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Investigating a Pollinator Curriculum (1-3 grade)

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Day 1 – Sketching and Crafting
Total Time: 9 am - 3:00 pm

1. Nature Walk and Talk: Tree Trek and Living Cycle (50 mins; 9:00-9:50)

Materials- sticky notes, markers, iPads (2 per camper)

Counselors will engage the students by letting them observe, communicate, and discuss.

- Shade for introduction and discussion: Campers will go for a nature walk, reach the nearby sitting shade, and introduce themselves—name, age, and what they like doing. Counselors will even pose some connecting questions, i.e., who likes ice cream, your favorite one, who likes playing in the ground, if you want to see butterflies and flowers, etc.
- Walk to *Walk to Children’s Garden – Habitats Gallery*.
- During a nature walk, let them observe for a while, smell the fragrance of flowers, and see the plants’ colors, shapes, and sizes.
- During the walk, the counselors will ask questions to engage and explore, i.e.,
 - What do you see?
 - What’s your favorite flower?
 - Can anyone help me to name the different colors of flowers? *I think so, it’s red color.*
 - Which color you like most?
 - Do you smell some fragrance?
 - Do you notice some flies over there?
 - Do you notice insects, bees, or butterflies flying near these flowers?
- Campers may answer, as I notice, I wonder, and I wish.
- Campers will take pictures of insects they see during nature walks. Two campers per iPad.
- Next, the Campers will observe these insects and tell what they see. They may answer as I notice, I wonder, and I wish. The campers will note what they see, wish, and wonder in post-it notes.
- Counselors will help campers place their post-it responses on bulletin boards and post-it notes.

Power Break (20 minutes)

- Walk back to the classroom from the children’s garden. Break for restroom/drinking water.

2. Let’s Chit-Chat! (30 mins)-

Materials- pictures of pollinators, i.e., butterflies, hummingbirds, insects, chart board, markers, and sticky notes.

- **Set Expectations:** The counselor will announce that campers will quietly watch the video, and questions or comments will be discussed at the end.
- Let’s see -https://www.youtube.com/watch?v=pJqA02a_g-Y
 - **Turn & Talk**
 - Make pairs of campers and ask questions
 - What do you see?
 - What colors have you noticed?
 - How does it feel?
 - What does it look like?
 - What is a flower? What do we know about Flowers...!
- Here, the counselor will note down the camper’s responses on the chart on board-

Shape	Color	Size	Fragrance	Any other
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- Explain and discuss flowers’ shape, color, size, and fragrance.
- These attract birds like hummingbirds, butterflies, insects, and bats.
- The counselors show [pictures](#) of butterflies, hummingbirds, and insects to observe them for 2-4 minutes, sorting them and telling them these get attracted to flowers’ colors, fragrances, shapes, and sizes (supplementary)
- Tell them it is an occasion to share what you already know about flowers!! Campers will use cutouts (10 sets of pollinator cutouts) to share their views, such as “I notice, and I wonder.”

3. **Flower Anatomy activity** (60 mins)—The flower Anatomy activity fosters the Engineering Design Process by Showing the steps to designing and labeling diagrams. Campers will learn the importance of transparent labels, detailed diagrams, and the difference between high-fidelity and low-fidelity prototypes.



Figure 1*e.e.*, Source:(<https://www.adabofgluewilldo.com/parts-flower-craft/>)

Materials- Jumbo craft stick/straw, glitter, sponge, construction paper (blue, brown, green, and white), glue, scissors, cupcake liners, wildflower seeds, marker, sketches, brown crinkle paper (10 sets). All the paper cutting will be done before the class.

- **Set Expectations:** Campers will be in groups of two. Every group will show their final craft outcome to the camp counselor and other groups. In the end, questions, comments, and feedback will be discussed.
- The counselor will brief the kids about the craft work by showing this craft image on the PowerPoint/project and helping them to do so.
- Campers will do craft work, which they will later show to each group, which leads to getting feedback.

Power Break (10min)

- Break for restroom/drinking water.

Lunch (11:30 – 12:15)

4. **Be Creative with Flowers: Introduction to the EDP** (60 mins) –

Materials- paper sheet, pencil, crayons, sketches, post-it poster notes, and sticky notes ((20 sets).

