ACCESS Origins

- Evolved from a 5-year federally funded research initiative called i3 SLOPE. Seamlessly Integrated 3 Elements
  - Project based math modules
  - College and career curricular modules
  - Responsive teaching and coaching support

- SLOPE significance and acclaim
  - What Works Clearinghouse standards
  - Huffington Post
  - 5 Congressional Representatives support SLOPE
  - Briefing for Committee Chair of Assembly Education Committee
  - State wide educational news coverage
Advice From Teachers

- Students get “college going” from their teachers
- Students *can* and *will* achieve beyond what teachers might first believe
- Teachers *can* and *will* implement new strategies when they see that “it works” with their students
- Relevance matters
- Change does occur!
“Students enjoy math when they have the projects to look forward to. They want to come to my class and do the work”.

Stacie Doss – Teacher, Newman, CA

“I was looking for “something” to re-kindle my passion to teach and your professional development program and all the support that came with it was just what I was praying for. It gave me a new perspective on teaching Algebra and it helped me transition to the “new” Common Core. So, from the bottom of my heart, THANK YOU, THANK YOU, & again THANK YOU.”

Emmanuel Del Mundo – Teacher, Los Angeles, CA

“It’s made me really challenge my own thoughts as a teacher…to push myself to go ahead and achieve higher.”

Robert Denithorne – Teacher, Porterville, CA
College Awareness Curriculum

- “Do Now”

3. The graph shows the SAT score corresponding to GPA for three students.
   a. Which student has the highest SAT score?
   b. Does the student with the lowest GPA have the lowest SAT score?
   c. Which student has the highest GPA?
## Sample Career Specialties / Occupations

### Agriculture Sales & Communications
- Agricultural Sales
- Agricultural Communications

### Bioinformatics Specialists
- Plant Breeder and Geneticists
- Biotechnology Lab Technician
- Soil & Water Managers
- Crop Farm Managers
- Agricultural Educators
- Plant Pathologists
- Aquaculturalists
- Sales Representatives
- Botanists
- Tree Surgeons
- Education & Extension Specialists
- Agricultural Journalists
- Commodity Marketing Specialists
- Grain Operations Superintendents
- Custom Hay/Silage Operators
- Forest Geneticists
- Golf Course Superintendents
- Greenhouse Managers
- Growers
- Farmers
- Ranchers

### Agricultural Educators
- Livestock Producers
- Animal Caretakers-Poultry Managers
- Equine Managers-Veterinarians
- Veterinary Assistants-Feedlot Specialists
- Animal Scientists
- Embryo Technologists
- Livestock Buyers
- Feed Sales Representatives
- Varnishing Technicians
- Wildlife Biologists
- Livestock Geneticists
- Animal Nutritionists
- Dairy Producers
- Livestock Inspectors
- Feed Sales Specialists
- Animal Health Salespersons
- Meat Science Researchers
- Reproductive Physiologists
- Embryo Transfer Technicians
- Pet Shop Operators
- USDA Inspectors

### Machine Operators
- Electronics Systems Technicians
- Agricultural Engineers
- Extension Engineering Specialists
- Heavy Equipment Maintenance Technicians
- Recycling Technicians
- Waste Water Treatment Plant Operators
- Equipment/Parts Managers
- Welders
- Machinists
- Communication Technicians
- Agricultural Applications Software Developers/Programmers
- Database Administrators
- Computer Service Technical Support Technicians
- Information Lab Specialists
- GPS Technicians
- Remote Sensing Specialists

### Cartographers
- Wildlife Managers
- Range Managers
- Ecologists
- Park Managers
- Environmental Interpreters
- Fish and Wildlife Officers
- Game Officers
- Log Graders
- Pulp and Paper Manager
- Soil Geology Technician
- Geologists
- Mining Engineers
- Fisheries Technicians
- Water Monitoring Technician
- Hydrologists
- Fish Hatchery Manager
- Commercial Fishermen
- Fishing Vessel Operators
- Vessel Crew
- Agricultural Educator

