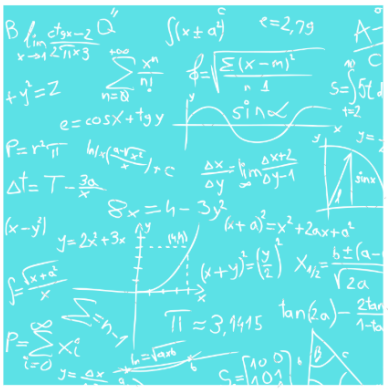
Bouncy Ball: Personal Power



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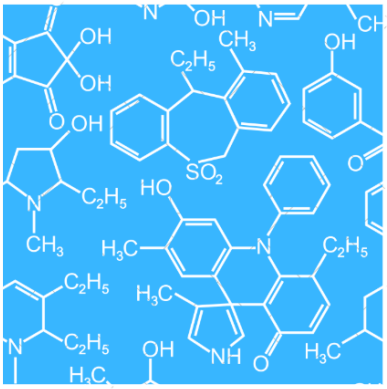

SCIENCE WORTH EXPLORING

Written by Aubree Larson adapted by A. R. Butz from Promoting Mentee Research Self-Efficacy (Byars-Winston, Leveritt, Branchaw,& Pfund, 2013, 2016). University of Wisconsin-Madison. Supported by NIH grant # R01 GM094573 (ByarsWinston, PI). Branchaw, J. L., Butz, A. R., & Smith A. (2018). Entering Research (2nd ed.). New York: Macmillan.

Bouncy Ball Teacher Information: Personal Power

When do I give the student this work sheet?

This work sheet is meant to be completed after the entire experiment has been completed. This worksheet is best if the student performed the experiment without a partner. There is a separate work sheet for scientists who completed this experiment with a partner.

What will they learn?

1. The discussion materials for this experiment will be based off the Iowa Core Standards for Employability Skills. These standards are consistent across all age groups, so this work sheet can be used for any aged scientist. The following standards that will be reflected on through this work sheet are:
   a. 21.9 – 12.ES.2
      Adapt to various roles and responsibilities and work flexibly in climates of ambiguity and changing priorities.
      - Adapt to varied roles, responsibilities, and expectations
      - Work effectively in a climate of ambiguity and changing priorities
      - Demonstrate appropriate risk-taking
   b. 21.9 – 12.ES.4
      Demonstrate initiative and self-direction through high achievement and lifelong learning while exploring the ways individual talents and skills can be used for productive outcomes in personal and professional life.
      - Perform work without oversight
      - Use time efficiently to manage workload
      - Assess one's master of skills
      - Set and achieve high standards and goals
      - Engage in effective problem-solving process

Bouncy Ball Scientist Information: Personal Power

1. **Read through the following cognitive distortions:**

   Cognitive distortions are irrational thoughts that can influence your emotions. Everyone experiences cognitive distortions to some degree, but in their more extreme forms they can be harmful

   a. Magnification and Minimization: Exaggerating or minimizing the importance of events. One might believe their own achievements are unimportant, or that their mistakes are excessively important
      i. Catastrophizing: Seeking only the worst possible outcomes of a situation.
   b. Overgeneralization: Making broad interpretations from a single or few events. "I felt awkward during my job interview. I am *always* so awkward."
   c. Magical Thinking: The belief that acts will influence unrelated situations. "I am a good person – bad things shouldn't happen to me."
   d. Personalization: The belief that one is responsible for events outside of their own control. "My mom is always upset. She would be fine if I did more to help her."
   e. Jumping to Conclusions: Interpreting the meaning of a situation with little or no evidence.
      i. Mind Reading: Interpreting the thoughts and beliefs of others without adequate evidence. "She would not go on a date with me. She probably thinks I'm ugly."
      ii. Fortune Telling: The expectation that a situation will turn out badly without adequate evidence.
   f. Emotional Reasoning: The assumption that emotions reflect the way things really are. "I feel like a bad friend, therefore I must be a bad friend."
   g. Disqualifying the Positive: Recognizing only the negative aspects of a situation while ignoring the positive. One might receive many compliments on an evaluation, but focus on the single piece of negative feedback.
   h. "Should" Statements: The belief that things should be a certain way. "I should always be friendly."
   i. All-or-Nothing Thinking: Thinking in absolutes such as "always", "never", or "every". "I never do a good enough job on anything.

Bouncy Ball Scientist Information: Personal Power

2. **Identify the cognitive distortion (or multiple distortions) described during these paragraphs:**
    a. *Suzy is completing the bouncy ball experiment. She can't get her bouncy ball to bounce as high as she wants to. The ball splats every time she throws it on the ground. Suzy feels like she keeps failing at this task. Eventually, Suzy thinks to herself, "I can't get this bucket to stay on and it's making me feel stupid. If I feel stupid during this experiment, then I must be stupid all the time."*

    b. *Bob just finished the bouncy ball experiment. When he hands the materials in to his teacher, the teacher congratulates him. He got 19/20 right on his discussion materials. Bob is mad that he didn't get 20/20. He can't believe he missed a problem. Bob isn't happy with his performance at all, he is mad that he got something wrong.*

    c. *Walter is working through the bouncy ball experiment. He does not quite understand how to measure out the ingredients. He starts to worry that he won't be able to make any part of the bouncy ball and he won't finish any of the discussion materials. He imagines this means he is going to fail this experiment.*

d. *Karen handed in her discussion materials to her teacher nearly 5 minutes ago. She can see the teacher writing things on her paper as they go through it. Karen immediately thinks that she did poorly on this experiment. The teacher would not be spending so much time on her paper if she had done well. However, when she gets her paper back she sees she did well. Her teacher wrote things like "good job" and "nice work" throughout her materials.*

3. Read through these four sources of self-efficacy:

Self-efficacy is a belief one has in his/ her ability to successfully complete a given goal or task. In other words, it is a situation-specific self-confidence. It answers the question "can I do this?" Self-efficacy is informed by four sources: mastery experience, vicarious experience, social persuasion, and emotional/ physiological state. Here are some examples:

1. Mastery experience: a past accomplishment or success: "I've done this before"
2. Vicarious experience: a model that has successfully completed the task: "I've seen others do this before"
3. Social persuasion: a social or verbal message reinforcing ability or effort: "Others have told me that I can do this"
4. Emotional/ physiological state: an emotional, affective, or physiological response: "Doing science in the classroom makes me happy," "I get excited when I am doing a science experiment," or "my heart starts racing when I begin to conduct an experiment."

4. Identify how Suzy, Bob, Walter, and Karen could use self-efficacy to help deal with their cognitive distortions:

Suzy: Bob: Walter: Karen:

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5. Now practice dealing with your cognitive distortions while you work on through this exercise:

Think about an invention that could help you or society as a whole. The invention needs to use the same scientific principles as the bouncy ball you made earlier. Write down/ draw your ideas:

6. Explain how you improved your behavior this time when you worked towards this invention: