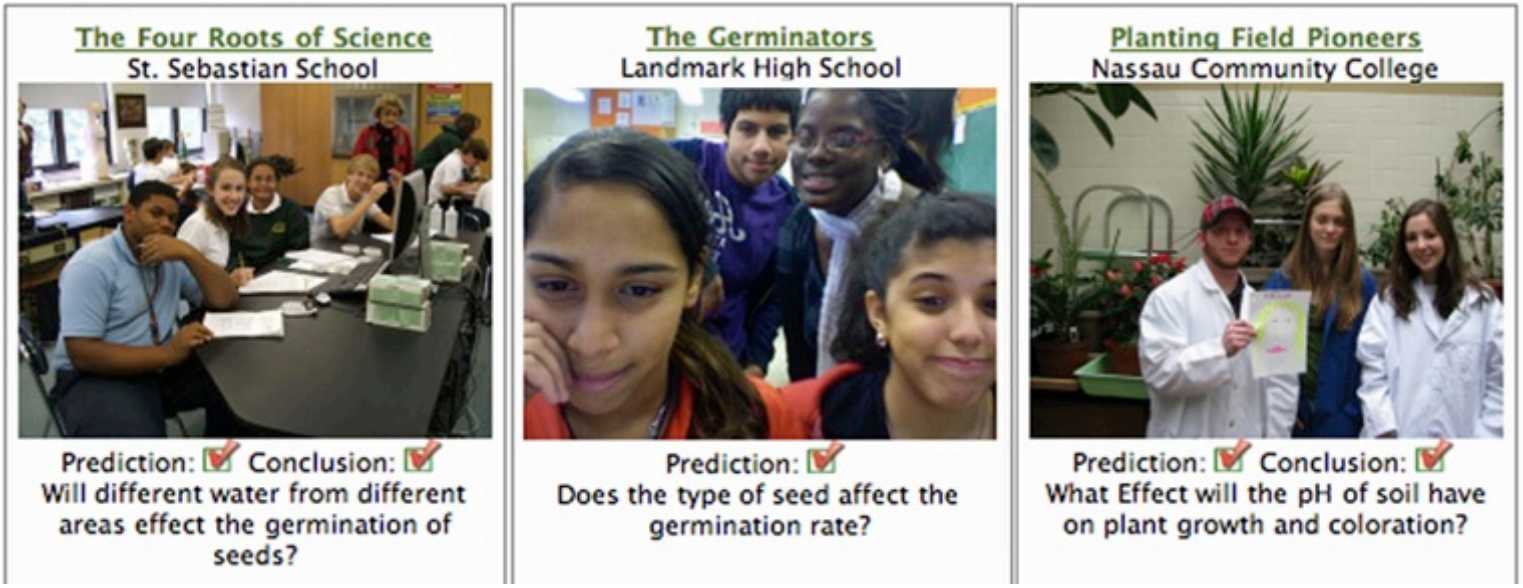
What's in Your Investigation Toolkit? – Digital Resources for Personalized, Anytime Science Learning

Claire Hemingway and Catrina Adams
Botanical Society of America

In this session on www.PlantingScience.org



- ❑ Describe how our model aims to support authentic investigations
- ❑ Show a few planned new resources and interactive tools
- ❑ Share your ideas about materials and resources you are looking for

Too ambitious for time, so please come chat after

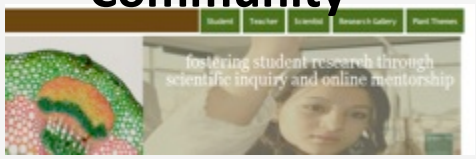
Professional Development

60 Summer Institute for Teachers
2008, 2009, 2010, 2011
120 Master Plant Science Team
graduate student & post-docs

Web Platform Resources and Tools

Embedded student tests
Automatic notifications
Video helps
Teacher handbook
Mentor guide
Administrative tools

Online Learning Community



11,642 students working in 3,207 teams.
Middle and high school teachers in 37 U.S. states and abroad. >700 scientists registered as online mentors.
14 society partners.

Plant Inquiry Modules

Germination, Photosynthesis, Reproduction, Life cycles, Genetics, Cells and Tissues, Variation, Science Practices

Dissemination

NABT, NSTA workshops,
Science essay, *Science Scope,*
society meetings

Research and Evaluation

Workshop teacher profiles
14 Classrooms observed
1 dissertation: online inquiries
Student attitude, process, and content

National Science Foundation
WHERE DISCOVERIES BEGIN

Game Changers to “traditional” Education

NEXT GENERATION SCIENCE STANDARDS
For States, By States

What Does Today's Learning Landscape Look Like?