### Pollution Prevention and Control Managers
- Pollution Prevention and Control Technicians
- Environmental Sampling and Analysis Technicians
- Scientists
- Health & Safety Sanitarians
- Environmental Compliance Assurance Managers
- Hazardous Materials Handlers
- Hazardous Materials Technicians
- Water Environment Managers
- Water Quality Managers
- Waste Water Managers
- Toxicologists
- Solid Waste Disposers/Recyclers
- Solid Waste Technicians
- Solid Waste Managers
- Solid Waste Specialists
- Agricultural Educator

### Salesperson
- Sales Manager
- Banker/Loan Officer
- Field Representative for Bank
- Insurance Company or Government Program
- Farm Investment Manager
- Agricultural Commodity Broker
- Agricultural Economist
- Farmer/Rancher/Feedlot Operator
- Farm Manager
- Livestock Rancher/Breeder
- Dairy Herd Supervisor (DHIA)
- Agricultural Products Buyer
- Animal Health Products Distributor
- Livestock Seller
- Feed and Supply Store Manager
- Produce Commission Agent
- Ag Lenders
- Agricultural Chemical Dealer
- Field Service Representative
- Chemical Sales Representative

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The **Common Career Technical Core** (CCTC) includes a set of standards for each of the 16 Career Clusters™ and their corresponding Career Pathways that define what students should know and be able to do after completing instruction in a program of study. The CCTC also includes an overarching set of Career Ready Practices that apply to all programs of study. The Career Ready Practices include 12 statements that address the knowledge, skills and dispositions that are important to becoming career ready.
# Agriculture, Food and Natural Resources: Environmental Service Systems

**Career Pathway Plan of Study for** ▶ Learners ▶ Parents ▶ Counselors ▶ Teachers/Faculty

This Career Pathway Plan of Study (based on the Environmental Service Systems Pathway of the Agriculture, Food and Natural Resources Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner’s educational and career goals. *This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.*

<table>
<thead>
<tr>
<th><strong>EDUCATION LEVELS</strong></th>
<th><strong>ENGLISH/LANGUAGE ARTS</strong></th>
<th><strong>MATH</strong></th>
<th><strong>SCIENCE</strong></th>
<th><strong>SOCIAL STUDIES/SCIENCES</strong></th>
<th><strong>OTHER REQUIRED COURSES AND/OR DEGREE MAJOR COURSES FOR ENVIRONMENTAL SERVICE SYSTEMS PATHWAY</strong></th>
<th><strong>SAMPLE OCCUPATIONS RELATING TO THIS PATHWAY</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>SECONDARY</strong></td>
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<tr>
<td>9</td>
<td>English/Language Arts I</td>
<td>Algebra I</td>
<td>Earth or Environmental Science</td>
<td>State History Civics</td>
<td>- Introduction to Agriculture, Food and Natural Resources</td>
<td>- Environmental Compliance-Assurance Manager</td>
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<tr>
<td>10</td>
<td>English/Language Arts II</td>
<td>Geometry</td>
<td>Biology</td>
<td>U.S. History</td>
<td>- Introduction to Environmental Service Systems</td>
<td>- Environmental Sampling and Analysis Scientist/Technician</td>
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<tr>
<td>11</td>
<td>English/Language Arts III</td>
<td>Algebra II or other math course</td>
<td>Chemistry or other science course</td>
<td>World History</td>
<td>- Power Systems</td>
<td>- Hazardous Materials Handler</td>
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<td>College Placement Assessments-Academic/Career Advisement Provided</td>
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<td>12</td>
<td>English/Language Arts IV</td>
<td>Trigonometry or other math course</td>
<td>Physics or other science course</td>
<td>- Research in Natural Resources and Biotechnology</td>
<td>- Hazardous Materials Technician</td>
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<td>- Internship in Environmental Service Systems</td>
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<td>- Recycler</td>
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<td>- Solid Waste Technician</td>
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<td>- Pollut Prevention and Control Technician</td>
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</table>

Articulation/Dual Credit Transcribed-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.

<table>
<thead>
<tr>
<th><strong>POSTSECONDARY</strong></th>
<th><strong>ENGLISH COMPOSITION</strong></th>
<th><strong>ALGEBRA</strong></th>
<th><strong>CHEMISTRY</strong></th>
<th><strong>AMERICAN GOVERNMENT</strong></th>
<th><strong>ENVIRONMENTAL SYSTEMS</strong></th>
<th><strong>OCCUPATIONS REQUIRING BACCALAUREATE DEGREE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 13</td>
<td></td>
<td></td>
<td></td>
<td>All plans of study need to meet learners’ career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.</td>
<td>- Environmental Systems</td>
<td>- Agricultural Educator</td>
</tr>
<tr>
<td>Year 14</td>
<td>Speech/Oral Communication</td>
<td>Calculus</td>
<td>Biological Science Botany</td>
<td>American History Geography</td>
<td>- Soil and Water in the Environment</td>
<td>- Chemical Engineer</td>
</tr>
<tr>
<td>Year 15</td>
<td>Technical Writing</td>
<td>Statistics</td>
<td>Organic Chemistry Microbiology</td>
<td>Political Science</td>
<td>- Environmental Service Systems Operations</td>
<td>- Environmental Engineer</td>
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<td>- Pollution Prevention and Control Manager</td>
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<td>- Solid Waste Manager</td>
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<td>- Toxicologist</td>
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<td>- Water Environment Manager</td>
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<td>- Water Quality Manager</td>
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<td>Complete Environmental Service Systems Major (4-Year Program)</td>
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</tbody>
</table>

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Project funded by the U.S. Department of Education (VOS1B020001)
Proven Results

- ACCESS builds on the success of the i3 program and implements what we’ve found to work for students and teachers.

- In 5 years of running our SLOPE i3 program, one district reported that **70% of students using the project strategies scored “proficient” in the 2014 district-wide common Algebra assessment**, more than double those who did not have the i3 operating in their classroom.
PROGRESS MADE WAS PROMISING BUT NOT SUFFICIENT
The 'New' American Dilemma: STEM and Students of Color

California has the largest gap between students of color and STEM degree attainment

When it comes to having a big gap between students of color in STEM, California is the clear leader among American states. In 2012, over 40% of the population of the state belonged to an under-represented student groups but just 13.1% of bachelor’s degrees awarded to California college students of color were in engineering.
THEREFORE, WE HAD TO RETOOL, REFOCUS, AND SEEK PARTNER REINFORCEMENTS
Our Partners

[Logos of various educational institutions and organizations]
Leadership Team

An Intersegmental approach to the project

Project Coordination

Sharon Twitty, ARCHES

Robyn Fisher, R.T. Fisher Educational Enterprises, Inc.

Content Leads

Bruce Arnold, Executive Director, Mathematics Diagnostic Testing Project (MDTP), CSU/UC; Director, Math Testing and Placement and Lecturer, University of California, San Diego

Chris Dell, Director of STEM, Shasta County Office of Education

Ivan Cheng, Professor, California State University, Northridge
Three Shifts

Common Core State Standards for Mathematics

Three Shifts in *Standards*

- Focus
- Coherence
- Rigor
ACCESS Content Alignment Reference Guide

CCSS Domain & Cluster Heading

Grade 8 Focus: Understand the connections between proportional relationships, lines, and linear equations (Claim 1, Target C)
Define, evaluate, and compare functions (Claim 1, Target E)
Use functions to model relationships between quantities (Claim 1, Target F)