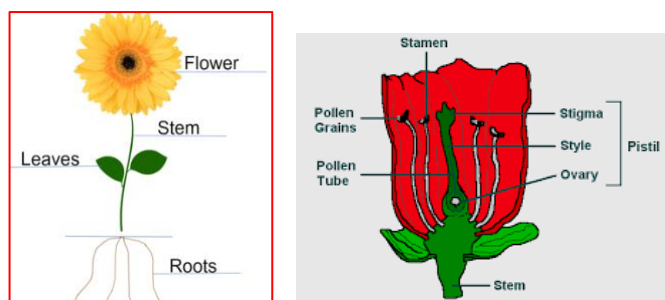


Figure 2 Flower and its parts

- The counselor will introduce different parts of flower petals, leaves, stems, roots, stamens, pistils, and pollen using the above pictures on the project/PowerPoint.
 - What is a flower? What do we know about Flowers...!
 - This picture shows the outside and inside structure of a flower.
 - How will it turn into more flowers?
- **Set Expectations:** The counselor will present the engineering design process: Ask, Imagine, Plan, Create, and Improve. This activity introduces the idea of a “low-fidelity prototype.” Students will draw and sketch a flower as they understand it.
- **Lead Activity-**Draw a simple flower using their imagination and its parts.
- **Sketching Prototype-** Campers will sketch using different colors for different parts.
- **Feedback-** Make pairs of campers and show them to other groups for feedback.
- **Resketching Prototype-** Campers will re-draw and resketch the flower and label each part, including petals, leaves, stem, and roots
- **Low Fidelity Prototype= Lead activity + Sketching + Feedback + Resketching = Engineering Steps**

Power Break (10min)

- Break for restroom/drinking water.

Observe and turn-talk (50 min): What is a Pollinator? Campers will engage by connecting to their personal experiences. They will learn how flowers and pollinators have adapted to meet each other’s needs. Form groups of two campers and give them three minutes to think about the first video.

Materials: 10 sets of pollinator cutouts, chart on board, sheets, sketches, and sticky notes.

- a) **Time-Lapse: Watch Flowers Bloom Before Your Eyes**
- <https://www.youtube.com/watch?v=LjCzPp-MK48>
 - **Set Expectations:** Campers will watch a video and reflect on it here. Before watching the video, the counselor will announce that campers will quietly watch it, and at the end, they will raise their hands to discuss questions or comments.
 - Ask the campers what they saw. What do you see?
 - What colors have you noticed?
 - How does it feel?
 - Revision questions: What do we know about flowers, i.e., color, shape, and parts of plants?
 - Do you know why we give flowers to friends and family?
 - The Counsellor will inform them of the plethora of flowering plants on our planet as well as in the Arboretum botanical garden.
- b) **Tell me know session:** The Counsellor will play this video to get into detail about pollen, pollinators, pollination-
- <https://www.youtube.com/watch?v=CUPzbTuJlgc>
 - The counselor will introduce the terms individually using a story-telling method and ten sets of pictures/ cutouts of pollinators while pausing the video to discuss.
 - The counselor will pause at [1.00 sec.](#)
 - What do you see?
 - What is yellow color powder?
 - Learners may reply, “I notice, and I wonder.”
 - The counselor will explain Pollen for a while.
 - Campers will do **quick drawing using sketch** on sticky notes.
 - The counselor will pause at [2.19 sec.](#)
 - What do you see?
 - What is the yellow feathery part called?
 - What is the pink color part called?
 - Which part moves from stamen to pistil?
 - Why has it been moved from stamen to pistil?
 - The counselor will explain pistil and stamen for a while.
 - What do you notice?
 - Campers may reply, “I notice, and I wonder.”
 - * The counselor will explain Pollination for a while.
 - Campers will do a **quick drawing using the sketches** on sticky notes.
 - The counselor will pause at [2.40 sec.](#)
 - What do you see?
 - What do you notice?
 - If pollen can't move by itself, how will it get to the pistil?
 - who will help to move the stamen to the pistil?
 - Campers may reply, “I notice, and I wonder”.
 - It's Pollinators. Let's learn who the pollinators are.
 - Campers will do a **quick drawing using the sketches** of pollinators.
 - The counselor will pause at [5.36 sec.](#)
 - * What do you see?
 - * What do you notice?
 - * When pollen is moved from the stamen to the pistil, what is it called?
 - * Now, ask them what they notice and understand.
 - * Learners may reply, “I notice, and I wonder.” With the counselor's help, each drawing will be stuck on the board.
 - **Glossary:**
 - a) Pollen is a fine powder-like substance in a flower that is made up of grains.
 - b) Pollination is an important task in the reproduction of flowering plants. It is the process by which pollen is transferred from one place/flower (male stamen) to another/flower (female stamen).
 - c) Pollinators are birds, butterflies, or insects that help transfer pollen. They are attracted to the color, fragrance, size, and shape of flowers.

