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Impacts of New York Sun Works'

Discovering Sustainability Science

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Executive Summary

New York Sun Works (NY Sun Works) has been a leader in providing year-round, hands-on science and sustainability education for K-12 grade students in urban schools. Starting in 2010, the organization invested in environmental education through hydroponic Greenhouse Classrooms and science curricula. NY Sun Works Greenhouse Classrooms offer students the opportunity to grow food, while learning about urban agriculture, plant biology, human interactions with the environment, ecology, and human impacts on the environment.

Today, 170 schools across the metropolitan area have NY Sun Works Greenhouse Classrooms. However, in spring 2020, the COVID-19 pandemic closed New York City schools, which introduced fully remote and hybrid learning models. Students and teachers could no longer depend on access to Greenhouse Classrooms as laboratories to explore urban farming, topics in plant biology, ecology, chemistry, as well as human interactions with and human impacts on the environment. In response to the changing landscape of education, NY Sun Works adapted the Discovering Sustainability Science curriculum and created a new tool, the Home Hydroponic Kits and companion lessons, as an extension of the curriculum.

The Discovering Sustainability Science curriculum was designed to promote science learning through studying plant biology and food systems in urban areas. The Home Hydroponic Kits and a new set of lessons aimed to bring the science to life as students assemble and experiment with their own miniature plant laboratory at home. Together, these tools were intended to help students learn about and be a part of solutions for environmental and social challenges. At the writing of this report, NY Sun Works distributed over 12,500 kits to students across 79 schools.

What are the real-life outcomes of this investment in Discovering Sustainability Science and the Home Hydroponic Kits? In 2021, NY Sun Works partnered with Knology to study how teachers and students use these materials. The evaluation explored the impacts of these resources, with a particular focus on the types of science learning students take part in. We also examined the special role these tools have for supporting students during a time of isolation brought on by the pandemic.

Impacts

The case study of the NY Sun Works program revealed education tools that empower teachers and strengthens their ability to guide science learning. At their core, the Discovering Sustainability Science curriculum and the Home Hydroponic Kits embody **innovation, flexibility, hands-on learning, and critical thinking** that meet the challenges of an uncertain education landscape created by the COVID-19 pandemic. The kits retained the core characteristics of the Greenhouse Classrooms, offering students interactive learning tasks and the opportunity to experiment with plant biology.

A student presents plants grown in their Home Hydroponic Kit.

The Home Hydroponic Kits situated **teachers as learners** first and foremost, especially educators who were new to NY Sun Works. Educators valued the process of growing a range of skills and knowledge, from understanding seemingly abstract science concepts like germination to gaining pedagogical strategies for engaging students in science learning. Teachers were able to adapt and tailor the curriculum to address the diverse needs of their students. They applauded the hands-on nature of the curriculum as especially beneficial for students whose needs are unmet by conventional classroom science curriculum.

As **key informants** of student impacts, teachers provided a rich picture of the myriad ways students had benefited from the Discovering Sustainability Science curriculum and the kits. Using the National Research Council's 2009 framework as a guide, we found that students of different ages learned and applied science concepts like experimental research design, problem solved by adjusting variables to help their plants grow, and connected their science learning to the natural systems surrounding them. Moreover, students were eager to engage with the kits, expressing curiosity about science as they worked on their projects.

The impacts stretched beyond science learning. The curriculum and particularly the kits provided students with much-needed vehicle for **social-emotional support** as virtual schooling became the norm. This development was critical especially during the stressful context of the pandemic. The kits provided students with hands-on projects that helped them focus during virtual learning. The process of growing plants offered a hopeful, enjoyable experience that stood in contrast to the public health challenges that fluctuated throughout the school year. In caring for their plants, students were also growing their sense of responsibility and efficacy, meaning they gained a sense that they could achieve their goals. Throughout the process, they supported their peers even when their own experiments didn't work, and collaborated on presenting their projects to their classmates. Students even involved their family members in their projects, demonstrating the resources' value for promoting family bonding and inter-generational learning.