Learning with technology

The Digital Learning Imperative

Learning in action

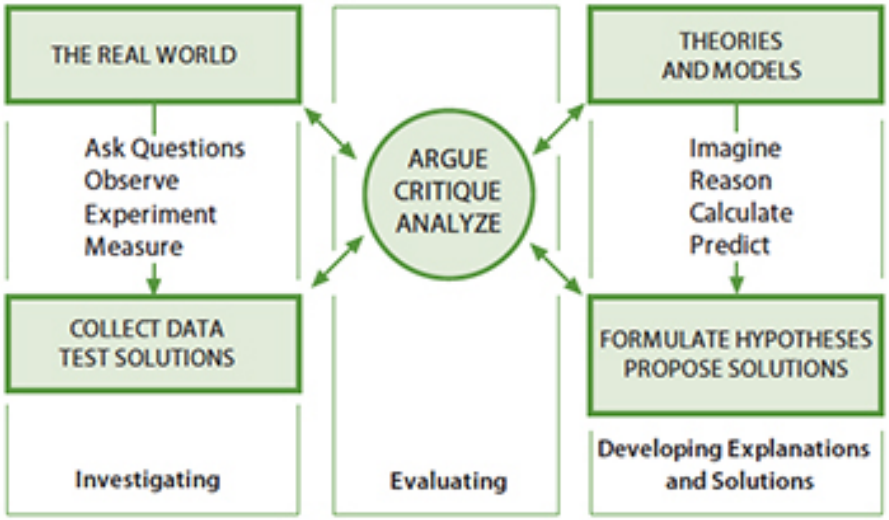
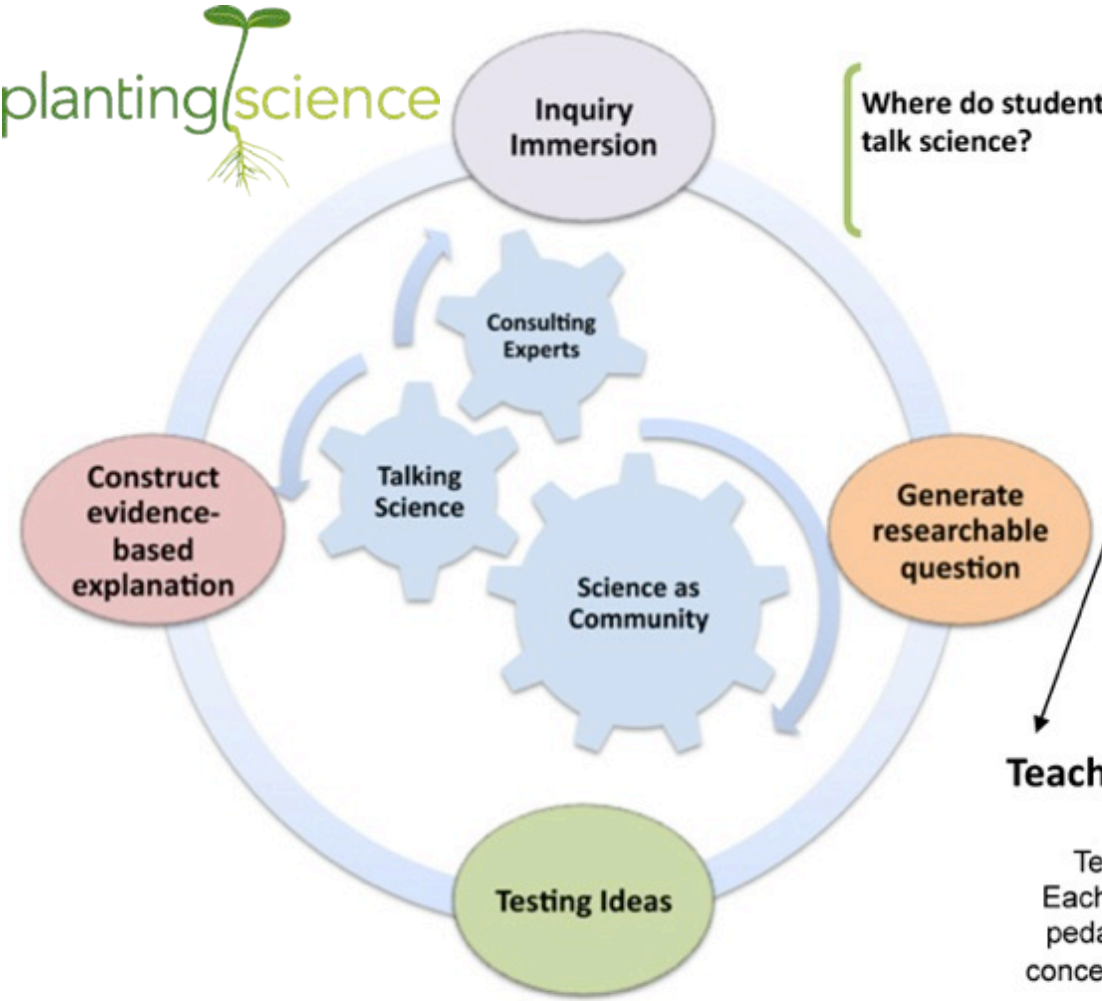
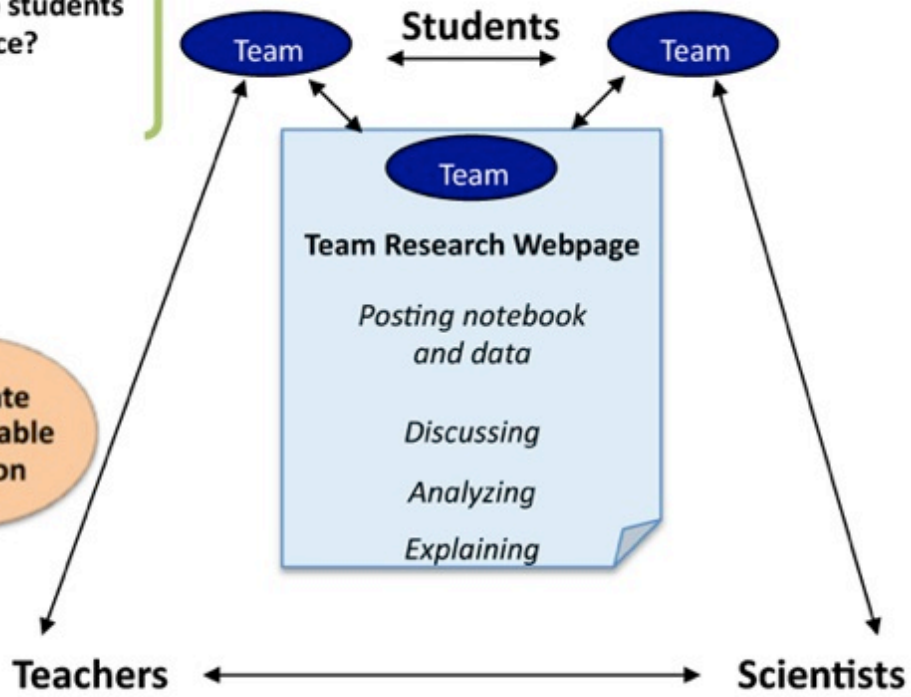


