Barrier Game: Building-Bricks Challenge

Activation	30 Minutes	Offline	Special	Games

In this activity, learners practice giving and following clear commands.

- One learners gives instructions (words and/or pictures) for assembling a structure made of building bricks (e.g., LEGO®).

- The partner follows the instructions to create a duplicate structure.

✅ CT Learning Checkpoints

- ☑ Create clear commands for building a structure
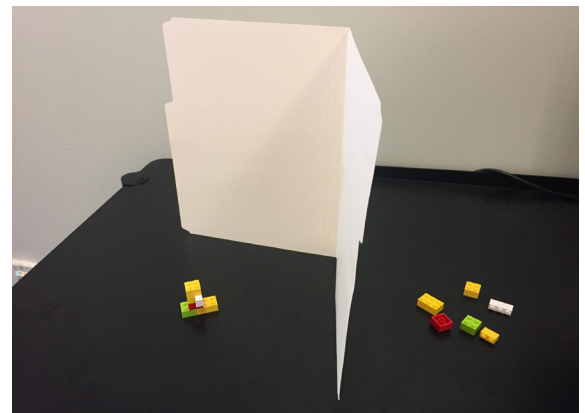- ☑ Interpret commands for building a structure

Image: Setup ready for play, with a barrier between the two learners, one set of blocks assembled into a structure, and one set of identical, loose blocks

Links & Materials

- Building bricks (e.g., LEGO®)
  - ○ For each pair/small team:
    2 identical sets of bricks, with one set pre-assembled into a structure
- Plastic bags
- Folders, books, or similar to act as a barrier
- Optional: Barrier Game Picture Cards in the Barrier Game Folder
- Optional: Scissors (1 for Preparation)
- Optional: Paper clips

Differentiation

- Consider varying the complexity of the structures through number of bricks, variation in color/shape, etc.

- Decide whether you will incorporate the **Picture Cards** into the activity for some or all learners.

  ○ The **Picture Cards** may work well for learners with language challenges, spatial strengths, and/or a preference for giving or receiving instructions visually. These cards may make the game easier for some learners and harder for others.

- Use some **trios,** where an additional learner joins a pair as a troubleshooter This learner can see both the pre-assembled structure and the loose bricks. They can provide "hints" when needed and/or provide guidance for how to give clear instructions and/or ask clarifying questions.

Preparation & Setup

- Make at least one bag of bricks for each pair (or trio) of learners with:

  ○ A pre-assembled structure

  ○ Loose bricks matching those in the pre-assembled structure

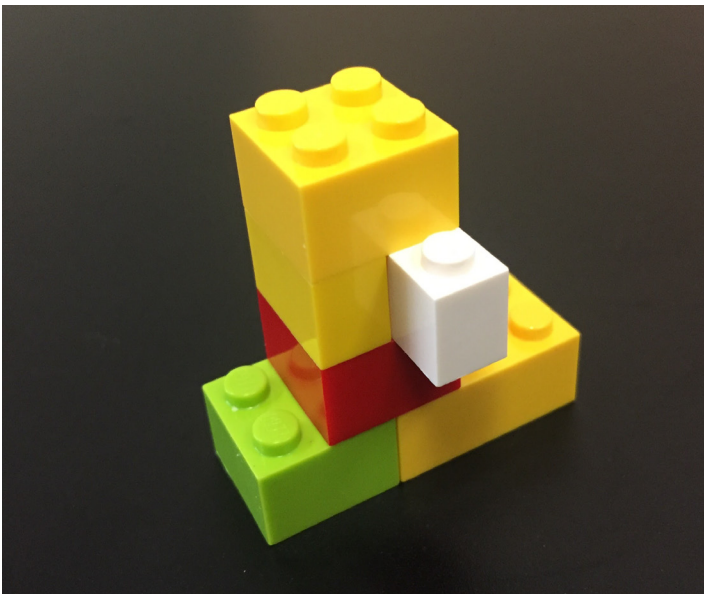- Optional: Print and paperclip the **Picture Cards** (if using).

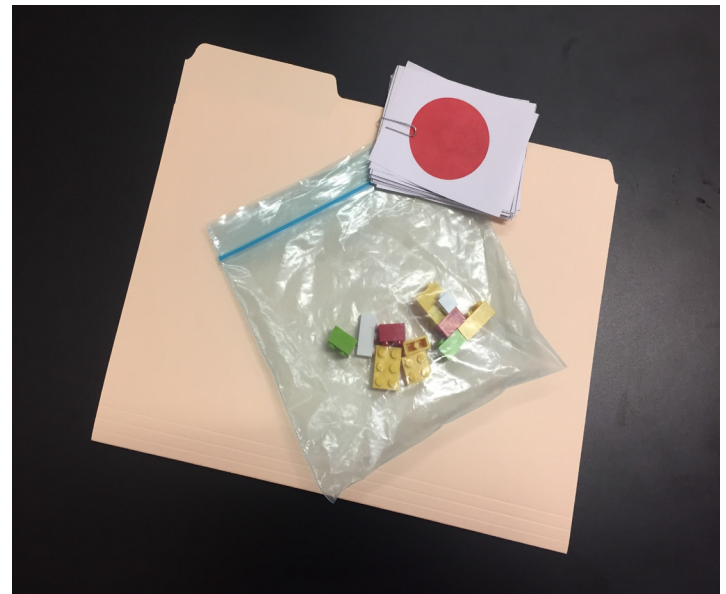Image: Example structure, made with six building blocks

Image: Example set of materials for a pair (or trio), including a folder, **Picture Cards**, and plastic bag of 2 identical sets of building blocks, with one set pre-assembled into a structure

🎇 Set Up for Success

- Model gameplay before having learners play or allow learners to watch another pair for the first round of the activity before trying it on their own. Or use trios, with an additional learner joining a pair to be a "troubleshooter." (See **Differentiation**.)