- d) Adaption refers to the physical/behavioral features of birds or insects that help them to survive in their environment.

Power Break (10min)

- Break for restroom/drinking water.

5. Reflection activity - Journal Decorating (30 min)

Campers will decorate their journal Covers. Each cover must have the following:

Camper Name, phrase: I have the mind of an innovator but may decorate their covers however they want.

Inside cover: The engineering design process is pasted in.

6. Campers/Counselors Clean Up

Campers will Take home the completed flower anatomy activity.

Day 2 – Modelling and Sketching
Total Time: 9 am - 3:00 pm

1. **Nature Walk and Talk: Trial Garden** (50 mins; 9:00-9:50 am): The Counselor will engage the students by letting them observe, communicate, and discuss. Learners will visit the “Trial Garden.” The counselor will ask numerous questions to observe their previous knowledge and reflection. Pairs of campers will be formed, and the counselor will ask questions to help them revise the terms Pollen, Pollination, and Pollinators.
 - Ask them to observe a flower for a few minutes to see if any bees or butterflies visit it.
 - What do you see?
 - What does it look like?
 - How many colors have you seen here?
 - Which is a brighter color?
 - Can anyone tell me where pollen is located? What does it look like?
 - Who are Pollinators? Do you see any pollinators?
 - Can wind help to move the stamen to the pistil?
 - Campers may reply, “I notice, I wonder.”
 - The Counsellor will take some pictures of flowers and parts.

Power Break (10min; 10am)

- Back to the classroom and break for restroom/drinking water.

2. **Dissecting Flowers** (40 mins) –

Campers might know many things—tulips are different colors, their moms planted a rose bush, or they watered the home/school garden in summer. Today, we will observe the flower parts and how they attract pollinators (e.g., bees) and learn how they adapt to certain garden plants.

Materials: Magnifying glass (10nos.), a bunch of different flowers—some have stamens or pistils, post-it poster notes, a pen, and a flower diagram.

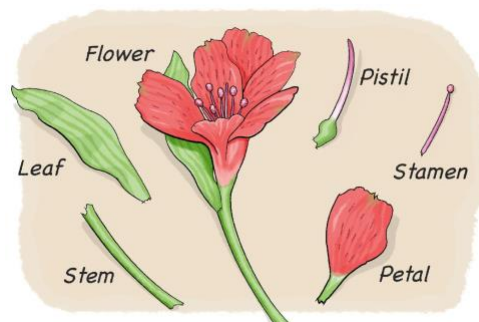


Figure 3 Dissect a Flower

- **Turn & Talk:** What makes a flower a flower? Do all plants have flowers? What is the purpose of a flower? Campers may not know the answers yet, and that’s ok!
- **Instruct the campers to preserve each part as best they can; they will use them later.** Each camper will receive a tray with a hand lens, tweezers, a toothpick, a flower diagram, and fresh flowers. Each camper will select and dissect one flower. They will observe the various parts of the flower. They will go back to their turn-and-talk groups and discuss what they observed. They will discuss as a whole group.
- Campers Tape each part of the flower into their journal. They label the parts of the flower. Highlight that this is what we mean when we say “diagram” and label.”

Act It Out: Campers will act out the life cycle of a plant.

Begin as a seed. The counselor walks around and sprays the “seeds” with water. They sprout. Then, campers pretend to “grow” into a flower. Finally, the “flower” is “pollinated” with the bee puppet. After pollination, the flower turns into a “fruit” with “seeds” inside. The seeds are “scattered,” and the process starts over.

- Explain pollination: a plant’s fertilization process helps produce seeds or fruits.
- Color, fragrance, and shape attract bees, birds, bats, and insects.
- **Adaption** refers to the physical/behavioral features of birds or insects that help them to survive in their environment.

