



A second generation of research exploring the effect of an online student teacher scientist partnership program (STSP) on student outcomes

FAQs about the PlantingScience Digging Deeper {F2} study

What is the PlantingScience Digging Deeper {F2} study?

The PlantingScience Digging Deeper {F2} research study is funded by the National Science Foundation. The grant was awarded to the Botanical Society of America (BSA), BSCS Science Learning (BSCS), and the University of Colorado Colorado Springs (UCCS).

The PlantingScience Digging Deeper {F2} study builds on a previous grant, Digging Deeper. Digging Deeper was a successful study that investigated the effects of quality curriculum, in depth professional learning, and mentoring by professional scientists to improve student outcomes in content achievement and attitudes about scientists. The Digging Deeper {F2} study is a study to ensure that the positive outcomes of Digging Deeper can be replicated. In addition, Digging Deeper {F2} adds a new component. This study will compare an in-person professional learning experience with an online format, which could be more sustainable. The design of the study is as a randomized control trial, the most rigorous type of design for educational research.

Who is doing the research study?

This research study, as was as the previous Digging Deeper study, is a collaboration among three organizations. The **Botanical Society of America** is the professional organization of botanists and plant scientists. **BSCS Science Learning** is a nonprofit organization that is a recognized leader in science education including instructional materials, professional learning, and science education research. Researchers at the **University of Colorado Colorado Springs** bring extensive experience in designing, conducting, and analyzing educational research studies.

What are the benefits of participation?

- All teachers will receive professional learning. Teachers in the treatment groups will receive the professional learning experience either through a face-to-face format or an

asynchronous online format during the first year of the study. Teachers assigned to the control group will take part in online professional learning during the second year of the study.

- Students of teachers who participate in the study will benefit from participating in a high-quality curriculum that includes authentic independent research projects and collaboration with scientist mentors.
- All online communications between students and mentors take place over the PlantingScience online platform. Teachers supervise and monitor all communications. Communications between student teams and scientist mentors are not visible to the public or other students or mentors.
- BSA will provide some supplies for teaching the Power of Sunlight module in participating classrooms.
- Teachers who participate in the study will receive a stipend of \$2000 paid in installments if they complete the two-year study.

Who is eligible to participate in the study?

- We are looking for US high school teachers who teach biology or life science. Other related classes, including environmental science, honors biology, or AP biology are also eligible. (If you have a question about eligibility, please do not hesitate to contact us with your questions.)
- Teachers who took part in the earlier Digging Deeper research project are not eligible.
- Teachers who have previously taught the PlantingScience Power of Sunlight module are not eligible.
- We are only able to select one teacher per school for this project. (This is due to the random selection process because having teachers in different treatment groups would create too much risk of overlap between groups.)

What is the PlantingScience Power of Sunlight module?

- The PlantingScience Power of Sunlight module is an online module focusing on photosynthesis and cellular respiration. Students begin the module with guided investigations and work toward a culminating activity in which they design and conduct an independent investigation based on their own research question. Throughout the module, students communicate with their scientist mentors for help and feedback.
- We anticipate that teachers will spend the equivalent of approximately two weeks with the Power of Sunlight module. However, this will not be “full-time.” For example, on some days students will spend an entire class period on investigations and discussions. On other days, students may spend approximately 15 minutes checking in with their mentors online followed by other activities of your choice. Days of instruction do not need to be consecutive.

If I am selected to participate in the study, what are my duties and responsibilities?

If you are selected for the study, you will be assigned randomly to one of three groups. Random assignment is important for maintaining the “gold standard” of educational research study design. It will not be possible to change groups once assigned. The responsibilities are somewhat different for each group, as specified below.

- **Treatment group 1: In-person professional learning.** Teachers in this group will
 - Attend a 6-day in-person professional learning experience at BSCS Science Learning headquarters in Colorado Springs in the summer of 2023 (travel required; travel, hotel, and meal expenses covered through the grant).
 - Disseminate and collect assent and consent forms from students and parents for participation in the study.
 - Teach the Power of Sunlight module to their class during the fall 2023 semester.
 - Complete brief (approximately 5 minute) surveys to document their instruction each day while teaching the module.
 - Administer pretests and posttests to students.
 - Complete end-of-unit teacher surveys.
 - During the fall of 2024, teachers will again teach the Power of Sunlight module to their students to determine if implementation improves when teaching the unit for the second time.

- **Treatment group 2: Online professional learning.** Teachers in this group will
 - Participate in approximately 36 hours of online professional learning. This will take place over approximately 6 weeks during the summer of 2023. The professional learning will include facilitated large group sessions as well as non-facilitated small group sessions and individual time.
 - Disseminate and collect consent and assent forms from students and parents for participation in the study.
 - Teach the Power of Sunlight module to their class during the fall, 2023 semester.
 - Complete brief (approximately 5 minute) surveys to document their instruction each day while teaching the module.
 - Collect student assent and parent/guardian consent forms permitting students to participate in the research study.
 - Administer pretests and posttests to students.
 - Complete end-of-unit teacher surveys.
 - During the fall of 2024, teachers will again teach the Power of Sunlight module to their students to determine if implementation improves when teaching the unit for the second time.

- **Control group: Business-as-usual.** Teachers in this group will
 - Disseminate and collect consent and assent forms from students and parents for participation in the study.
 - Teach their usual curriculum materials on photosynthesis and cellular respiration to their class during the fall, 2023 semester. Teachers will be provided with a list of scientific concepts that they should address in their lessons.
 - Complete brief daily surveys (approximately 5 minutes) to document their instruction each day while teaching the module.
 - Collect student assent and parent/guardian consent forms permitting students to participate in the research study.
 - Administer pretests and posttests to students.
 - Complete end-of-unit teacher surveys.

- During the summer of 2024, teachers will take part in online professional learning followed by teaching the Power of Sunlight module to their classes in the fall.

Summary of Timeline for the 3 Study Groups

	summer 2023	fall 2023	summer 2024	fall 2024
treatment group 1	in-person Professional Learning	Teach PlantingScience Power of Sunlight module	no scheduled activities	Teach PlantingScience Power of Sunlight module
treatment group 2	Online Professional Learning	Teach PlantingScience Power of Sunlight module	no scheduled activities	Teach PlantingScience Power of Sunlight module
Control group	no scheduled activities	Teach your usual lessons about photosynthesis and cellular respiration	Online Professional Learning	Teach PlantingScience Power of Sunlight module

NOTE: This is designed to be a two-year study. However, we realize it can be difficult to complete this requirement due to a variety of circumstances. For this reason, we prioritize participation during the first year. If you are not sure if you would be able to complete the second year, we would still encourage you to apply and take part in the first year of the study. Payment of the honorarium is phased and linked to completion of the tasks and responsibilities of the study as described above. Participants who complete all the requirements of study year 1 will receive \$1400. Teachers who complete the second year of the study will receive an additional \$600.

Who do I contact if I have questions?

If you have questions about the research study or the application process, please contact

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