FIGURE 3-1 The three spheres of activity for scientists and engineers.

A Framework for K12 Science Education



Where do students talk science?



Teachers and Scientists collaborating to guide students. Each bringing expertise and specialized knowledge. Teacher pedagogy training and understanding of student knowledge, conceptions, and skills: essential foundation for student inquiry.

Where do teachers talk online?

Team Research Webpage

- *Encouraging team*
- *Reinforcing student expectations*

Teacher-and-Mentor Discussion Forum

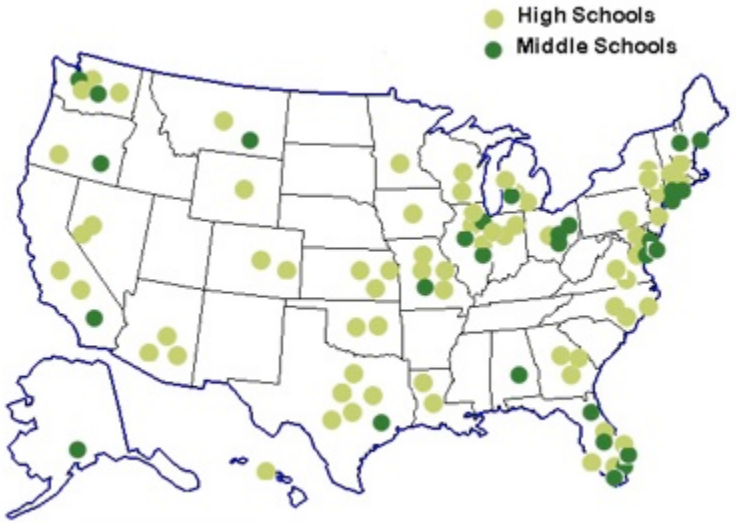
- *Sharing about teams, schedules*
- *Talking about inquiry, guiding students*

Teacher-to-Teacher Discussion Forum

- *Exchanging views*
- *Sharing tips, concerns*

>11,642 students working in 3,207 teams since 2005

Middle and high school teachers in 37 U.S. states and abroad



>700 scientists registered as mentors

14 society and organization partners

are you taking part in the evolution?
planting science
join us, make a difference

American Society of Plant Biologists
BSCS
APS
American Society of Agronomy
Crop Science Society of America
Soil Science Society of America
Canadian Botanical Association
L'Association botanique du Canada
The American Fern Society
abls American Bryological and Lichenological Society
American Institute of Biological Sciences
esa Ecological Society of America
Society for Economic Botany
SSE
ASPT
Wisconsin Fast Plants
NSF
ATM
Monsanto Fund





Teachers

- National recruitment
- Web-surfing teachers seeking inquiry
- Approval from school board/principal
- Reform-minded teachers
- Innovators at their schools
- Summer professional development optional

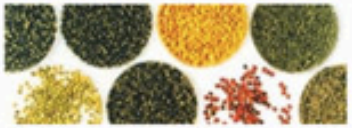
Scientists

- National/international recruitment via plant-related scientific societies
- >700 volunteer mentors
- Early, mid- and late-career scientists
- Cohort of graduate students and post-docs sponsored annually by BSA and ASPB (n=120 to date)
- New mentors receive Mentor Guide
- “Mentor Tip Sheets” with key tips for each investigation theme

plantingscience.org

PlantingScience Resources

The Wonder of Seeds



Germination and Seedling Growth Investigation

Grades 7-12

More Information

The Power of Sunlight

Photosynthesis and Respiration Investigation

Grades 9-12

More Information

Foundations of Genetics

Traits, Variation, and Environment in Rapid Cycling Brassica

Grades 9-12

More Information

PlantingScience Modules in Field-Testing

Corn Competition

Grow the largest corn plants.