This impacts study of the Discovery Sustainability Science Curriculum points to **the possibilities of the E→STEM movement** which advocates for environmental education to be integrated into learning science, technology, engineering, and math (STEM). In practice, E→STEM is an approach that uses learning about the Environment as a pathway to STEM

learning (Flinner et al., 2020; Gupta et al., 2018). E→STEM taps into several educational best practices: project-based environmental learning that is hands-on, connects STEM with daily experiences, aligns learning experiences with students' existing interests, and fosters achievement and empowerment by equipping students to pursue their own inquiry (Fraser et al., 2013). These characteristics are central to NY Sun Works' overarching approach and are explicit in the Discovering Sustainability Science curriculum and Home Hydroponic Kits. NY Sun Works has been recognized in the past for these achievements through the UL Innovative Education Award and the EPA Environmental Champion Award. This study suggests that the program continues to serve as an inspiration for E→STEM learning.

The NY Sun Works team was the **engine for innovation and creativity** in envisioning a resource that could cultivate students and educators during the pandemic. The team worked quickly in spring 2020 to incorporate flexibility and extra scaffolding into their materials. The Home Hydroponic Kits were a key innovation in this approach. The result was a more adaptive and usable learning tool that schools used across a wide variety of communities and different education models, including fully remote, in-person, and a hybrid of the two.

Table of Contents

Introduction

NY Sun Works began to introduce science curricula in 2012 to support learning in Greenhouse Classrooms installed in schools across New York City. In 2020, NY Sun Works reimagined how the curriculum could facilitate science, technology, engineering, and math (STEM) learning while serving the diverse needs of educators and students who suddenly transitioned to remote learning models due to the COVID-19 pandemic. The Discovering Sustainability Science curriculum aims to inspire students to steward the earth and engineer solutions with positive environmental and social impacts. The curriculum also emphasizes students' awareness and enthusiasm for the role plants play in our daily lives and develop a greater affinity for healthy, nutritional habits. In addition to the curriculum, NY Sun Works introduced the Home Hydroponic Kits. Each kit contains materials from the Greenhouse Classroom that allow students to grow and care for multiple seedlings at home without soil, including five seed varieties, plant nutrients, clay pebbles, containers for the plants, and supplies for testing and caring for the plants. The kits also offer students the opportunity to transplant the seedlings into a passive hydroponic system that they construct with recycled materials from their own homes.

In 2021, NY Sun Works partnered with Knology to assess the impacts of the Discovering Sustainability Science curriculum and the Home Hydroponic Kits. Knology is a nonprofit research organization that produces practical social science for a better world. This report presents that findings of the evaluation, focusing on the ways teachers and students used the curriculum and kits, as well as the impacts of their experiences.

Approach

Knology designed the evaluation as an *intrinsic, explanatory case study*. This means that the assessment could describe the ways teachers and students used the curriculum and kits, as well as connect those practices to outcomes. To do this, we used a combination of methods that included focus groups and interviews, as well as surveys conducted by NY Sun Works. We focused the analysis on comparing the experiences of "returning" teachers (those who had previously used NY Sun Works' materials in their Greenhouse Classrooms) with teachers who were "new" to NY Sun Works (those who had not used Greenhouse Classrooms).

Knology conducted focus groups and interviews with 19 teachers (13 new teachers and 6 returning teachers). In parallel, NY Sun Works conducted an email-based survey of 28 teachers, which Knology included in the analysis. Participating teachers represented a mix of grade levels – including elementary, middle, and high school – and both returning teachers and those who were new to NY Sun Works. Finally, the research team interviewed two NY Sun Works staff about the process of developing and facilitating the Discovering Sustainability Science curriculum and Home Hydroponic Kits. A full description of Knology's methods and evaluation approach, as well as the instruments, can be found in the Appendix.

Impacts

We studied the ways that teachers and students used the Discovering Sustainability Science curriculum and Home Hydroponic Kits, as well as the outcomes for both educators and students. This chapter examines impacts on science learning and explores the ways that these resources supported social and emotional well-being for students.

The Kits & Curriculum in Action

The Home Hydroponic Kits

The Home Hydroponic Kits' lessons explored a range of science and food sustainability topics, including hydroponic versus traditional farming, types of hydroponics systems, plant biology, observation and data collection, and scientific experimentation. Most of the participating teachers had distributed the kits to students for use at home. They set aside time one or two days each week for the class to remotely check in on progress with kits and work through lessons in the curriculum.

