

# **GLOBE CAP: Using Real World Science to Further College and Career Readiness**

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**STEM Smart: Pathways to Middle-Skill Occupations and Beyond**  
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# Objectives of the Session

- Establish elements of high-quality work-based learning that supports college and career readiness and success
- Explore examples of strategies in the sciences that meet the critical elements
- Explore how implementation of these strategies can help scale work-based learning and maximize access

# Defining “College and Career Readiness”

Consistent with the CCSS and the NGSS, we are defining college and career readiness as the attainment of:

- Core academic knowledge and skills
- 21<sup>st</sup> century transferable competencies (including cognitive and “non-cognitive” skills)

*Plus...*

# Defining “College and Career Readiness” cont.

- Career and technical knowledge and skills that provide context and the opportunity to apply learning to solving real problems, as well as marketable job skills
- Navigational skills to succeed in the worlds of college, career, and civic life over time

# 21<sup>st</sup> Century Transferable Competencies

- Blend of cross-cutting knowledge and skills
- Structured around fundamental principles of the content area and their relationships rather than disparate, superficial facts or procedures
- Developed through “deeper learning” that allows students to apply learning to solve new problems.

# Three Categories

- Cognitive
- Intrapersonal
- Interpersonal

*Education for Life and Work:  
Developing Transferable Knowledge and Skills in the 21<sup>st</sup> Century*

# Cognitive Domain

- Cognitive processes and strategies
- Knowledge
- Creativity

E.g., critical thinking, information literacy, reasoning and argumentation, and innovation.

# Intrapersonal Domain

- Intellectual openness
- Work ethic and conscientiousness
- Positive core selfevaluation

E.g., flexibility, initiative, appreciation for diversity, and metacognition



# Interpersonal Domain

1. Teamwork and collaboration
2. Leadership

E.g., communication, collaboration, responsibility, and conflict resolution.

# College and Career Readiness Synthesis

## College and Career Readiness: What Do We Mean?

**A Proposed Framework**

REVISED DRAFT VERSION 1.2: April 12, 2012



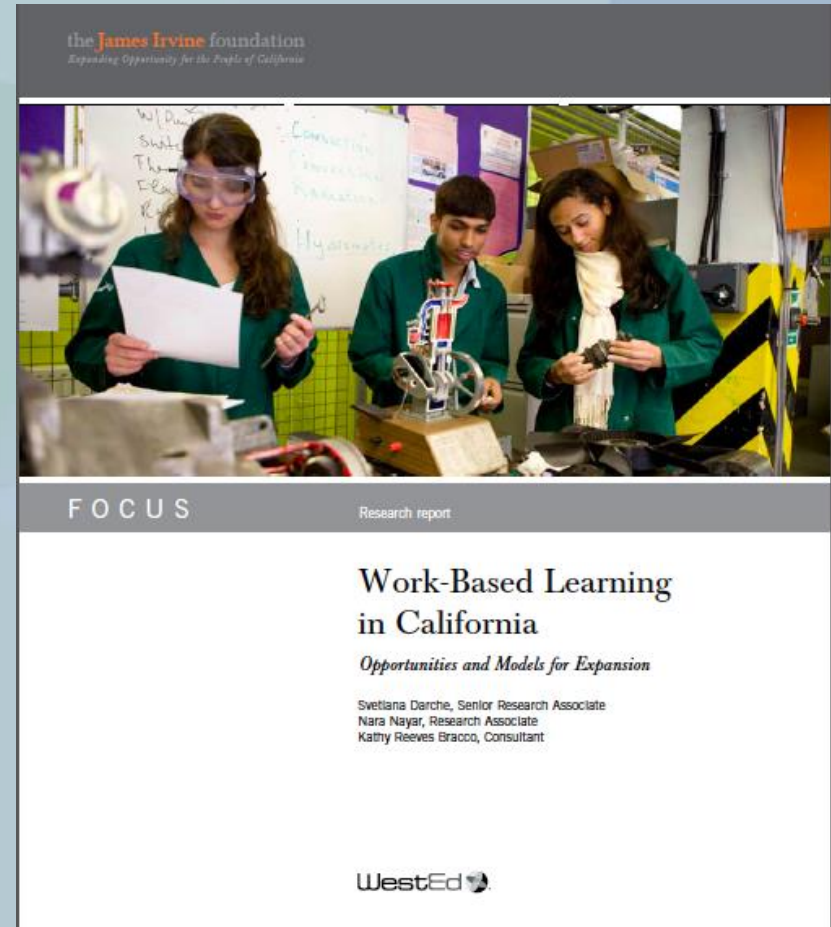
Available at:

<http://www.connectedcalifornia.org/>

# **Work-Based Learning: Real Work as the Context for Learning**

# Work-Based Learning Research

Available at:  
<http://www.wested.org>



# The Stages of Career Exploration and Work-Based Learning

**Career Awareness:** Students build awareness of the variety of careers available and begin identifying areas of interest.

