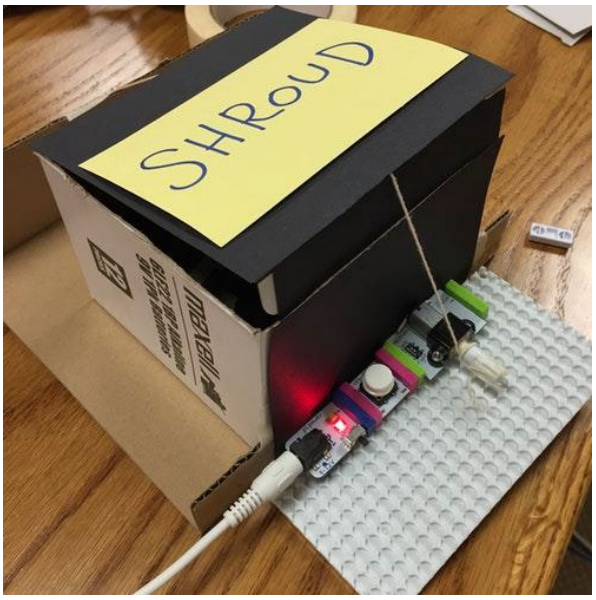
LESSON

VocaBitlary: Using Bits to Build Vocabulary



Overview

In this lesson, students will:

- Explore new vocabulary words through visuals and haptic learning.
- Demonstrate understanding of new vocabulary words and their definitions.
- Design a unique object to represent and show understanding of new vocabulary.
- Critique and improve upon their models based on peer feedback.

THE CHALLENGE

Using littleBits and assorted craft materials, build an object that demonstrates the understanding of a new vocabulary word and it's definition.

Lesson Tags

GRADE LEVEL:

Elementary, Middle (3-8)

SUBJECTS:

English language arts, engineering

DIFFICULTY:

Beginner

DURATION:

2 x 50 minute periods

PREREQUISITE KNOWLEDGE:

- littleBits basics

Supplies

Bits:

- STEAM Student Set
- Optional Extension: Code Kit Bits

Tools Used:

- Pen/pencil
- Scissors

Other Materials:

- Assorted craft materials (e.g. glue, tape, styrofoam balls, pipe cleaners, construction paper)

Description

LESSON OUTLINE:

INTRO: Introduce the lesson prompt and assess students' current knowledge.

CREATE: Groups of 2-3 students start to build their inventions.

PLAY: Students share their projects with another group for peer feedback.

REMIX: Enhance project based on peer feedback.

SHARE: Students do a gallery walk to see other vocabulary words.

ASSESSMENT STRATEGIES:

FORMATIVE ASSESSMENT: Circulate the classroom as students work, assessing their use of the Bits, teamwork, and any other relevant skills you wish to focus on. Depending on students' level of experience, you might look for students putting Bits together backwards (e.g. trying to force them together and not aligning the right sides and getting a magnetic snap), students not adding a power source etc.

SUMMATIVE ASSESSMENT Students should complete the student handout. You may choose whether this is an individual or group submission. Evaluate students' understanding during their presentation using the Assessment Rubric.

Standards

CCSS

VOCABITLARY

CCRA.L.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

CCRA.SL.1: Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCRA.SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Vocabulary

Strategies	**Vocabulary from current class unit**
Visual	

Resources

ATTACHMENTS

Student Handout

Lesson Slides

Assessment Rubric

TIPS & TRICKS

#1: Keep an eye on the clock, and where students are at. Some students will want to spend too much time in the Create stage, and some students will try to speed through it.

#2: This lesson is designed to be used as a vocabulary learning activity and can easily be used multiple times whenever you feel it is necessary for your class to review new words. Check out the extensions at the end of this lesson for fun ways to differentiate the activity for future use!

#3: Students of all grades need practice with new vocabulary, so grade differentiation for this lesson will mainly occur in the difficulty of new vocabulary. However, for older students you may want to “level-up” this activity to push their thinking and meet further standards. One way to do this is to incorporate figurative language. See extensions #2 and #3 on how this could be done.

PACING (2 x 50 minute class periods)

Day 1

Prep + Setup

Intro (10 mins)

Create (25 mins)

Play (10 mins)

Close (5 mins)

Day 2

Prep + Setup

Intro (5 mins)

Remix (20 mins)

Share (20 mins)

Close (5 mins)

Instructional Steps

Step 1: SETUP

DURATION: 10 minutes (prior to class)

This lesson can be done individually or in small groups (2-3 students). Each group will need one STEAM Student Set and a lesson handout. Set up a central location in the classroom for assorted materials and tools.

