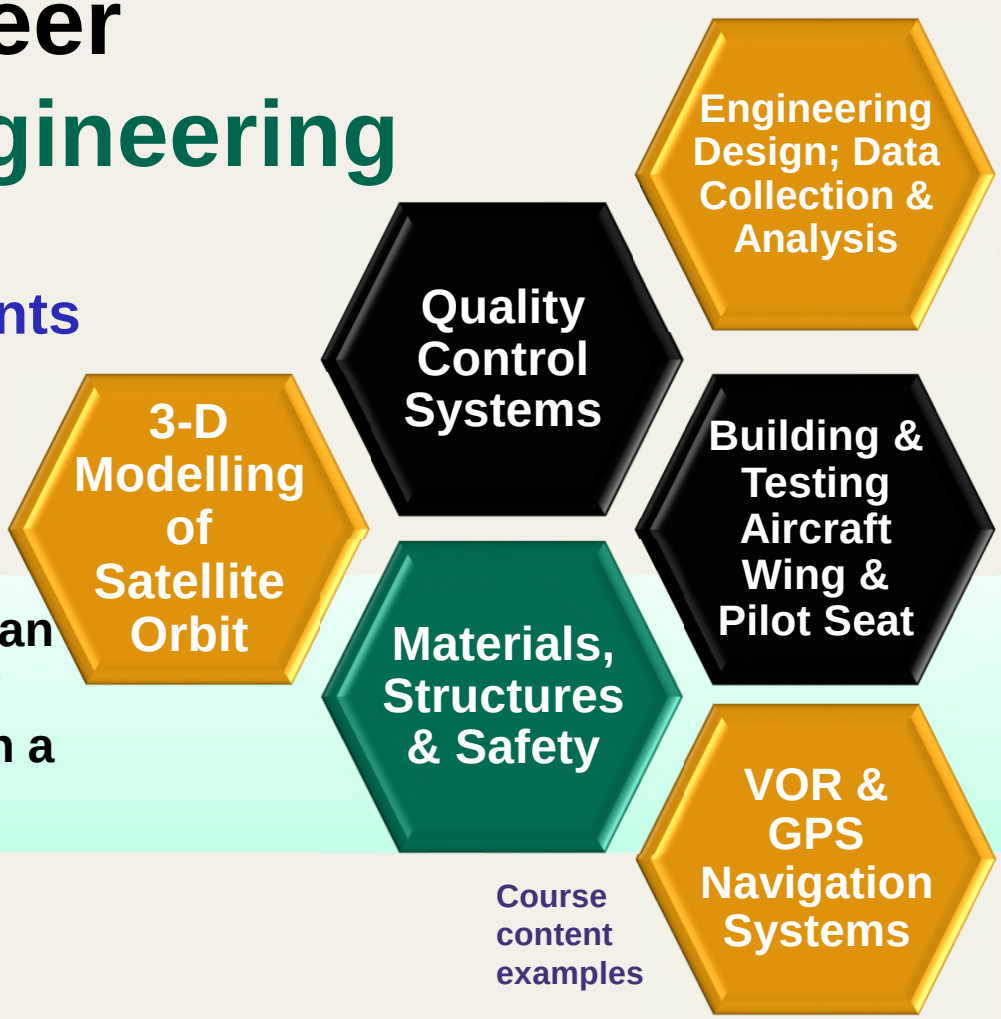
EQ. How can we design a mini-hydroelectric system for homes and farms?

Course content examples

Advanced Career
Aerospace Engineering

Projects Engage Students in Solving Real-World Challenges

EQ: How can your team make an assembly of parts so that they fit and function properly within a larger system of parts?

