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**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan—Kindergarten**

**Kibo Robots**

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| **BIG IDEAS:**   * Sequencing and experimenting with coding * Understanding cause and effect   **Curriculum Expectations:** *Problem Solving and Innovating* - 24.2 state problems and pose questions as part of the process of creating and designing  - 24.3 make predictions and observations as part of the process of creating and designing  - 24.4 select and use tools, equipment, and materials to construct things | |
| **Learning Goals:** “We are learning to…”   * make a sequence * code * understand cause and effect * use new coding vocabulary words including: sequence, code/coding, barcode, scanning | **Success Criteria:** “We will be successful when…”   * a sequence has been created from left to right (starting with the green block and ending with the red block) * the robot follows my sequence * we can code (we are coders) |
| **Lesson Overview:**  Students will be introduced to the Kibo robot and its parts (sequencing blocks and attachments). Students will use the blocks to create a sequence. Next, they will scan their block sequence and push the “go” button on the Kibo. The Kibo will perform the sequence. The lesson engages students in understanding cause and effect while fostering inquiry surrounding coding. This is an introductory lesson for the purpose of familiarizing students with the Kibo and introducing coding. | |
| **Materials and Technology:**   * KinderLab Robotics Kibo Robot and coding blocks (Robotics kit for children ages 4-7) * Optional: Paper, Pencil | |
| **Student Accommodations/Modifications:**   * One to one support * Quiet space * Extra time * Small group instruction * Modelling | **Lesson will be differentiated by:**  **Content, specifically:** - limited exposure to blocks  - limited exposure to attachments  **Process, specifically:** - EA support with reading and fine motor assembly **-** allow for partners or small groups  - allow time for practice/review/repetition - rewording/rephrasing of instructions  **Product, specifically:  -** no assessment of product  **Environment, specifically:  -** quiet setting, strategic seating |
| **MINDS ON: Getting Started** | |
| Introduce: Introduce the Kibo to the students. Show the Kibo’s clear bottom to the students to promote inquiry about the wires, batteries, and main board (the “main brain”). Next, show the students the coding blocks. Explain that each block is a unique *code* for the robot. The blocks communicate their code to the robot when their *barcodes* are *scanned*. When you assemble the blocks from left to right you create a *sequence*. Demonstrate a small sequence (emphasizing the start/end blocks) and model scanning.  *Kibo Rules*: handle gently, treat with respect, do not touch Kibo while it is performing a sequence  Key Questions: “Where have you seen batteries before? What do they do?” “What is a sequence?” “What is coding?” “What is scanning?” “Where have you seen scanning before?” “Does the Kibo understand your sequence? Why or why not?”  Assess Understanding: Explore the answers to the key questions in a class discussion. Review and provide an example and/or demonstration of the new terms: barcode, scan, sequence.  Groups: Students will work with the Kibo in partners or small groups (no larger than 4).   Materials: Kibo and coding blocks. Students may use paper/pencils if they wish to plan or record their findings. | |
| **ACTION: Working on it** | |
| Task(s): Create a variety of sequences using the coding blocks. Effectively scan the sequences and have the Kibo complete them.   Difficulties: Fine motor skills required to effectively scan the barcodes. Difficulty reading and interpreting the labels/visuals on the blocks. Inability to understand the cause and effect of scanning and the Kibo’s actions.   Demonstrate Understanding: Ask the students what the various blocks mean and how they work. Clarify any misconceptions by having students implement these blocks in a sequence and see how they work. Students will demonstrate their ability to predict and observe.  Assessment: *Checklist/Anecdotal Records*   * Is the student participating? * Does the student effectively scan the blocks? * Does the student start and end the sequence with the correct blocks? * Does the student understand the cause and effect of their sequence? * Does the student pose questions about problems they experienced while designing their sequence? * Does the student make predictions and observations while designing their sequence?   Potential Extensions:  - Prompt the students by asking, “Can you make the Kibo go to the other side of the hallway?”  - Create a challenge for the students, such as having the Kibo complete an obstacle course or reach a chosen point. Alternatively, have students create their own challenges. | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| Sharing Work: Have students sit in a circle to share their findings. Explore key inquiries through shared demonstration (e.g., Will the Kibo spin three times if I scan the spin-code block three times?)  Key Questions:  - Ask students if they have any questions about the Kibo. - What did you discover while using the Kibo?  - Did the Kibo always follow your sequence? What problems did you experience?  - What else can we do with the Kibo? What next steps would you like to try?  Strategies/Key Concepts:  - Connect the learning to previous knowledge to consolidate their findings: “the Kibo reads from left to right like we do”, “the Kibo always starts at the beginning of the sequence (sentence) and stops at the end”, “the Kibo teaches us cause and effect just like our choices have consequences”.  - Finish by reviewing new vocabulary once more (scanning, coding, sequence). Inform the students that they are now coders. | |