

# The Smithsonian Science Education Center: *Transforming Science Education*



Smithsonian  
*Science Education Center*

Katherine P. Blanchard – 5 November, 2015

# Our Evolution.....

Founded 1985



*National Science Resources Center*

THE NATIONAL ACADEMIES



Smithsonian  
Institution

Renamed 2013



**Smithsonian**  
*Science Education Center*



**Smithsonian**  
*Science Education Center*

5 November, 2015

# What do we do?

## Mission

Transform science education  
for all students in the  
United States and throughout  
the world.



## How do we strive to achieve this?



# LASER:

## Leadership and Assistance for Science Education Reform

**LASER Model for  
Systemic Reform**



# Products and Services

## ▣ Science and Technology Concepts (STC™)

### ▣ Digital Initiatives

- Live action content
- Good Thinking!
- Digital simulations
- Learning Interactives

## ▣ Professional Development

- Differentiated and tiered to serve teachers
- Both content and pedagogy training

## ▣ Leadership Development

- Serve schools, districts, and communities

# How do we know LASER works?

## Investing in Innovation (i3) Validation Grant

Northern New Mexico

North Carolina

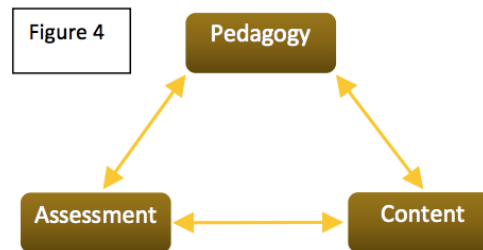
Houston, Texas

- 92% of students in our treatment group showed statistically significant or educationally meaningful gains



# Connecting to the Big Ideas

- *WHAT* students should be learning through IBSE
  - Ideas OF Science
  - Ideas ABOUT Science
- *WHAT* we do to support in learning through IBSE
  - Pedagogy
  - Content
  - Assessment



How do we create strong learners?

How do we make this sustainable?



# A US Approach to Create Strong Learners

- Next Generation Science Standards
  - Guiding Document
  - Aligned to preexisting math and literacy standards
- Each standard begins with a performance expectation
- Standards go beyond content
- Three Dimensions:
  - Disciplinary Core Ideas
  - Cross-Cutting Concepts
  - Science and Engineering Practices



# Anatomy of the NGSS

## 5-PS2 Motion and Stability: Forces and Interactions

### Standard (Competencies)

Students who demonstrate understanding can:

**5-PS2-a. Support an argument that the gravitational force exerted by the Earth on objects near Earth's surface is directed toward the Earth's center.** [Clarification Statement: Support will be drawn from diagrams, evidence, and data that are provided. Earth causes objects to have a force on them that point toward the center of the Earth.] [Assessment Boundary: Mathematical representation of gravitational force is not assessed.]

Performance  
Expectation

### Foundation (Content)

#### Science and Engineering Practices

##### Engaging in Argument from Evidence

Engaging in argument from evidence in 3-5 builds from K-2 experiences and processes to critiquing the scientific explanations or solutions proposed by others by citing relevant evidence about the natural and designed world.

- Construct and/or support scientific arguments with evidence, data, and/or a model. (5-PS2-a)

Practices

#### Disciplinary Core Ideas

##### PS2.B: Types of Interactions

- The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-a)

Content

#### Crosscutting Concepts

##### Cause and Effect

- Cause and effect relationships are identified, tested, and used to explain changes.