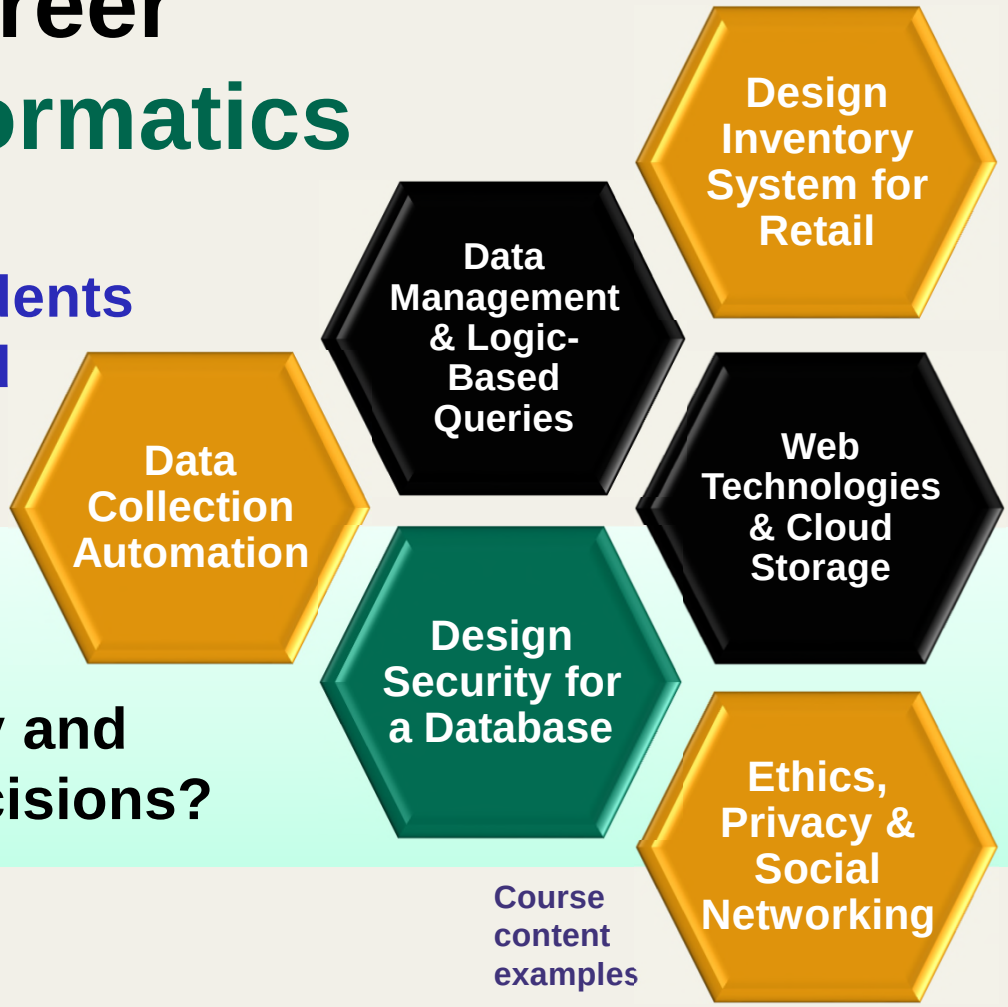


Course content examples

Advanced Career
Business Informatics

Projects Engage Students in Solving Real-World Challenges

EQ. How can we design a system to better track inventory and make purchasing decisions?