Each group will work together to build a Bit representation of the vocabulary word they are working with. It is helpful for this lesson to provide students with an example of how they can build their vocabulary word, so we recommend either building your own invention or using the example on slide 5.

Depending on students' level and the desired outcome for this lesson, you may choose to either assign groups vocabulary words you wish for them to work with, or allow them to choose from a list of vocabulary words projected on slide 10. Keep in mind when providing students with their vocabulary words that certain types of words will require them to think more creatively in how they will build a physical representation. For example, designing a physical representation of a "flag" is much more straightforward for learners to conceptual than designing the words "above " or "pensive". Encourage students working with more difficult words that they should be creative in their designing. Their object simply needs to show their understanding of the word, so guide them to think outside the box!

NOTES

- You should use a classroom timer or digital timer to help keep students on track.

Step 2: INTRODUCE

DURATION: 10 minutes

Discussion

Elicit student responses to gauge understanding and warm-up for the activity.

1. Discuss the vocabulary words that you are currently working on.
    a. Discuss any new vocabulary words that your class is currently working with from your lesson. Briefly review what each word means as well as an example of that word used in a sentence.
2. Ask students what strategies they use to learn new vocabulary words.
    a. Take some time to discuss different methods of learning and practicing new words. Write responses on the board, taking time to respond to each. Answers will most likely include flashcards, word lists, drawing, etc. If not, introduce the idea of creatively demonstrating word meaning through drawings, song writing, and acting.
3. Moderate a discussion on why the ways discussed may be an effective strategy for learning new words.
    a. Guide students to understand that physical and visual representations of new words help us store these words in our memory more easily.

Introduce the Challenge

Explain that they'll use littleBits and the littleBits Invention Cycle to build a representation of one of the new vocabulary words. The activity will be broken up into the following steps:

CREATE: Build your circuits based on the word your group is given.

PLAY: Student pairs meet and share their thinking and projects.

REMIX: Add any necessary craft materials to your invention.

SHARE: Gallery walk and presentation of projects.

Students will be working on their projects over the course of two class periods. Explain that at they end of the first period, they will receive feedback from their peers using the Glow and Grow feedback process. They should use the encouragement and critical feedback they receive on their designs at the end of the first period to make any necessary edits or enhancements to their projects during the time allowed in the beginning of the second period.

Divide the class into groups of 2-3 and pass out a vocabulary word per student (or you may allow students to choose from a vocabulary list projected on slide 10).

Then, distribute the student handouts.

Day 2

Use slide 15 to briefly refresh students on where they should be at this point in their project and what the goal of today's work is. The second day of this lesson will begin with students reviewing the feedback they received from their classmates. They should incorporate their peers comments into the Remix portion of their design process. Once they have improved upon their designs, they will they prepare to present their projects to the class!

Step 3: CREATE

DURATION: Day 1: 25 minutes

In their groups, students should discuss their word and definition, brainstorm some possible designs for their object, and begin building their first prototype. Students should document their design process in the student handout to monitor their work.

Students should consider the constraints of their physical designs before they begin the building process. Encourage students to think creatively about how they can turn their vocabulary word into a physical object with the materials and time allowed. Guide them to consider:

1. What type of word are they building?
    a. They may need to think more critically about how they will represent their word if it isn't a

noun or a verb. Encourage students to get creative! Guide them to think deeply about the meaning of the word and how it can be represented through a littleBits invention.

2. What role will the Bits play?
    a. Students should take some time to think about how the Bits they have will help bring their words to life! How can littleBits best be used to illustrate the word? They should consider lights, sound, motion and how inputs/triggers can be used in their creations. For example, lights and sounds can be used to display emotions and feelings, while motors and servos can give their project movement.
3. What craft materials will they need?

Once students have considered these constraints for their projects and developed their design plan, they should begin building.

NOTES

- If students need a little extra help getting started, reference the Bit Index in their STEAM Student Set Invention Guide or the littleBits website to learn how specific Bits work.

Step 4: PLAY

DURATION: Day 1: 5 minutes

Feedback

Group two pairs of students together and have each share their thinking and project with one another. Can the other group guess the word? Using the Glow and Grow feedback process, students receive encouragement and critical feedback on their design. During this time, project slide 13 to provide students with some helpful tips on how they should provide their feedback successfully. Explain that the feedback they provide should be positive as well as constructive to help their peers improve their projects!

