Day 4. Crazy putty

Learning

Liquids can be poured and they take the shape of the container they are poured into. Solids hold their shape. Sometimes you can have a fluid that is both liquid and solid (called a non-Newtonian fluid). Crazy putty (also called flubber) and Oobleck are both non-Newtonian fluids – their viscosity changes when force is applied. At rest, they are like thick fluids, but when pressure is applied they act like a solid.

You need:

Clear plastic cups containing some water, containers
Marbles or small solid balls
Made-up ooblek (2 cups of cornflour in a mixing bowl; add a few drops of food colouring. Slowly add 1 cup water a little at a time, mixing it with fingers until it is the consistency of honey – put a little into ziplock bags (6-8) for chn to feel in their groups)
Skewers broken into stirring sticks (discard sharp ends)
Computer/screen/projector
Small tasting cups – one per child
1 small ziplock bag per child
Felt pen – to name bags
Ingredients for crazy putty: Borax solution (mix 2 tsp borax in 8Tbs hot water)
Good PVA e.g. Craftworks or Elmers

What to do:

1. Ask what is a liquid? Pour water from one cup to another. Is water a liquid? Why? (You can pour it and it takes on the shape of the container). Is this a liquid? Pick up a marble or ball. Is this a liquid or solid? What is a solid? Tip the marble into a cup. Does it take on the shape of the container? (it holds it's shape). Can you have something that is both a solid and liquid?
2. Show made up Ooblek. Pour it. Does it pour? Go into the shape of another container? Get a child to hit it. Is it hard? Roll it into a ball. Tell them to feel it in their fingers, pour it, make it into balls. Is it a liquid or solid – or is it both?
3. Give each group a ziplock bag with Oobleck in it. Children pass it around – feeling it in the bag. Leaders could open bags and encourage children to drip some off their fingers or to take a little and roll it on their hands.
4. Watch **https://www.youtube.com/watch?v=BN2D5y-AxIY** Reinforce idea of cornflour and water being both a liquid and solid – a non-Newtonian fluid. It goes hard on impact (when something is pushing against it forcefully).
5. Crazy putty is another non-Newtonian fluid. You can make a ball with crazy putty. To make crazy putty you mix glue with a substance called borax. A chemical reaction occurs with this non-Newtonian fluid. You will make your balls in your small groups.
6. **Leaders have ingredients ready for children in their groups.**
   Groups are sitting on a large plastic sheet to protect the carpet.
   Each child has 1 small plastic tasting cup half full (1Tbs) of glue and a stirring stick.
   Divide borax solution into 6-8 separate cups so each leader can dispense it. Children choose a food colouring and leaders add a few drops to their glue. Children use stirring stick to stir colouring into glue.
7. Leaders add 1/2 teaspoon of borax solution to children's glue. **Do not stir.** Allow the ingredients to interact on their own for 10-15 seconds and then children stir them together to fully mix. Once the mixture becomes impossible to stir, children pull the mixture off the stick and start moulding the ball with their hands.
8. The ball will start out sticky but will solidify as they knead it. Once it is less sticky try bouncing it. Store in a sealed zip lock bag. Take home.