Grades 7-12

Where does pollen come from?

Pollen and Pollination Investigation

Grades 7-12

Genetics in Inbred Arabidopsis

Investigation with a model species to track transmission of traits.

Grades 9-12

Celery Challenge

Osmosis, Diffusion, and Transpiration Investigation

Grades 7-12

C-Fern in the Open

Sexual reproduction, alternation of generations investigation

Grades 9-12

School Level: Middle School/Jr High
Print this

Research Information

Research Question
which seeds grow in beach climates?

Research Predictions
Some seeds will grow better in salt water rather than regular water, like the ones that live in beach climates.

Experimental Design

Research Conclusions

Conversations – use this space to communicate about this project

Students, please do not include your last name in any comments.

Add a new Comment
Subject

Comment

Submit Comment

Research Team Profile

Super Science Samurai

Project Data

Our Uploaded Journals:

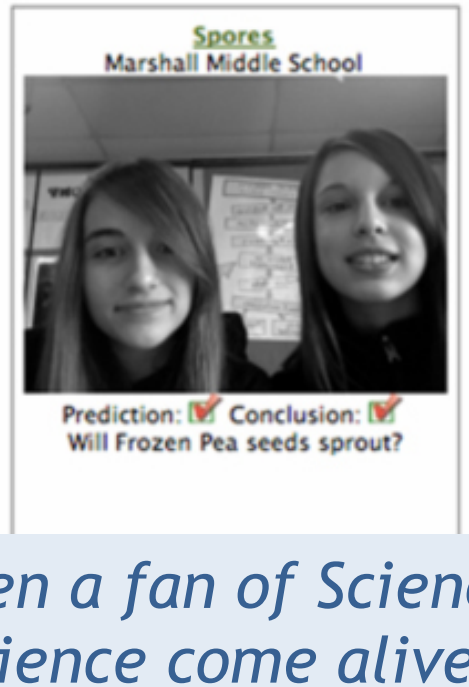
Our Uploaded Data Files:

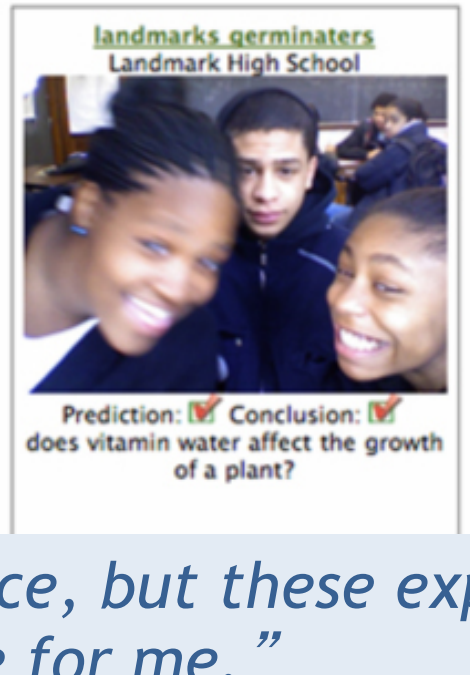
Our Uploaded Final Presentation Files:

Images:

Blanket Flower 0% and2% and 5% salt

Resources for collaborative science learning





"I've never been a fan of Science, but these experiments really made Science come alive for me." - Student

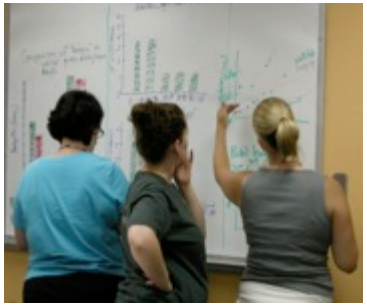
"It has helped me to change the way I teach all grades in the classroom. I don't give answers anymore, I lead discussions and let them research and guide them through their thought processes."

- Teacher

Thanks to the teachers, scientists, and students


pollinator map


flower bed



National Science Foundation
WHERE DISCOVERIES BEGIN

Doing Science

Roadmap through a science project

Explore

Research Question

Planning Your Study

Doing Investigations

Visualizing and Analyzing Data

Making Sense of Findings

PlantingScience for Students

PlantingScience offers students in middle school through college classes a personal experience to work like real scientists with their scientist mentors. Enhance your team skills. Get a better understanding of what science is really like. Get to know a scientist. Talk science in our online community.

Register Now

Talking Science

Online Communication

Peer Communication/Review

Recording Your Ideas

What's in Your Notebook?

