



NATIONAL ALLIANCE OF  
**CONCURRENT ENROLLMENT**  
PARTNERSHIPS

# **NACEP Webbytes**

**September 27, 2017**

*advancing quality college courses for high school students*



Dr. Betsy Desy

Professor of Biology

Southwest Minnesota State University

Marshall, MN

I am a Professor of Biology and also served as Department Chair, interim Dean, and Assessment Coordinator. I have been at SMSU for nearly 30 years, and involved in College Now since 2010.



Dr. Catrina Adams  
Education Director  
Botanical Society of America  
Saint Louis, MO

I am the Education Director for the Botanical Society of America. I run the PlantingScience program, an online mentoring program for middle school/high school/undergraduate students. I've been working with PlantingScience for almost 7 years and leading it for 3 years.



Partnering with disciplinary professional organizations to increase student learning and motivation in CE courses

The planting  science experience

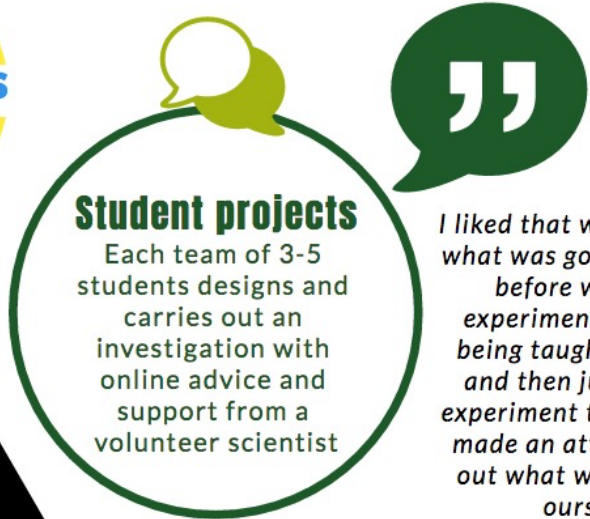
# Background

- Researchers and organizations that focus on improving science education *for all students* note the critical importance of providing students with authentic research opportunities that allow them to experience the process of science rather than being passive observers of science
  - Hands-on, authentic research promotes critical thinking, allows students the opportunity to develop new skills, increases student confidence and motivation, and increases their interest in pursuing a STEM (Science, Technology, Engineering, Math) career
- 25% of high school students shift their interest into or away from potential STEM careers
  - CE courses may play a critical role in fostering STEM interests among high school students

- Exposure to and opportunities to interact with ‘working’ scientists (other than the high school teacher and college/university liaison) in CE science courses may be limited and thus especially critical for students in rural and/or underserved areas
- One strategy to address above concern is for CE schools to partner with disciplinary professional organizations that are committed to advancing undergraduate science education
  - Disciplinary professional organizations in the sciences (eg., biology, chemistry, physics) are dedicated to supporting and improving K-16 science education through a variety of resources and services
    - PlantingScience, sponsored by the Botanical Society of America is one such example



- Is a *free* online resource to teachers and schools
- Connects volunteer scientists to small student teams for student-centered research projects
- Offers students a personal experience to work like real scientists with scientist mentors, enhancing team skills and understanding of authentic science
- In 12 years has reached over 25,000 students from 44 U.S. states and 5 countries
- Is supported by 625+ scientist mentors from 48 states and 25 countries <sup>18 scientific societies</sup>



**Student projects**

Each team of 3-5 students designs and carries out an investigation with online advice and support from a volunteer scientist

*I liked that we didn't know what was going to happen before we did the experiment. Instead of being taught something and then just doing an experiment to prove it, we made an attempt to find out what would happen ourselves.*



**IN THE CLASSROOM**

- students work together in teams to plan and carry out investigations
- students and teachers correspond with scientists online and get to know the scientists as real people
- teachers cover other content alongside investigations

projects last **2-8** weeks



**9 Plant Biology Themes**

From seed germination to genetics to agronomy...basic materials provided

STUDENT TEAMS DOING **REAL SCIENCE** COLLABORATING ONLINE WITH **SCIENTIST MENTORS** FROM AROUND THE WORLD

**Scientists are:**

- from 32+ countries
- from 18+ scientific societies
- excited to share their passion for plants and science with the next generation

**AROUND THE WORLD**



Videoconferences with scientists are an option if classrooms have a high speed internet connection

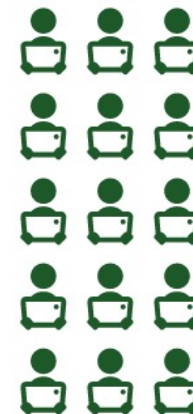


**teacher/mentor group**

Teachers communicate online with their teams' scientist mentors about what is going on in the classroom and about student projects



Selected early career scientists work closely with teachers and help keep conversations going strong





## PlantingScience Plant Investigation Themes and Associated Resources

### The Wonder of Seeds



**Germination and Seedling Growth Investigation:** Students explore scientific inquiry through germination experiments designed by the students themselves.

