Literacy Activities with KIBO's Expression Module

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The following activities are designed for students to practice reading and writing using KIBO's Expression Module. These activities can be done individually or can be integrated with a KIBO robotics curriculum. You should feel free to pick whichever activities resonate the most with you and your students. While these activities are designed for kindergarten students, they can easily be adapted for first and second grade students.

Visit kinderlabrobotics.com if you are interested in integrating these activities with already existing KIBO curriculum.

Activity 1: Name Builder
<u>Goal:</u> Students will work alone or in pairs to create a non-robotic vehicle and then decorate it with words that start with their names.
Materials: masking tape and/or glue, markers/crayons, colored paper, Expression Module, (optional), a variety of craft and recycled materials for building and decorating such as cardboard boxes, bottle tops, paper towel tubes, pipe cleaners, brads, etc.
KIBO Concept: Sturdy Building, Engineering Design Process
Activity Preparation: Gather materials ahead of time. There should be materials that can be used for both structural and aesthetic purposes. These could be materials such as cardboard boxes, bottle tops, paper towel tubes, etc. It is also important to provide materials that can be used as wheels, as well as something to attach the wheels to the vehicle (ex. pipe cleaners or brads). Additionally, students should have materials that they can use to assemble their vehicles, such as tape and glue.
Activity Description: After reviewing the Engineering Design Process, students will work alone or in pairs to create a non-robotic vehicle use craft and recycled materials. The criteria for a successful vehicle are that is has wheels that roll, it can be pushed between two places on the floor, and that it remains intact when being handled and pushed along the floor. After creating the vehicle, students should decorate it with their name and items that start with the same letter as their name. If desired, students can use the Expression Module to write their name and then attach it to their non-robotic vehicle.

Activity 2: Find Your Match!
<u>Goal:</u> Students will create a program for KIBO to travel from a word written on an index card to its matching picture.
Materials: 1 KIBO set per group of students, one Expression Module per KIBO, index cards pairs (one with a word like cat, dog, bat, etc. and the other with a matching picture), pen/marker
KIBO Concept: Sequencing KIBO's programming blocks
Activity Preparation: Prior to the start of this activity, create index card pairs, one with a word and one with the matching picture. Some examples of words include cat, bat, ant, red, boy, hat, etc. Once you have finished creating the pairs, spread the word and picture cards

out on the floor (the matching cards should be placed relatively close to one another so KIBO can be programmed to move between the index cards).

Activity Description: Assign each group of students to one of the picture cards. Tell them that their task is to first write the word that describe their picture on their Expression Module, and then program their KIBO to travel from that picture card to the matching word. Remind students that they can use a variety of programming blocks, and they can even add in sounds or other instructions once they have figured out the route their KIBO should take.

Activity Adjustment: Have students practice matching words and pictures during non-robotics time. This can be done by giving each person a picture card and then having them walk around the room looking for their matching word card.

Activity 3: Vowel Maker

Goal: Students will program their robot to travel around and create new words.

Materials: 1 KIBO set per *group* of students, one Expression Module per KIBO, index cards, pen/marker

KIBO Concept: Sequencing with KIBOs programming blocks

Activity Preparation: Review KIBO's different blocks. Identify three letter words that students are familiar with and have a vowel as one of the letters (ex. cat, bat, jet, bus, dog, top, hen, bib, lip). Choose a handful of words (at least as many words as there are robots) and write one word on each index card; however, do not write the vowel. Instead, draw a line to indicate that the vowel belongs in that area.

Activity Description: Students will choose one vowel (either of their choosing or one that is assigned) to write on their Expression Module. Then, they will program their robot to travel from a designated spot to one of the index cards. In order to go to an index card, the vowel on the Expression Module needs to be the vowel that completes the index card to create a real word. For example, if a group has "e" written on their index card, their KIBO could travel to "h_n" and "j_t" but not "c_t." If desired, this activity can be repeated, either by having the groups change their vowel or have the robots travel to another index card.

Activity Extension: Try lengthening the words or choosing words that have the same vowel in two different places in a word.

Activity 4: Word Scramble

Goal: Groups of students (each with 1 KIBO) will work together to unscramble a word.

Materials: 1 KIBO set per *group* of students, one Expression Module per KIBO

KIBO Concept: Sequencing with KIBOs programming blocks

Activity Preparation: Review KIBO's different blocks. Identify short words (2-4 letters long) that students are familiar with and know how to spell.