**Career Exploration:** Students explore career options to provide motivation and to inform decision-making.

**Career Preparation:** Students apply learning through practical experience and interaction with professionals from industry and the community in order to extend and deepen classroom work and support the development of college and career readiness knowledge and skills (academic skills, technical skills, 21<sup>st</sup> century skills and other applied workplace skills).

**Career Training:** Students train for employment in a specific field and range of occupations.

# A Continuum of Experiences

## Work-based Learning Continuum

Pre-K

13+

### Career Awareness

#### Learning ABOUT work.

Build awareness of the variety of careers available and the role of post-secondary education; Broaden student options.

### Career Exploration

#### Learning ABOUT work.

Explore career options and post-secondary requirements for purpose of motivation and to inform decision-making in high school and post-secondary.

### Career Preparation: Practicum & Internships

#### Learning THROUGH work.

Apply learning through practical experience that develops knowledge and skills necessary for success in careers and post-secondary education.

### Career Training

#### Learning FOR work.

Train for employment and/or post-secondary education in a specific range of occupations.

# Work-Based Learning in the Career Preparation Phase

*Learning through work*

# Refining the Definition of Work-Based Learning

Defined as an educational strategy that:

- Links school-based instruction with activity that has consequences beyond the class or value beyond success in school
- Uses the workplace, or in-depth experience with employer or community input, to engage students and intentionally promote learning and access to future educational and career opportunities