Grades 6-12

[More Information](#)

### Agronomy Feeds the World



*(Beta Testing in Spring 2017 for up to 5 teachers!)*  
**Where does food come from?** This module is designed to encourage students to think about food production around the world.

Grades 6-12

[More Information](#)

### Celery Challenge



**Osmosis, Diffusion, and Transpiration Investigation:** Students are challenged to cause and then explain the most extreme bending in celery petioles (stalks).

Grades 6-12

[More Information](#)

### Corn Competition



**Grow the Largest Corn Plants:** This module helps students build skills in experimental design and empirically-based justification.

Grades 6-12

[More Information](#)

### Where Does Pollen Come From?



**Pollen and Pollination Investigation:** Explore pollen and pollination through one or more projects in this module.

Grades 6-12

[More Information](#)

### The Power of Sunlight



**Photosynthesis and Respiration Investigation:** Students learn critical concepts of photosynthesis through leaf disc assays.

Grades 9-12

[More Information](#)

### C-Fern in the Open



**Sexual Reproduction, Alternation of Generations Investigation:** This module is designed to expose students to the plant life cycle and the alternation of generations.

Grades 9-12

[More Information](#)

### Foundation of Genetics



**Traits, Variation, and Environment in Rapid Cycling Brassica:** Students explore studies in genetics by growing a selected strain of *Brassica rapa* from seed to seed and examining plant traits during the life cycle.

Grades 9-12

[More Information](#)

### Genetics in Inbred Arabidopsis



**Investigation with a Model Species to Track Transmission of Traits:** Students learn about genotypic variation in *Arabidopsis thaliana*.

Grades 9-12

[More Information](#)



STUDENT TEAMS DOING  
**REAL SCIENCE**  
COLLABORATING ONLINE WITH  
**SCIENTIST MENTORS**  
FROM AROUND THE WORLD

Tweets by  
[@PlantingScience](#)

 **PlantingScience**  
@PlantingScience  
Deadline is August 8th (and 12th for @CanBotanical applications)  
[twitter.com/STLMelB/status...](#)

  27 Jul

 PlantingScience  
Retweeted

 **BSA on TWTR**  
@Botanical\_  
.@SciEdSusan @ASPB  
Thanks, Susan! Deadline is 8/8/16. @PlantingScience

  21 Jul

HELP US GROW!



Your contribution at any level will go directly toward increasing capacity to

serve more teachers and students and it will help to sustain the program. Get a print copy of the book *Inquiring About Plants: A Practical Guide to Engaging Science Practices* by Uno, Sundberg and Hemingway with a donation of \$30 or more.

[DONATE NOW](#)

SEEKING MENTORS



**We are looking for 100 new mentors for our Fall 2016 Session.**

[Volunteer as a scientist mentor](#)

**ARE YOU A GRADUATE STUDENT OR POST-DOC?**

Consider joining our [Master Plant Science Team](#).

FEATURED TEAMS  
STAR TEAMS

This session is sponsored by:  
**Naomi Volain, Paragon TEC**

Each week we feature some of the best projects of the current session here. Go to the [Star Projects Page](#) to see all the excellent work by star teams in past PlantingScience sessions.



## The Wonder of Seeds



### Germination and Seedling Growth Investigation

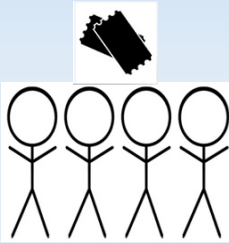
Grades 7-12

### Mrs. Rebecca Buzzell

Nottingham Elementary

Nottingham, NH

[Website](#)



**Plant Warriors**  
Nottingham Elementary  
NE\_F14\_W01



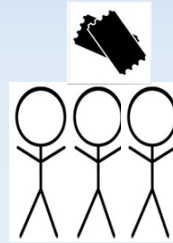
Prediction: ☑

What will happen if we put the buckwheat seeds under different wave length colors on the light spectrum such as red and violet? Will the



### Miss Rachel Hackett

Central Michigan University  
Biology  
Mt Pleasant, MI



**Cornicles of Science**  
Nottingham Elementary  
NE\_F14\_W09



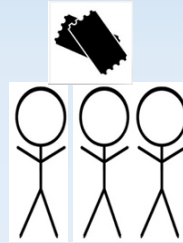
Prediction: ☑

If we place our Buck Wheat seeds at different temperatures, then will it change the amount of



### Dr. Stephen Stern

Colorado Mesa University  
Biology  
Grand Junction, CO

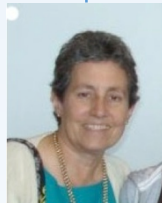


**ABC Stalkers**  
Nottingham Elementary  
NE\_F14\_W07



Prediction: ☑

Will the radishes grow faster upside down or right side up?