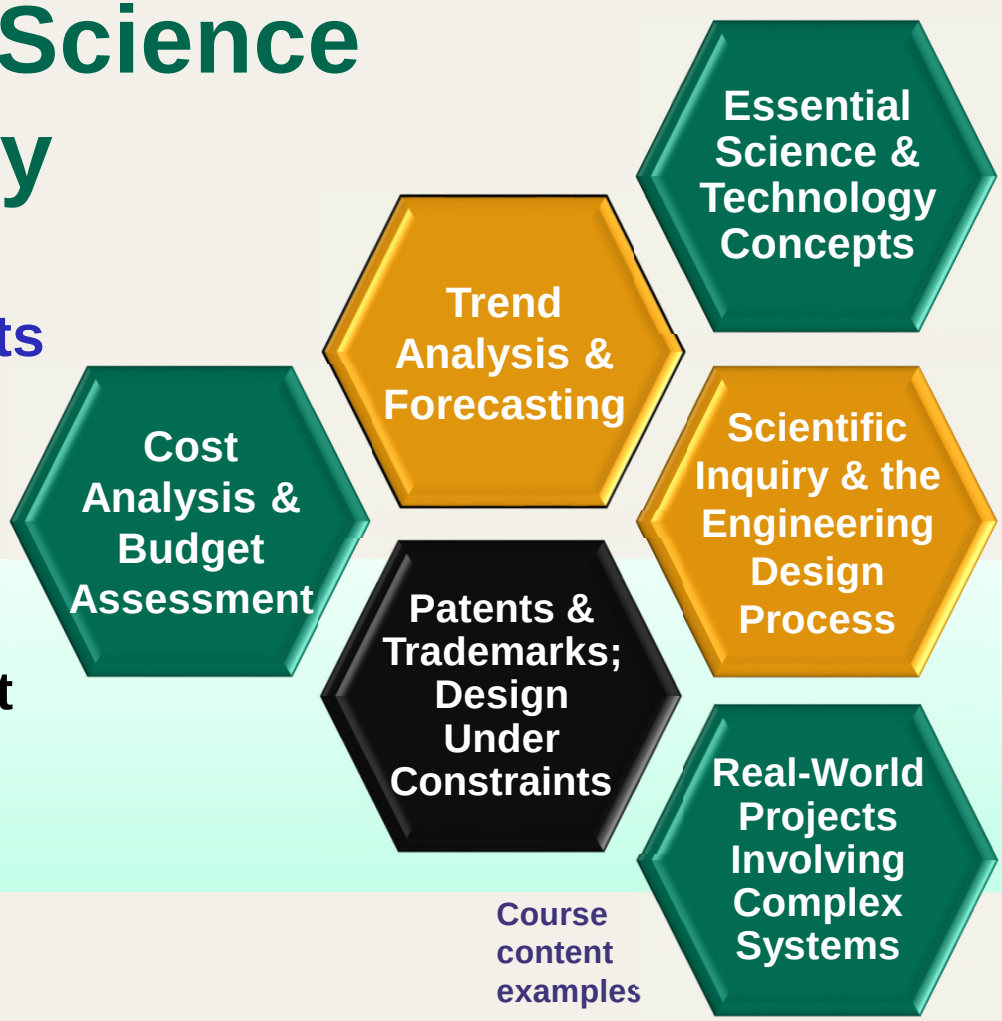


Course content examples

Advanced Career
Innovations in Science and Technology

Projects Engage Students in Solving Real-World Challenges

EQ. How can we determine which contaminates impact drinking water quality, and how can we remove them?



Skills Most Needed to Succeed in a Changing Workforce

APPLIED KNOWLEDGE

- Reading
- Writing
- Mathematics
- Science
- Technology
- Critical Thinking

PERSONAL SKILLS

- Integrity
- Initiative
- Dependability & Reliability
- Adaptability
- Professionalism

PEOPLE SKILLS

- Teamwork
- Communication
- Respect

WORKPLACE SKILLS

- Planning & Organizing
- Problem Solving
- Decision Making
- Business Fundamentals
- Customer Focus
- Working with Tools & Technology

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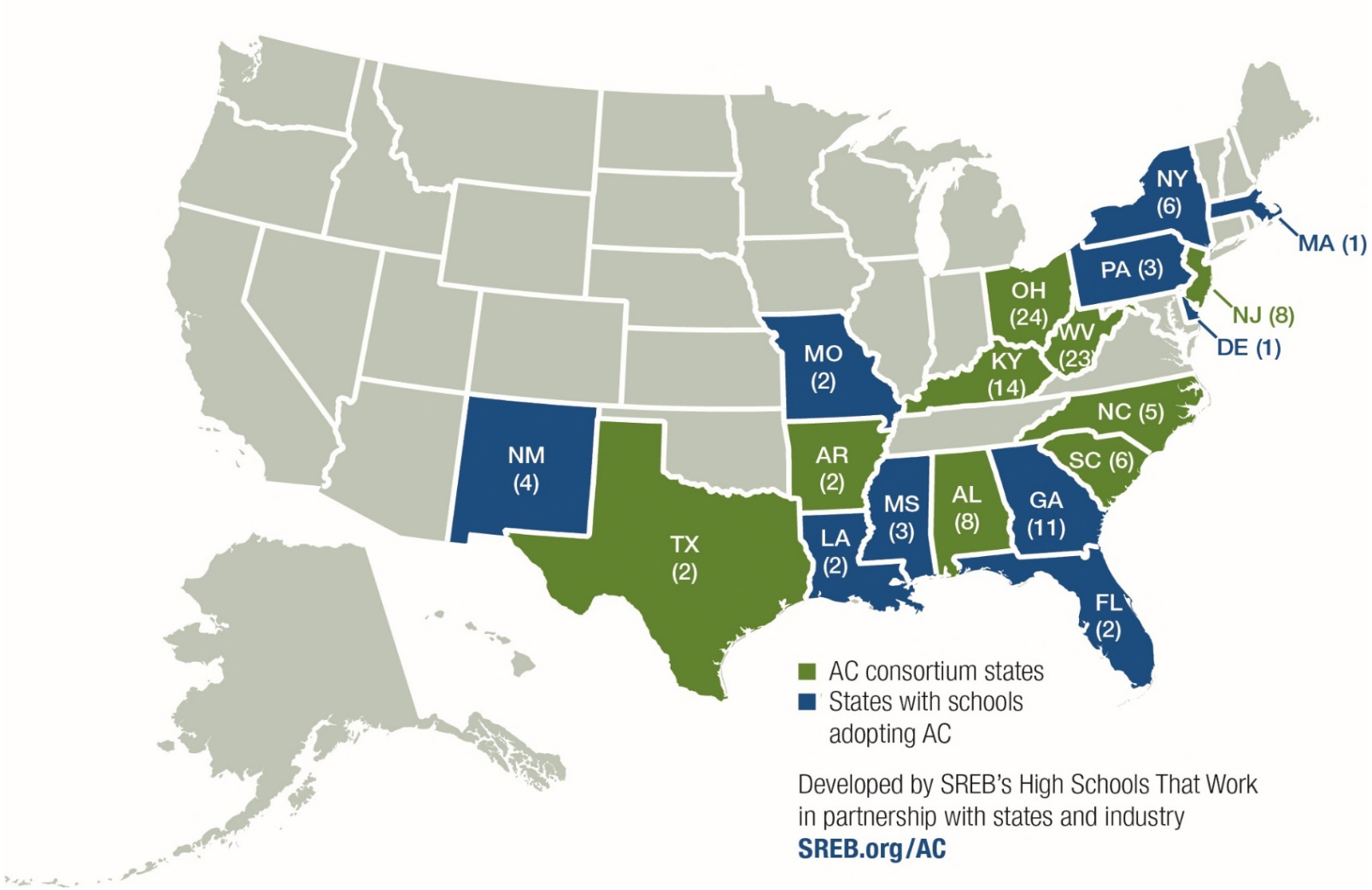
Nine AC Curricula