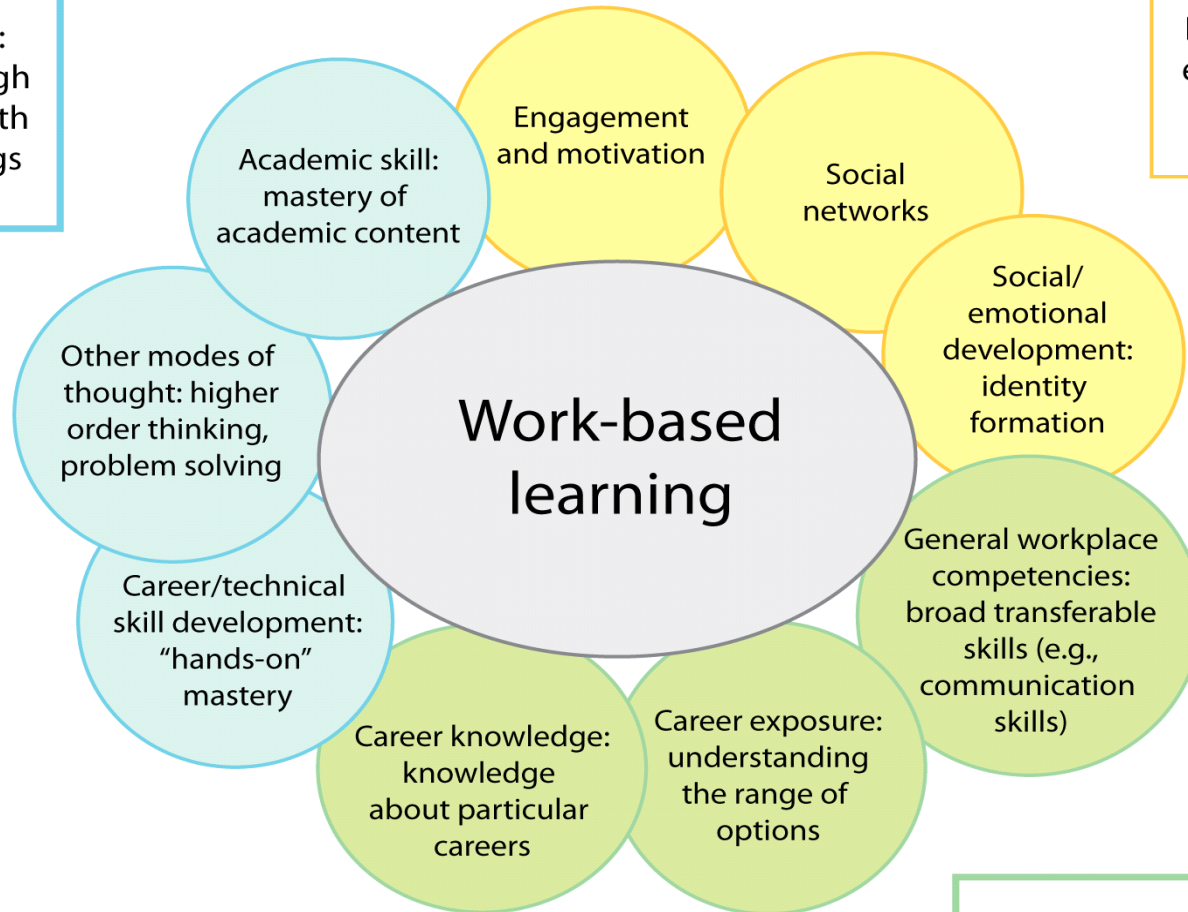


Place, or *where* the activities take place, is important in addressing several of the purposes of work-based learning, but is not the primary defining criterion.

# **Learning Domains or Purposes Supported by Work-Based Learning**

Cognitive  
Development:  
Learning through  
engagement with  
ideas and things

Social/Emotional  
Development:  
Learning through  
engagement with  
people and self



Career  
Development:  
Learning through  
engagement with  
work processes  
and places

# Key Elements of Work-Based Learning

1. Purposeful connection to learning — and to standards and curriculum, as well as employer expectations (*not disconnected work experience*)
2. Depth of experience with opportunity to engage in a professional community of practice (*not job shadowing*)
3. Direct, systematic employer and/or community input (*not project-based learning*)

# Key Elements of Work-Based Learning

4. Producing goods/services of value beyond the classroom (*not just for the class*)
5. Authentic value/benefit to students beyond the classroom (*not just for the grade*)

# Expanding Access

# Why a Purpose-Driven vs. Place-Based Definition?

- To address learning outcomes that may be attained through varied experiences
- To explore options that can enable us to scale work-based learning and ensure equity of access
- Because the workplace is changing

# Types of Experiences

- Multi-disciplinary projects with systematic employer or client input
- Student-led school-based enterprises
- Social enterprises
- Service learning
- Career-related student competitions
- Internships



# GLOBE CAP:

GLOBE: Global Learning and Observation to  
Benefit the Environment

CAP: California Academy Program

Supported by the **National Science Foundation** under Grant No. 1139664.

# GLOBE CAP Facts

- Funding: Funded by the National Science Foundation through the ITEST program (Innovative Technology Experiences for Students and Teachers)
- Timeframe: 2011-2015
- Purpose: Embedding GLOBE into the curriculum and programming of career academies to deepen learning and promote sustainability
- Operating in six (6) high school environmental career academies in Northern California

# Key Strategies

- Students collect real data that contributes to our understanding of climate change and other environmental issues
- Scientists support data collection, provide input on careers, and help students understand the data
- Students delve deeply over a prolonged period of time
- GLOBE data collection is linked to curriculum and students' interests
- Students carry out projects to apply what they are learning