Step 5: REMIX

DURATION: Day 2: 20 mins

Iteration

At the beginning of the lesson, students should review the feedback they received from their classmates. They should take this time to discuss how they will be able to incorporate this feedback into their projects, using their student handouts to record the changes they will make. Students should then improve upon their projects and add any other finishing touches they will need so their work will be ready to present to the class!

Step 6: SHARE

DURATION: Day 2: 20 minutes

Once students have completed their projects, have them place their work on their desks. Then, have the class embark on a Gallery Walk, where students will walk around the class to observe the different projects. Encourage students to try and get their classmates to guess their word before revealing it to them (to turn this lesson into more of a guessing-game activity, see extension #1!). Have one student from each pair stay with their project while the other walks around to see others' work. Then, have the pairs switch.

Have pairs then present their project to the class. Guide students to consider the following points for their presentation:

1. What vocabulary word did they work with?
2. What does their word mean? Can they use it in a sentence?
3. How did they use Bits to create a representation of this word and it's meaning?

Use the Assessment Rubric to accurately assess students' work.

NOTES

- For the Gallery Walk, it will be helpful to set a timer so students know when it is time to switch and return to their project so they can let their partner walk around and observe.
- While we recommend having students do both the Gallery Walk and presentations to share their work, we understand time can get tight! If you find yourself crunched for time, you may choose to implement only one of the Share activities depending on which best suits your class.

Step 7: CLOSE

DURATION: Day 1: 5 mins, Day 2: 5 mins

Day 1

Students should put their projects in a designated area so they can remain intact and ready to be worked on again tomorrow. Have students put away any craft materials and/or tools they had used during the lesson and clean up their work stations.

Day 2

Students should take apart their inventions and put away the Bits according to the diagram on the back of the Invention Guide. Students should clean up their workspace and return any usable materials/tools.

Step 8: EXTENSIONS

1. Try engaging students further by turning this lesson into a fun vocabulary review game! Follow the flow of the lesson as is, but skip the Play portion of peer feedback and tell students to keep their vocabulary word secret. When finished, have students Gallery Walk and guess what vocabulary word each invention represents! How many words can each group guess correctly?

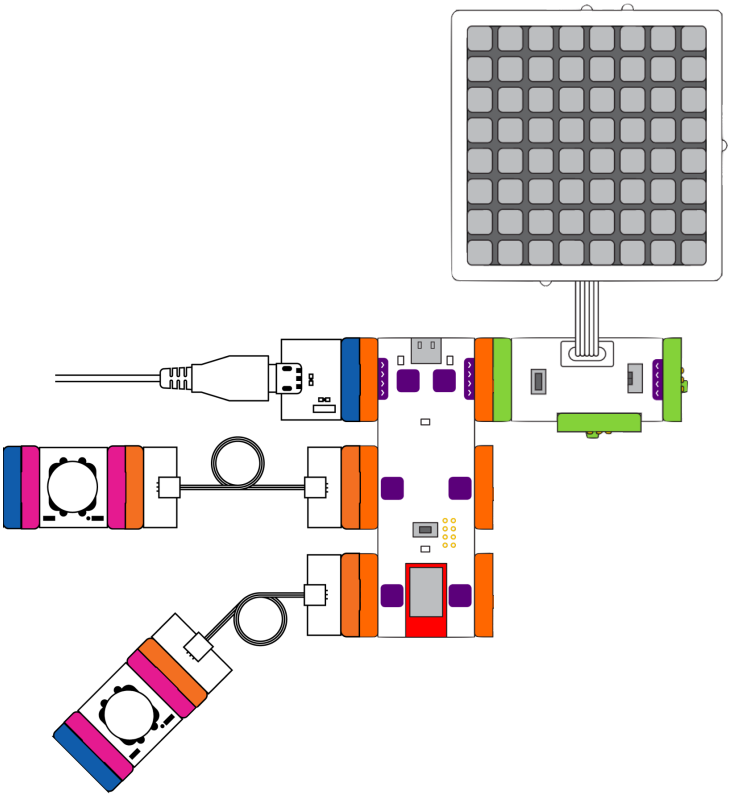
2. Working with middle school students and want to give them more of a challenge? Have them pick out which vocabulary word they wish to use from a text they are reading, rather than assigning one to them. Students will have to explore unknown words in their reading texts on their own, so this extension can work to encourage deeper understanding of new vocabulary.
    - *Additional standards met through this extension:*
        - **L.6.4.C, L.7.4.C ,L.8.4.C:** Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.

