Science Experiment: Engineering Agility Project: Dog

Introduction:
Many times in the dog project, we must try to solve problems with our dog to complete a task. Whether it be in the agility course or in obedience, the challenges of patience, problem solving, and critical thinking are always there. Also the opportunity to work with a partner or team member (your dog) is also critical in success. You are now charged with the same task, except your partner is a nanobot "dog". Through this activity you will be given a list of materials, a set of parameters, and a dog (nanobot) that you need to get through the agility course. This will give you an opportunity to learn about life skills such as teamwork, problem solving, and critical thinking skills, while seeing what it takes for your dog to get through the agility course.

Engineering Design Process:

1. *Generate Ideas: Brainstorm possible solutions that might address those constraints.*
2. *Evaluate and compare possible solutions: Decide which of the possible solutions are the most logical or make the most sense.*
3. *Build a prototype: A prototype is a first attempt at a design and is built to test your hypothesis.*
4. *Test the Prototype: Conduct a series of experiments to see if your prototype works.*
5. *Tell your story: Record your data to share what you learn with others.*
6. *Refine your design: Explore how you can use what you've learned to improve or change your design.*

Overall Goal:
Each team has the goal to get the nanobot from the start through the agility course. Once the nanobot has started, no member of the team is allowed to touch the nanobot during the agility course. You will work together with your team members using the materials that you have to create an opportunity to get your dog (nanobot) through the course.

Challenge Rules:

1. The nanobot must start at the beginning of the course
2. The nanobot must complete all obstacles
3. When designing the course, all obstacle completion must be continuous. No starting and stopping and readjusting your nanobot.
4. Teams can only use the materials that are given to them in their packet
5. Make sure to write down detailed instructions on how to do the challenge for someone else to be able to run your course with their "dog".

Facilitator Suggestions:
Once the teams are assembled give each team 15-20 minutes (or more depending on pace) to make their design. Have them write down directions on how to complete the course on post-it notes. Have them then test the design using the written instructions that are left. Have them use the post-it notes to write suggestions for improvement and what each of the teams can do. As they run the test, also have them write down what works, what didn't work, and what rules they were able complete and which they were not. Once they are all finished, have teams go back to their original design and have them read through the notes (give each team time to ask the teams that evaluated questions if they have any). Then give each team 5 minutes with their nanobot to test and think about redesign. Once they are finished with this 5 minutes, let each team redesign the obstacle course. If time allows, have teams switch to test the redesigned designs, if time is tight have them test their own designs.

Process Questions:

1. When you were designing your course, what was the most difficult part?
2. How did you work as a team to complete this task?
3. Which rule was the most difficult and why?

Generalize & Apply Questions:

1. When have you had to design something in 4-H in which you had a similar experience or challenges to work through? How did you do this?
2. Why is working in teams important not just to this challenge, but in other parts of our lives?
3. When in your life have you had to pay attention to rules, even when some are harder to complete than others? Why do we pay attention to rules?