Activity Description: Students will be working together with their own group and with 1-3 other groups to create a word using their KIBO Expression Modules. To do so, groups will be divided up and assigned to work together. Each group will be assigned a letter and then will need to write it on their Expression Module. Once students have their letter, they will need to work with their partner groups to program their KIBOs to move and be in the correct order so that their KIBOs together spell one word. For example, if three groups were

working together to create the word "the," the robots would be programmed to move so that the robot on the farthest left has "t" written on the Expression Module and the "e" on the farthest right

Activity Adjustment: If creating a program to unscramble a word is challenging at first, create a non-robotics version of the task. To do so, choose short words that students are familiar with (these can be the same words used in the robotics activity) and write one letter on a piece of paper. Then, while sitting as a group, choose a few students (one per letter) to hold up the pieces of paper that create the word and have them move around to "scramble" the letters. Then, have the class verbally give them instructions on how they should move so that they create a real word.

Activity 5: Draw Letters with Repeats!

Goal: Students will program KIBO to trace different letters using repeat loops.
Materials: 1 KIBO set per group of students, one Expression Module per KIBO, masking tape
KIBO Concept: Repeat with Numbers
Activity Preparation: Prior to the start of this activity, use masking tape to create the following letters of the alphabet on the floor: I (shaped like a straight line), L, C, U, and T. When creating these letters, make sure that each part of the letter is at least 2-3 "Forwards" long and that the letters are spread throughout the room. Additionally, you may want to create more than one masking tape version of each letter. Once the letters are set up, review how to use the Repeat, End Repeat, and Number parameters with students.
Activity Description: Students will program their robots to travel along the different masking tape paths to "draw" the letters. Encourage students to start with the easiest letters (particularly I, which is a straight line, and L) and then move onto the more complex letters. When creating their programs, students should use the Repeat and End Repeat blocks. As children are creating programs for each of the letters, they should write the letter on their Expression Module to match.
Activity Extension: Redo this activity with the repeat blocks and the distance and/or light sensor so that KIBO "draws" the letters when it meets certain conditions.

Activity 6: KIBO Drawing

Goal: Students will program KIBO to draw letters on a piece of poster paper.
Materials: 1 KIBO set per group of students, one Expression Module per KIBO, scrap paper, large poster paper (of at least legal size), markers, masking tape
KIBO Concept: Sequencing with KIBOs' programming blocks, Repeat with Numbers
Activity Preparation: Prior to the start of this activity, review how to sturdily build KIBO and about its different programming instructions.
Activity Description: Once students have assembled their robots, they should use the Engineering Design Process to figure out how to attach a marker to the front of their robot. The marker should: 1) not fall off when the robot moves; and 2) be attached so that it can draw on the ground when the robot moves. It is helpful to use masking tape for this part. Have students test their design by giving them a scrap piece of paper and having them program their robot to move Forward once. After this test, the students should see a

straight line drawn on their paper. Once students have successfully attached the markers, have students choose a letter that they would like to draw using KIBO. Have them write the letter on the Expression Module as a way of practicing and then create a program for KIBO. Encourage them to start with letters with simple shapes (such as an I or L) and then move on to more challenging letters.

Activity Extension: Have groups work together to have their KIBOs write one word. Groups should decide on what word they would like to create and then designate which group is doing which letter. Then, they should create their programs for their letter. Remember, students may need to rearrange themselves so that the letters are drawn in the correct order.

Activity 7: Chicka, Cicka, Boom, Boom! Sensor Activity

Goal: Groups of students will work together to create a relay race for the KIBO robots (incorporating the distance sensor), just like the letters in the story "Chicka, Chicka, Boom, Boom."

Materials: 1 KIBO set per group of students, one Expression Module per KIBO, 1 distance sensor per group, "Chicka, Chicka, Boom, Boom" by Bill Martin, masking tape

KIBO Concept: Repeat with Sensors (distance)

Activity Preparation: Review the concept of sensors and remind students how KIBOs' distance sensor work. Then, read the book "Chicka, Chicka, Boom, Boom" as a class. At the end, re-read the first page of the story.

Activity Description: Students will program their robots to do a relay race, just like in the story when "A told B, and B told C, 'I'll meet you at the top of the coconut tree.'" Three groups will work together for this activity. The "A" robot (denoted with "A" on the Expression Module) will start the race and stop once it senses the "B" robot using the distance sensor. Then, the "B" robot will travel to the "C" robot and stop when it senses it is close. Finally, the "C" robot will travel to the finish line.

Activity Adjustment: Try this activity without sensors. Instead, set up the three robots so that they are equidistant from one another (about 2-3 "Forwards" apart). Then have students use the Repeat and End Repeat blocks, as well as the number parameters, to reach the next robot on the race.