**SBAC Alignment**

<table>
<thead>
<tr>
<th>Evidence Required for Target C</th>
<th>Evidence Required for Target E</th>
<th>Evidence Required for Target F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The student graphs proportional relationships.</td>
<td>1. The student recognizes that a function is a rule that assigns to each input exactly one output.</td>
<td>1. The student constructs a function to model a linear relationship between two quantities.</td>
</tr>
<tr>
<td>2. The student interprets the unit rate as the slope of the graph of a proportional relationship.</td>
<td>2. The student identifies or produces input and output pairs for given functions.</td>
<td>2. The student determines the rate of change and initial value of a function, either from a description of a relationship or from two ((x, y)) values, including reading the rate of change and/or the value of the function from a table or a graph.</td>
</tr>
<tr>
<td>3. The student compares two different proportional relationships represented in different formats.</td>
<td>3. The student recognizes the same function written in different functional forms (algebraic, graphic, tabular, or verbal).</td>
<td>3. The student interprets features of a linear function, such as rate of change and initial value, in terms of the situation it models, its graph, or a table of values.</td>
</tr>
<tr>
<td>4. The student uses similar triangles to determine that the slope (m) is the same between any two distinct points on a non-vertical line in the coordinate plane.</td>
<td>4. The student compares properties of two functions, each represented in a different way (algebraic, graphic, tabular, or verbal).</td>
<td>4. The student qualitatively describes the functional relationship between two quantities by analyzing a graph (e.g., whether the function is increasing or decreasing, or whether the graph is linear or nonlinear).</td>
</tr>
<tr>
<td>5. The student finds the equation (y = mx) or (y = mx + b) for a line.</td>
<td>5. The student interprets the equation as defining a linear function with a graph that is a straight line.</td>
<td>5. The student draws a graph that exhibits the qualitative features of a function that has been described in writing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standards</th>
<th>Examples from SBAC</th>
<th>Sample Problems from SBAC</th>
<th>Notes (from Howard County, MD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target C</strong>&lt;br&gt;<strong>8.EE.5</strong></td>
<td>Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.</td>
<td><strong>Task Model 1</strong>&lt;br&gt;<strong>Evidence Required</strong>&lt;br&gt;1. The student graphs proportional relationships.&lt;br&gt;2. The student interprets the unit rate as the slope of the graph of a proportional relationship.&lt;br&gt;<strong>Stimulus:</strong> The student is presented with a proportional relationship that may be represented as a verbal statement, table, or equation.&lt;br&gt;<strong>Example Stem 1:</strong> The cost ((c)) for (p) pounds of meat is shown in the table.</td>
<td><strong>Big ideas:</strong>&lt;br&gt;Connect understanding of unit rate (constant of proportionality) and proportional relationships to concept of slope (rate of change).&lt;br&gt;Graph and compare different proportional relationships when given scenario, equation, and/or table of values. Use similar triangles to explain why the slope (m) is the same between any two</td>
</tr>
</tbody>
</table>
Empowering Teachers and Students to Achieve REAL Success.

- Over the past 5 years, through SLOPE, we have been gathering data on what drives student success in the classroom and what inspires them to become active, enthusiastic lifelong learners.

- ARCHES ACCESS is the culmination of that research and we are very excited to be offering a professional development experience that will change the lives of teachers and students alike.

- Most importantly, ARCHES ACCESS seeks to serve students who have historically struggled in mathematics and lacked interest in the classroom.
An Overview of ACCESS

ACCESS is a comprehensive professional development strategy that assists teachers with Applying College and Career Equity-based STEM Strategies to enhance K-12 mathematics teaching and learning.
ACCESS Elements

- Support over time and in classroom actualizing the outcomes of California State Standards, Mathematical practices for teachers, student evidences for state assessment and mathematical understanding for students.

- Professional development experience using a well-appointed *Instructional Strategies Toolkit* to assist with application of the STEM related instructional strategies promoting academic rigor and relevance.

