

# Getting College and Career Ready in Science

Fall 2014 NCTN Webinar Series on Science



# Greetings from the NCTN!

**Cynthia Zafft**

**NCTN Senior Advisor**



**Ben Bruno**

**NCTN Media Specialist**





# Our presenters

**Michele Bahr**

**Scientist/Science Educator**



**Amy Dalsimer**

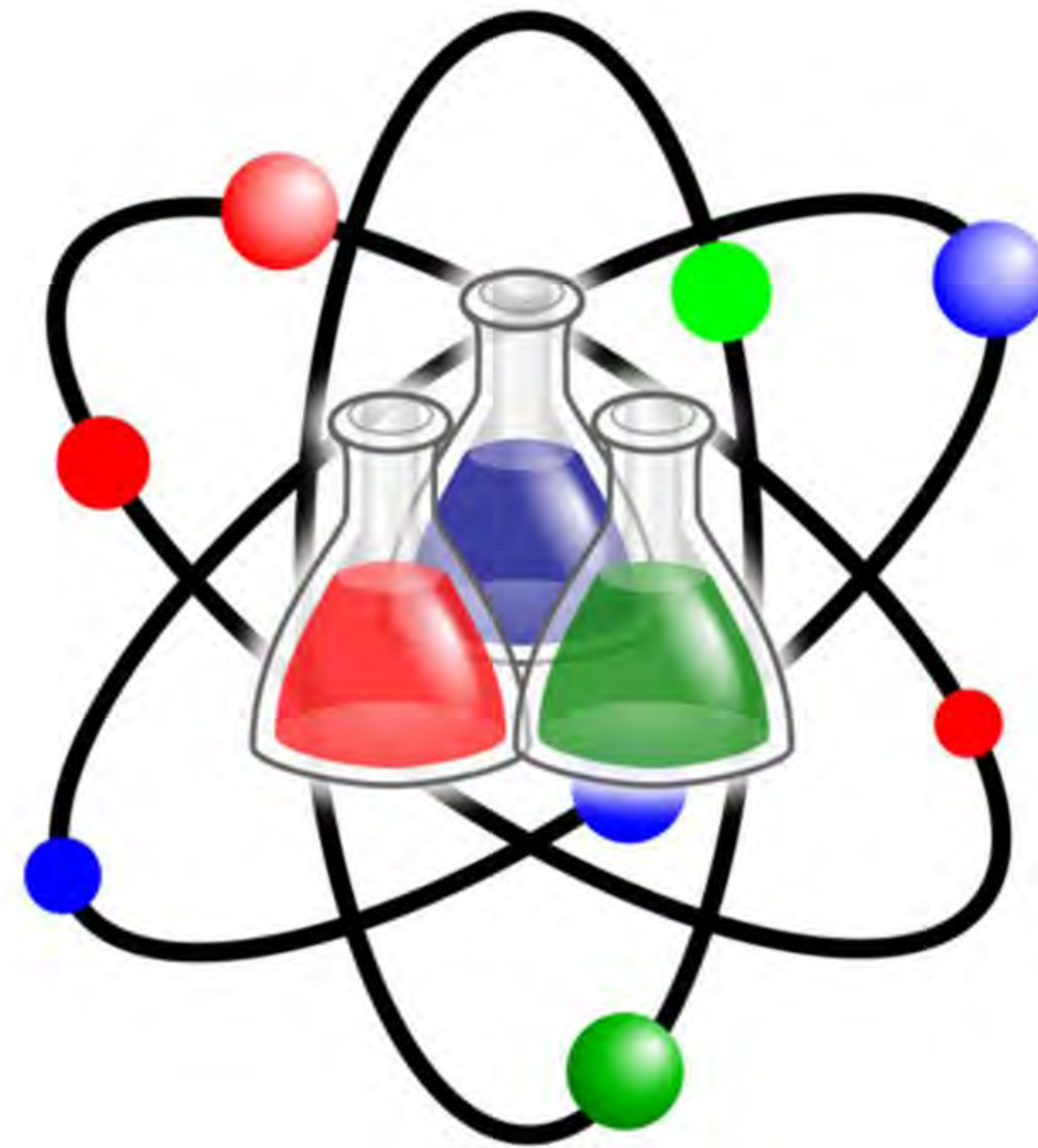
**LaGuardia Community College**





# Today's webinar agenda

- **Setting the stage**
  - (Cynthia)
- **Life Science Strand of MA Science Framework**
  - (Michele)
- **Bridge to Science /Bridge to Healthcare**
  - (Amy)
- **Questions and Comments**
- **What's Next?**



## Science



# Getting started

- “Who’s here?” poll
- What hat are you wearing today?





