



Outreach Playbook

Fourth Grade Days

Metrics:

Grade Level: 4th-grade	# of Student Participants: 1158	Duration (hrs): 28 hours (each visit was an hour-long but we did visits for 7 hours over the span of four days)	# of SWE Volunteers: 48	Partner orgs (if any): N/A
---------------------------	------------------------------------	---	----------------------------	-------------------------------

Overview of Activity

Each year for National Engineers week, California Polytechnic State University, San Luis Obispo's SWE section (CPSWE) visits classrooms in our surrounding regions from February 22nd – 25th. This year, from 8:00 AM to 2:00 PM every day, CPSWE volunteers visited 41 classrooms throughout San Luis Obispo County and beyond to complete an Aerospace Engineering activity with over 1,000 students total. This year's activity involved creating a paper rocket that was powered by a straw to teach them about concepts such as aerodynamics and gravity and to expose them to the types of projects they could work on in the aeronautical or astronautical fields of engineering. Students were walked through the engineering design process, with the first activity of each visit starting with a brainstorming period where we asked them to consider what sizes and lengths would make their rocket fly the farthest. Then, students constructed their rockets before going outside to test them. Here, students could see what they could improve upon in their design and what went well. If there was any extra time, students were able to rebuild their rockets and reflect on what they learned and what their favorite part was. They were encouraged to continue the iterative rebuild phase of the design process at home with their friends and families. The main takeaways for these students were what the engineering design cycle was, what types of projects aerospace engineers work on, and that anyone can be an engineer. We specifically traveled to schools outside of SLO county, including areas like Santa Maria in order to reach underrepresented students, specifically the children of migrant workers in the area, as they have limited access to STEM exposure.

Outline and Script

Introduction:

Person 1: Hello everyone, my name is <insert name here> and I am a <insert major here> major.

Person 2: I am <insert name here> and I am a <insert major here> major.

Person 1: We both attend California Polytechnic State University, also known as Cal Poly, which is about <distance away> minutes away from your school!

About 4th Grade Days:

Person 2: Do you know what week it is?
(Wait for class responses)*switch slides*



Person 2: if (response is its Engineers Week) then (Yes, you are correct. It is national engineers week.)

Otherwise (Well actually it is National Engineers Week.)

Person 1: National Engineers Week is all about exposing students to engineering and technology. *switch slides*

Person 2: We are here on behalf of the Society of Women Engineers at Cal Poly to teach you the principles of engineering through a fun hands-on activity and to let YOU all know you can be engineers! The Society of Women Engineers (or SWE for short) is a national society geared toward fostering diversity and encouraging underrepresented groups in engineering! Does anyone know what diversity means?

Person 1: (Let them answer) Yes! Essentially diversity means differences. People may be different in many ways, including race or ethnicity, age, disabilities, language, culture, appearance, or religion. All these differences make us who we are, and it is super important to engineering so we have really well-rounded solutions!

switch slides

Person 2: Now let's go over the engineering design process! Can anyone read to me the first step?

Person 1: Can anyone explain what that means, or give an example?

(repeat for each of the five steps) *switch slides*

Key Terms:

Person 1: Today we will be doing an activity relating to aerospace engineering! Does anyone know what aerospace engineering is or what they do?

Switch slides

Person 2: aerospace engineering is a branch of engineering that focuses on air and space flight! Aerospace engineers design things like airplanes, satellites, and rockets! **Person 1:** The second term that we want you to think about today is **aerodynamic**. This is the way air moves around objects! This activity requires you to build your very own catapult and then test it against other groups' designs to see who can launch the furthest and hit the center of a target

Person 2: Our last term is gravity. Who can explain what gravity is? (wait for response). Those are all great answers! Gravity is a force that attracts things to the earth! *Switch slides*

Person 1: Now today we are going to build rockets! Normal rockets are powered by rocket fuel, but today your rockets will be powered by your own breath!

Person 2: Your challenge is to design a paper rocket that will fly the highest! *Switch slides*

Person 2: Your materials for today will be a straw to power your rocket, paper, a pencil to roll part of your paper into the base of the rocket, and scissors and tape!

Switch slides

Person 1: Now let's get to brainstorming! Think of how big you want the nose of your rocket to be, how long you want your rocket to be, and how many fins you want it to have in order for it to fly the highest!

(pass out materials while they brainstorm, and ask them what they are thinking. You can explain that a more narrow nose will make it more aerodynamic)

Activity (Refer to instructions)

Link to instructions

(Bring them outside to test their rockets and count them down for launch.)

(if there is time redesign and ask them what they think did well and what could improve)

(if there is still extra time ask what their favorite part is, what they would do differently, and what they learned. Also, open the floor to any questions they may have about college or engineering!)



Closing Statement

Person 1: Great job today everybody, you are all aerospace engineers now!!! We hope that you not only had fun but that you learned something as well. Even if your rocket didn't work the way you wanted it to, remember that the most important thing engineers do is fail and learn from their mistakes!

Person 2: Thank you for letting us do this activity with you all and I hope you have a great day!

Lessons Learned

1. **Start Planning Early:** This event usually takes us 3 months to plan, but the time it takes to coordinate the event will be dependent on how many schools you are reaching out to! We have been doing this event for many years and have been able to grow to 41 classrooms this year, but if this is your first time trying to host this event I would suggest starting at one school, and doing one or two classrooms at that school!
2. **Create a subcommittee!** We usually have a **volunteer coordinator** who will make volunteer sign-ups for all times our volunteers are available from February 22nd to February 25th, and if they speak another language. This coordinator will also assign volunteers to the classroom slots and ensure each classroom has at least one volunteer and if it's not within walking distance that there is someone to drive to the event. Additionally, the volunteer coordinator will ensure that if there are multiple volunteers that one is experienced and one is inexperienced to help train our volunteer pool. Finally, they send out the finalized volunteer schedule and ensure that the groups have each other's contact information for rides. We also have a **classroom coordinator** that will ensure all the classrooms have signed any release forms needed, and create a signup sheet for teachers (usually via signup genius in combination with google forms). They then invite all the schools in our surrounding counties via email with the link to the sign-ups, and once sign-ups close they create a class visit schedule based on the teachers' availability. We usually have one or two **lab activity coordinators** that brainstorm what major we should cover, and activities we can do relating to the major. They come up with a supply list and decide what we need to order. They also test the labs to ensure the instructions are clear and compile the materials needed for each visit in gift bags for the volunteers to pick up. We also have a **publicity coordinator** that creates a challenging video to excite students about the visit, and they create a pretty presentation that goes with the theme and will walk the students through the event.
3. **Volunteers:** two of our biggest lessons learned from past events are relating to volunteers. Make sure that you are assigning your volunteers to shifts instead of having them sign themselves up. If you know everyone's schedule and can account for travel time to the schools, you can ensure all the classroom slots are covered! However, when volunteers sign themselves up, they usually only sign up for one event and it might be a last-minute scramble to cover all the classrooms. The only thing to be wary of when doing this is to ensure everyone has 4 or fewer classroom visits, so you do not overwhelm your volunteers!

Accessibility Adaptations

This activity was very inexpensive for us to put on as the only materials we needed for this event were construction paper, scissors, tapes, and straws, all of which we already had in our inventory. The only cost we spent was \$100 and that was for reimbursing our volunteers for the gas they used to drive to these schools. If a SWE section did not have an existing stockpile of these supplies, the section could reach out to the classrooms they were planning on visiting and see if they have any scratch paper from old homework, and if not SWE volunteers could bring



their own scratch paper for the students to use! Lack of internet access is not a problem with this hands-on activity as we drive to them with the materials they need, and all our volunteers know how the activity works so we can explain it to them without needing any internet access. Some of our classrooms this year chose a virtual option, and in these cases, we left gift bags containing the event materials for the teachers in their school's office (though in past virtual years we have also reimbursed teachers for any purchased materials). Since a good portion of the schools we go to have a huge Hispanic population, we usually try to bring SWE volunteers that are studying or fluent in Spanish, in order to make the non-English speaking students feel more comfortable. However, if a SWE section did not have Spanish-speaking volunteers, I would highly recommend reaching out to SHPE or other societies that may be in their area to get better representation at the event.

Materials and Costs

Again, we did not have to purchase these supplies for this year so I do not have a total cost, but I have put links and how much the cost for the given size! The materials needed will be completely dependent on how many schools are being reached.

Item	Quantity	Where to Buy	Total Cost
Construction paper	1 per student	Staples, Target, or Amazon	\$44 for 600 sheets
Pencils	1 per student	Staples, Target, or Amazon	\$41 for 576 pencils
Scissors	1 per 3 students	Staples, Target, or Amazon	\$20 for 48 scissors
Tape (masking or scotch will work)	10 pack	Staples, Target, or Amazon	\$20 for 10 pack of masking tape
Soda straws	1 per student	Staples, Target, or Amazon	\$7 for 200 paper straws
Bags for Material transportation	1 per classroom	Amazon or reuse from grocery store	\$17 for 24 large gift bags

Describe any additional funding sources outside of section budget (if applicable):

We did not even have to use our section budget for this event this year because we used old materials, but you could look into company sponsorships, or grants from your institution or community if you need additional funding!