STEM Lab: Designing a Nest

Objective: SWBAT design and build a bird's nest by activating prior knowledge and watching real birds at work.

Standards: 1-LS1-2 SP2 SP8
Subject(s): Science

60 minutes

Preparation - 0 minutes

At my school, we have a unique opportunity with a STEM lab! Once a month for 5 days, my students work in the STEM lab and I co-teach a lesson with a colleague. Listen to my Explanation of Essential Standards (https://betterlesson.com/lesson/resource/3156287/explanation-of-essential-standards) in North Carolina.

During this 2 day lesson, students will watch the engineering feats of birds as they build their nests, look at some real nests, and then build their own bird's nest! This lesson will be followed up with an additional 2 day lesson addressing evaluating and communicating, which are the two final steps in the engineering design cycle.

Learning about the patterns of birds caring for their young by building nests for shelter supports NGSS Standard 1-LS1-2. My students are familiar with the Engineering Design Cycle and how we follow the steps.

Materials:
* Internet and Projector/Smart Board
* Copy of Engineering Design Cycle (http://s3.amazonaws.com/files.betterlesson.com/files2/uploads98/1v0bp/prev800p1.png)
* Paper
* Pencils/drawing supplies
* Assorted building materials for nests (twigs, yarn, ribbon, scraps of material, etc.)
* Glue
* Copies of the Bird Nest Rubric (betterlesson.com/document/3126375/bird-nest-rubric)

RESOURCES


Subscribe to the BetterLesson Blog
Join our community of teachers and instructional leaders. Have the most updated blog delivered right to your inbox.

Subscribe now
Day 1 - Warm Up - 15 minutes

For this project, my students work in partners. This is because their final product --a nest-- will be fairly small and it would be difficult to involve more than 2 people in that small of a work space.

The Engineering Design Cycle starts with 'Think'. So, I say, "We are going to think about an animal today that makes amazing homes-birds! Then, you are going to design and build a model of a nest! To start the design process and to help you think about how to build a nest, we are going to watch two short videos".

I show this video clip which shows two birds working together to build the nest. I point this out to the students afterwards and we watch the clip again. I say, "I hope we can learn something from how well these two birds are working together! Watch this video and see if you can figure out how they actually build their nest".

After we watch the second video, we talk for a few minutes about how the birds start with just a few twigs and add on, one piece at a time.

I selected these specific birds and nests to address the Essential Standard 1.L.1.2 which requires students "give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world". The birds in the videos can be found in North Carolina, so I make that explicit connection with the students through our conversations. I say, "Both of these birds are native to North Carolina. That means that their species live somewhere in our state. What do you notice that the two nests have in common? Can you think of a reason that they are similar?"

For students to be successful in constructing their own nest, evaluating and comparing the two nests in the videos will strengthen their understanding through higher order thinking skills about them.

Day 1 - Activity - 20 minutes

The second step of the design process is to make 2 plans. I always ask students to make 2 plans because it allows for each person to get their ideas on paper and it also organically lets similarities in their thinking come to the surface so that building together can be more cooperative. I say, "For the second step, you need to draw two plans. As you work, think about the materials we have for you to build with".

I show them all of their available materials. To engage students in authentic learning, I limit their materials to things that birds would typically, like sticks and ribbon pieces, as well as glue. Using the actual materials bird use furthers student's understanding of how birds collect available materials and how those materials are used together. For example, birds often weave together the sticks using garbage, like candy bar wrappers and ribbon or yarn, or sometimes grass and leaves that they find. Using authentic materials provides students that layer of understanding of how hard birds have to work! Here are some examples: Bird Nest Plan, Bird Nest Plan 2, and Bird Nest Plan 3. It is interesting that my students also wrote a lot of their background knowledge as part of the plan because I emphasized "using what you already know about birds and their nests" as part of my description for the project. Several students, unprompted, added the text to their plans!

Then I prepare them to be assessed with the Bird Nest Rubric. It is interesting that my students also wrote a lot of their background knowledge as part of the plan because I emphasized "using what you already know about birds and their nests" as part of my description for the project. Several students, unprompted, added the text to their plans!

"As you work with your partner, you need to know how your project will be checked. Your nest must have a way for
the bird to get in, 3 types of materials used, and must not fall apart when it is picked up. You are also getting points for working together. Do you have any questions about the rubric?"

I show them exactly how I will mark "yes" or "no" for each item. Then, it is time for them to draw their two plans! I give each group 2 pieces of paper and tell them to write 'Plan 1' and 'Plan 2' on the top, along with their names and date. As they work on their plans, I listen in on conversations to hear how well students are articulating about the basic need of shelter and to see if there are any questions they have about birds or nests that needs to be answered by me. After about 7 minutes, I say,

"The expectation is for you and your partner to have 2 completed plans done today. Finish the first one and start on a second one. Should it be exactly the same as the first one? Of course not! Think of some different ideas to draw. When we finish this one, we will think together about the best choice for you to make."

After students have finished both, I talk to them again about choosing the one that they are going to build tomorrow and I ask them to put a star at the top of the one they are going to build and then I collect the plan papers. I ask the students to share their Plans. This supports Science and Engineering Practice 8, communicating information. They may get other ideas from listening to other groups. I keep their papers safe so I can return them to them before they build tomorrow.