3. **Thanks, a bee: A honeybee story (30 min)**—The Counselor will explain bees, beehives, and honey.
Materials: one piece of drawing paper per camper, *a picture of a honeybee, and sketches.*
- Campers discuss the following questions in pairs:
 - Have you seen the bees’ home (hive) before?
 - Does anyone know where we get honey?
 - Campers may reply that honey can be from Costco, Tom Thumb, supermarkets, etc.
 - Let’s watch this video and find out where the honey comes from.
 - **Set Expectations:** Before watching the video, the counselor will announce that campers will quietly watch the video and questions or comments will be discussed at the end.
 - **Video:** <https://youtu.be/ta154f5Rp5Y>
 - What do you see?
 - What do you notice?
 - Campers may reply, “I notice, and I wonder.”
 - Campers will draw & sketch. Campers will draw an anatomically correct bee. They will follow the Art For Kids Hub how-to video or use books to draw a bee. All drawings need to be labeled. They will draw in their journal. Campers can color their illustrations if there is time. This activity will help campers think through the needs of Pollinators. Campers will sketch the body part using sketches.
 - **Watch, Think, Reflect & Sketch**
4. **Happy Feet with Plant Song (15 mins; 11:30 am)** https://www.youtube.com/watch?v=9bFU_wJgvBI

Lunch (11:30 – 12:15)

5. **Bee Pollinator modeling: Applying the Engineer Design Process (60 mins)**- Campers will complete their bee diagrams. After that, with the help of craft materials, they will do modeling and will be able to learn the pollination process through modeling. Finally, campers will consider how they will improve on their design. They will look at their sketches and their low-fidelity bee model. They will discuss how they would improve on their model using Think, Pair, and Share.
- Materials**—Pipe Cleaners, black or Regular black Chenille Stems, Peel-and-Stick Pom Poms, Colored Craft Sticks, aluminum foil, craft glue, Cheetos, Cheese Powder/Corn meal/ any powder substance, two red and blue cut-outs of flowers, and one small plastic container with lid. All the cutting will be done in advance. Sketches and paper for drawing.
- **Sketching Prototype:** Campers will do sketching the body part using sketches.
 - How To Draw A Realistic Bee. <https://www.youtube.com/watch?v=Ho4aUHY6fss>
 - **Feedback-** Make a pair of campers and show their sketching to other pair groups and counselors for feedback.



Figure 4 Bee Pollinator activity

- **Modeling:** Next, campers will do modeling. The steps are given below, but campers can make pollinators from the provided material.
- **Steps:**
 - Take two pom-pom balls and stick them craft sticks. Cover the craft stick with aluminum foil.
 - Take two pieces of black pipe cleaners and place them between the pom-pom balls, as shown in the picture. Another cleaner will be placed after the pom-pom balls. (One ball, then pipe

cleaner, and again one ball and other pipe cleaners.) The Bottom of the pipe cleaners will be twisted a little to get attached properly and shape the bees' legs. It will become a four-legged little bee.

- Take two flower cutouts of different colors. Place a small container on one of the flowers and the lid on the other.
- Keep some powder/corn meals in a small plastic container jar. Take the little bees and have them dip their legs into the yellow powder container so the bees will get stuck to the powder substance.
- Once the little bee has enough pollen sticking to her leg, fly her over to the empty container lid and help her drop off some pollen. This shows that campers' flowers get pollinated by applying modelling.
- However, the counselor will ask questions before starting the new step to assess the students' thinking and reflection skills, such as what to do next.

Low-fidelity prototype = Lead activity + Sketching + Feedback + Modelling + Recap & Feedback = Engineering Steps.

Power Break (10min)

- Break for restroom/drinking water.

6. Quiz time (10-15 min)

Set Expectations: Campers will introduce the engineering design process using a quiz on an interactive board and help them prepare a cardboard presentation.

7. Journaling: Students write on sticky notes their favorite parts of the day, their most minor favorite part, and something they wonder about tomorrow.

Campers/Counselors Clean Up

Day 3 – Engineering Design Challenge
Total Time: 9 am - 3:00 pm

1. **Nature Walk and Rationale Talk** (50 mins; 9:50 am) – Campers will visit [Incredible Edible Garden](#). The counselor will engage the campers by letting them observe, communicate, discuss, and make a group of 2 kids. Counselors will help learners revise the terms pollen, pollination, pollinators, and adaptation by asking the following questions: Each group will raise their hands and respond to the questions or whatever they observe. They walk to incredible edible places and enjoy nature.
 - Ask them to observe a flower for a few minutes.
 - What do you see?
 - What does it look like?
 - Can anyone tell me where pollen is located?
 - Who are Pollinators?
 - Ask them to observe a flower for a few minutes to see if any pollinators visit it.
 - How are plants pollinated?
 - How do you think flowers attract birds, butterflies, and insects?
 - What are the benefits for birds, butterflies, and insects?
 - Are there any benefits for plants?