3. Another way to "level-up" this lesson is to use it to teach aspects of figurative language rather than simple vocabulary words and definitions. For example:
    - Students build an object that represents a figure of speech. For example, students would have to use Bits to build an object that shows their understanding of personification. How could a group use Bits to represent "the leaves danced in the wind"?
    - Students can build objects to show the relationship between two words (e.g. synonyms). This can be done by having two groups combine and show the relationship their objects have with one another. How could students build two objects that represent "push" and "pull" to demonstrate the two words are antonyms?
    - *Additional standards met through this extension:*
        - **CCRA.L.5:** Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

4. Want to use coding to complete this lesson? Consider the following Code Kit alternative:
    - Rather than representing a word and it's meaning with Bits from the STEAM Student Set, students can use their Code Kit to code a vocab video game!

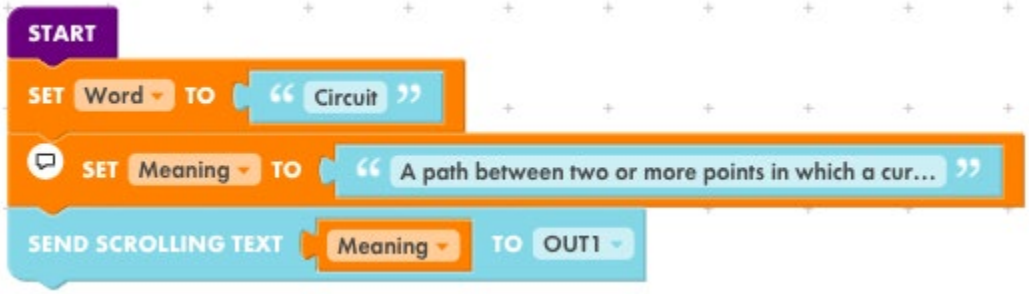
- Below's an example circuit and line of code for a game in which students have to try and guess a word based on the definition provided. Using variables and functions, students will create a speed-guessing game where two players will race to hit their button and guess the correct word before their opponent!

1. Put together the following circuit using the rechargeable battery, USB cable, USB power, 2x button Bits, 2x wires, codeBit, and LED Matrix:



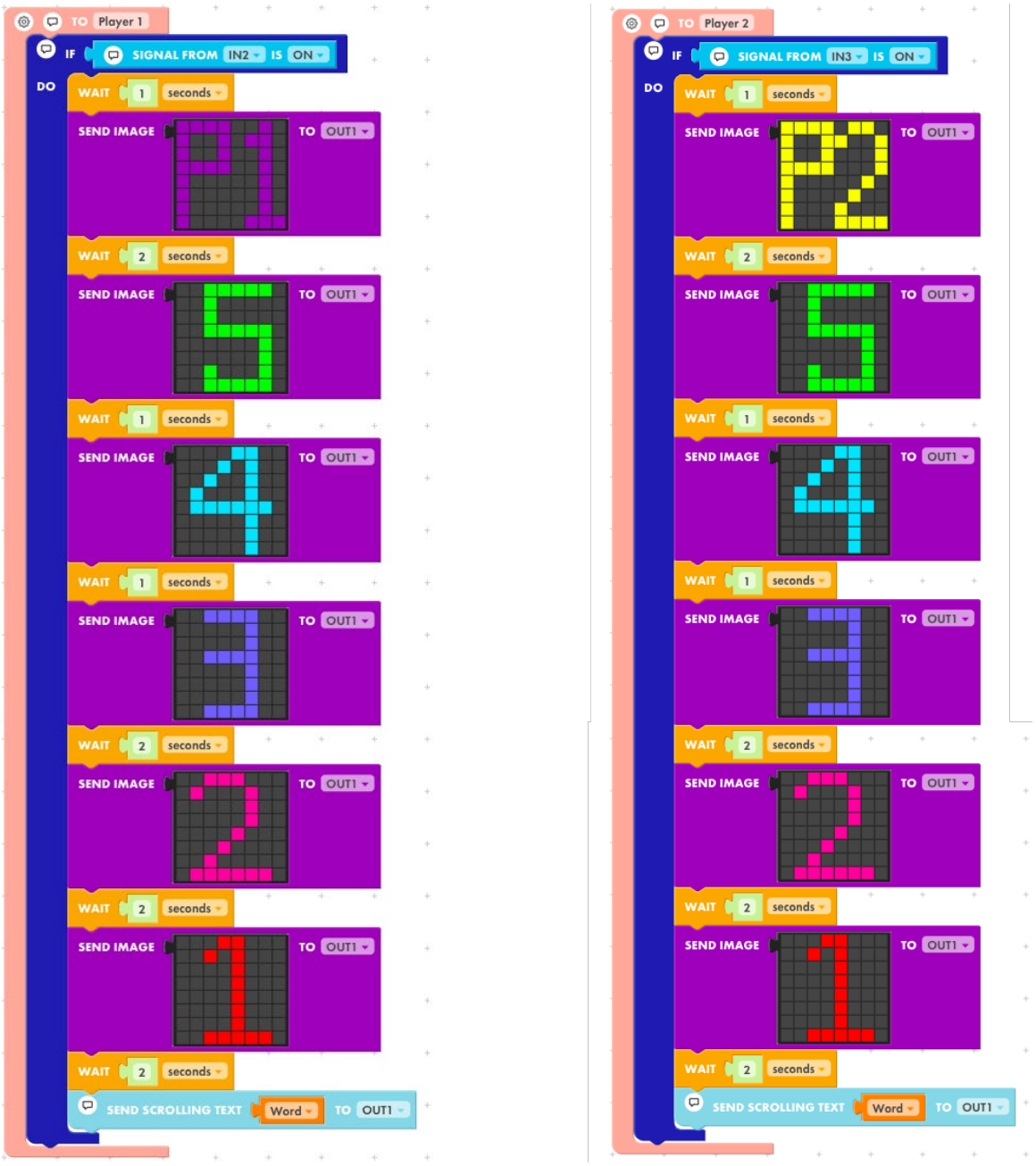
2. Now, open up your littleBits Code Kit app and let's create some variables! We'll create variables for our "Word" and it's "Meaning" so students can customize their game based on the vocabulary word they wish to use. In this example, our vocabulary word is "Circuit" and its meaning is "A path