### Dr. Joan Hudson

Sam Houston State University  
Biological Sciences  
Huntsville, Texas



**KKS=Korny Korn Stalks**  
Nottingham Elementary  
NE\_F14\_W08



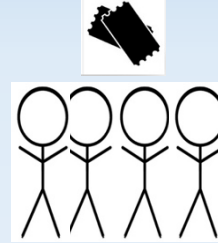
Prediction: ☑

Will Rye Grass grow faster and taller than Buckwheat under the same conditions?  
:D



### Janet Van Zoeren

University of Wisconsin-Madison  
Madison, WI



**Super Stimuli Discodancing Kernels- Sierra, Sam, Delaney, and Katy**  
Nottingham Elementary  
NE\_F14\_W02



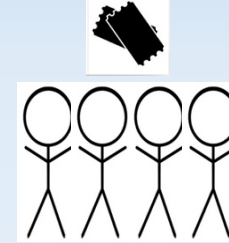
Prediction: ☑

How will the plant react if it is put through 2 variables- various obstacles and gravity?



### Chris Loebach

Illinois State University  
Normal, Illinois



**Vicious Violets**  
Nottingham Elementary  
NE\_F14\_W03



Prediction: ☑

Will plants grow taller when watered with water mixed with the inside of vitamin D3 1000 IU versus crushed up



### Alona Banai

Oak Park, IL

## The Tree Musketeers

Project reviewer

Hi Team, I'm sorry to hear your project is frustrating. Remember that this is VERY NORMAL in science. I've spent many projects planning and planning and getting everything in order, and things still go wrong! It is just a part of the game, and happens to scientist at ALL levels – so you are not alone at all! In terms of how to improve things...



PlantingScience Staff May 3 at 04:46pm

said

**Looks like you are in the final stages of your projects**

It's great to see that teams from your school are wrapping up and posting conclusions. Enjoy the final stages of your project, and feel free to post any final comments or questions you have...

[more](#)

Jennifer Robison Apr 28 at 11:45am





SMSU CE Biology faculty member and PS Director collaborated on research project, 2015-2017, that focused on determining the impact of PS on students' attitude towards science.

- Results of attitude study:
  - The majority of students had a positive experience, e.g., enjoyed mentor interaction, group work, science skills, ownership of the investigation, and 'figuring things out rather than being told about things' (i.e., inquiry-driven vs 'cookbook' lab)
    - Of the 17% of students who indicated a negative experience, most specifically mentioned difficulties with mentor communication
  - Student comments:
    - I analyze things more and think about things that could affect the outcome.
    - Science is a lot of work—it isn't as easy as one may think.
    - I learned that even if your experiment doesn't support your hypothesis, you still learn valuable information.

## High School Teacher Perspective: Top three benefits of PS for their students

- 1) Students had greater motivation/ownership of project
- 2) Students developed better team skills
- 3) Students experienced greater personal identifications with scientists and science
  - Students were exposed to possible career choices (via their mentors) that they were not aware of previously



## Additional Teacher Self-Reflections of PS experience

- Participation in PS makes the teacher's job easier once you work through the logistics
- With the science mentors, my students had better research ideas than before
- PS is a great way to bring scientists into the classroom
- PS experience helped students with answering questions on the ACT
- Students learned team-building and communication skills
- More than the inquiry part of PS, the biggest impact on students was mentoring by scientists

# Challenges of PS Project

- Computer/internet access
- Aligning PS project with timing of existing curriculum
- Evaluating students individually rather than as a group

# Conclusions

- Colleges/Universities, professional societies, and K-12 should work closely together to prepare students for post-secondary higher education. This includes preparation in
  - disciplinary content (disciplinary core concepts)
  - core competencies (e.g., lifelong skills such as communication, critical thinking, gathering, analysis, interpretation, and presentation of data)
- Collaborations among educational partners may increase high school student interest in STEM careers, increase recruitment to STEM majors, increase retention within a major, and ultimately contribute to future workforce needs



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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

are you taking part in the **evolution?**

# planting science

join us, make a difference



American Institute of Biological Sciences

LANDSCAPE ONTARIO.COM  
Green for Life!

ABRC

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L'Association botanique du Canada



MONSANTO FUND



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BOTANICAL SOCIETY OF AMERICA  
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A SCIENCE EDUCATION CURRICULUM STUDY



American Society of Plant Biologists  
Cultivating a better future through plant biology research

## Future NACEP Webinars and Events:

**September 28<sup>th</sup>:** NACADA and NACEP Joint Webinar on Advising

**October 8-11<sup>th</sup>:** Washington D.C. for National Conference, Pre and Post Conference Events

**October 24<sup>th</sup>:** NACEP Webbytes: Collaboration in Little Rock

**November 10<sup>th</sup>:** Discovery Series: University of Wisconsin-Oshkosh Webinar

**November 16<sup>th</sup>:** NACEP Workshop: Strategies for Building Quality Partnerships that Lead to Quality DE Instruction. Columbus, Ohio.

**November 29<sup>th</sup>:** NACEP Webbytes: A Journey through Institutional Change.