Sketching and Drawing in Science

Presenting Your Research

Arguing from Evidence

Making Presentations

Science practices, Core Ideas, Cross cutting concepts

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluation, and communicating information

Learning in action

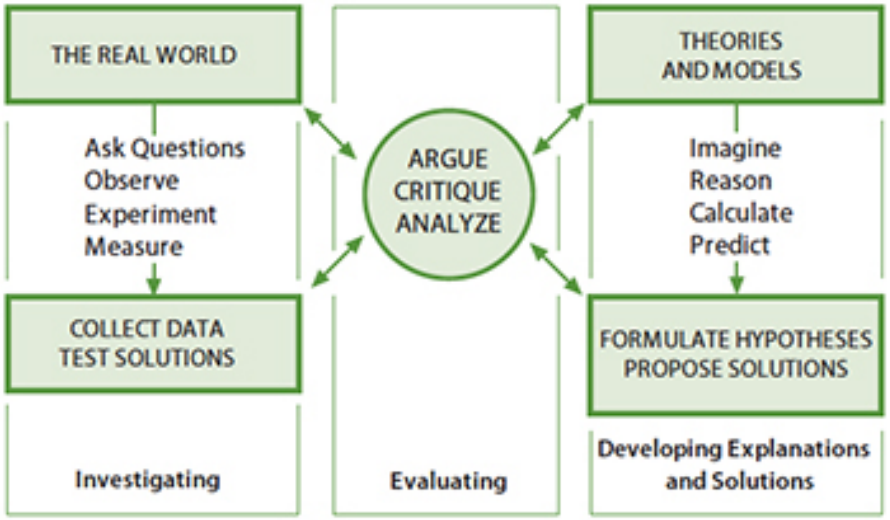


FIGURE 3-1 The three spheres of activity for scientists and engineers.

NEXT GENERATION SCIENCE STANDARDS
For States, By States

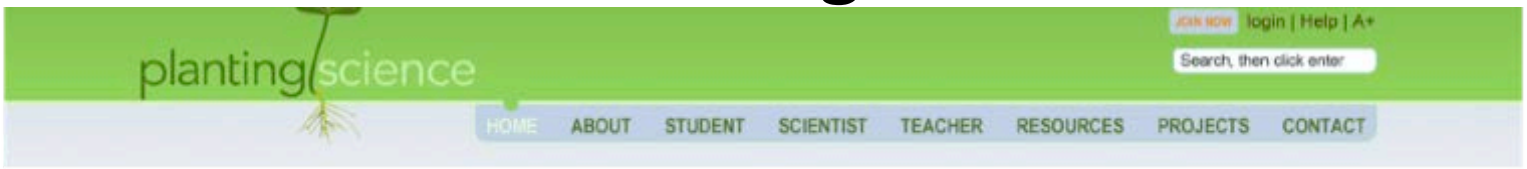
A Framework for K12 Science Education

Think-pair-share

"Where do you think students struggle most?"

"Where is it most difficult for you as an instructor to facilitate student learning?"