Power Break (10min; 10am)

- Back to the classroom and break for restroom/drinking water.

2. **3D Life Cycle of Flower reproductive parts (60min): Engineering Design Challenge**

Materials: Paper plate, Markers, Play-doh, pop cycle sticks, air-dry clay, paint, paint brushes, drawing, pencils, erasers

- The counselor will introduce our Engineering Design Challenge: Create your flower to attract more pollinators.
- **Lead Activity:** First, Campers will draw the flower's reproductive parts.
- **Sketching:** Then sketch it. Labeling it.
- **Feedback:** Show pictures to each other and get or provide input to different groups.
- Low Fidelity play-doh and popsicle sticks
- Feedback and redesign
- **Final High-Fidelity: 3D modeling:** Next, they will create a 3D model of a reproductive flower using air-dry clay. Tomorrow, we will paint.
- **Feedback & Recap:** It's time to get feedback from a counselor and other groups, and we appreciate it by clapping to everyone's efforts.
- **Low Fidelity Prototype = Lead activity + Sketching + Feedback + Modelling + Recap & Feedback = Engineering Steps.**

3. **Quiz time** (10-15 min)

Set Expectations: Campers will introduce the engineering design process using a quiz on an interactive board and help them prepare a cardboard presentation.

Lunch (11:30 – 12:15)

4. **Clap and Dance.** If You Are Happy and You Know It- <https://www.youtube.com/watch?v=M6LoRZsHMSs>

5. **Construction Engineering Building Blocks** (40min)-

In this activity, campers will foster engineering and creativity, stimulate imagination by practicing eye-hand-head coordination, including keen observations, fine motor skills, communications skills, and develop problem-solving skills. They are resilient to building blocks from scattered to complex objects such as

dinosaurs, buildings, vehicles, robots, etc. This activity will enhance their motivation and develop interest and confidence in engineering design practices activities. Here, the counselor will pair the campers.

Materials: STEM Educational Construction Engineering Building Blocks DIY Learning Set (10nos.)

- **Set Expectations:** Each group will provide one set of toys. No one will eat, chew, throw, or keep them in their bag.
- **Lead Activity:** The group will make their own objects using 110 pieces. They can make anything: an animal, bird, butterfly, insect, house, robot, dinosaur, building, vehicle, etc.
- **Recap & Feedback:** Each group will present what they have made and why they have made it, and the counselor and groups will provide feedback, if any.
- **Let's Clap:** campers will clap and appreciate each group.
- **High Fidelity Prototype**



Power Break (10min; 1:35pm)

- Break for restroom/drinking water.

6. 3D activity- Tinker cad (50min)

- The counselor will form a group of 2 campers and inform them about the details. The campers will explore the 3D shapes and create their objects.
- Place it, View it, Move it, Rotate it, Size it up, Group it, Copy it, Duplicate it.
- <https://www.tinkercad.com/3d-design>
- <https://www.tinkercad.com/learn/designs>
- **Digital Modelling Fidelity Prototype**

7. Draw a diagram in the journal about what you created in TinkerCad.

Counselor: Remember to label your diagrams!

Make a to-do list for tomorrow's finalization of the Design Challenge board. Is there anything you need to change or improve? Is anything going well?

Campers/Counselors Clean Up

Day 4 – Bee’s Bots

Total Time: 9 am - 3:00 pm

1. Nature Walk and Rationale Talk (40-50 mins; 9:50 am): Campers will attend the Pure Energy lesson in the Children’s Garden and visit the Little Sprouts Butterfly Adventure Puppet show.

Power Break (10min)

- Back to the classroom and break for restroom/drinking water.

2. Bird Feeders for outside (30min)-

In this activity, campers will have fun and frolic and foster their creativity, eye-hand-head coordination, focus, and soothing effects on the brain during coloring and decorating.

Materials: Createology craft box per pair, additional paint brushes, yarn or twine, a cup, glue guns (counselor only), a sheet of colorful diamond stickers, and plastic cups

- Campers are free to create their bird feeders however they want. Counselors will help them with the glue guns.
- **Turn & Talk** to their partner about what they have made.
- Let them interact with other pairs for a few minutes about what they are experiencing.



