UV Experiment: Which fabric will best block ultraviolet rays?

**Purpose:** To determine which summer fabric best blocks ultraviolet rays.

**Materials and Equipment**
- 320 UV pony beads (40 of each color: purple, blue, pink, orange, yellow)
- 15 cm X 15 cm white linen fabric
- 15 cm X 15 cm white muslin fabric
- 15 cm X 15 cm white terry cloth fabric
- 15 cm X 15 cm white polyester knit fabric
- 15 cm X 15 cm white cotton knit fabric
- 15 cm X 15 cm white cotton twill fabric
- 15 cm X 15 cm white denim fabric
- 8 Styrofoam plates
- 8 pieces of black construction paper straight pins
- Scotch tape
- white wool yarn
- Equipment
  - scissors
  - clock
- UV Bead Scale

**Procedure**
1. Trace eight circles on black construction paper using one of the Styrofoam plates. Cut out the seven circles and tape each circle to the bottom of a Styrofoam plate.

2. Cut a 15 centimeter X 15 centimeter square out of each of the following fabrics: linen, muslin, terry cloth, polyester knit, cotton knit, cotton twill, and denim. Center each square on the construction paper side of a Styrofoam plate and secure each of the four corners with a straight pin. Push the fabric up to the top of the pin so that there is some space (no more than 3 centimeters) between the fabric and the construction paper. There will be one construction-paper covered plate left over for the control. Label each plate with the type of fabric or “control”.

3. Make eight bracelets using UV pony beads and white wool yarn. Cut eight pieces of yarn 25 centimeters in length. Make a large knot at the end of each piece of yarn. Thread pony beads on each piece of yarn in the following pattern: 5 yellow, 5 blue, 5 pink, 5 orange, 5 purple. Move the beads to the center of the yarn and make a knot with the two ends of yarn joining the beads at each end and forming a circle. Cut off excess yarn.

4. Place each of the bracelets under a piece of fabric mounted on one of the plates covered with black construction paper. Place the last bracelet on the plate without fabric to serve as the control.

5. Take each plate outside and place in direct sunlight at 12:00 P.M.
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6. Record the reactions of the beads on each bracelet by carefully looking under each piece of fabric without exposing the beads to any direct sunlight. Use the UV Bead Scale to rate the amount of UV rays that are getting through the fabric.

7. Record the reaction of the control beads using the UV Bead Scale.

8. Repeat steps 5 through 8 on ten different days in midsummer.

Data Table:

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<th>Fabric</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Test 5</th>
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<th>Average</th>
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Extensions:
1. Obtain and test fabric that claims to block all UV light.
2. Test fabric when it is wet to see if it alters the amount of UV light it allowed through.
3. Consider testing SunGuard, a laundry additive to increase sun protection of clothing.

Reflection Questions:
Did the type of the fabric make any difference in the amount of UV light it allowed through? Use your data to explain your answer.

Did the color of the fabric make any difference in the amount of UV light it allowed through? Use your data to explain your answer.

Special UV blocking clothing is now being sold. Based on your results, do you think it is worth the extra money for this specialty fabric? Explain.

Resources:
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UV Index plus monthly and yearly data
http://www.epa.gov/sunwise/uvindex.html

Sun Protective fabrics
http://www.rockywoods.com/Fabrics-Kits/Sun-Protective-Fabrics
http://www.therainshed.com/

Student's Guide to Ozone and UV
http://uv.biospherical.com/student/default.asp

Conclusion:
As a reflective practitioner, make notes about what worked well, and what aspects of the lesson could be improved.
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UV Bead Scale

Rating/Amount of UV Rays/Change in Beads:

0 None: No color change.

1 Minimal: Very pale purple and very pale blue.

2 Low: Pale purple, pale blue, and very pale coral.

3 Moderate: Bright purple, bright blue, pale coral.

4 High: Bright purple, bright blue, bright coral, pale orange, and pale yellow.

5 Very High: Bright purple, bright blue, bright coral, bright orange, bright yellow.

6 Extremely High: Intensely bright purple, blue, coral, orange and yellow.