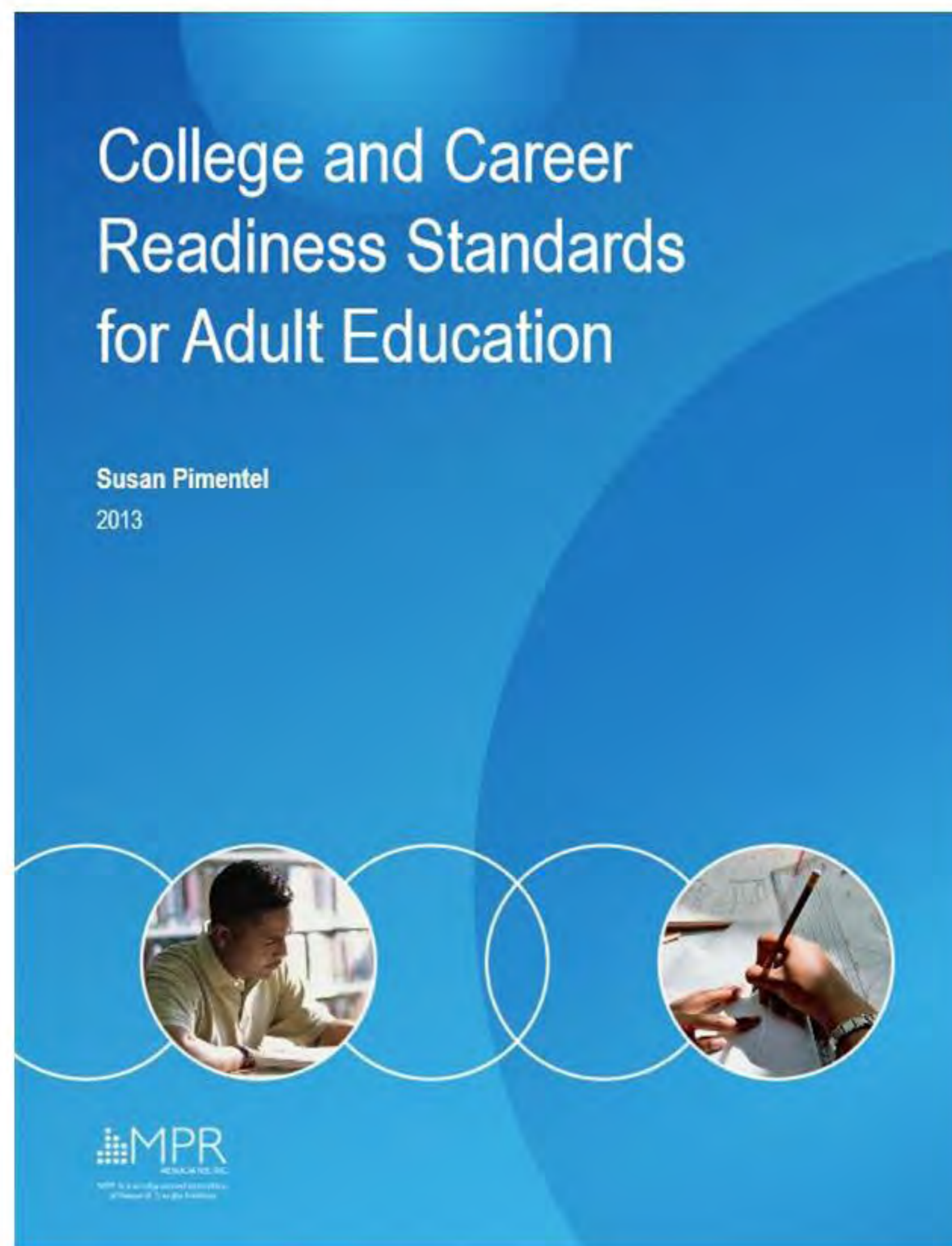
# Setting the stage





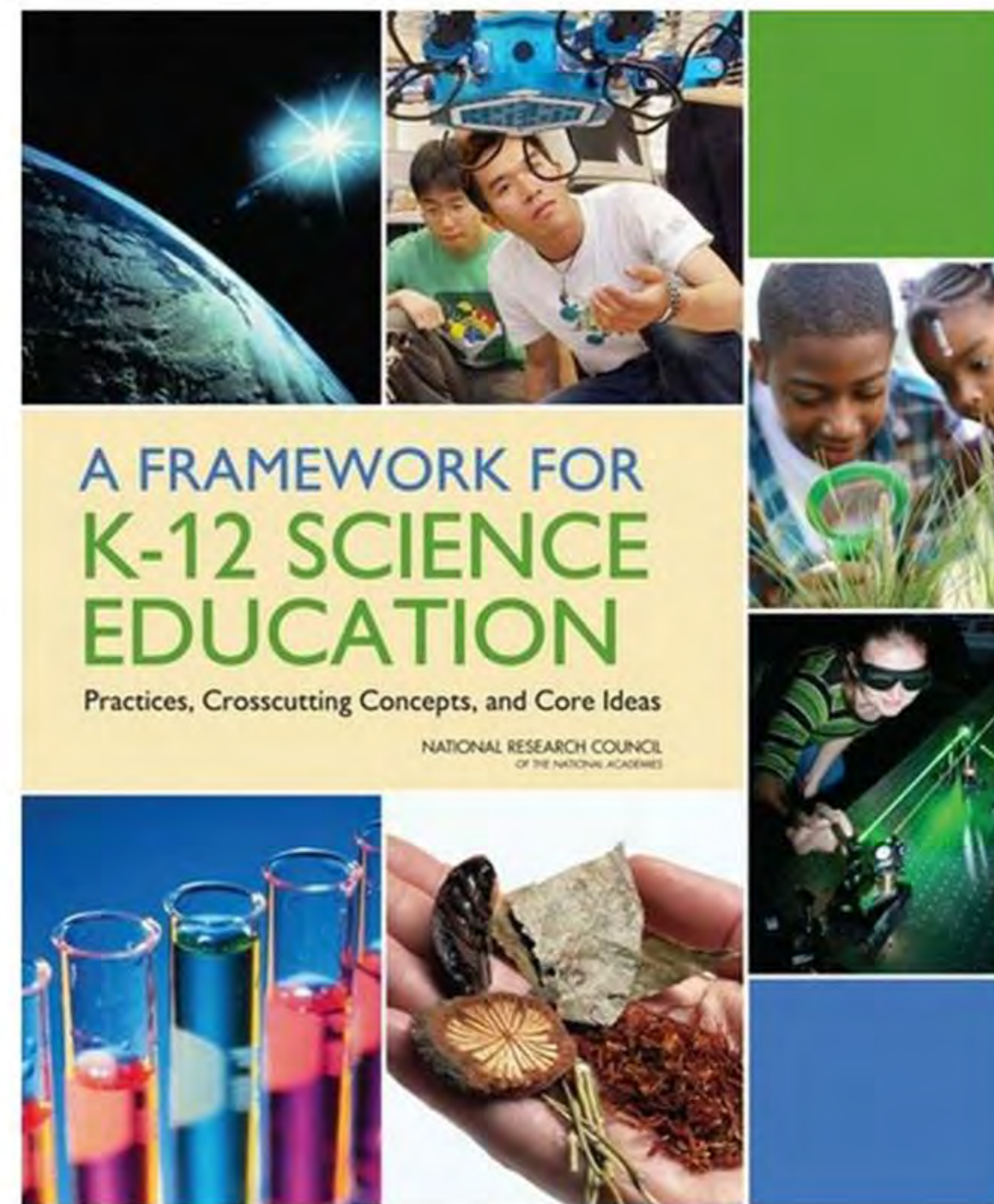
# CCR Standards

## CCR Standards for Adult Education



<http://lincs.ed.gov>

## Next Generation Science Standards



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



## Comparison of CCR Mathematics Standards and Next Generation Science Standards<sup>1</sup>

CCR Mathematics Standards	Next Generation Science Standards (NGSS)
<p><b>Mathematical Practices</b> (How students are to engage across domains and levels)</p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct valid arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>	<p><b>NGSS Practices</b> (How students are to engage across disciplines and levels)</p> <ol style="list-style-type: none"> <li>1. Asking questions (for science) and defining problems (for engineering)</li> <li>2. Developing and using models</li> <li>3. Planning and carrying out investigations</li> <li>4. Analyzing and interpreting data</li> <li>5. Using mathematics and computational thinking</li> <li>6. Constructing explanations (for science) and designing solutions (for engineering)</li> <li>7. Engaging in argument from evidence</li> <li>8. Obtaining, evaluating, and communicating information</li> </ol>
<p><b>Mathematical Levels</b></p> <ul style="list-style-type: none"> <li>• Level A (K-1)</li> <li>• Level B (2-3)</li> <li>• Level C (4-5, and some 6)</li> <li>• Level D (6, 7-8)</li> <li>• Level E (High School)</li> </ul>	<p><b>Cross-cutting Concepts</b></p> <ul style="list-style-type: none"> <li>• Patterns, similarity, and diversity</li> <li>• Cause and effect</li> <li>• Scale, proportion and quantity</li> <li>• Systems and system models</li> <li>• Energy and matter</li> <li>• Structure and function</li> <li>• Stability and change</li> </ul>
<p><b>Mathematical Domains</b></p> <ul style="list-style-type: none"> <li>• The Number System</li> <li>• Operations and Algebraic Thinking</li> <li>• Functions</li> <li>• Geometry</li> <li>• Measurement and Data</li> <li>• Statistics and Probability</li> </ul>	<p><b>Disciplinary Core Ideas</b></p> <ul style="list-style-type: none"> <li>• Physical science</li> <li>• Life science</li> <li>• Earth &amp; space</li> <li>• Engineering, technology, and application to science</li> </ul>
<p>Preparing Students for STEM fields (See Appendix E, pp., 119-121)</p>	

<sup>1</sup> CCR Math Standards are taken from *College and Career Readiness Standards for Adult Education* (<http://lincs.ed.gov/publications/pdf/CCRStandardsAdultEd.pdf>) and information on Generation Science Standards can be found at <http://www.nextgenscience.org/next-generation-science-standards>