# What is a Career Academy?

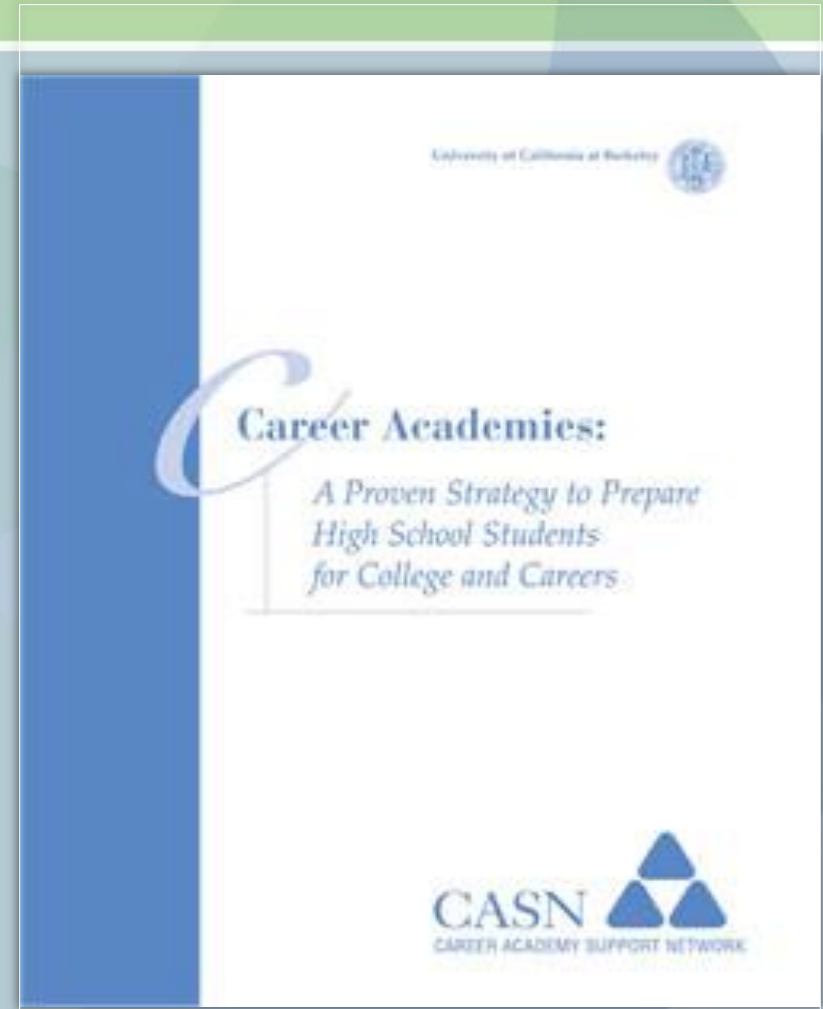
High School SLC:  
Cohort scheduling  
Teacher team  
2 to 4 years

College Prep  
curriculum with a  
career theme

Learning outside  
classroom

# Compendium of Career Academy Info and Research

Available at  
<http://casn.berkeley.edu>



# GLOBE CAP Three-Year Trajectory

- **Grade 10:** *What is it about?* – focus on data collection as part of an international community
- **Grade 11:** *What does it mean?* – focus on data visualization and analysis
- **Grade 12:** *What can I do?* – focus on public policy and application of knowledge and skills

# Assessment of Science and 21<sup>st</sup> Century Competencies

- Students are assessed with a project-based performance task on the development of:
  - Academic knowledge and skills in science (based on select NGSS standards)
  - 21<sup>st</sup> Century competencies, such as critical thinking and problem solving, collaboration, and communication

# GLOBE CAP Rubric

	<u>1</u> Novice	<u>2</u> Developing	<u>3</u> Proficient	<u>4</u> Advanced
<b>SCIENCE KNOWLEDGE AND PRACTICES</b>				
1. Evidence of content knowledge and skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Planning and carrying out investigations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Analyzing and interpreting data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>21<sup>st</sup> CENTURY SKILLS</b>				
4. Oral communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Written communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Visual communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Precision and accuracy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Information technology application	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Collaboration and teamwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Global awareness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Career awareness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

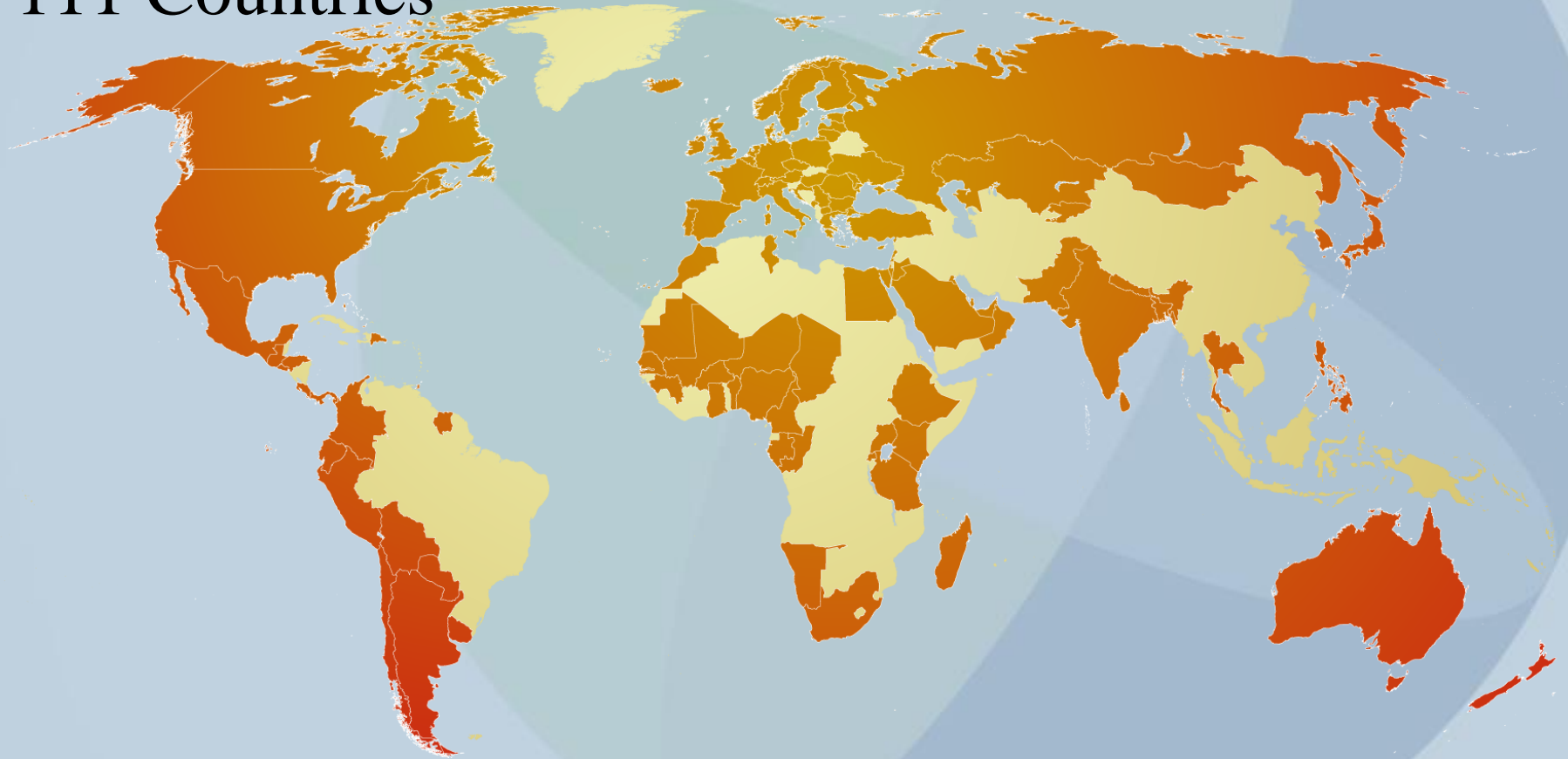


# Students Collect Data and Upload to an International Database

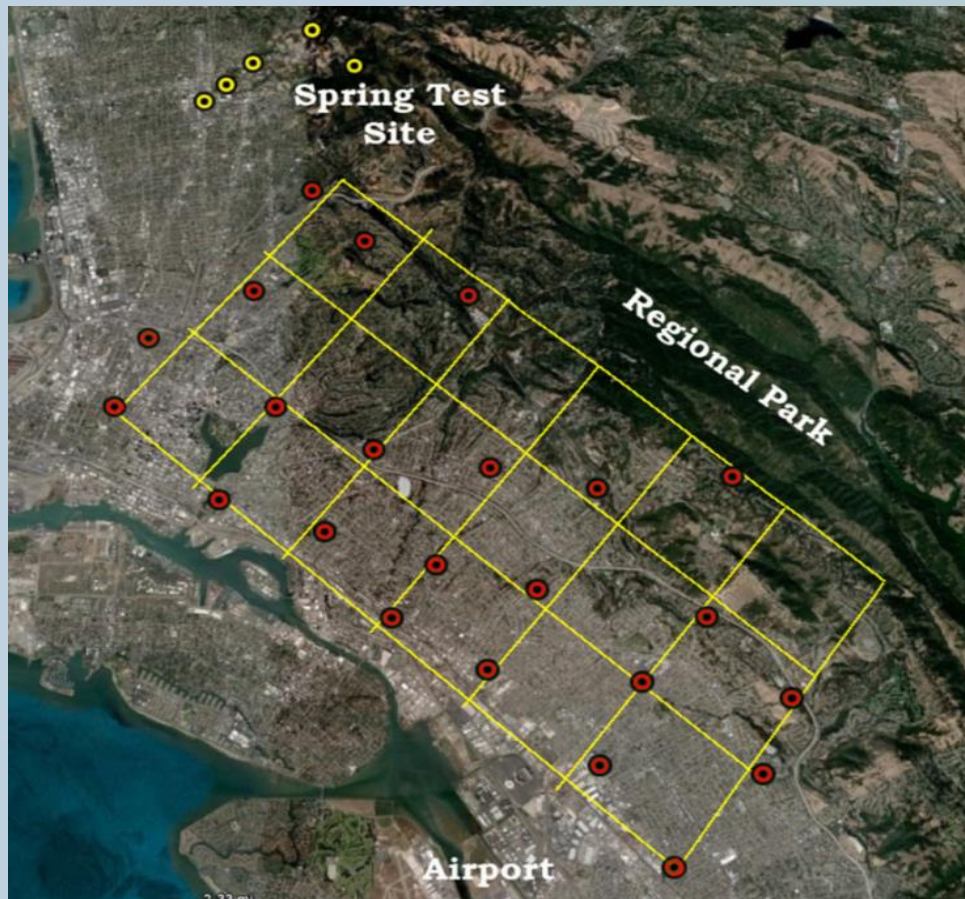


# GLOBE Around the World

- 111 Countries



# BEACON: Berkeley Atmospheric CO<sub>2</sub> Network



A 36 node, dense network.

Each node will include measurements of CO<sub>2</sub>, NO<sub>2</sub>, CO, O<sub>3</sub>, P, T, RH.

Rough spacing between nodes will be 2km.

