



Drawing for STEM Action Research

By Paul Carney, paulcarneyarts@gmail.com

If you are a teacher or educator in an educational setting from Year 5 (Grade 6) to any age, I'd love you to take part in this action research which will contribute to a paper I'm writing called; 'Creativity, can it be Taught?' due to be released in 2019.

What I'd like to know is how effective my visualisation drawing exercises are at improving your student's ability to conceptualise and create mental images to solve problems. To take part, choose a time in your academic calendar when you can allocate five brief teaching sessions over a short period of time, (two weeks at the latest).

Day One: the Alternative Uses Test

In this test you will be required to try to think of as many different uses as you can for a familiar object. For example, below are some alternative uses for a brick:

- A step
- A paperweight
- A diving aid
- A cheap dumbbell

They might try to think of some more uses for a brick and shout them out. Make sure all students understand the concept and what is required of them.

Now write down as many alternative uses as you can for a Paper Clip, in silence on your own in 2 minutes. (You'll need to time them.)

Day Two: Each participating student is to attempt one of the exercises from the Olaf's Mad Machines worksheet - 15 minutes allowed.

Day Three: Each participating student is to attempt one of the exercises from the Visualising Sounds worksheet - 15 minutes allowed.

Day Four: Each participating student is to attempt one of the exercises from the Surreal Viewpoints worksheet - 15 minutes allowed.

Day Five: Each participating student should complete a different exercise in the Alternative Uses Test - 2 minutes allowed. Make sure students understand what is required of them and refresh their memories using the brick alternative uses if need be before they begin.

Write down as many different uses as you can for a ping-pong ball, in 2 minutes, in silence on your own.

THANK YOU SO MUCH!!!!

visit www.paulcarneyarts.com to enter your results



Scoring the Alternative Uses Test

(Note: you do not need to mark or score any of the Visualisation exercises. You are only scoring the first and last alternative uses test. These can be done in class with the students but you should check them over to ensure they are marked correctly.)

Results of the test are measured across four sub-categories:

- **Fluency** – the number of alternative uses you can think of. Mark as a total number.
- **Originality** – how unusual those uses are – evidence of ‘thinking differently’. Same or similar responses score zero points. Responses given by less than 5 students in a class of 30 would be unusual and score 1 point. Completely original responses score 2 points.
- **Flexibility** – the range of ideas, in different domains and categories. Group responses that fall into similar categories and score 1 point for each category.
- **Elaboration** – level of detail and development of the idea. One or two word answers score no points, but answers that are expanded upon score 1 point for every extra alternative use. For example; answering that a brick could be a step scores zero points. But answering that a brick could be a step that then creates a staircase scores 1 point for the additional alternative use of the brick.

Example Scoring

Ping Pong Ball

- Cat Toy
 - Float for fishing line or tie them together to make a float for a net. (*1 Originality point*) (*1 Elaboration point*)
 - Blow football game
 - Lottery balls
 - Bingo
 - Magic Tricks
 - Firing them from guns
 - Make a ping pong ball hat (*1 Originality point*)
 - Goldfish bowl throwing game at the fair.
- **Fluency** – 9 uses in total = *9pts*
 - **Originality** – compare each response to the responses from all of the people you gave the test to.
2 unusual ideas = 2pts
 - **Flexibility** – Most of the ideas were games related, except a float and a hat. So 3 ideas categories were used = *3pts*
 - **Elaboration** – One answer was elaborated into a second use so *1 point*

Total = 15 points

Now visit www.paulcarneyarts.com to upload your results on the online form

visit www.paulcarneyarts.com to enter your results

Olaf's mad mechanical machines

by Paul Carney

King Olaf is a rather demanding King who doesn't take no for an answer. If he wants something he gets it and he has a team of devoted scientists, mathematicians, engineers and inventors to build anything he wants. Use the resource sheet attached to invent:

1. A cloud catching machine.

Invent a cloud catcher to catch all the clouds blocking the sunlight from king Olaf's sun bed, squeeze the rain from them, use it to water the plants, then put the empty clouds somewhere else. You'll need to think of:

- How the machine will reach that high.
- Stability.
- How you will catch the clouds.
- How you will drain water from them.
- How you will move the clouds away from the King's sun bed.