Plant Investigation Toolkit



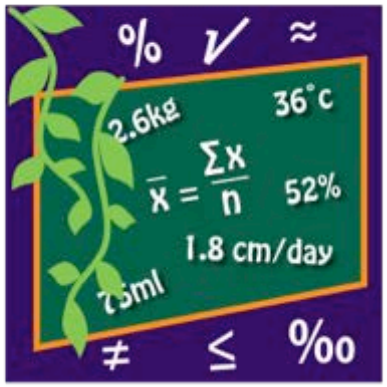
Plant Investigation Toolkit

Plant Care

Research in the Lab

Research in the Field

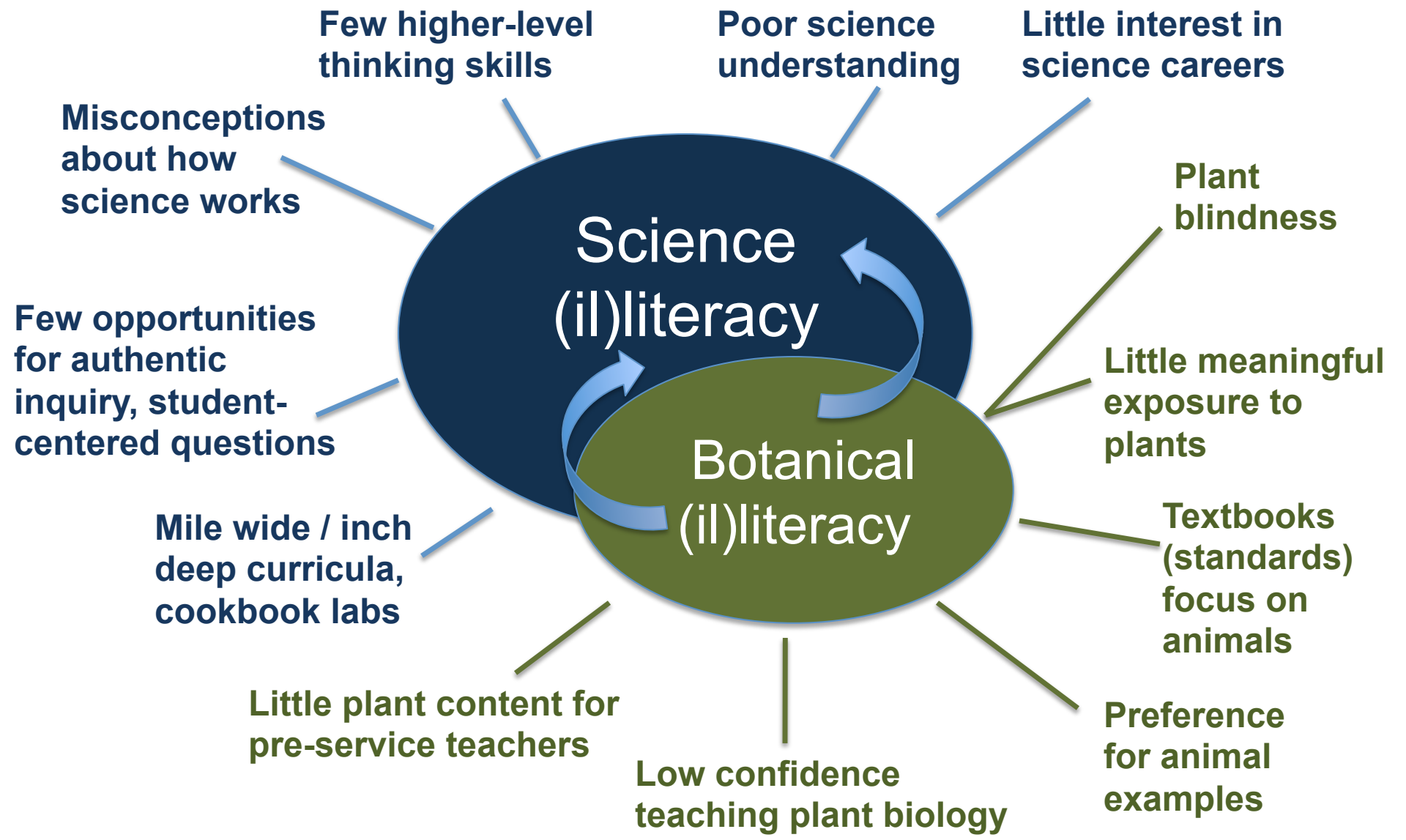
Math with Plants



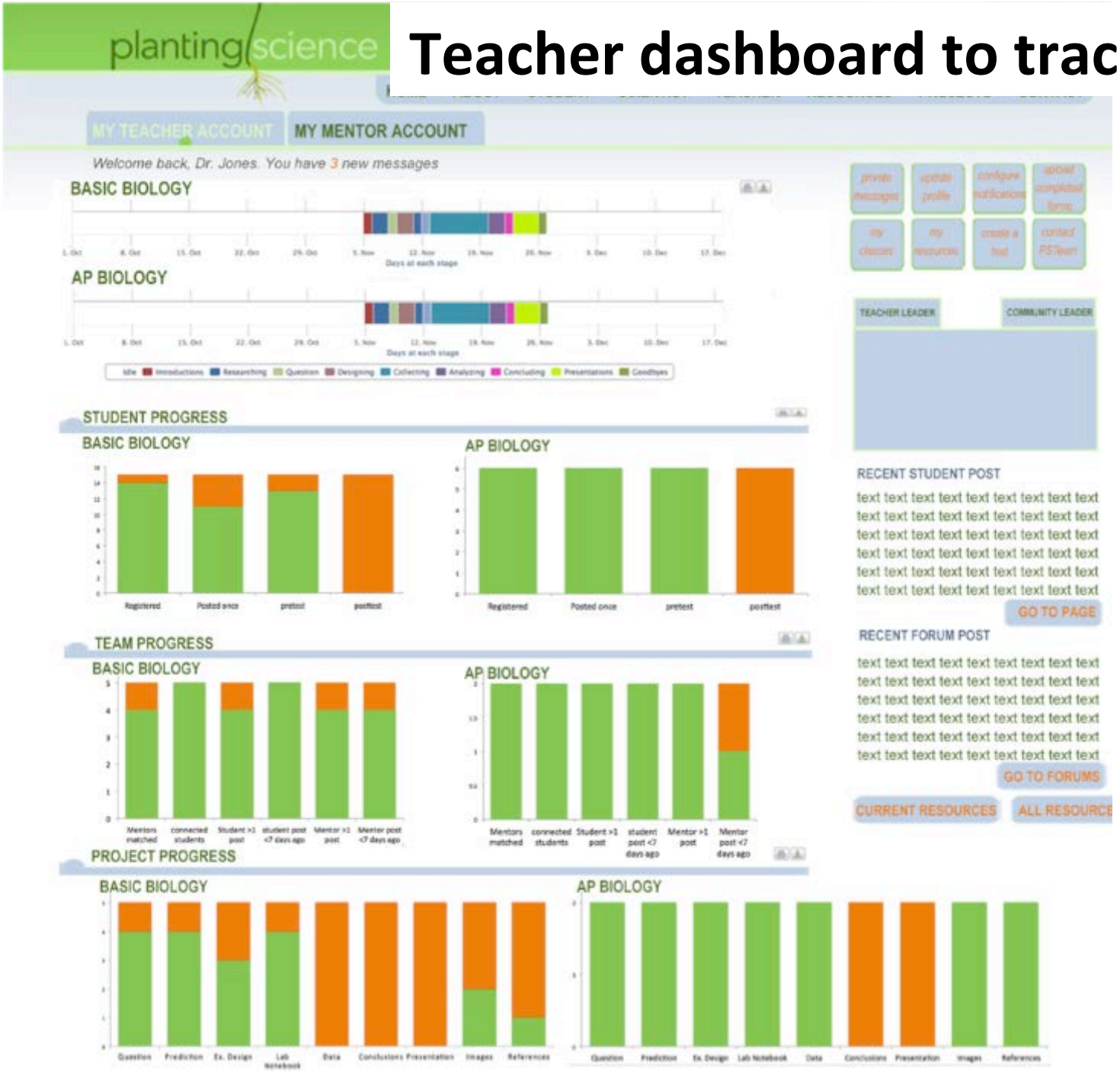
Technology

Investigating Safely

The Need for a Plant Investigation Toolkit



Teacher dashboard to track progress



Teacher and Mentor Class Page

Intro Biology - Carpinteria High School

About This Class | Student Background | Teacher Expectations | Class Calendar

Class Photo

Class Time
2:30 PM to 3:20 PM

Estimated Start Date
October 1st, 2012

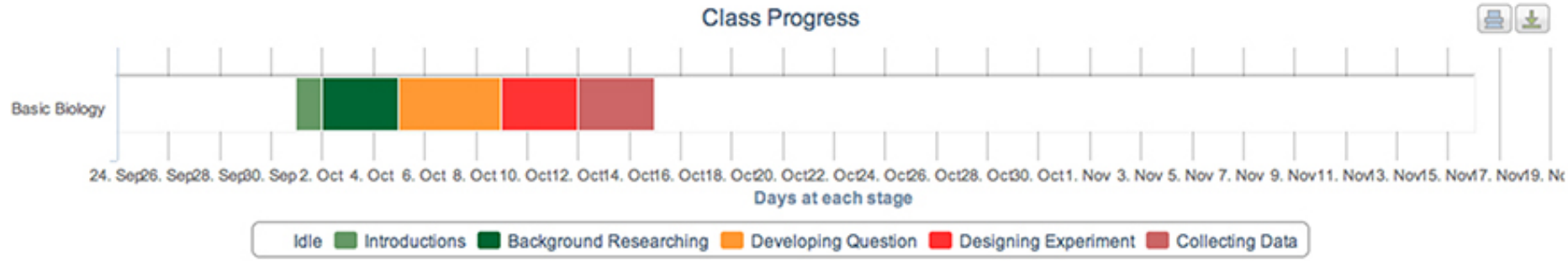
Estimated End Date
November 9th, 2012

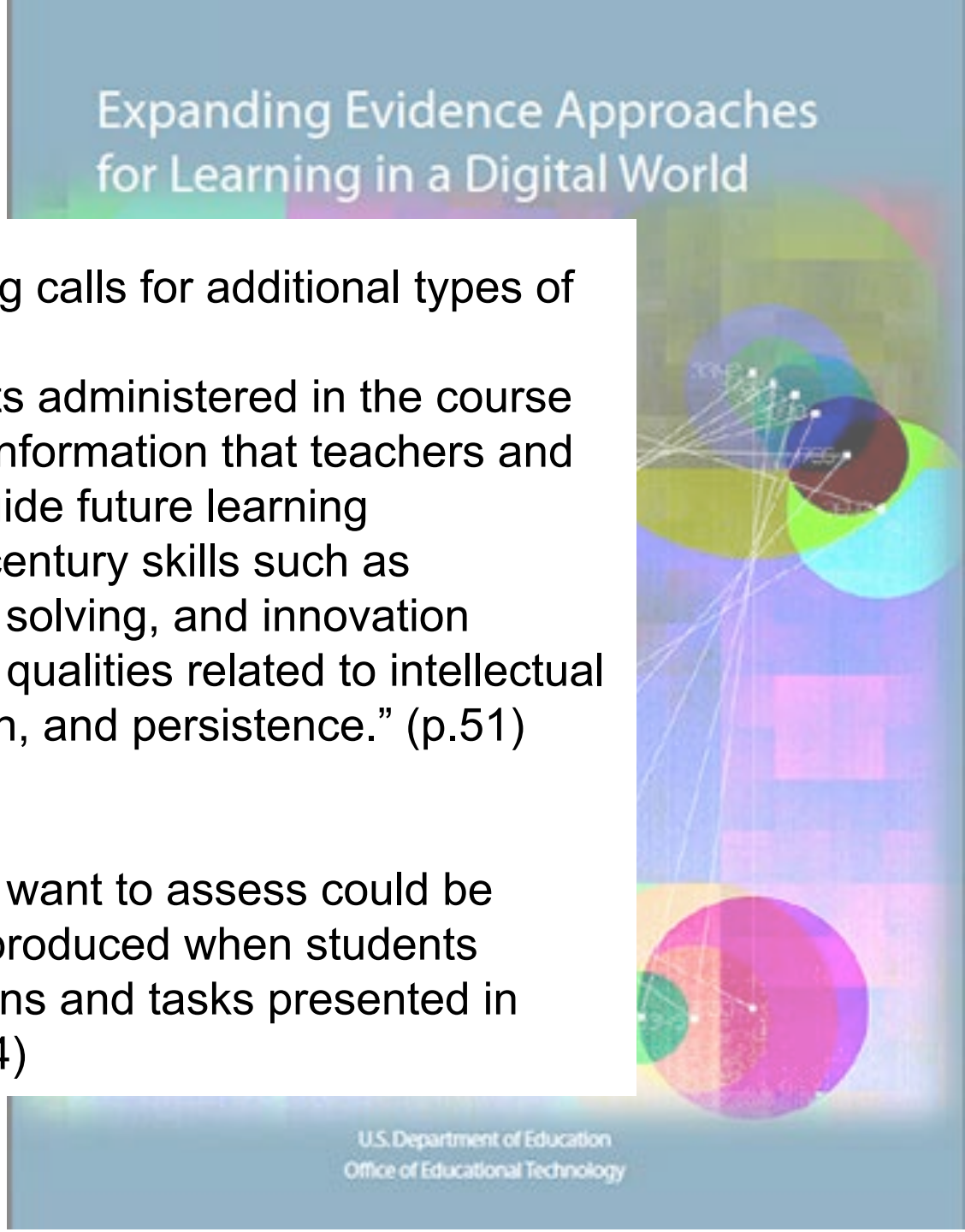
School Breaks
October 10, 2012

Student Background
This is a mixed class of abilities and interests.

Populations
- Academically Challenged
- ELL
- Academically Advanced

Grade Levels
- 9th Grade





"…supporting students' learning calls for additional types of assessment:

- Formative assessments administered in the course of learning to provide information that teachers and students can use to guide future learning
