

An Instructional Approach to Engage Children with Autism to Engineering Design

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ENGINEERING DESIGN FOR CHILDREN ON THE AUTISM SPECTRUM

This handout provides a research-based guide for developing appropriate engineering design activities for children on the autism spectrum (Activity Components) [1][2]. It also provides some instructional strategies that educators can use to better support children with autism's engineering engagement (Instructional Strategies) [1].

In Page 2, the Design an Amusement Park Activity is briefly presented which is developed following this guide [3]. In a research study [1], children on the autism spectrum and their parents engaged in this activity. The instructional strategies were emerged from observing parent-child interactions during this activity which resulted in child's design engagement.

ACTIVITY COMPONENTS

- **Scenario.** Introduce the design activity through a scenario with fictional clients and users, but give the problem specification in multiple steps.
- **Series of challenges.** Develop challenges that differ in structure, with the first being well-structured and the last being ill-structured, but all challenges should be related to the scenario.
- **Spatial challenge.** Provide a challenge with the purpose of exploring the material and a challenge for a free play.
- **Least to most prompt.** Provide various forms of prompts (written, shapes, pictures) for children for each challenge to be given to children as needed.

INSTRUCTIONAL STRATEGIES

- Soliciting information.** Ask for the child's input, explicitly or implicitly.
- Providing guidance.** Lead the interactions to provide information about the design.
- Disengagement.** Disengage purposefully to give space to the child.
- Acting as a student of the child.** Act as if the child knows better than the educator and ask them to teach the educator.
- Assisting.** Offer direct help to the child verbally or through building.
- Affirmation.** Provide encouragement or confirmation.

Note

While these strategies were used throughout the activity, the overall effective pattern was observe to be:

A and/or B strategy → Introduce the activity/task/challenge
C strategy → allow self-paced exploration and engagement
D, E, A and/or B strategy → overcome frustration, reengage child and answer their help request
F strategy → reengage and encourage, frequently as needed

Educators may use one or a combination of some, as needed, considering children's differences and desire. To learn more →



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REFERENCES

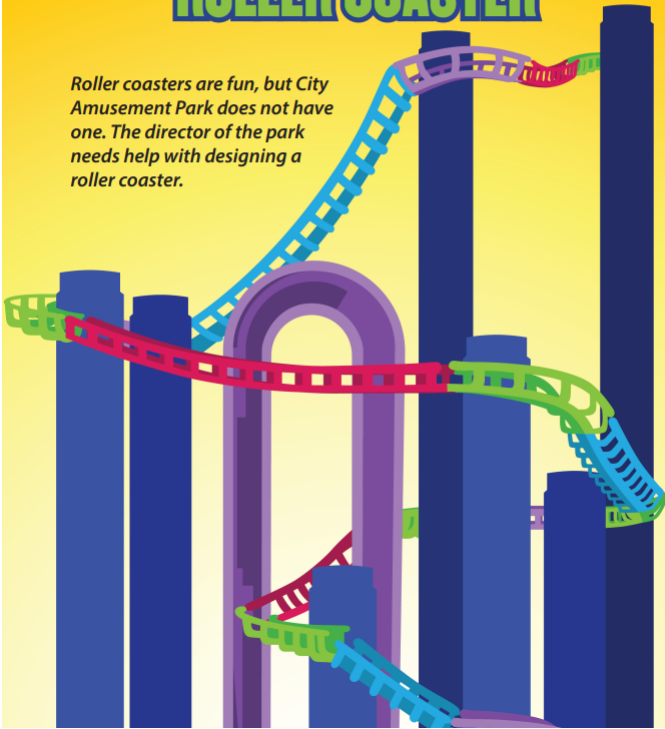
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DESIGN AN AMUSEMENT PARK ROLLER COASTER

Roller coasters are fun, but City Amusement Park does not have one. The director of the park needs help with designing a roller coaster.



This activity was used to research ways children on the autism spectrum and their families engage in engineering design [1] [3]. This activity can be used in inclusive settings and with all children. However, some children may not need the prompts or may complete the challenges sooner than others.

- **Activity scenario:** Help Hannah, CEO, of an amusement park to add a rollercoaster to make kids happy.
- **Activity parts.** Series of challenges including letter one, warm-up challenges 0-3, letter two.
- **Given prompts.** Written hints, material suggestion, pictures of possible models
- **Time needed.** 90 minutes (to be adjusted as needed).

Activity Series of Challenges

- **Letter one** introduces the activity to children through a letter. In this letter, children are directly encouraged to try the challenges to explore material and wait for more detail to come in the second letter.
- **Warm-up challenge 0** provides an opportunity for children to explore the material (i.e. the construction kit). In this challenge, children can build their own rollercoaster.
- **Warm-up challenge 1** is a well-structured activity that asks children to build the given model rollercoaster. It aims to give a sense of how the rollercoaster works and how the pieces and material specially connect.
- **Warm-up challenge 2** builds upon the previous one, but it provides one specific criterion for the rollercoaster.
- **Warm-up challenge 3** asks children to design a rollercoaster for one more criterion.
- **Letter two** comes with more details about the problem specifications. Some design criteria and constraints are presented in this letter.



Scan to learn more about the activity and conducted research