# English Language Arts & Science

## ELA Anchor Standards

### CCR Reading Anchor Standard

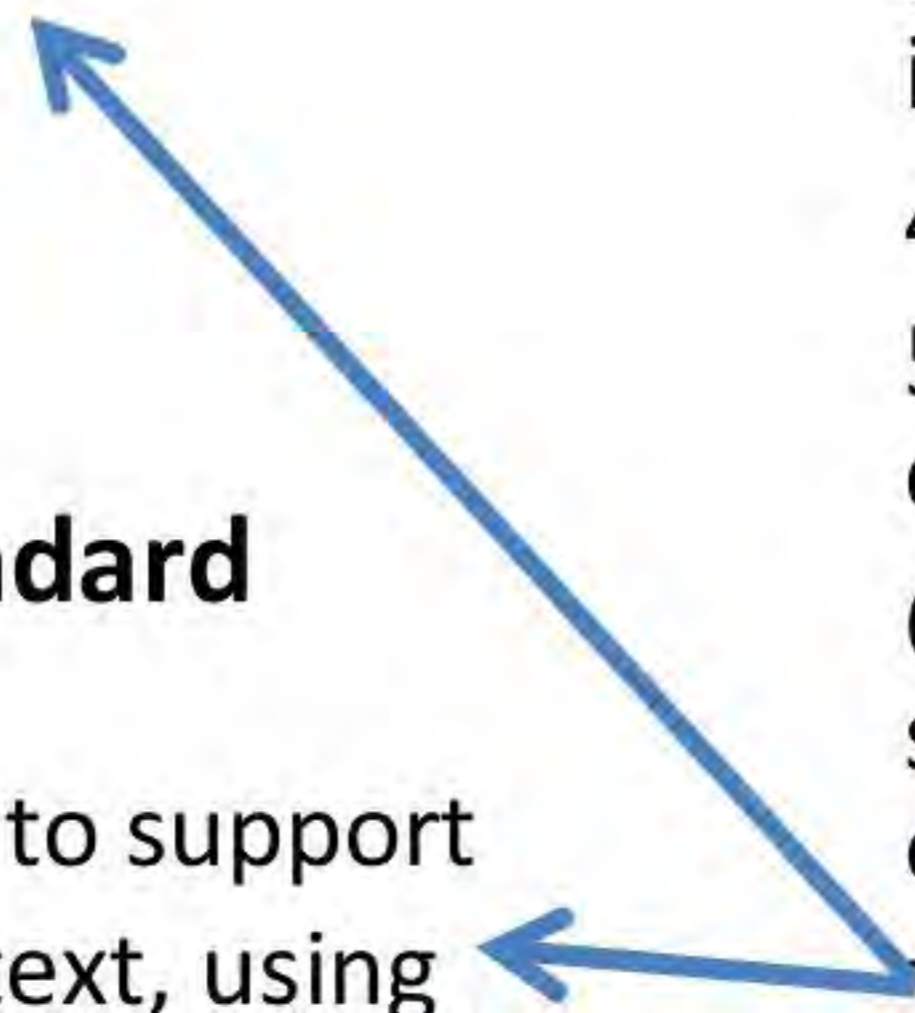
**Number 8:** Delineate and evaluate argument

### CCR Writing Anchor Standard

**Number 1:** Write argument to support claim in analysis of topic or text, using sufficient evidence

## Next Gen Science Standards Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information





# Mathematics & Science

## CCR Mathematics Practices

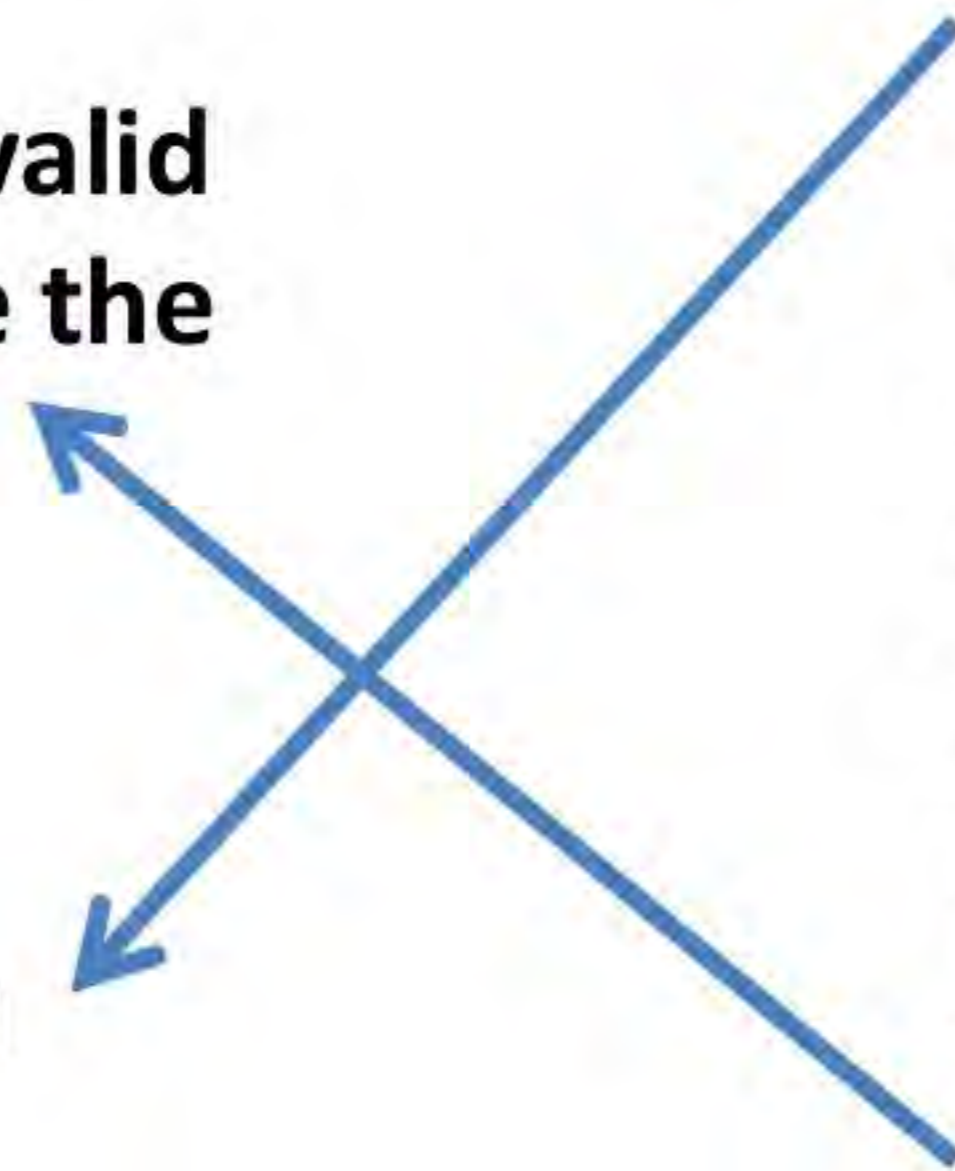
### CCR Mathematics Practices

**Practice 3: Construct valid arguments and critique the reasoning of others.**

**Practice 4: Model with mathematics.**

## Next Gen Science Standard Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information





# High School Equivalency

- GED®
  - HiSET™
  - TASC™
- Textual analysis and understanding
  - Data representation and inference skills
  - Problem-solving with science content
  - Aligned or aligning with CCSS and Next Generation Science Standards and Practices



# Career Pathways

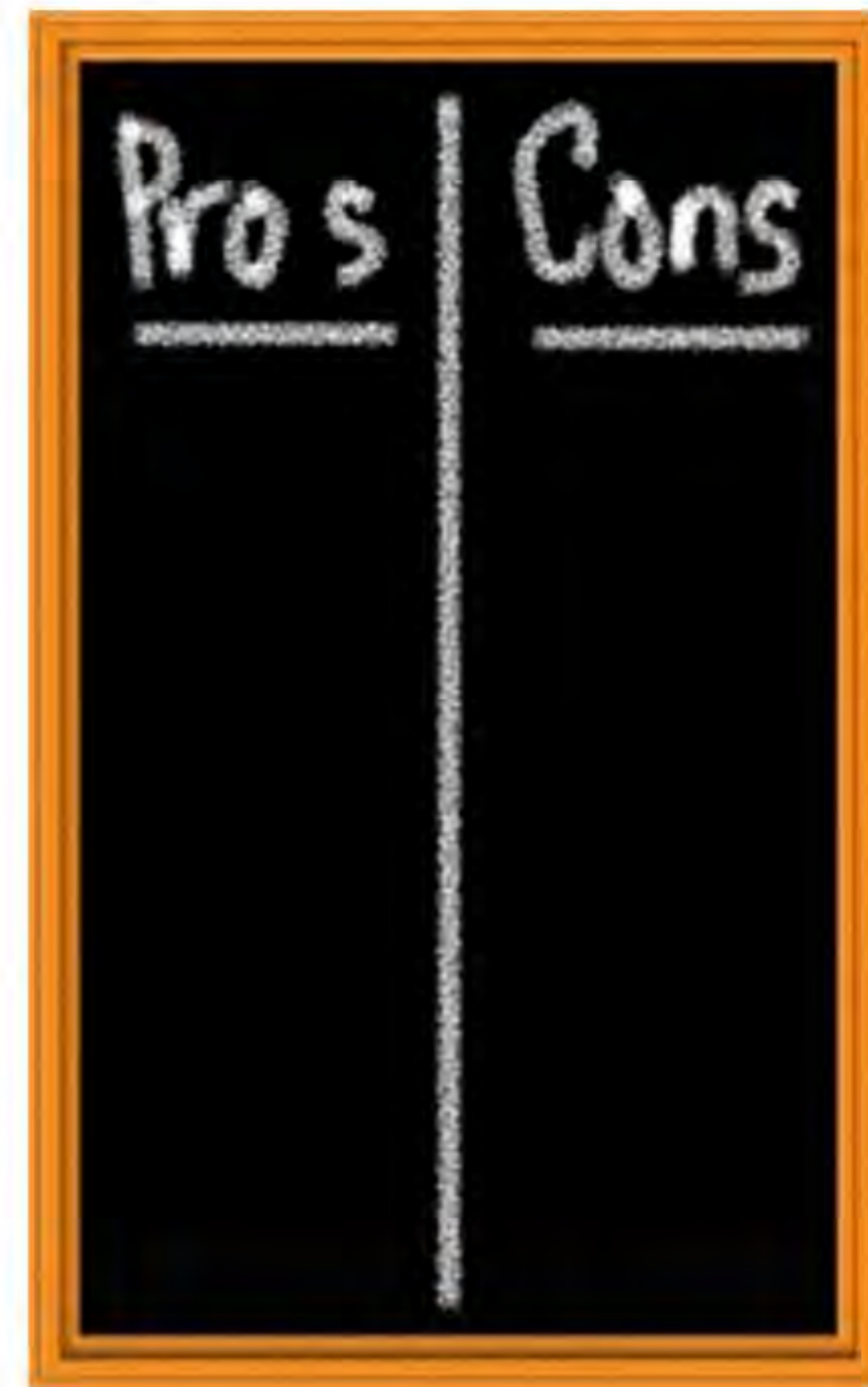
- Health careers are the largest majors in 2-year postsecondary institutions (NCES, Table 271, 2013).
- Health careers typically require several science courses (and the dreaded “Math for Meds” that links math and science).





# Science for Everyday Decisions

- My doctor says I have high blood pressure. What does that mean?
- Is my drinking water safe?
- Can I throw this used battery in the trash?
- Is my backyard suitable for a garden? What do plants need?





# Now it's your turn...



**What challenges do you face related to science teaching/learning?**

**Type your response in the Chatbox.**



# What's an educator to do?

- **Life Science Strand of MA Science Framework**
  - (Michele)
- **Bridge to Science /Bridge to Healthcare**
  - (Amy)





# CRITICAL THINKING, DATA ANALYSIS AND SCIENCE

## *THE LIFE SCIENCE STRAND OF THE NEW SCIENCE FRAMEWORK*



***Michele Bahr***

(Adapted from a presentation with Aliza Ansell & Lenore Balliro)



# Updating Life Science

- Appropriate for the ABE classroom
- Practitioner-friendly
- Drawn from 30 years of science education research by the National Research Council, beginning with Science for All Americans in 1989 and culminating in the Next Generation Science Standards, 2013





# LIFE SCIENCE STANDARD 1

## *CELL BIOLOGY*

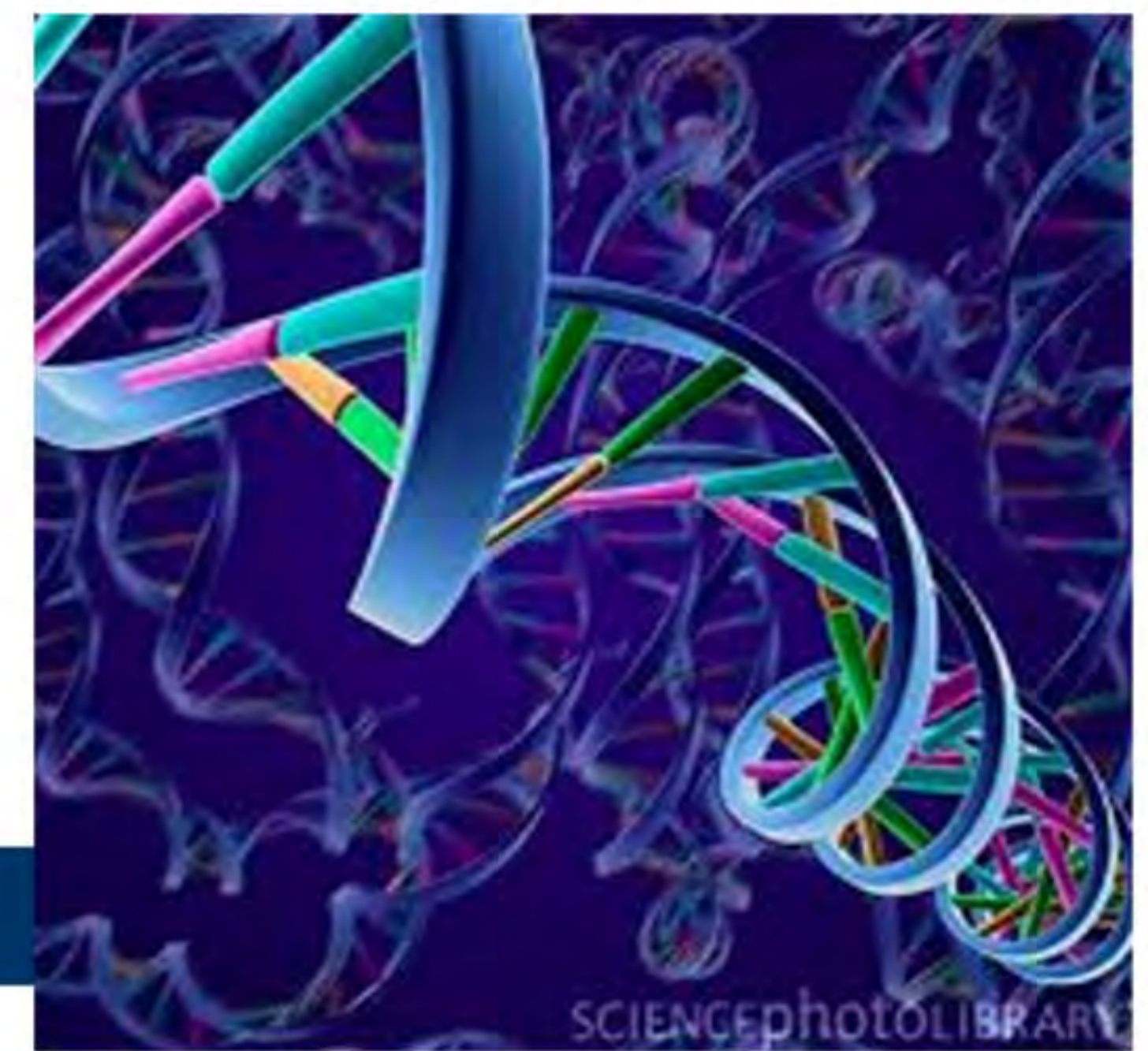
### *Questions*

- **What is a cell?**
- **How do cells get and use what they need to live and grow?**
- **How do cells divide?**
- **What is the role of cells in sexual reproduction?**





## LIFE SCIENCE STANDARD 2



### *Genetics*

#### *Questions*

- How are parents and offspring alike?
- How are the characteristics of one generation of organisms related to the previous generation?
- Why do individuals of the same species vary in how they look and function?





## LIFE SCIENCE STANDARD 3

### *Anatomy and Physiology*

#### ***Questions:***

- **How are organ systems formed?**
- **What systems make up the body of an animal?**
- **How do the systems of a body work together?**







## LIFE SCIENCE STANDARD 4

### *Ecology*

#### Questions:

- **What are the components of an ecosystem?**
- **What are the interactions between living things and the non-living parts of an ecosystem?**
- **How do scientists use observation and experimentation to study ecosystems?**



## LIFE SCIENCE STANDARD 5



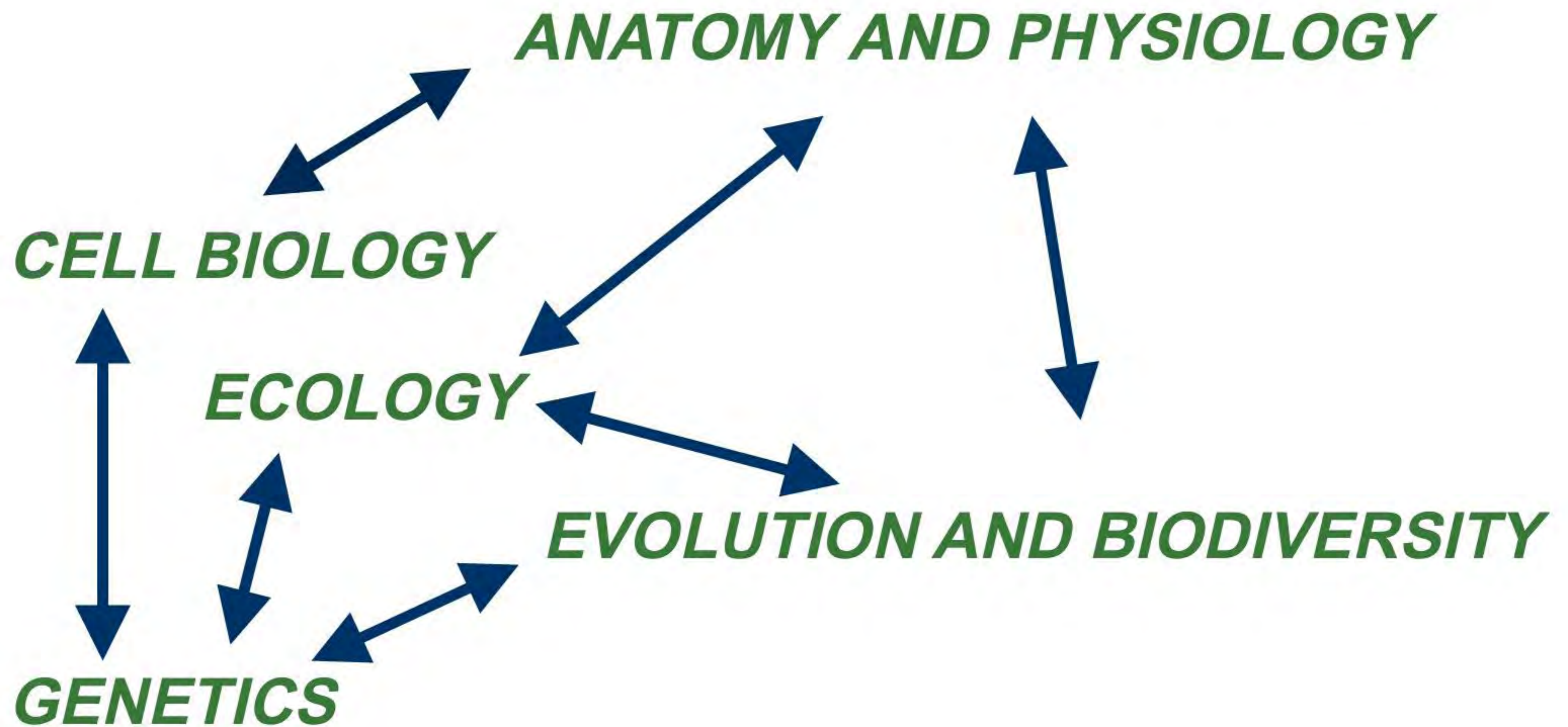
### *EVOLUTION and BIODIVERSITY*

#### *Questions:*

- How have organisms changed over time?
- How does the fossil record provide evidence of different life forms at different periods of geological history?
- What is biodiversity?



**The LIFE SCIENCE standards can be introduced from multiple entry points**





# The LIFE SCIENCE standards have been designed for all levels

ESSENTIAL QUESTIONS	Benchmarks for LEVELS 1 and 2 <b>BEGINNING ADULT BASIC EDUCATION</b> (0-3.9 GLE & SPL 0-3)	Benchmarks for LEVELS 3 and 4 <b>LOW INTERMEDIATE/HIGH INTERMEDIATE EDUCATION</b> (4.0 - 8.9 GLE & SPL 4-5)	Benchmarks for LEVELS 5 and 6 <b>ADULT SECONDARY EDUCATION/BRIDGE TO COLLEGE(9.0 - 12.9 GLE &amp; SPL 5-7)</b>
<p><b>G1 How are the characteristics of one generation related to the previous generation?</b></p>	<p><i>By the end of the level, learners will...</i></p> <p><b>G1.1a</b> Separate organisms into categories based on characteristics that are either similar or different (e.g., number of legs, eye color, fur type, gender).</p> <p><b>G1.1b</b> Recognize that every organism requires a set of instructions that specifies its traits. Collect data in the classroom on an inherited characteristic (e.g., tongue rolling, ear lobe attachment).</p>	<p><i>By the end of the level, learners will demonstrate previous benchmarks as needed, plus...</i></p> <p><b>G1.3a</b> Understand that when organisms reproduce, they transfer their genetic information to the new individual. Define the passage of information from one generation to another as heredity.</p> <p><b>G1.3b</b> Identify that the cells of all organisms contain one or more chromosomes with genetic information, i.e., genes.</p> <p><b>G1.3c</b> Explain that offspring of sexual organisms receive genetic information for all inherited traits from mothers (via the egg) and fathers (via the sperm).</p>	<p><i>By the end of the level, learners will demonstrate previous benchmarks as needed, plus...</i></p> <p><b>G1.5a</b> Use a model to describe the basic structure of DNA as a double helix with a sugar/phosphate backbone linked by complementary nucleotide pairs (A and G, C and T).</p> <p><b>G1.5b</b> Identify genes as being made of DNA. Outline how genes control the production and regulation of proteins.</p> <p><b>G1.5c</b> Diagram how organisms reproduce to transfer their genetic information to the new individual. In eukaryotes, the new individual receives genetic information from its mother (via the egg) and its father (via the sperm) during meiosis.</p> <p><b>G1.5d</b> Compare how heritable (able to be inherited) characteristics can be observed at molecular and whole organism levels—in structure, chemistry or behavior.</p>



## ***What It Looks Like in the Classroom- 4 Lesson Plans from Practitioners***

- **Lemons: Incorporating Science into the ESOL Classroom and using inquiry to advance language learning.**  
*Lenore Balliro, Plum Cove Consulting*
- **The Rice Project: One Community, One Grain of Rice, One Person- Understanding Statistics, Data Analysis, Measurement, Fractions, and Ratio and Proportion Using Data and Rice.**  
*Aliza Ansell, Holyoke Adult Learning Center*
- **Ecology: Capture and Release, a hands-on approach using an ecological model to understand ratio and proportion.**  
*Roxanne Heller, ACCESS Cape Cod*
- **Water Works, an integrated lesson focusing on the action of water in living organisms.**  
*Linda Matys O'Connell, Holyoke Adult Learning Center*





## **Water Works**

- ◆ **Establish the predicate for inquiring why plants need water in their leaves and how they get it there in defiance of gravity. Integrate use of critical thinking key words “and” & “because” and “in order to.”**
- ◆ **Activate background knowledge**
- ◆ **Check for understanding and make cause-and-effect explicit**
- ◆ **Pose questions**
- ◆ **Play Video explaining photosynthetic process**
- ◆ **Debrief**
- ◆ **Assessment**
- ◆ **Activity: Observe, Hypothesize, Make predictions**
- ◆ **Kinesthetic Activity**
- ◆ **Finish lesson with discussion of plant nutrition and circulation systems compared/contrasted with human body nutrition and circulation systems**



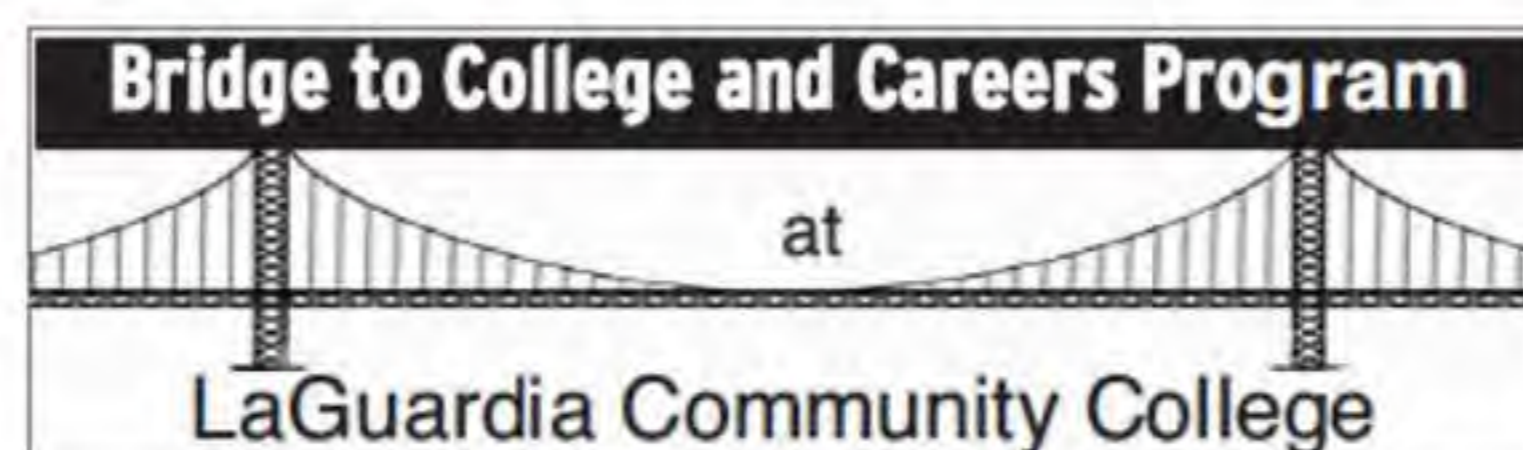
# GETTING COLLEGE AND CAREER READY IN SCIENCE

## Career-Focused Skills Instruction in the Bridge to College and Career Program

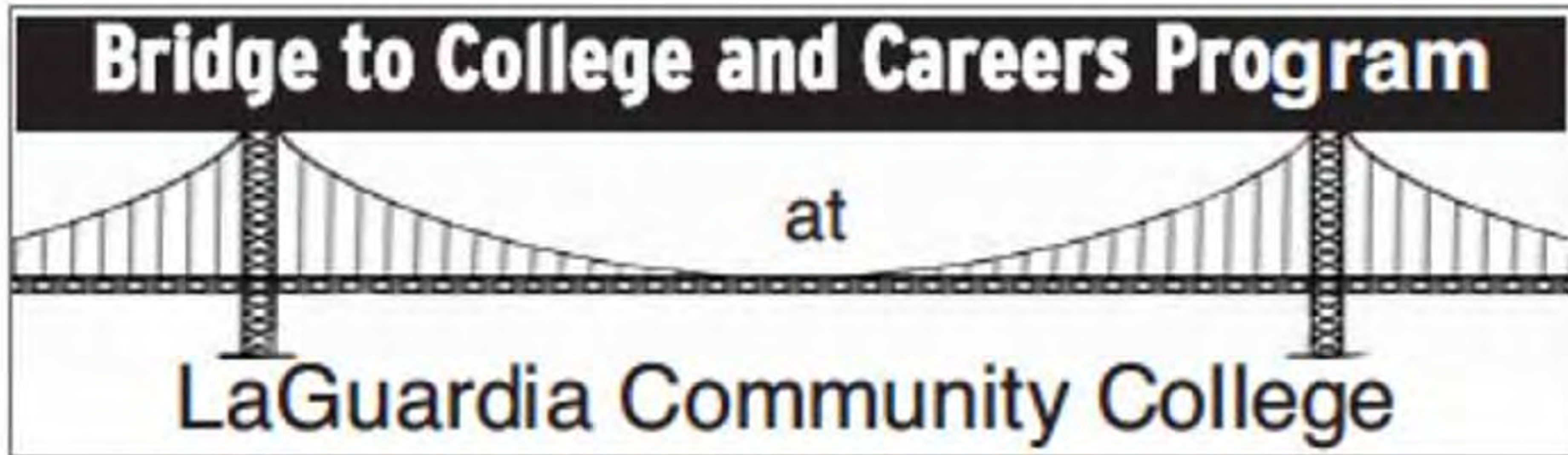
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Amy Dalsimer

