WELCOME to STEAM Education

We offer professional development for educators and parents to join a growing network of people contributing to a growing bank of lesson plans that relate to reality and the business world and uses all 9 subject areas (Science, Technology, Engineering, Social Studies, Language Arts, Fine Arts, Music, PE and Maths) all to add value to integrated curriculum.

UV Color Intensity

Use a UV bead to show how an exposure to UV rays (the sun) includes a transfer of energy over time to see a reaction.

**Supplies:**

- UV beads
- Mounting device – pipe cleaner, paper, etc.
- Timer
- Pantone Cards or Digital Art Program
- Optional: Sunscreen

**Base Instructions:**

1. Start with an unexposed UV bead. If it gets exposed, that is fine, just cover it up again until it is as ‘white’ as it will get. (Technology)

2. Mount the UV bead. Suggested: put it on a pipe cleaner and create a shape or hook to hold it on or glue or double-side tape it to a piece of paper (Technology & Fine Art)
3. Expose the bead to the strongest UV source that you have available. Usually you can either uncover it in the sun or use a UV spectrum light in a room without natural light. (Science)

4. When the bead has reached its darkest hue (color) match the color to find its RGB or pantone color code. If you don’t have pantone cards, a chart, or an advanced digital image program, many basic digital document editing programs have an option for choosing different colored custom fonts based on RGB colors. (Art & Maths)

5. Cover the bead until it is the most pale color it can get.

6. Prepare a timer to be ready for when you expose the bead again.

7. Expose the bead and time the UV reaction until it becomes its darkest color again. (Science & Art)

8. Record the time it took to turn that color. (Math)

9. Create a variable for the experiment (Science)
   a. Expose the bead in the direct sun and then in the shade
   b. Expose the bead in a direct sun and then next to a full-spectrum light bulb.
   c. Expose the bead while it is still versus agitating the bead. (PE)
   d. Expose the bead in the same UV light setting but with different things such as different types of fabric or various strengths of sunscreen (clean thoroughly between each application.) (Science & Technology)
   e. Develop a list of ways that UV beads are used. (Social Studies, Technology & Language Arts)
   f. Propose an idea of how UV beads can be used. (Engineering & Social Studies)
What are the STEAM elements of this activity?

**Science** – The properties of UV light that react with things to change their color.

**Technology** – How a polymer is used to react to UV light.

**Engineering** – How a polymer is made to react to UV light.

**Social Studies** – How the discovery of UV rays, and then the effects of UV rays have changed society.

**Language Arts** – following instructions, documenting changes, reporting on findings and applications, including the concept accurately in a narrative writing

**Fine Arts** – When and how UV reactions have been used in artistic creation and the spectrum of colors that can be produced.

**Music** – sounds of the beads themselves during the process – can put on elastic and make instruments

**Physical Education** – The positive and negative effects of UV rays on the body when exposed.

**Mathematics** - The analysis of transition of UV reactors as compared to the intensity of the UV rays and the reactors being used.
Polymer Links:

All polymers link in one of 4 ways, plastics, trees, people… learning these ways can be done in pre-school to lay the foundation for HS through PhD work of understanding one of the 4 categories of stuff (the tangible) in the world so that people can become knowledgeable citizens and scholars of whatever they wish to explore.

Supplies:

- Plastic Cording
- Beads

Instructions:

Link Beads together to create the types of polymer bonds shown below.

(a) Linear
(b) Branched
(c) Crosslinked
(d) Network (3-D)
What are the STEAM elements of this activity?

Science –

Technology –

Engineering –

Social Studies –

Language Arts –

Fine Arts –

Music –

Physical Education –

Mathematics -