3. More time for cardboard presentation (45 min)

Campers will foster creative thinking and get the first hands-on experience of learning.

4. Dance Break (5-10 min; 11 am) Ravioli | Songs for Kids | Sing Along | GoNoodle <https://www.youtube.com/watch?v=89XLOqF2sWk>

Lunch (11:30 – 12:15)

5. Engineering practice time-Bees 'bot (60 mins)-

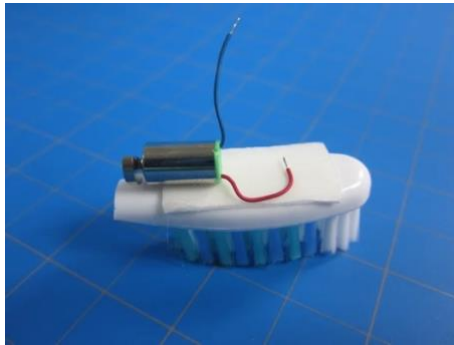
Bees 'bot is a fun activity for individuals or a group involving engineering practices, collaboration, eye-hand coordination, fine motor skills, and 21st-century STEM skills.

Material: Toothbrush, double-sided tape, vibrating motor, battery, google eyes, yellow and purple pipe cleaners, scissors, wire cutter, garden shears, and Cheese Powder/Corn meal/ any powder substance. *Handout guide* should be prepared in advance.

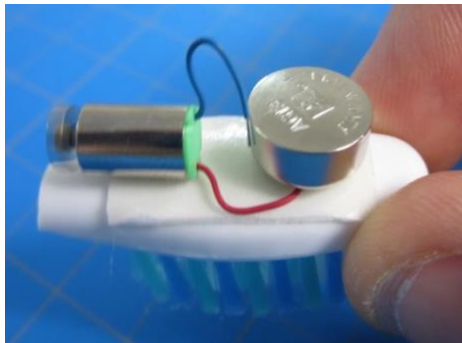
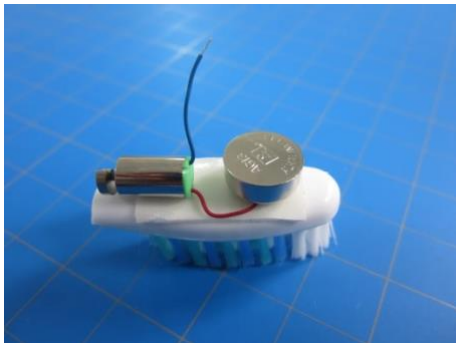


Steps: This engineering activity is excellent for young kids and contains a toothbrush head and motor. Counselors can provide handout guides to the learners. The counselor will help the campers by instructing each step-

- A. The counselor will cut the top of the toothbrush off using garden shears.
- B. Then, stick a piece of double-sided tape on the top of the toothbrush head. Peel off the sticker.
- C. Stick the motor onto the tape near the cut end of the toothbrush. Make sure it sticks to the tape.
- D. Stick the red wire on the tape with the end of it closest to the head of the toothbrush.
- E. Stick the battery on the wire, as shown in the reference picture.



- F. Place the pipe cleaners almost 2-3 inch long as shown in the picture. Fold the pipe cleaners down to help stabilize the bot.



- G. Remove the cover from googly eyes and stick on the head of the toothbrush.



H. Ask questions before every step. What should we do next if we spread some powder? Will this bee's bot carry the yellow powder? Let's see!

6. Reflection activity – Journaling

Day 5– Day-out & Creative Thinking
Total Time: 9 am - 3:00 pm

1. Speaker (10 am - 12 pm): Environmental Resource, Dallas Independent School District (DISD) and free time in the children's garden. The speaker spoke on ecology, reproductive system, pollination, different animals' life cycles, and food habits, i.e., lizards, turtles, and snakes.

Lunch (11:30 – 12:15)

2. The Butterfly Song (If I Were A Butterfly) <https://www.youtube.com/watch?v=KaLzudhlxxks>
3. Finish working on the Engineering Design Challenge board. Each board needs to have the following:
4. Engineering Design Challenge Showcase (60 minutes): The campers' families were invited to a showcase event in person or via Zoom and listened to the campers demonstrate their models.

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