*Executive Director, Pre-College Academic Programming  
and the College and Career Pathways Institute (CCPI)*







Bridge to  
Healthcare  
Careers

Bridge to  
Business  
Careers

Bridge to  
Science  
Careers

**1200+ students served since 2007**

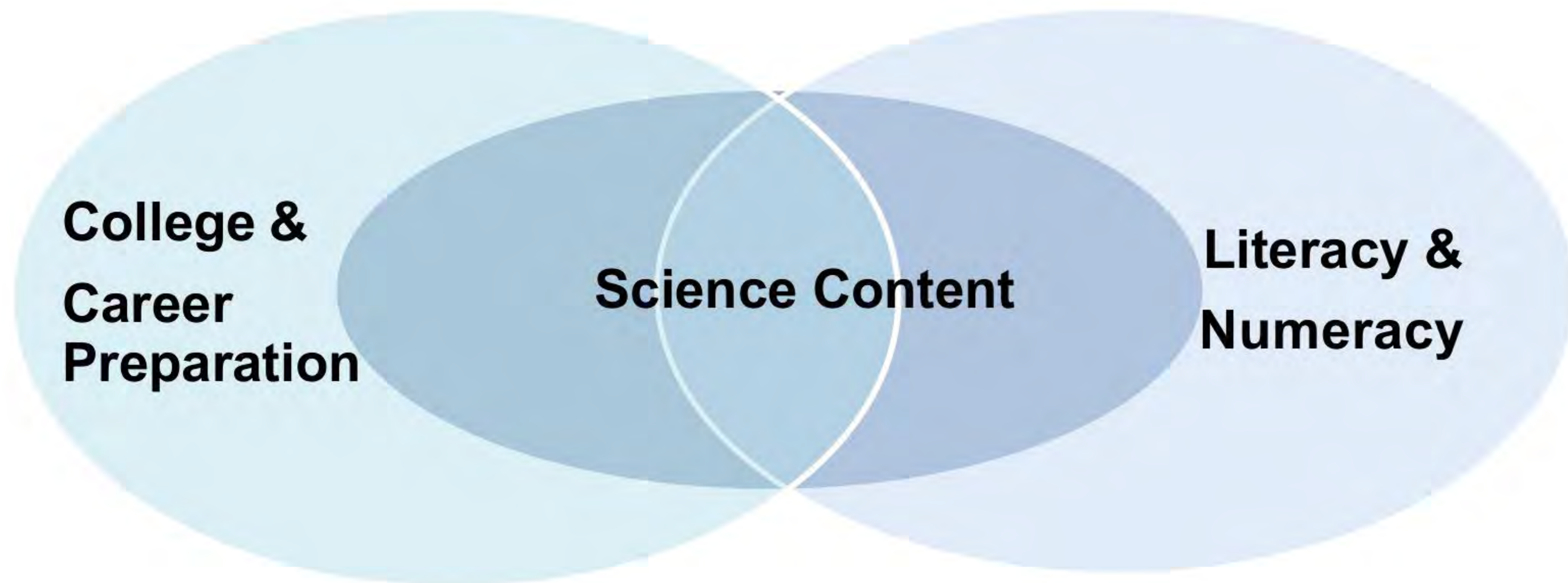


[www.laguardia.edu/pcap](http://www.laguardia.edu/pcap)



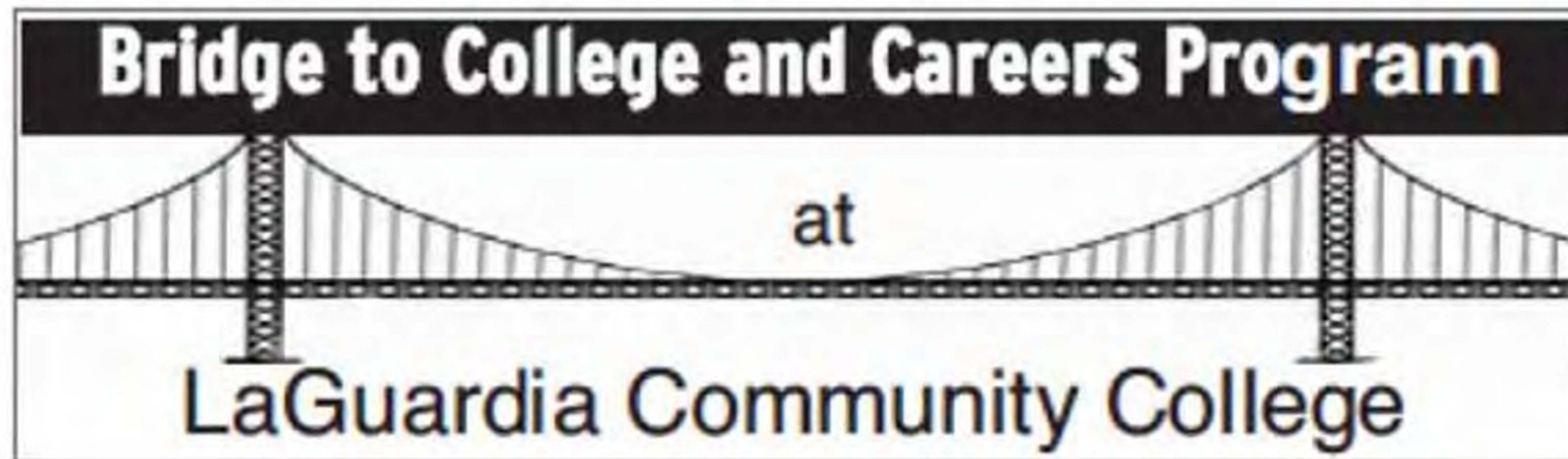


# Integrating Science Instruction in the Bridge Classroom





# Science Topics in the Bridge Programs



## College and Career Exploration

- Career Narratives
- Goal Setting
- PSE planning & research

## Science

- Cells and Genetics
- The Scientific Method
- Evolution

## Healthcare

- Nutrition
- Patient Care
- Epidemics and Infection Control



# Instructional Approach in the Bridge to Science Program

- Foster the spirit of scientific inquiry through investigation of essential questions
- Attention to scientific practice including:  
the roles of a scientist, experimental design, and scientific method
- Scaffolded skills development
- Activity-based and hands-on (or experiment) learning
- Variety of science texts