2. A tree topiary cutting machine.

King Olaf wants all the trees in his kingdom to be cut into funny animal shapes. Invent a machine that could do this. You'll need to consider:

- How to get your machine to any tree in the kingdom.
- How it will reach up to high and low branches.
- How it will move in complex ways to create the shapes.
- How you will cut big branches safely.
- How you will remove the unwanted debris.

3. A sheep hair-straightening machine.

The king hates curly hair. Invent a machine to straighten all the sheep in the kingdom's coats. You will need to consider:

- How to catch the sheep.
- How to hold them in place safely.
- How to move your machine around the sheep.

4. A bird-painting machine.

The king is dismayed that the birds in his lands are such boring colours. Invent a machine to paint the bird's different colours and patterns. You will need to consider:

- How to catch the birds safely.
- How to hold them in place so as not to hurt them.
- How to make different shapes and patterns on the birds.

5. A mountain-moving machine.

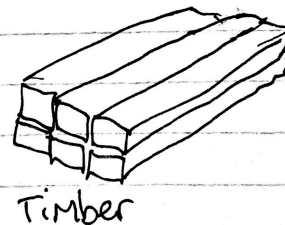
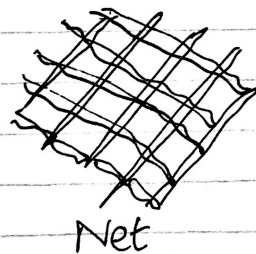
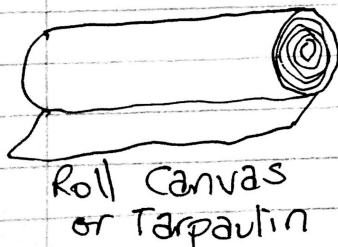
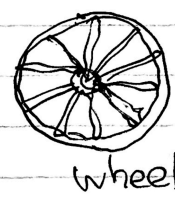
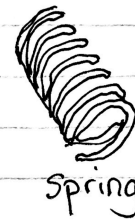
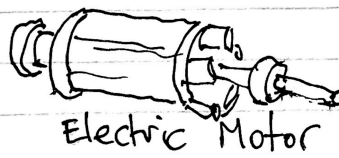
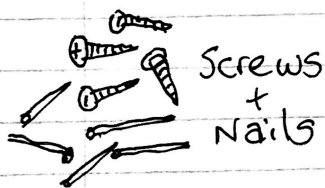
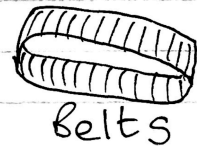
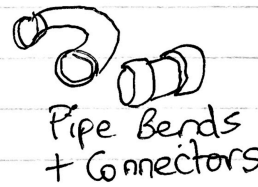
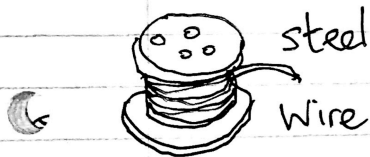
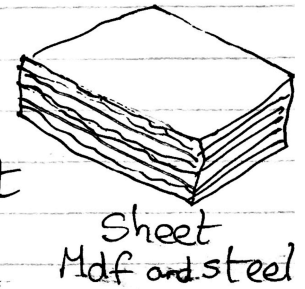
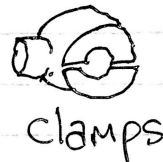
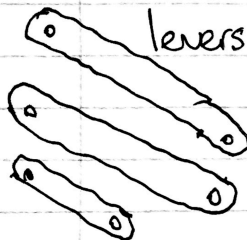
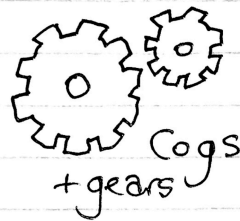
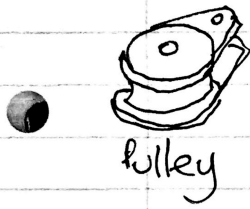
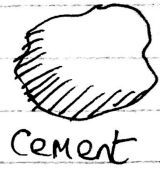
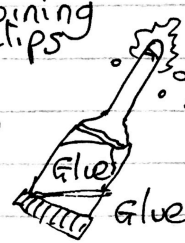
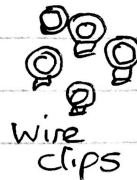
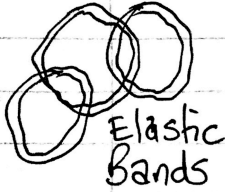
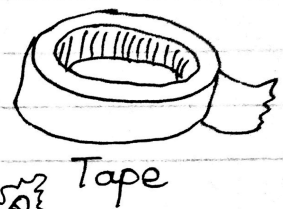
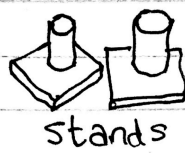
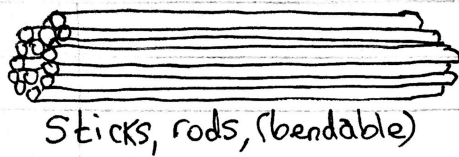
The king has a few mountains in his kingdom that he thinks are blocking his view of the sunset. He wants a machine inventing that can move them out of the way a few hundred miles or so. You'll need to consider:

- How you are going to cut into solid rock.
- How you will move large quantities of earth and rock.

Rules:

No drones, or computers. The king likes levers, pulleys, gears, and mechanical machines.

You must only use the items on the list plus up to 3 items of your own choice.



Rules:

No drones, or computers. The king likes levers, pulleys, gears, and mechanical machines

Surreal Viewpoints

For this exercise you must create a drawing from three words selected at random from the lists provided. You might add extra words to the list yourself. It would be a good idea to cut the words out and place them in separate bags so you can make a blind choice.

Task: Draw an image of an **adjective noun** from the perspective of a **viewpoint**.

	Adjectives	Nouns	Viewpoints
1	Surreal	Ice Cream	Slug
2	Magical	Dog	Tyrannosaurus Rex
3	Monstrous	Chair	Soaring Eagle
4	Acrobatic	Sandwich	X-Ray
5	Soporific	Hairbrush	Telescope
6	Excitable	Key	Microscope
7	Glamorous	Teapot	Sound Wave
8	Brave	Clock	Bacteria
9	Aggressive	Pizza	Quantum particle
10	Creepy	Shirt	Cloud

Visualisation drawing exercises

(Please see the appendix for resources to accompany these exercises)

Onomatopoeia

Onomatopoeia is a word that mimics the sound that it names. Onomatopoeia in nature would be words imitating sounds in nature. For this exercise I want you to draw what you imagine might make these strange sounds. The only rule about this exercise is that you are NOT allowed to copy anything directly from the known world. For example; you can't simply draw a known animal for any of the words, but you can base a new original composition based on features of flora and fauna (or objects) that you know of. You ARE allowed to adapt, alter and change aspects of things you know and are familiar with into something new, but your work must be an entirely original composition.

Read the words carefully in your head until you feel comfortable with them. Follow the instructions alongside the word to find out how they should sound. Then simply sketch out what you think might make that sound. Remember, it doesn't have to be a creature. Lots of things make sounds; something falling, vibration of something in the air or water, movement of some kind, musical instruments, or all the various sounds the weather makes.

Lastly, try to imagine what kind of thing would make this sound? Is it a tiny object moving slowly through rough terrain? Is it something whooshing through the air? An attacking roar or a defensive cry? Is it being made underwater? In another atmosphere or strange environment? The only limit is your imagination.

1. A high-pitched sound with a moderate tempo: KRRNGEH KRRNGEH RAK RAK WRRRRRRR
2. A shrill, frantic sound with a fast tempo: ZF-I ZF-I ZF-I ZF-I ZZ F ZF
3. A deep, bassy sound made with slow, monotonous rasp: AVOOOOOO WAAAAAH. MIY-AN-QUAAAAAAA
4. A garbled mid-pitch noise produced at medium tempo: GGGGHAR-RA-KOOOO
5. Low pitched and fast: CHWOB WOB WOB. CHWOB WOB WOB
6. Sprawling, reedy cry: OOOOOOOOOOOO YANK-OOOOOOO
7. A quick, mid-pitched rattle: KWAN TEE YAA KNEE.
8. Ponderous, deliberate vibration: SSSSSHHHAAAA - U. ASSSSSSHHHHAAAA - U
9. Screeching, quick paced and alarming: HYIKA CHYIKA CAKKKA KA KA KA KAAAAA
10. Languished, plodding beat: TRP TRRP TRP TRRRP TRRRRRRRRP.