- Offer **Word Cards** for learners who may need additional support with vocabulary.

Procedures

1. Explain the <u>purpose</u>: The explore **commands** — instructions a computer, robot, or similar can accurately follow — and what makes good ones.

2. <u>Orient</u> learners to the task: To give and follow instructions (words and/or pictures) for assembling a structure made of building bricks.

3. Assign and explain <u>learners' roles</u> (expectation for self and others):

   - They'll be playing in pairs (or trios).

   - One player will have a pre-assembled structure and will give very specific instructions for making an identical structure.

   - The other player, with the loose bricks, will follow the instructions to build the structure. They can ask clarifying questions as they build.

   - Neither player should be able to see the other partner's bricks.

   - If using trios, the third learner will act as a troubleshooter. This learner can see both the pre-assembled structure and the loose bricks. They will provide "hints" when needed and/or provide guidance for how to give clear instructions and/or ask clarifying questions (without giving too much away!).

   - When the learners think their structures will match, they should call over an educator to check.
     - **IF** the structures don't match, **THEN** the learners should continue to try with the current set of bricks.
     - **IF** the structures match, **THEN** they can move on to another round with a new set of building bricks, switching roles so they get practice both giving and following instructions.

4. Show an example setup and then have the pairs (or trios) of learners get set up.

   a. Have one learner, who will be the first builder, close their eyes or look away.

   b. Hand out the materials.

   c. Have the other learner(s) set up the barrier, keep the pre-assembled structure on their side (and the **Picture Cards**, if using), and put the loose bricks on the other side.
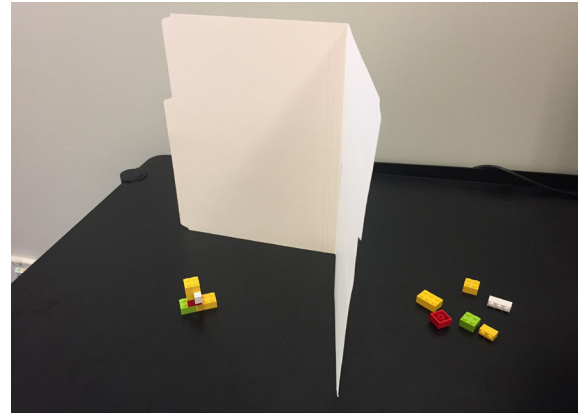
5. Have pairs (or trio) play the game.

Image: Setup ready for play, with a barrier between the two learners, one set of blocks assembled into a structure, and one set of identical, loose blocks

When learners complete a round, have them:

- Disassemble ONE of the now-matching structures,

- Return one assembled structure and one set of bricks to the bag,

- Request a new bag of bricks, which should be given to the learner who will be giving the instructions in the next round, and

- Play another round.

IF playing more than 2 rounds, **THEN**:

- Consider having learners switch partners. This will give learners an opportunity to learn additional strategies from one another and to further develop their communication skills.

- Consider having the partners switch between talking and using the **Picture Cards**, if/as appropriate to the learners involved. Using the cards instead of talking can potentially make the challenges harder or easier, depending on the language skills, spatial strengths, or other abilities of the learners.

Debrief, Reflect, and Check for Understanding

1. Ask questions such as:
    *   What did you find challenging or difficult about assembling the brick structures or giving your partner instructions to build the structures?
    *   What strategies did you use?
    *   How did you choose to start describing what should be built?
    *   Did you come up with a common vocabulary to describe pieces (e.g., # of dots, shape, etc.)?
    *   If you used the cards, did you combine or alter them with your hands/fingers to convey instructions?
    *   What strategies from this activity can you apply to solving other problems?
    *   Did you get better at building the structures with practice? Why?

2. Encourage learners to share/talk about:
    *   the structures that they built.
    *   the instructions that they gave.

3. Use the **PRADA Prompts and Strategies** to review the computational thinking principles used to play the Barrier Game.

PRADA Prompts and Strategies

Problem Decomposition

Breaking a problem or task down into smaller, more manageable parts

- What was your task?

- How was this task broken down into parts?

    ◦ Did you think about the structure in sections (e.g., levels, sides, other)?

Pattern Recognition

Identifying parts of a problem, task, or solution that repeat

- Did you notice any patterns or trends while you were doing the activity? If so, try to explain them (e.g., identified patterns in color, shape, number of dots on the bricks, etc.)

- How did you use patterns/shapes to describe the overall structure?

- What patterns, if any, did you see in what did and didn't work?

Algorithm Design

Designing a sequence of steps to be followed to accomplish a task or achieve some desired end(s)

- Did you always approach the structure in the same order (e.g., start at the bottom and work up to the top)?

Debugging

Systematically isolating errors in solutions to problems and then correcting them to achieve desired outcomes

- What did you do when/if the structure was built incorrectly?