# Sample Science Unit: The Cell

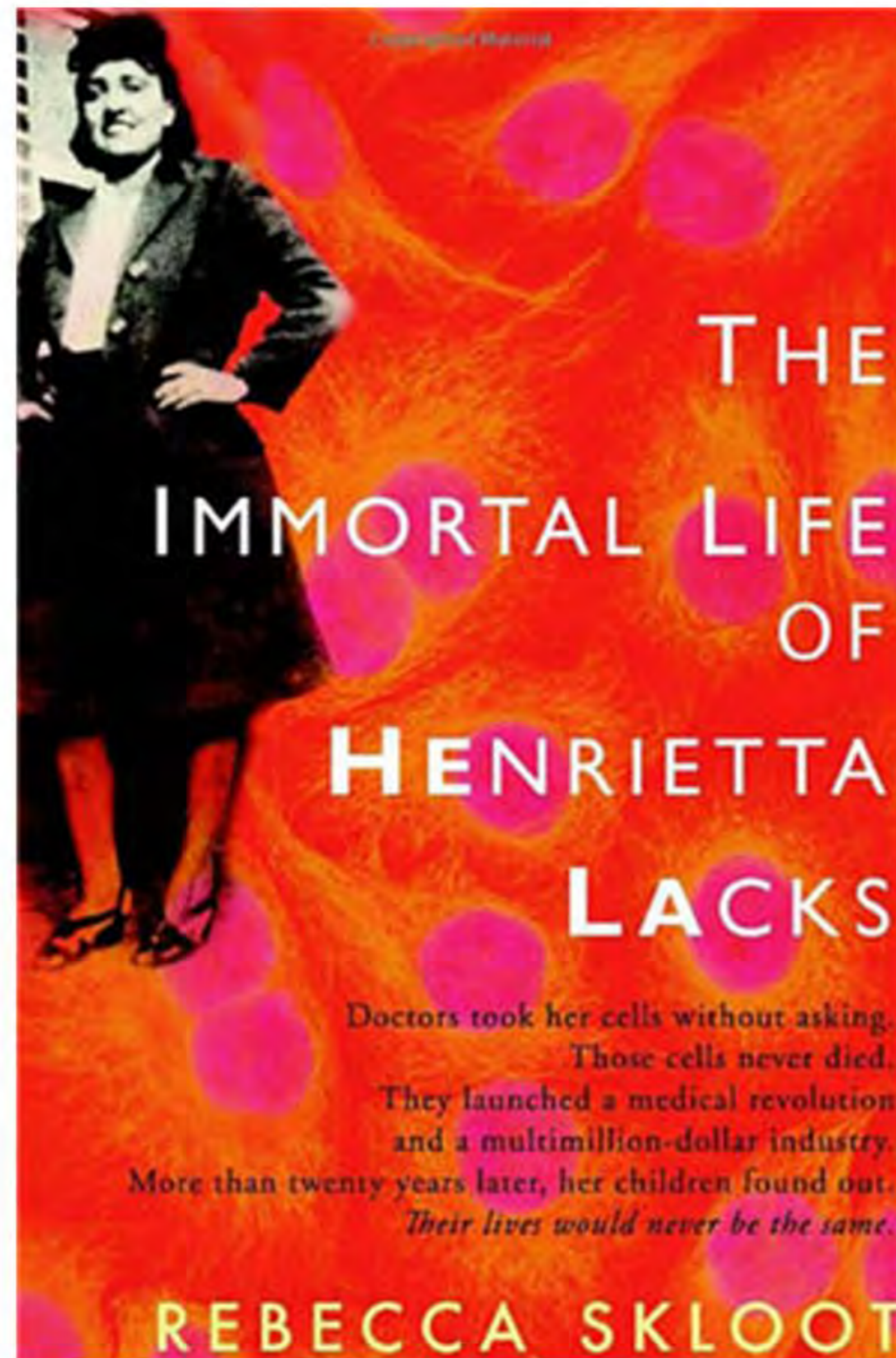
## Essential Questions:

- What are the demands and benefits of a career in a science field?
- How is an experiment conducted?
- What ethical issues are involved in scientific research?

Science Readings	Activities	College & Career Readiness Skills
<i>The Immortal Life of Henrietta Lacks</i>  stem cell articles from <i>NY Times</i>	onion root lab  comparing stem cells and HeLa cells	Understand concepts of angle and measure angles.  Follow precisely a complex multistep procedure when carrying out experiments.  Compare the point of view of two or more authors for how they treat similar topics.



# What are the ethical issues involved in scientific research?





# Stem Cell Reading/Writing Activity

## Step 1

In partners, students research both sides of the stem cell research debate using the provided sources: *Opposing Views website* or *The New York Times*

## Step 2

Students write a script around the two opposing views of the stem cell debate



# Onion Root Cell Stages of Mitosis





# Why integrate science instruction into the HSE Classroom?

- HSE exam/ Prior knowledge demands
- Depth over breadth
- Development of academic and professional identities
- Curriculum alignment to PSE
- College and Career Readiness





# College and Career Pathways Institute

## Upcoming Events

November 13<sup>th</sup> and 14<sup>th</sup> Workshops:

**Reading, Writing and Thinking like a Scientist**

**More than College Knowledge**

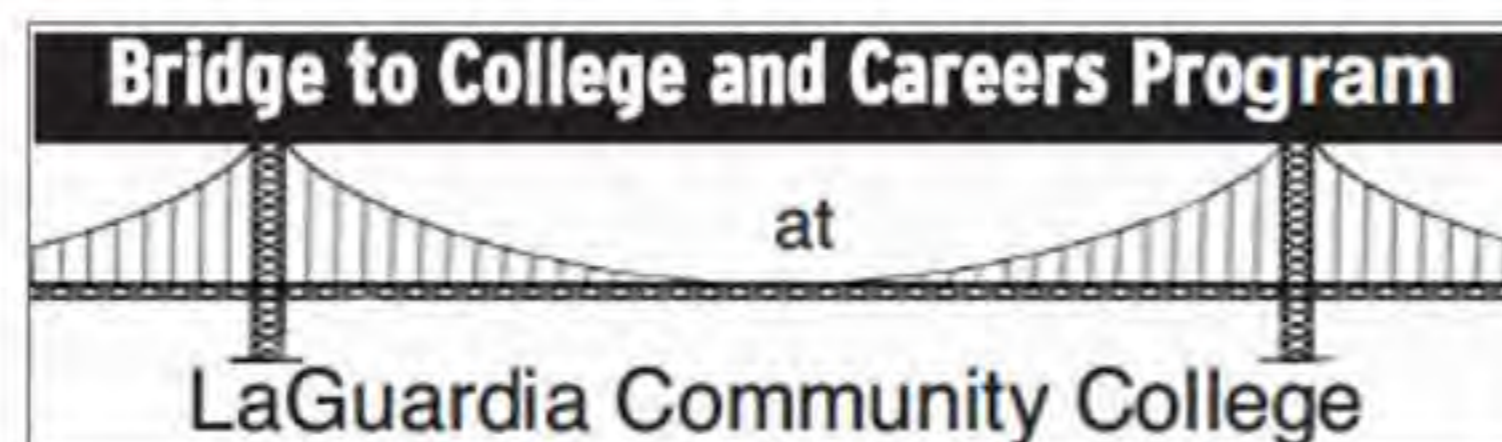
@ NCTN Conference on Effective Transitions in Adult Education  
Providence, Rhode Island

November 20<sup>th</sup> Webinar:

**WIOA, What's Next? Program Models That Work**

[CCPI@lagcc.cuny.edu](mailto:CCPI@lagcc.cuny.edu)

<http://www.lagcc.cuny.edu/pcap/>





# See you at the next webinar

## **College and Career Ready Science Teaching Sampler**

**Date:** Tuesday, October 21, 2014

**Time:** 2-3:30 PM Eastern Time

### **Presenters:**

**Meghan McNamara**

Statistics for Action

Combining environmental education and math

**David Rosen**

Science Video Review Project

AND....



# NCTN Science Pre-Conference

- Wednesday  
November 12 (9 AM  
to 12 noon)
- Using Science  
Content to Reach  
College and Career  
Readiness (And, Have  
Fun, Too!)



[www.collegetransition.org](http://www.collegetransition.org)