# Dr. Cohen's GHG Project

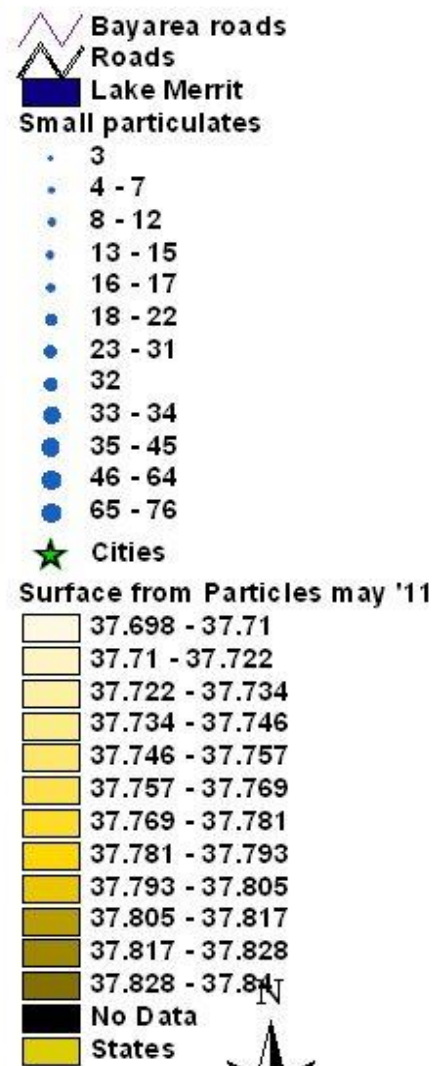
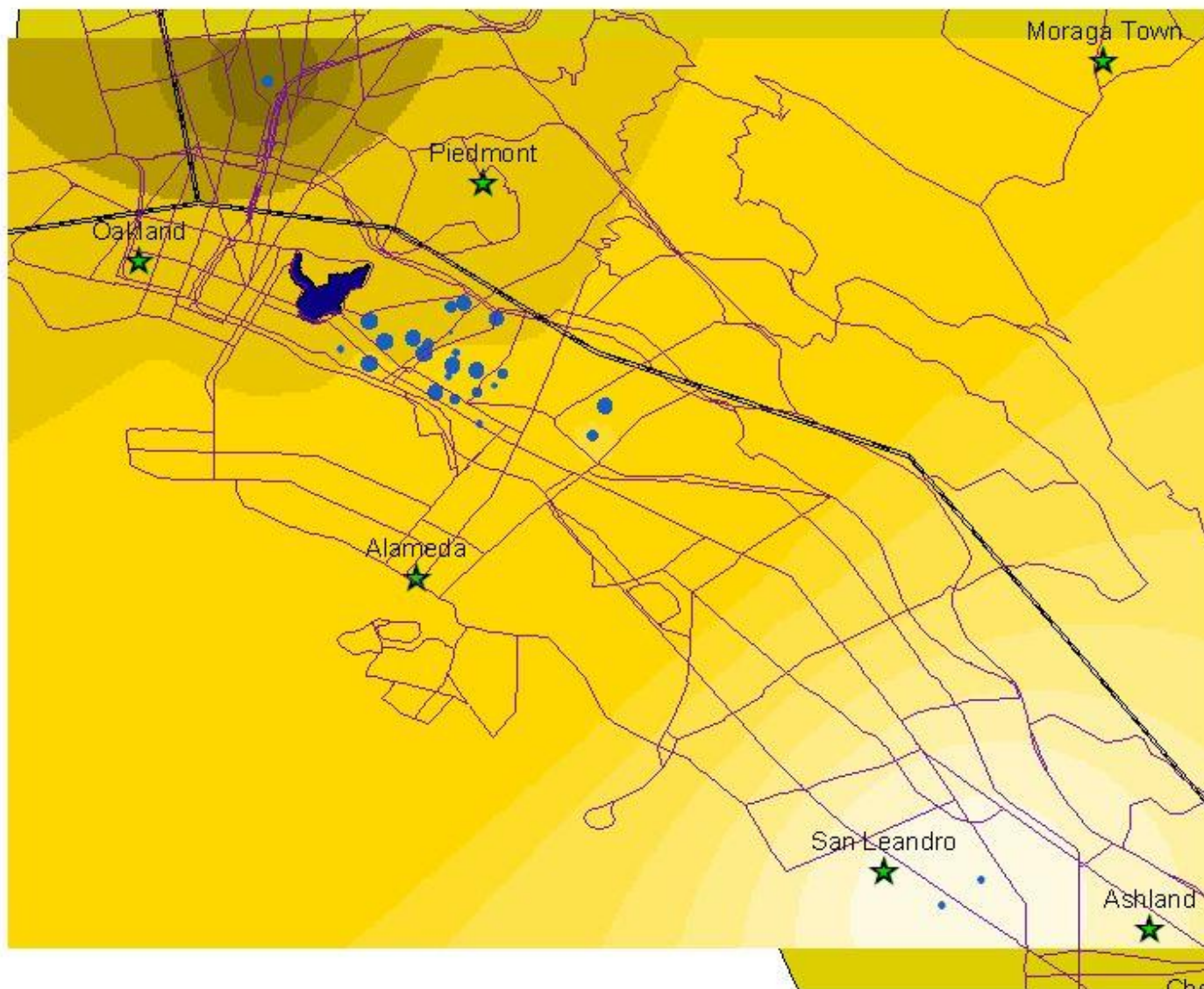
- UCB scientist/grad students make classroom visits to discuss their work and careers with our students.
- Students compare their data (collected using the GLOBE protocols) with data collected by the GHG Project, learn about measurement issues, and explore implications for scientific practice and public policy.
- Contributes to compliance monitoring for AB 32, California's Global Warming Solutions Act.

# Students Collecting CO<sub>2</sub> Data on their Campus





# Eric's Particulates Bay Area Map



# BEACON Grad Students Work with GLOBE CAP Students





# Accolades from the Mayor of Oakland



The mayor of Oakland talks to the lead teacher and students of the Oakland Environmental Science Academy about the students' project.

# Grad Students Share their Career Experiences



# GLOBE CAP as Work-Based Learning

- What critical elements of work-based learning does GLOBE CAP address?

*See first column in Exercise 1 of the worksheet.*

# Other Examples of Work-Based Learning Activities

- A team of community college students completes energy audits in the community as part of their environmental science program
- Through Y-PLAN, a group of students plans a “walkability” strategy to reduce dependence on cars in the community
- An individual student completes an internship in an environmental agency

# Discussion

*(Work Sheet)*

Looking at work experience programs and other work-based experiences that could be scaled in your college or school:

- How do they address the key elements?
- How do they address the learning goals of work-based learning?
- How could they be strengthened?

# Thank you!

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