- Assessments of 21st-century skills such as collaboration, problem solving, and innovation
- Personal and affective qualities related to intellectual curiosity, self regulation, and persistence." (p.51)

"More of what educators really want to assess could be measured by mining the data produced when students interact with complex simulations and tasks presented in digital learning systems." (p. 54)

Comment on, reuse, tag community resources

home > resources > wonder of seeds inquiry guide

< previous resource | return to search resources | next reource >

Wonder of seeds inquiry guide

Abstract:
Grade Level:
Length:
Biology Big Ideas:

Download the Resource

Add to my resources

Submit Related Resources

Tag the Resource

Table of contents

Welcome: What it's all about

- What will PlantingScience Do for My Students?
- PlantingScience Principles
- Learning Across the Inquiry Cycle

Planning: Plant Investigations and Curricular Connections

- The Flow of an Investigation
- Selecting an Investigation

Talking Science and Doing Science in Community

- Teacher's Role in Mentored Inquiry Investigations
- Making Thinking Visible with Science Talk Online and in Class
- Setting Up Productive Online Interactions
- Assessing Mentored Inquiry Projects
- Teaching and Learning Resources

Evaluate the resource:

Comment on the resource:

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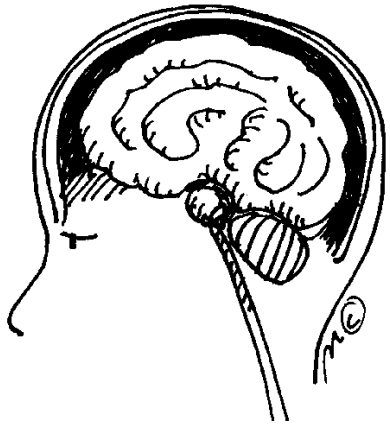
Speak Up 2011 National Report

Teachers' Wish List for Tech-Enabled Professional Learning Communities

- Tools for collaboration with teachers at my school (43%)
- Tools for collaboration with teachers at other schools (42%)
- Online courses (42%)
- Easy access to student data that I can use to inform my teaching (39%)
- Centralized repository of teaching resources (38%)

Think-pair-share



"What would you like to see as resources for personalized, anytime collaborative learning?"

For students?
For teachers?
For scientists?
For parents?
For administrators?

"What would you like to see as resources for personalized, anytime collaborative learning?"

Science practices NGSS / AP Bio

- Online poster student session
- Video introductions by mentors

Learning Analytics

- Dashboard
- Results student pre-post tests
- Student portfolio

Open Education Resources

- Webinars
- Online community of practice private space
- Tutorials