

Research and Planning Phase 1

1) Identify the big concept to be covered

The big concept to be covered is proposed to be how engineers “make things” to solve problems. We will explore what an engineer does and the utilization of the engineering design process to solve a given problem. The problem will be pertaining to the heart, exploring how the heart beats and how we listen to the beats. What is a stethoscope? Are there different kinds? Can we make one that works?

My goal is to utilize an anchoring phenomenon to “hook” the children into the activity.

I plan to have them watch a NASA film documenting Neil Armstrong’s heartbeat and heartrate on the Apollo 11 mission, without telling them what they are listening to.

How does his heartrate change as they approach the moon? What happens when he takes the first walk? Is your heartrate different after you run in comparison to sitting?

2) Learning standards

This activity is to be designed for the preschool age group. There are very few states that have any standards for this age group. There are no NGSS or Common Core standards as well. Massachusetts has a draft of Science, Technology and Engineering standards for this age group that will be explored.

3) Different types of problem solving and declarative/procedure knowledge needed

Some of the declarative knowledge necessary would be facts pertaining to the heart, such as what does it do?, what is a heartbeat?, how can we measure heartbeat?

With respect to the making of the stethoscope, properties of the materials used, as

well as how to cut, glue, tape, follow instructions, etc., would be necessary.

The problem solving would follow the engineering design process model, with logical trial and error being the dominant approach.

4) Explore objectives

Introducing engineering and the engineering design process as a means of approaching, thinking about and solving problems.

Emphasizing the process and analysis of the product developed.

5) Possible activities

Building a simple stethoscope

Utilizing a real as well as a student made stethoscope

Counting beats, comparing at rest vs. after running, comparing

Neil Armstrong's heartrate resting vs. moon landing