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Ideas with IMPACT

ROBOTICS

ALL Aboard the Lego STEAM Express

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All Aboard the Coding Express

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Location: 2801

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Project Overview

Students in the primary grades can learn coding through play. As students think about ways to make the Coding Express move, and building the various structures, they are also exploring many science mathematic concepts. Teachers can capitalize on this information and use pay as a way to motivate students to learn science and math. Students will be expose to a fun way to learn and communicate their ideas. In this project, students will program the train to move forward, reverse and stop. Coding Express is a creative, intuitive, and versatile solution that introduces preschoolers to early coding concepts that naturally sparks their curiosity, creativity, and desire to explore and learn together. Based on the ever-popular train theme, the highly versatile LEGO® DUPLO® solution allows children to make connections and intuitively explore early coding concepts, such as sequencing, looping and conditional coding, while developing problem-solving skills, critical thinking, collaboration, and social and emotional skills.

Goals and Objectives:

1. The curriculum is multidisciplinary where subject-integrated **problem-based-reality** lessons with hands-on projects are the norm.
2. Allows preschoolers to collaborate and interact with the physical toy train through a digital medium.
3. Swill show improvement on math and science subject area test as well district and state required assessments
4. Help students develop an attitude of curiosity and problem solving.
5. Students will learn to communicate their idea.

Florida Standards

Science

SC.K.P.12.1 Investigate that things move in different ways, such as fast, slow, etc.

SC.K.P.13.1. Observe that a push or a pull can change the way an object is moving.

Mathematics (B.E.S.T.)

MA.K.M.1.1. Identify the attributes of a single object that can be measured such as length, volume or weight.

MA.K.M.1.2. Directly compare two objects that have an attribute which can be measured in common. Express the comparison using language to describe the difference.

MA.K.DP.1.1 Collect and sort objects into categories and compare the categories by counting the objects in each category. Report the results verbally, with a written numeral or with drawings.

English language Art (B.E.S.T.)

ELA.K.C.2.1 Present information orally using complete sentences.

ELA.K.C.3.1 Follow the rules of standard English grammar, punctuation, capitalization, and spelling appropriate to grade level.

ELA.K.C.4.1 Recall information to answer a question about a single topic.

ELA.K.C.5.1 Use a multimedia element to enhance oral or written tasks.

ELA.K.V.1.1 Use grade-level academic vocabulary appropriately in speaking and writing.

First Trip

This getting started activity will allow the children to explore the action bricks and different bricks in the set.

30-45 min. Beginner. PreK-K

Prepare

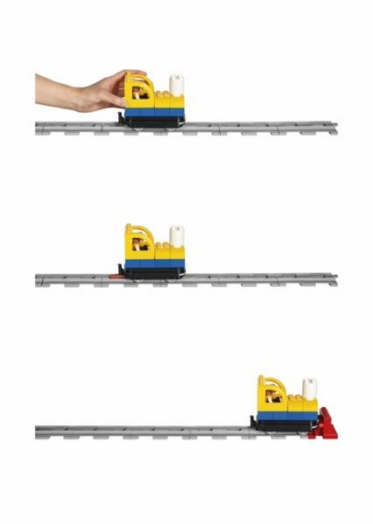
- Review this lesson plan and choose what you need from the *Teacher Support*box.
- If necessary, pre-teach these related vocabulary words: *action brick, stop (as a noun), destination, most, train station, journey*.
- Consider the abilities and backgrounds of all your students and decide when and how to introduce and differentiate lesson content, activities, or concepts.

Engage

- Ask the students if they've ever taken a train, subway, or tram. Where did they go?
- Tell them they're going to play the choo choo train game!
- Have the students line up and put their hands on the shoulders of the person in front of them.
- Explain that when you say, "go" they'll move around the classroom like a choo choo train, and when you say, "red light" they'll slow the train down and stop.
- Play a few rounds of the choo choo train game.

Explore

- Share printable model card 1 (image shown below) and have students build a model from it. Alternatively, they may use the Building Cards from the LEGO®Education Coding Express set as inspiration or build any destination they like.



- When the students have finished building, ask them to work together to build a double-ended track.
- Make sure the track is long enough to fit the train station and the destination (using eight track pieces is recommended).
- Start at the train station and use a LEGO® DUPLO® figure as a passenger.
- Tell the students that the passenger would like to go fishing at the harbor. Can you help them get to the harbor?

Tip: The students don't have to build what's on the building cards. They can build any destination they'd like.

- The students are likely to stop the train one of three ways:
  - By hand, which they've learned in the getting started activities
  - Using the red action brick
  - Using the red stop brick

Explain

- Show the three different ways of stopping the train.
- Talk to the students about the red action bricks.
- Ask questions like:
  - How many red action bricks did you use?
  - Where did you place the red action brick(s) and why?
  - Where did the train stop?

Elaborate

- Encourage the students to build a longer track and to create more stops.
- Pique their interest in using the green action bricks on the track.
- Ask questions like:
  - What did you see when the train went over green bricks?
  - How can we help the train get back to the station?

https://education.lego.com/en-us/lessons/preschool-coding-express/first-trip/

O-Shaped Track - Looping

The objective of this lesson is for students to explore and understand use of the O-shaped track for repeating sequences.

30-45 min. Intermediate PreK-K

Prepare

- Review this lesson plan and choose what you need from the *Teacher Support*box.
- If necessary, pre-teach these related vocabulary words: *during, daily, weekly, often, usually*.
- Consider the abilities and backgrounds of all your students and decide when and how to introduce and differentiate lesson content, activities, or concepts.
- Coding Concept: Looping – repeating a portion of code a set number of times until a process is complete.

