

Public Lesson: Upside Down World

Summary of Public Lesson:

In this lesson students are introduced to a narrative in which the world gets flipped upside down. Students are asked to step into the fantasy world and play the role of protagonists, as they must re-build the upside down world right side up again. Students are asked to examine a series of upside down buildings constructed with multi-colour interlocking cubes. Students take turns offering a description of how to re-construct the building the right side up again. With cubes in hand, students listen to the description and build accordingly. One building at a time, students check and compare their newly constructed building to the original in the hope that they have built a perfect replica. The lesson concludes with students having the opportunity to build their own upside down building and then describing how to build it the right side up to a partner.

Learning Objectives:

- Spatial Visualization
- Spatial Reasoning and Problem Solving
- Composing 3D figures
- Spatial Language (on top, beside, left, right, flip, etc.)

Materials:

- Teacher prepared buildings constructed with interlocking cubes (each building should be of increasing difficulty).
- For each student, 1 bag of interlocking cubes (number of cubes dependent on number required to build the preconfigured buildings, plus additional cubes for student designed buildings)

Lesson Progression:

Visualization Warm-up

- 1. You've been doing a lot of building with cubes. In this activity I'm going to give you some instructions so that you build a shape in your head. So here are the instructions: In your head, imagine 3 blue cubes and 1 green cube (Hold them up).**
- 2. Take 3 blue snap cubes and snap them together in a row and lay them on the ground (all 3 touching the ground).**
- 3. Then take one green cube and put it on top of the middle blue cube.**
- 4. Does everyone have a picture of that in your heads? How many cubes are there altogether?
So there are 3 blue on the bottom and one green on the top in the middle.**
- 5. Now does everyone picture this shape in your head?**
- 6. OK, now picture the shape and flip it upside down.**
- 7. Can you picture it?**
- 8. Can you describe what it might look like?**

9. Show students the pictures on the iPad and ask them to point to the one they are picturing
10. **Why didn't you choose the others?** (Reason why it is not one of those shown).

I. Activation of Student Thinking

- Students introduced to narrative of upside down world and then asked to consider what our world would look like if flipped upside down
- Once students are thinking 'upside down,' introduce the problem.
- Show students the upside down world (a set of 4 or 5 upside down buildings pre-constructed with interlocking cubes) and tell them that the characters in the story need their help in re-building their world the right side up

Narrative Used:

Imagine a world far in the future where everything is made of cubes. The buildings, trees, cars, and homes are all made of cubes. Place a tray of 4 3D objects in the centre of the carpet. **You are giants visiting this future world. Look at this city. What do you see?** (allow for some answers) **These are some of the buildings in this future world. Could you imagine living in one of these buildings?** Then remove all but one building. **If you were a builder in this city and wanted to make an identical building how would you do it? Can a volunteer explain to us how to make this building? Here is our challenge. You can only place each cube as he/she tells us how to do it. You can't pick up the building.** Children use the cubes in their baggies to build the tower.

Now imagine this future world where everything is made of cubes. The people are shopping, working, going to school, life is fun and everyone is happy. I'd like you to meet George. George walks to work every morning. On his way to work he passes a building which has a red button on it. Everybody walks past the red button and no one ever stops to touch it or to look at it. But George is very curious. Every day he wonders what the button is for. What would happen if he pressed it? Well one day, George decided to press the button. Immediately the ground began to shake, the buildings began to move and everything in their world turned upside down!

Can you imagine what Toronto would look like if it was flipped upside down? Turn the buildings on the tray upside down. **What do you think this would look like?** (allow for student responses) **It was chaos. The trees were**

upside down, people were walking on the ceilings, the doors were at the top of the buildings...etc.

Now George was very upset. He didn't mean to ruin the city. He was going to make it right. Luckily George was a builder. So he was determined to rebuild the every single building right side up. How is he going to do that? (allow for student responses)

2. Development of Ideas

- Introduce students to the idea that they will be taking turns describing to one another how to construct the building
- Students are to listen carefully and build according to the description offered by the speaker
- Model for students what this might look like using lots of spatial positioning words (on top, beside, in front, left, right, etc.)
- Facilitate lesson as students take turns describing how to re-build the upside down world (e.g., scaffold students use of spatial words, ask prompting questions, Did you mean on top, etc.)
- After the completion of each building, check and compare students' buildings to the original (if need be, flip the upside down building for a more accurate comparison)
- After all buildings have been re-built, invite students to build their own building with half of their left over cubes
- Have students pair up and take turns describing to their partner how to re-build their structures
- Using their remaining cubes, students listen and build accordingly

Narrative Used:

If you were going to rebuild the building where would you start? Have a student respond and show using the first building as an example. Have a volunteer describe to the class how to build the building right side up starting from the base/bottom. Students use the snap cubes in the baggies. **Rules – can't build ahead of the instructions and can't pick up the object**

When the building is made right side up, we can flip the original and put the others alongside to compare. * Review/highlight terminology: flips and turns.

Continue with building #2. Have a student volunteer give the instructions to build the shape. Then flip the original and compare.

Students work with a partner to build the 3rd and 4th shapes. Each takes turns giving the instructions.

3. Consolidation of Student Thinking:

- Thank the students for their help in re-building the upside down world
- In comparing the upside down world with the newly build right side up world, ask students to reason about what you have to do to one building to make it look the same as the other (e.g., What do I have to do to this building to make it look the same as this one? As a teacher, emphasize flips and rotations).
- Ask for students thoughts about the activity – What did you find challenging? Were you able to picture the building the right side up in your minds?

Questions to Consolidate Learning:

- **What strategies did you use to build the building right side up?**
- **How did you know the 2 figures were the same?**
- **What kind of words did you use to help your partner try to build the figure?**
- **Were you able to make the object? Why or why not?**
- **What did you find challenging in this task?**