The Home Hydroponic Kits required students to find warm, sunny, and undisturbed places for their plants, as well as add water and nutrients on a regular basis. Students also needed to properly assemble their hydroponic bottle systems. Teachers working on a full remote schedule reported difficulty with ensuring students set up their kits' bottle systems correctly. New teachers working with a range of age groups, even high school students, described these issues, as did returning teachers with elementary-school classes. We did not speak to enough returning teachers with older students to know whether this was a challenge prevalent in this group. All teachers, whether new or returning, observed that students whose families were engaged with the hydroponics project had more success in setting up their bottle systems and keeping their plants alive.

The NY Sun Works team assembled over 12,500 Home Hydroponic Kits.

In spite of some challenges, teachers also observed a learning opportunity with having kits at home. This arrangement enabled students – often with support from family members – to independently experiment with the conditions their plants were exposed to. They moved the kit to different locations within their homes, varied the amount of water they added, and attempted other variations to understand the effects on the plants. Another advantage to the Home Hydroponic Kits was their ability to encourage students' sense of ownership and responsibility over their plants. Returning teachers commented that this dynamic was difficult to come by in the Greenhouse Classrooms.

Returning teachers remarked on a difference in the type and number of plants that could be grown in the Greenhouse Classrooms versus in the Home Hydroponic Kits. In Greenhouse Classrooms, it was possible to grow enough vegetables and herbs for the students to prepare and eat a meal together at the end of the semester, and in some cases bring extras home with them. These included lettuces, tomatoes, cucumbers, cilantro, basil, and more. At home, students' plants grew at different rates, and needed to be transplanted into soil once they outgrew the bottle used for the kit. Teachers found that many students did not have space to transplant, and some did not reach this step before the end of the semester. Some may have succeeded in growing edible vegetables after the school year ended, but teachers were unable to celebrate these successes with students.

While the kits were designed for remote learning, several teachers were able to continue in-person classes and used the kits in the classroom as well. This allowed the teacher to step in when students needed help, and to ensure that the plants were watered consistently. Whether they used the kits in remote, in-person, or hybrid models, teachers who participated in a survey conducted by NY Sun Works said they were highly likely to recommend the home kits to a friend or colleague, and had interest in using them in the upcoming school year.

The Discovering Sustainability Science Curriculum

While teachers did not often draw distinctions between the curriculum and the kits, they were quick to say they had found all the Discovering Sustainability Science curriculum topics helpful in both the focus groups and surveys. Some topics that were mentioned frequently were parts of plants and what plants need to grow. Teachers new to NY Sun Works found that one of the most useful lessons discussed how hydroponics can be used to grow food in the city and without soil, which their students were surprised to learn. Teachers also pointed out the usefulness of topics that overlapped with those in the Amplify Science curriculum, a K-8 science curriculum that encourages students to think, read, write, and argue like scientists and engineers by combining hands-on investigations, literacy activities, and interactive digital tools. These topics included light for first grade, water for second grade, and ecosystems and photosynthesis for older students. Two new teachers said that their students had been less engaged with the lesson on types of hydroponic systems. They speculated that the information seemed less relevant to students since they did not have greenhouses in their school.

Overall, returning teachers were very pleased with the new lessons. They remarked that the original curriculum had worksheets which were challenging for students who struggled with

reading and writing. They related that, in the past, they had tried to find alternative, hands-on tasks for these students in the Greenhouse Classrooms. They were happy that the kits offered activities that were less language-focused, such as drawing a picture and labeling it. One teacher suggested also incorporating the new lessons into the NY Sun Works introductory unit, Farming Foundations, which they had previously found limited in content.

Adaptations to the Curriculum & Kits

Teachers found the lesson PowerPoints very useful for remote and hybrid learning. In the focus groups, most teachers, who were also new to NY Sun Works, reported that they had to split a lesson's content across two class periods or create a "condensed" version of the lesson which could be completed more quickly. In contrast, most teachers who participated in the survey – who were also more likely to have used NY Sun Works in the past – reported that the lessons are an appropriate length for their class periods. Most returning teachers also said they had used more NY Sun Works lessons this year than in previous years, although many also reported they did not complete the full 10 lessons provided with the kits.

Teachers also added to the slides to meet their students' specific needs, such as additional images and video for students designated as "English Learners." They also adapted slides to make them more interactive using Pear Deck, and to link the curriculum with other topics. For instance, one teacher asked students to collect data on the rate their plants were growing to connect with the math curriculum. One teacher used the kits and curriculum but had students plant seeds in soil rather than water.

Overall, it seems that prior experience with NY Sun Works may have made it easier to move through the curriculum, especially if students were already familiar with some hydroponics concepts from working in a Greenhouse Classroom. The grade level of students may have contributed to ease of use as well, as more elementary school teachers reported needing to break up the lessons across class periods.

Student Impacts

"Every time we did a lesson, they wanted more."

We studied the NY Sun Works' impact on students through the lens of their teachers. Teachers' perspectives are valuable since they can be considered to be "key informants" who are highly knowledgeable about the activities, habits, and achievements of their students (Payne & Payne, 2004). We relied on the focus groups to understand the majority of these impacts, and the survey results confirmed these findings as well.

Teachers unanimously described their students as excited about the Home Hydroponics Kits and eager to use them. One teacher captured students' overall response with their comment, "every time we did a lesson they wanted more." Students looked forward to

A student shows off plants' growth in their Home Hydroponic Kit.

bringing their kits home and doing hydroponics lessons. They were enthusiastic about the growth of both their own plants and those of their classmates. Several teachers said they had expected kids to be jealous of others whose plants grew faster, but this did not become a problem.

As described above, returning teachers noted that having individual plants for students increased their sense of ownership and responsibility for their plant. In a classroom hydroponics lab, opportunities for tasks like adding nutrients and adjusting the pH level of the system were limited since once one class had performed these tasks, later classes did not need to do so. With the individual kits, each student took care of all their plants' needs. In describing students' impacts, teachers reiterated the role of hands-on learning in engaging young people in science in various ways. Teachers described in detail how the kits had helped their students build both science skills and social connections during the pandemic. The two sections below tell the story of these impacts.

Science Skills

In the survey, teachers reported that the curriculum effectively helped students learn science concepts. The focus groups gave us a deep understanding of several aspects of science learning at play in both the curriculum and the kits. Trying to keep their plants healthy sparked students' creativity and **problem-solving** skills. The kits challenged students to find solutions to unfamiliar problems, according to teachers. Students figured out how to keep their bottle in the right position, experimented with amounts of water and nutrients,

and some found a new home for their plant as it outgrew the bottle from the kit. Students were curious about and engaged with the topics covered in the curriculum, both asking questions in class and expressing interest in experimenting further. They also talked about continuing to grow more vegetables at home after the school year ended.

Solving problems with their plants, in many cases, required students to use **critical thinking**. The curriculum provided some experimentation-based lessons, and teachers at the middle- and high-school levels saw the kits as an opportunity for students to design and conduct original experiments, according to the survey results. Across all ages, students needed to understand multiple factors necessary for plants to grow, as well as potential risks for plants. Teachers reflected on helping students check these variables one by one to identify the source of problems. In this process, students explored how changing one factor – for example, adding more water or moving the plant to a new location – would affect a plant's growth. Many teachers encouraged students whose plants died to try again with another seed. Students used this opportunity to think about what might need to be done differently with a new attempt, and which factors might remain outside their control, such as the temperature of the room and the hours of sunlight in the day.

The curriculum and kits encouraged students to engage in **systems thinking**. In particular, this thinking was evident in their discussion and learning about the relationships among variables in their hydroponic setups, which included aspects of the environment that they could control, such as temperature and exposure to light, their own practices of watering and nourishing the plants, and factors they could not control, such as the length of daylight hours. The curriculum helped students draw connections between their work with the kits and the larger agricultural system in the region and beyond. Teachers reported they were also able to link the lessons to ecology, nutrition, and sustainability.

Students became more **curious about science** in general and interested in pursuing science-related activities in the future. According to the survey, teachers felt that the curriculum was very effective or effective in enhancing students' interest in science. In a focus group, one elementary school teacher said that "My [students], any time they get to see things change and grow, it sparks curiosity." Another educator spoke about students expressing "how much they love science, they want to be a scientist." According to teachers, older students developed an experimental mindset. In one class, comparing vegetables in the grocery store to those which could be grown at home became "an ongoing experiment with the students." One teacher described how the kits led students to look at their surroundings with more curiosity. They remarked, the kits "had them looking at the world around them and what they could do even at home with such a small amount of supplies and in such a small, kind of simplified system."

The kits "had them looking at the world around them and what they could do even at home with such a small amount of supplies and in such a small, kind of simplified system."