Engage

- Ask the students if there's anything they do many times a day or week (e.g., brushing their teeth, showering, cleaning their room).
- Tell the students that they're going to play another game!
- Model a sequence of hopping, jumping, running, walking backward, dancing, spinning, or other actions in a circle.
- Ask the students to copy what you've just done and to repeat (i.e., loop) the sequence at least twice.

Tip: For younger students and beginners, limit your loop to just one or two actions.

Explore

- Ask the students to combine curved and straight track pieces to make an O-shaped train track (six curved and four straight pieces is recommended).
- Have students build two or three places they'd like to visit on the train. For inspiration, share the image below. Alternatively, students may use the Building Cards from the LEGO® Education Coding Express set for ideas or build any three places they wish.
- Let's go on a day trip! Use some LEGO® DUPLO® figures as passengers.
- Tell the students that the passengers would like to have a picnic in the forest and then visit the beautiful castle. Can you help the passengers take the train to the forest and then to the castle?

Tip: Remind the students to use action bricks to make sure that the train will be able to stop at each location. Encourage them to use the blue action bricks for any stops with drinks, water, or gas.

Explain

- Tell the students that the passengers enjoyed their trip so much that they'd like to do it again!
- Talk with the students about how they could help make this happen.
- Ask questions like:
    - Will you be able to help the passengers take the same trip again? How? (The O-shaped track creates loops.)

- Which action bricks will you use and why?

Elaborate

- Encourage the students to build a double-ended track next to the O-shaped track.
- Talk about the difference between the two types of tracks.
- Ask questions like:
  - What's the difference between these two types of tracks?
  - Will you be able to repeat the same journey on the double-ended track? Why or why not?

Evaluate

- Ask guiding questions to elicit students' thinking and their decisions while ideating, building and programming.

Observation Checklist

- Review the learning objectives and educational standards addressed in this lesson (Teacher Support box).
- Share specific student responses and behaviors at different levels of mastery.
- Use the following checklist to observe students' progress:
  - Students can create an o-shaped track and can describe this as a loop.
  - Students can describe, with prompting, the repeating sequence of events on the trip.
  - Students can discuss the difference between a journey on the O-shaped track and one on the double-ended track.

https://education.lego.com/en-us/lessons/preschool-coding-express/first-trip/

Math - Distance

In this lesson students will understand how to measure distance, be able to compare distances and be able to do simple math.

30-45 min. Advanced PreK-K

Prepare

- Review this lesson plan and choose what you need from the *Teacher Support*box.
- If necessary, pre-teach these related vocabulary words: *measure, distance, step, compare, vehicles, reverse*.
- Consider the abilities and backgrounds of all your students and decide when and how to introduce and differentiate lesson content, activities, or concepts.
- This lesson is designed to be used with the Coding Express app. Download the app for student devices at legoeducation.com/downloads.
- To use this lesson without the Coding Express app, see the unplugged version.

Engage

- Talk to the students about distance.
- Ask questions like:
    - How did you get to school today?
    - Why do you think some people walk or bike while others take the bus?
    - Would you like to play a game?
- Choose two or three spots around the classroom to be “train stops.”
- Name the stops.
- Ask the students to walk from one stop to the next and count how many steps they’ve walked.
- Compare the number of steps between each of the stops.
- Talk about which distance is longer and why.

Explore

- Have the students pick building cards and work together to build the models shown (three models are suggested).
- Ask them to build a double-ended track and place their models alongside it.
- Now experiment with the app.
- Let’s start the train!
- Ask the students how many numbers they’ve seen in the app. Can they count from the smallest number to the biggest?
- Press each number and see how far the train moves.
- Have the students pick the number(s) that will help the train reach each stop

Tip: Make sure the engine is connected to the app before experimenting with the different numbers.

Explain

- Talk to the students about distance.
- Ask questions like:
    - Why do people use different vehicles like bikes, cars, and airplanes?
    - When do people take airplanes or buses?
    - When do they walk or bike?

Elaborate

- Encourage the students to build more stops and decide the distance between them.
- Ask questions like:
    - Which distance is the shortest/longest between the stops and how long is it?
    - Can you describe the path of the train's journey? (e.g., it started from…, stopped or passed…, and ended at…)

Evaluate

- Ask guiding questions to elicit students' thinking and their decisions while ideating, building and programming.

Observation Checklist

- Review the learning objectives and educational standards addressed in this lesson (Teacher Support box).
- Share specific student responses and behaviors at different levels of mastery.
- Use the following checklist to observe students' progress:
    - Students can create and describe a sequence of events.
    - Students can predict the expected outcome of the sequence of events, with prompting.
    - Students can compare two distances using descriptive words like longest, shortest.

More Ideas

- Use this lesson's format to work with **Longer Distances** and explore more numbers with your kindergartners!

https://education.lego.com/en-us/lessons/preschool-coding-express/first-trip/

Resources

Coding Express - https://education.lego.com/en-us/products/coding-express-by-lego-education/45025/

STEAM Park- https://education.lego.com/en-us/products/steam-park-by-lego-education/45024/

Product Resources -

https://education.lego.com/en-us/product-resources/coding-express/teacher-resources/teacher-guide/

Materials and Cost

Coding Express byLEGO-45025	Price Regular price.	$239.95
LEGO® Education STEAM Park by LEGO® Education	45024	$209.95
Hefty Jumbo Storage bags	2 packs.	$10.00

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