Abbey the Dog

Lesson Overview:
This activity is based on a case study from the Tufts School of Veterinary Medicine about a dog named Abbey who has mobility issues in her back legs. Abbey is no longer able to do the things she used to do so students will build something that will improve Abbey's life while keeping her injured lower back safe.
Suggested Time: 60-120 minutes

Learning Objectives:
- To get experience planning for a client
- To incorporating constraints and criteria
- To make connections between engineering and real-life situations

Materials:
- Scissors
- Felt or fabric
- Stuffed dachshund
- Wheels
- Cardboard
- Paper
- Tape
- Paperclips
- Wire
- Velcro
- String
- binder clips
- pipe cleaners
- popsicle sticks
- Paper cups

Directions:
1. Let students know that they will be building something to help a dog whose back legs are temporarily unusable.
2. Introduce Abbey. (A link to slides is in Appendix X.) Abbey is an 8 yr old female dachshund who is fond of playing ball and jumping on and off the couch in her owner's den. One morning, Abbey wasn't acting like herself and seemed very reluctant to get up from her bed to move around the room. When she did walk, she had a funny stilted gait that some describe as "walking on eggshells". By the time the owners were able to take Abbey to the veterinarian later that morning, she was unable to stand and was partially paralyzed in both of her rear legs.

   Findings from a thorough neurological exam and radiographs suggested that Abbey had ruptured an intervertebral disc and that the contents had damaged her spinal cord. After surgery, Abbey still couldn't walk and so the veterinarian suggested that some kind of device was needed to help Abbey in her day-to-day life until she healed. The veterinarian felt that Abbey would improve but would still need help moving for several weeks to come.

Abbey is now not able to do the following things:

- Jumping on the bed
- Chasing the ball
- Walking to food
- Walking with the owner
- Swimming
- Running
- Playing games with other dogs
- Dig with her back legs

Requirements for the assistive technology:

- Has to be comfortable on Abbey: not too tight or too loose
- Easily attached and removed
- Takes very little time to put on/off
- Nothing can be glued, taped, pinned, etc. to Abbey
- Must support the lower back and legs
- Lower back and hips must be kept as still and stable as possible when the device is being used.

3. After understanding the challenges faced by Abbey, lead two brainstorming discussions. Focus the first one on Abbey's day to day problems. Focus the second one on building ideas and constraints (size, weight and cost, etc), weight, cost, etc). Be sure to document the ideas in a visible location for reference. If not mentioned previously, discuss fit, stability, and ease of taking the device on and off.
4. Students break into groups and begin planning. They should choose a problem together first and then take time to quietly draw or write about possible solutions to that problem. Once they have had some time to think on their own (2 minutes), they can brainstorm together and establish a single design plan with which to proceed. It is a good idea to have an educator check their idea before they start building to make sure it is feasible.
5. Have students build and test their designs on the stuffed dog. Once their designs have been approved, students can grab materials that they need and begin to build.
6. Stop for a mid-design check-in.
7. Give students time to iterate on their designs based on the feedback from the check-in.
8. After students complete their designs, have them share again or facilitate a discussion that helps them reflect on the process.

Possible Discussion Topics:

- What problem did you choose?
- What did you build to solve it and why?
- What evidence did you use to help make design decisions?
- What changes did you make because of the feedback you got and your tests?
- What are you going to change about your design? What is your next step?