Invisible Light - Teacher's Notes

Invisible Light

As scientists we are obliged to test all ideas before we can agree or disagree with them. Our Western Australian schools usually have a rule "No hat - No play". It insists that students should not be allowed outside without their hats. Lets find out why.
Teachers may say that nasty ultra violet light will damage our skin and eyesight and that a hat will help counter this but is this so? You can't see, hear, taste, smell or feel this threat.
I have tested this activity in the south of this state in cold midwinter with a slight drizzle falling. It still works! It takes the stress out of having to keep hassling students about their hats as they leave the classroom.

Materials per student

- School hat. If students do not have hats fold a 'pirate' hat from a double sheet of newspaper.
- A box of UV beads (available from Scitech – enough for two classes was just under $10 in 2016 – educational suppliers or other Internet sources). I find getting all the beads the same colour stops bickering. Pale yellow beads are the least sensitive to UV light.
- Half a length of pipe clear for each bead
- A UV torch (if possible)

Method

1. Thread the pipe cleaner through the hole in the bead and twist it once to keep it in position (and to stop it rolling away and getting underfoot).
2. Ask students to use their five senses to observe the bead (NOT the pipecleaner). They should enter their observations into the table.

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Sight	Feel	Hearing	Smelling	Taste
Cylinder White Solid/hard Has a hole Plastic Translucent Has a join Shiny	Hard/solid Has a hole Cylinder Has a join smooth	No sound	No smell	We do not taste things in Science

3. Ask students to wind the pipe cleaner around their third finger on their left hand (they are now 'engaged to Science'). Students may need to help each other.
4. Explain that we have
    - The same students
    - In the same place
    - At the same time
    - With the same type of bead
    - On the same finger
    - Of the same hand
5. Ask students how many things should we change in a Science experiment that is a 'fair test'? ONE!
6. Take students out to a sunny or well lit position and ask them:
    - If the bead sounds different? No
    - If the bead feels different? No
    - If the bead smells different? No
    - If the bead looks different? Yes. The bead has changed colour.
7. Ask the students what it is about being outside that is different from being inside that could have reasonably cause the bead to change colour. Standard answers are heat/cold, light, wind, grass and

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occasionally that it is a 'mood' bead (as students are happier outside)

8. Ask student if they, as scientists, would believe any of these ideas without testing. NO!
9. Take students back inside the classroom and test their ideas.

Idea	Test	Result
Heat	On the outside of their top place the bead in their warm armpit for 10 seconds.	Nil
Cold	Put the bead on the cold linoleum floor or cold bench top for 10 seconds.	Nil
Wind	Blow on the bead for 10 seconds.	Nil
Grass	Place some grass on the bead for 10 seconds.	Nil
Light	"Power ranger" point the bead at the ceiling light for 10 seconds.	Nil
Mood	Split the class into two. One half whispers nice things to the bead whilst the other half whispers about the bead's shortcomings.	Nil

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Students may appreciate that something outside did cause the change but our human senses cannot observe the cause. When we returned inside that energy was no longer present.
If you have a UV torch you will be able to shine it on the beads and they will change colour.
Ask students to complete the questions on the worksheet.

What specifically caused the bead to change colour? Ultraviolet light

Where did this energy come from? The Sun

Why do we need to protect ourselves from this energy? Because it is harmful

Why do all schools in Western Australia have the same rule?

NO HAT
NO PLAY

To protect their students

Should you have used a hat and sunscreen today? Yes

Ultraviolet light causes skin cancer and can also contribute to the growth of pterygiums over the eyeball. Wearing your hat and appropriate clothing will decrease your risk of cancer.
Students may put the bead under their school hat and walk outside. Under the shade of the hat the bead will/should remain white.