Nine AC Curricula • 34 courses • 192 projects

Status of Implementation of Advanced Career Curricula
Fall 2016

States Adopting AC High School Curricula



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Finding, Preparing and Supporting AC Teachers

- Teacher Selection
- Two weeks of summer PD, 2016
- Nature of PD
- Help desk for supporting teachers

A Principal Reflects

"The AC curriculum, Innovation in Science and Technology, provides a framework for learning that encourages students to explore, experiment and adapt based on their authentic research. Students learn conflict resolution to advance through their projects as a team. The SREB AC curriculum is more than a simulated work environment; it is a true laboratory where experiments lead to solutions."

Melinda Isaacs, principal

Clay County High School, West Virginia

A Teacher Reflects

"The kids love it; they are eating it up. Students like problem solving in a team atmosphere and the fact that they do not have to work on the same thing every day. It's enables them to see the need for things they are learning in other classes."

Kim Cortines, Aerospace Engineering teacher
Oak Hills High School, West Virginia

AC Changes Student's Thinking and Learning

"This is the first year I have followed through with assignments. No matter how hard an assignment is, I complete it. The real-world projects help me see the relevance of this class and my academic classes."

Informatics student at Ben Franklin Career and Technical Center
West Virginia

What Employers Say About AC

15 Integrated Production Technologies students were invited to make their project presentations to Toyota Motor Manufacturing Co. of West Virginia.

The Toyota representative was extremely impressed with the strong talents students were developing regarding presentation and communication skills, keeping engineering notebooks and acquiring the mix of skills needed to complete strong projects.

These would make excellent tools essential for success at Toyota.

What Employers Say About AC

A Dow Chemical Engineer indicated that the Integrated Production Technologies (IPT) students' written and oral presentation and problem-solving skills were what they were looking for in their employees.

A Dow chemist noted that the IPT students' ability to program with LabView was an essential skill in the chemical industry.

Advanced Career Student Survey 2015

- 72% of AC students say that this AC course helped them in determining a career goal after high school
- 88% of AC students find the AC course rigorous
- 80% of AC students like the blend of hands-on activities, academics and creative thinking in the AC class
- 77% of AC students would recommend this course to a friend
- Over 70% of AC students report frequently using reading, writing and mathematics to complete assignments

AC pathways draw a mainstream group of students

▼

Over 81% of AC students plan to take all four AC courses

Learn More About AC

- You will find a display of the AC materials — teachers' and students' guide — on a table outside.
- Dale Winkler and Scott Warren will be there to answer any questions you might have.