Crosscutting Concepts

### Common Core Connections

*Common Core State Standards Connections:*

*ELA/Literacy -*

**RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS2-a)

**RI.5.10** By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently. (5-PS2-a)

**W.5.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-a)

*Mathematics -*

**MP.3** Construct viable arguments and critique the reasoning of others. (5-PS2-a)

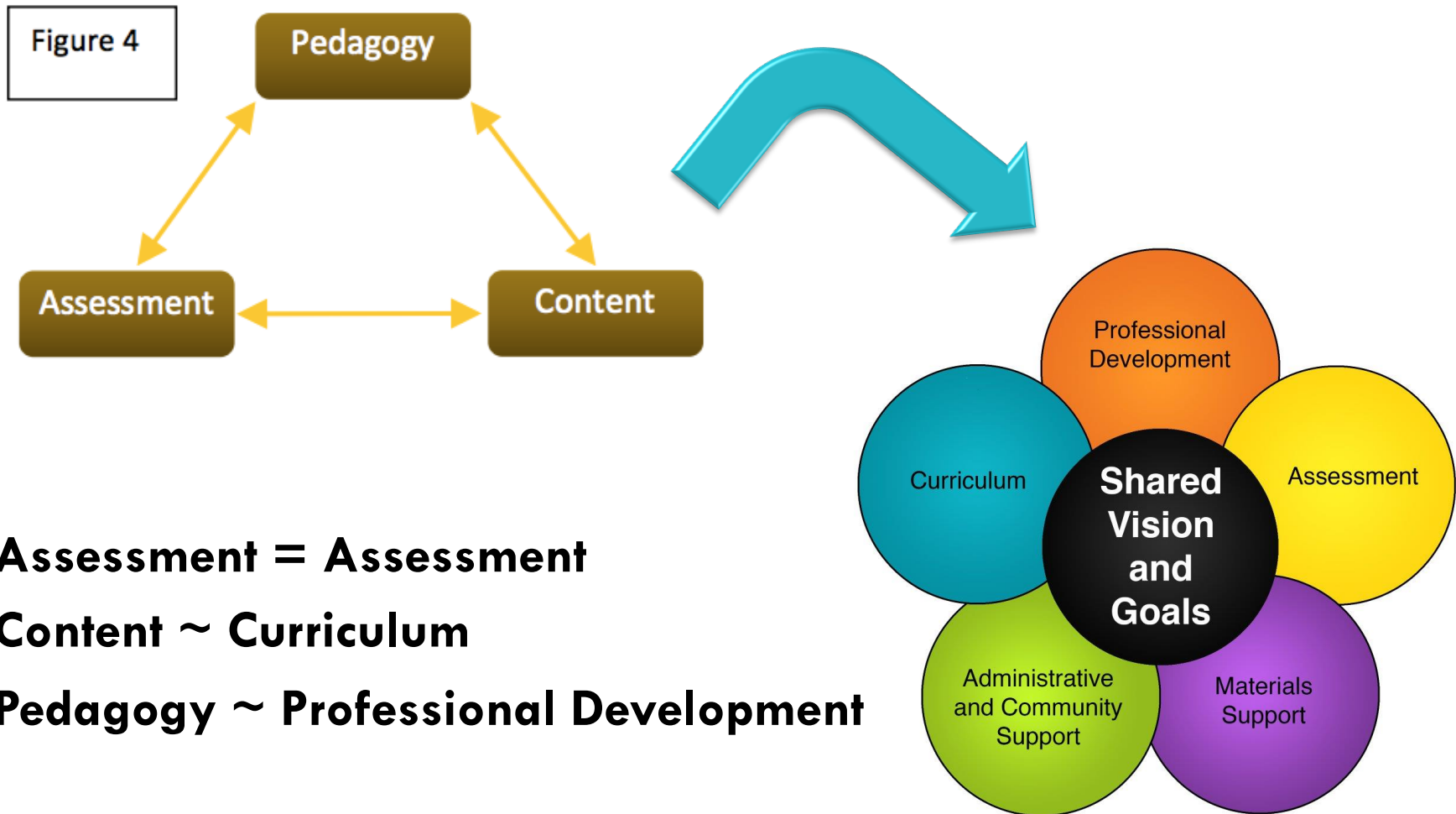
Connections to other disciplines

# Key to Successful IBSE

---

Sustainability!

# Creating Sustainable Change



# LASER Leads to Sustainable IBSE

## How do we go beyond the Big Ideas structure?

- ▣ Materials Support
  - IBSE takes A LOT of stuff
  - Must not be the responsibility of teachers
- ▣ Administrative and Community Support
  - Must have support of those who can make decisions and provide resources
- ▣ Shared Vision and Goals
  - Must know where we are going
  - Must know what success looks like



# How do we achieve IBSE for all students?

- Empower students to master skills, not just content.
  - Set clear performance expectations
- Provide systemic infrastructure for sustainability
  - Burden of materials should not be on teachers
  - Involve decision makers and those who can provide resources
- Share a collective vision for IBSE
  - Understand what success looks like for our schools, our teachers and our children

# Our Message to Students:



## How can we better prepare students to meet the science and technology challenges of the future?

The Smithsonian Science Education Center works with districts and regions to build leadership teams that transform science education.

Let's start by transforming K-12 science education

### Create a Plan

School, district, and community leadership teams get time to work together and develop long-term reform plans, guided by research, that focus on local and regional needs

### Implement

We work together on an ongoing implementation and evaluation of that plan

### Professional Development and Curriculum

We offer ongoing, content-focused professional development, and professional learning communities. We also provide resources for inquiry-based curriculum



■ [www.ssec.si.edu](http://www.ssec.si.edu)

■ @SmithsonianScie

■ facebook.com/  
SmithsonianScienceEducation  
Center/

■ Katherine P. Blanchard  
BlanchardKP@si.edu