Teachers reflected on their students' **relationship with nature**, especially in urban surroundings where many students lack easy access to green spaces. During the pandemic, these experiences were further limited due to public health guidelines about being outdoors. In both the survey and the focus groups, teachers called attention to the ways that the kits address young people's need to connect with nature. Survey results showed that nearly all teachers thought the curriculum effectively supported awareness and appreciation of the environment. With the curriculum exploring the challenges of feeding urban populations with limited space to grow food, teachers reported in the focus groups that many students became interested in hydroponics and wanted to continue to grow their own vegetables.

Social-Emotional Outcomes

For students learning remotely during the pandemic, teachers observed that having a plant to nurture gave them something positive to focus on. One teacher summarized this dynamic: "the kits were like a pet that they didn't know they needed or wanted." The hands-on nature of working hands-on with hydroponics was also especially valuable to these students, as most other online classes were completely computer-based. For students whose schools had previously used the Discovering Sustainability Science curriculum, having the kits to use at home provided a sense of continuity. As one teacher put it, "it felt normal for them to have the greenhouse back in their lives."

Teachers reported that many students' families were excited about using the kits and helped care for plants. Both the focus groups and survey results showed that the kits gave families an activity to participate in together during quarantine, and a shared learning experience as many parents and caregivers were also unfamiliar with hydroponics. They also noted that not every student's family members were able to assist with the kits.

A NY Sun Works Greenhouse Classroom.

The curriculum also gave students opportunities to engage with each other when sharing the progress of their plants. According to teachers, both in person and remote students were interested in how others' plants had been growing and were enthusiastic about discussing their own. For remote students, these interactions took different forms: some teachers created an online space for students to share photos of their plants and comment on others' posts via Google Classroom or Padlet, while others set aside time for "show and tell" during video calls. Teachers in the latter group said that even students who normally kept their cameras turned off would use video to show their plants.

Helping Students with Special Needs

Teachers felt that the curriculum is a valuable resource for students with special needs. They called out several characteristics that are particularly useful for this group: the step-by-step instructions, the use of visuals and video throughout lessons, and the hands-on nature of the activities. They applauded the fact that success with the kits depended less on reading and writing than most classroom activities. As one teacher explained, "I think this was an area for them where they were able to excel, because they didn't have to read, they could just do."

Building Teacher Capacity

While teachers described in detail the impacts of the NY Sun Works resources for students, they reflected to a lesser extent on how their own professional growth and development. When they were able to comment on their own progress, they emphasized how their learning helped students.

Facilitating Learning

Both new and returning teachers felt they were successful in guiding science learning with the curriculum and the kits. New teachers in particular appreciated that the curriculum was well-organized and easy to use even without prior knowledge of hydroponics. In a similarly positive vein, returning teachers compared the new curriculum to previous versions of the classroom-based curriculum. Having all the materials included with the home kits contributed to ease of use as well. One teacher said, "I feel like it was the one thing all year where I felt like I have everything I need. I felt very prepared."

> ***"The kids learned, like I did, that it's not always perfect but we're going to make it work."***

Teachers also made it clear that the hands-on nature of working with hydroponics was highly engaging for students, which strengthened their ability to guide students in learning. Several science teachers noted that it was more relevant to kids than their normal curriculum and that this contributed to student learning. One asserted, "I've taught science for a couple years, and when there's no real-life example, they lose interest. I feel like they were invested because they were *doing* something." According to teachers, keeping students engaged throughout

the pandemic, especially in a virtual classroom, was challenging, and the kits helped to involve students in the scientific process.

The visual and tactile elements of Discovering Sustainability Science curriculum and the Home Hydroponic Kits also helped teachers introduce students to abstract concepts, such as pollination and life cycles. They felt this was especially important for students who might otherwise have struggled with these topics. One teacher noted, "Both the home kit and the curriculum itself, for special ed and ELL students, they are visual learners. Telling them that germination is a term that means a seed began to sprout does not mean anything to them until they see it." The slides and videos featured in the curriculum helped educators explain complex concepts. In parallel, growing plants gave students a real-world, hands-on example which teachers felt "cemented" the concepts in their minds.