between two or more points in which a current travels." Let's plug it in and make it scroll!



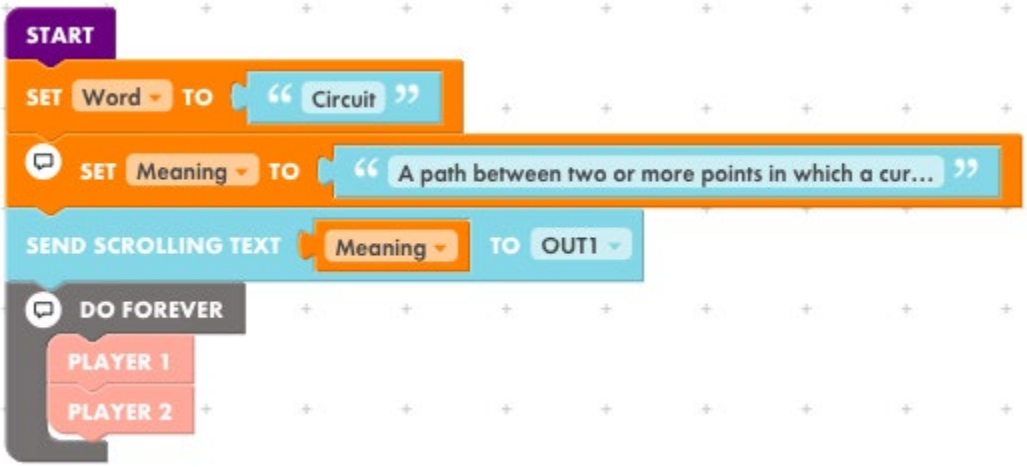
3. Now, your going to create the code for each player's button. To make our final line of code cleaner, we will put these into the new functions we'll name "Player 1" and "Player 2". We need to consider a few things that we want from this function:
    1. We need it to notify us which player pressed their button first.
    2. We need to give the player a *few* seconds to think about the vocabulary word their going to guess.
    3. We need it to reveal our vocabulary word to see if the player guess it correctly.

VOCABITLARY



- It is important to note in these functions that “Player 1” is only activated when there is a signal from input 2 and “Player 2” is only activated when there is a signal from input 3. That means that when students play this game, Player 1 must use the button snapped to input 2, and Player 2 must use the button snapped to input 3. Otherwise players could get very confused!
- Notice also at the end of these functions we used our new variable “Word”. This will reveal the vocabulary after giving the speediest player some time to guess.

1. Now that we've made our functions, we can seamlessly insert them into our final line of code, and boom! We've got ourselves a speed-racing, vocab-guessing, videogame!



2. Try out your game with your classmates! Get into groups of 3 and take turns having one student choose the vocabulary word, while 2 others race to guess it from it's meaning! How could you level-up this video game with sound? What other variables could you add to your code to make the game more challenging?

- *Additional standards met by this extension:*
  1. **CCSS**
     - **SL.5:** Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
  3. **CSTA**
     - **1B-AP-09:** Create programs that use variables to store and modify data.
     - **1B-AP-12:** Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.