RESOURCES

IMG_4396.JPG  https://betterlesson.com/lesson/resource/3156288/students-planning
IMG_4397.JPG  https://betterlesson.com/lesson/resource/3156289/students-planning-2
Plans.mp4  https://betterlesson.com/lesson/resource/3156394/plans

ENTION A PURPOSE: High Quality Task

Before beginning the activity part of this lesson, I want to Set the Purpose and make sure that my students understand why we are building a nest as well as why the features of the nest are important. Since they have quite a bit of background knowledge about birds from their own experiences as well as classroom experiences, this goes pretty quickly. However, it is really important to verbalize why we are doing the things we are doing! This creates a good starting point for a high quality task. Without this discussion, some students may be left doing the activity and not really relating it to the content objectives.

Setting a Purpose.mp4  https://betterlesson.com/lesson/resource/3156389/setting-a-purpose

Day 1 - Wrap Up - 5 minutes

To finish the lesson for today, we review the concept with this music video. I often use these kinds of videos as transitions in my class, so my students already know this one, but it is a great reminder of the content and the need for nests!

After the lesson, I look at the selected plan for each group and make sure that I have enough materials so that they can build their nests tomorrow.
Day 2 - Warm Up - 5 minutes

My students are eager to build, so we want to have a really quick warm up today so we can get to the project! I say, "Yesterday, you chose which design you would use today. Also, let's see where we are with the design cycle - which steps have we completed? That's right - 'think' and 'plan', so we are ready to 'invent' and 'build'. Let's look at the rubric quickly to make sure you are thinking of all the things you need to include".

We review the rubric quickly together and then I say, "Before we start, I want to show you a few real nests I have found. What do you notice about them?"

This gives students a chance to see a real example but they already have their design on paper, so I do not feel like they are just going to make one 'just like mine', as first graders often do! Then I say, "I have put the materials out on this table. I will call you up by partners to select your materials and I will be around to help if you need me!"

Day 2 - Activity - 35 minutes

*The activity may take 1-2 days depending on class length*

Most of today's lesson is spent building. As students engage in this activity, they have their plan that they have chosen to follow nearby so that they can reference it as they work. Although I want them to really follow their plan, sometimes things do not work out how you expected! When that happens, I encourage students to talk about a different way to work out their challenge by adjusting this plan.

Students work together and I provide access to materials and help when the students needs me. The materials are kept in one area of the room and students are expected to articulate why they need a particular material. For example, if a student asks for a plastic bottle cap, I may ask, "How are you going to use this in your design?"

If they are unable to articulate why they need it, I ask them to return to their partner and determine if they actually need that material. This is for two reasons - first, students need to understand that the work we are doing is purposeful and not a frivolous undertaking and a mad dash for the 'best' materials! Second, we have limited supplies to use (as do most teachers!) so it is necessary to make sure students understand the idea of using resources wisely!

As I work with students, I ask them to point out the different parts of the rubric so I know they understand the task and the content. I say things like, 'Can you show me how a bird would get in?' or 'Which 3 materials are you using?' Since the students are building a model and not an actual nest, this supports Science and Engineering Practice 2. I want to make it clear to students that this is not an actual nest so that they can 'distinguish between a model and the actual object' as the Practice calls for. Showing students both video and real examples of nests at the beginning of the lesson also supports this standard. Distinguishing the difference between a nest and a model can be tricky, but I approach it through conversation with the students. I say, "Do you think birds would live in your nests? It would be nice if they did, but they like to build their own to suit their exact needs. We have built models - how are the models useful to us as we learn about the basic needs of birds and their habitats? What can you see from your model that you might not be able to see with a real nest?"

Some answers that I am hoping for during this conversation include the idea that we can really see how the nest building material has to be woven together so the nest does not fall apart which also indicates how skillful the birds are, and that we can learn about the size and strength of nests by creating models.

RESOURCES

- IMG_4452.JPG [https://betterlesson.com/lesson/resource/3156396/nest-1](https://betterlesson.com/lesson/resource/3156396/nest-1)
- IMG_4455.JPG [https://betterlesson.com/lesson/resource/3156398/nest-3](https://betterlesson.com/lesson/resource/3156398/nest-3)
Day 2 - Wrap Up - 10 minutes

As we end the 'invent' part of our project, I work with partner groups to make sure their nest will be able to sit safely somewhere and dry. I cannot test whether or not I can pick up the nest without it falling apart because the glue is wet. So, after the glue dries either later today or tomorrow, I will call just the two students over and have them pick it up and go through the rubric with them.

I thought about doing this in front of the whole group but if a nest falls apart it could be pretty embarrassing to young (or old!) students - so I want to avoid that and complete the rubric with just the two students who worked on each nest.

At the end of the day, I say,

“What did you enjoy today? What worked? What did not work? Did you have to make any changes to your design?”

I want to invite students to talk about both their successes and failures to emphasize that designing does take tweaking and fixing! This conversation supports Science and Engineering Practice 8, communicating information.

©2018 BetterLesson