Lessons for Teachers

Leading students through the curriculum helped teachers not only to guide learning, but also develop their own skills and practice. New teachers, who had been largely unfamiliar with hydroponics before starting to work with the Home Hydroponic Kits, learned the basics from the NY Sun Works materials and felt confident with the process. Both new and returning teachers described the experience of being asked a question they didn't know the answer to and searching for information online with their students. Teachers perceived this degree of comfort with not having all the answers as a skill they had gained through their experience. Searching in-class for answers to these questions was an opportunity to model research skills for students, although teachers did not explicitly point to this as a skill they had gained as a result of working with NY Sun Works' resources.

Another student displays the products of their work with the Home Hydroponic Kit.

Most teachers shared in the hands-on learning experience by growing their own plants – in a garden or hydroponically – which sparked their own enthusiasm for planting and gardening. Their interest and enthusiasm was clear to Knology during focus groups, and potentially evident to their students during the coursework as well. Additionally, participating alongside students made it easier to understand the challenges of the process and how to overcome them. One teacher remarked, "The kids learned, like I did, that it's not always perfect but we're going to make it work."

Looking Forward

Teachers expressed great value in the Home Hydroponic Kits even as schools resume in-person classroom-based learning. Teachers who used the kits in classes and in virtual learning anticipated that they can be a source for continued learning beyond the classroom and in their home environments. We recommend that the NY Sun Works team **explore ways to integrate the kits into the regular Greenhouse Classroom experience** to supplement in-person learning. We see this as an opportunity to continue to foster their growth as informal learners, beyond the structured formal classroom setting. We anticipate this approach will also help students involve family members in their learning.

The curriculum and kits enabled meaningful engagement and learning across a broad group of students, as teachers modified and adapted them for their specific students' needs. We recommend that NY Sun Works **document the various modifications** to understand how specific adaptations addressed diverse contexts and needs. We anticipate this will be especially helpful for new teachers joining the NY Sun Works network, to build on previous teachers' effort and minimize teacher burden.

Finally, we support **ongoing professional development for teachers**, both those new and returning to NY Sun Works, to scaffold their skill-building during the upcoming school year. As the current public health situation continues to present an uncertain future for in-person learning, teachers will benefit from additional support from the NY Sun Works team to structure and design their classes to fit an in-person, remote, or hybrid approach. We also see this as an opportunity to recognize teachers who worked with the kits in 2020 in ways the enable them to share their experiences and lead by example.

Recommendations from Focus Group Participants

While teachers were highly satisfied with the Home Hydroponic Kits, they also identified potential improvements for future iterations of the kits and corresponding lessons. Many classes had difficulty distinguishing the types of seeds based on the drawings provided, particularly the basil and kale seeds, and teachers commented that photos would be clearer. Similarly, a video demonstrating how to set up the bottle system would clear up confusion about this part of the process. A few teachers also mentioned students not noticing the labels to indicate which seeds were planted where, and suggested color-coding them to clarify.

Teachers observed that the PowerPoint slides provided were text-heavy, were too long to fit class periods, and some felt that the questions from the lessons were "teacher-centered." They suggested incorporating more interactive and visual content, especially for students who are designated as English Language Learners or struggle with reading. Reducing the amount of text – or splitting PowerPoints into smaller lessons – would also make it easier for teachers to fit a lesson into a single class period.

Multiple teachers hoped for a guide or professional development session to give a brief overview of each lesson's topics and activities. This approach would allow teachers to make

sure they have additional materials (such as additional containers for an experiment in one of the optional lessons) and could highlight potential connections to other science curriculum and to students' lives outside school.

Balancing the Use of Home Hydroponic Kits & Greenhouse Classrooms

Teachers were interested in the potential for combining the Home Hydroponic Kits with the classroom-based curriculum. They imagined that the lesson topics and materials, except those that focus on the setup of the home kit, could be used as part of the classroom curriculum.

Teachers who had access to a Greenhouse Classroom were interested in having their students take kits home as a supplement to apply what they were learning in class, and some suggested that plants could be transplanted into the larger hydroponics system within the classroom once they outgrew the bottles. Those teaching older grades saw the potential to assign the kits as a project in which students could design an experiment with their plant at home and report on their findings. The success of in-person teachers who kept the kits in their classrooms also suggests that this would be a viable option for schools without a Greenhouse Classroom. The teachers who took this approach had small class sizes, but several new teachers proposed the idea of kits several students could work on collaboratively, reducing the number which would need to be kept in the classroom.

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