- Focus is on teaching and learning in classroom through collaboration in the local context with coaching support and use of diagnostic assessment.
Our Approach

- Right math
- Right tools
- Right reason
- Right team
ARCHES ACCESS R.E.A.L. Toolkit
PROFESSIONAL DEVELOPMENT PROGRAMMATIC ELEMENTS

- Coaching; Collaboration and Implementation Support
- Equity, Access and Rigorous Instructional Tools
  - MR, OE, CLRR, & GD
- Mathematics Content Professional Development Built Upon Teacher/Student Assessment Measures
- Application of State Standards Mathematics Instructional Strategies
- K-12 STEM College and Career Awareness Curriculum
Using district adopted curriculum, texts & resources as the foundation, participants learn how to use…

**Rigorous Design Tools** = Mathematical Reasoning Tools

**Engagement** = CLRR (Culturally & Linguistically Relevant & Responsive) Strategies

**Alignment & Coherence** = CCSS Content Professional Development Built Upon Teacher/Student Assessment Measures – Use of MDTP

**Learning for Life** = STEM College and Career Awareness Curriculum (CAC) aligned to CCSS Math Standards:
What are the goals of this professional development program?

- Enhance teacher instructional practices
- Improve student achievement in mathematics
- Connect and align CCSS standards to an applied awareness of STEM relevant interests and ideas
- Develop a college-going mindset among middle school students.
Our Ultimate Goal is to…

- MOVE AWAY FROM LOOKING FOR “WHAT WORKS?”

- ANSWER THE MORE COMPLEX QUESTION OF “WHAT WORKS FOR WHOM when?”

Take a moment to reflect on following statement.

Share your thoughts with an elbow partner.
What is unique about ACCESS?

- With so many options for professional development, it’s important to find one that will work for your classroom. Our program is unique in that it is:

  - **Teacher-centered.** We do not push teachers to adopt “our program”. We meet teachers where they are at and provide instruction based on their strengths and as teachers as opposed to perceived deficits in their teaching.

  - **Student-centered.** Using the RTC (The Responsive Teaching Cycle) approach, we design instruction centered around how students think and learn. So instead of demanding that students learn in a way that fits a preconceived notion of how math should be taught, we help teachers instruct in a way that’s compatible with how students have been shown to learn best.

- Most importantly, ACCESS moves from **WHAT to HOW** – We Focus on the Training Pedagogical Framework
A Collaborative, Locally-Focused Effort

- The ARCHES ACCESS professional development and curriculum is tailored to the needs of students and teachers in any given classroom, district, or city.

- The ARCHES ACCESS training programs are a collaboration between coaches, local educators, colleges, employers, and community members to better understand the needs of students and teachers in their unique local context and to provide specific opportunities for students to be part of in their communities.
A Comprehensive Approach.
The ARCHES ACCESS REAL Toolkit is comprehensive in that it is:

- **Rigorous:**
  Presents four instructional strategies for implementing CCSS standards in the classroom based on the particular learning needs of students that are fun, engaging, and effective in learning.

- **Engaging and Accessible:**
  Helps teachers make math relevant to students real lives and cultural background to meet the needs of diverse student populations.

- **Aligned with CCSS (Common Core Standards State Standards) and SBAC (Smarter Balance Assessment Consortium) Targets:**
  We work with the California Mathematics Diagnostic Testing Project (MDTP) to determine student gaps and misunderstanding at the beginning of the course and assess student growth by the end of the course.

- **Lifelong learning focus:**
  Making math come alive and become relevant in the lives of our students is the center and most unique component of this professional development model. We provide teachers with the right tools, resources, and activities so they are able to answer, with confidence, students’ most basic question, “When am I ever going to use this math in ‘real’ life?” Teaching math in the context of lifelong learning skills is the key to exposing students to college and STEM career opportunities and pathways.
Current ACCESS Projects

Under auspices of ICC, a fee-based model emerged

- Gear Up
  - Central Valley
  - San Diego
- Madera County California Math Science Project
- California Academic Partnership Program
  - College-Going Culture Project