

An Early Years Design Challenge - Plant Stand

by Aileen Najduch

Early/Middle Years Science Consultant

Manitoba Education, Training and Youth

The following "design brief" describes a design challenge for grade 3 students. It follows a format established for use by teachers in the Kindergarten to Grade 4 Beyond Orientation Sessions.

STUDENT INFORMATION:

Plant Stand

You decide to keep a plant in your room. You put it on the dresser and notice that the plant isn't high enough to get the light it needs.

Challenge: To make a support to hold your plant at a higher level so it will get more light.

TEACHER INFORMATION:

Outcomes addressed by this design challenge:

Thematic Cluster Outcomes Grade 3, Cluster 2: Materials and Structures

| | |
|--------|--------|
| 3-2-03 | 3-2-06 |
| 3-2-04 | 3-2-08 |
| 3-2-05 | 3-2-11 |

Cluster 0 Design Process Outcomes

| | |
|--------|--------|
| 3-0-3d | 3-0-4e |
| 3-0-3e | 3-0-4f |
| 3-0-3f | 3-0-4g |
| 3-0-4b | 3-0-4h |
| 3-0-4c | 3-0-5b |
| 3-0-4d | 3-0-7c |
| | 3-0-8c |

Note: This design challenge also provides a link with Cluster 1: Growth and Changes in Plants.

Suggested materials:

- 12 plastic straws
- 12 sheets of paper
- 12 popsicle sticks
- 6 pipe cleaners
- 10 paper-clips
- modeling clay
- masking tape
- string
- scissors
- ruler

Alternatives:

- Students could be provided with a budget and then required to purchase materials they want to use, while staying within the budget.
- Masking tape could be limited to force students to think carefully about how to use it (as opposed to totally covering their structure with it), or left out completely, increasing the challenge.

Note: These are suggested materials only, you may provide students with all or none of these materials, or substitute other available materials.

Suggested criteria:

- raise the plant 25 cm higher
- hold a mass of 200g (or a classroom plant/standard container)
- allow easy access for watering
- stable
- aesthetically pleasing

Note: criteria should be developed **with** the students.

Required Prior Experiences:

In order to ensure student success with this design challenge, students should have the following prior experiences:

- experience working with and joining the materials (e.g. straws, pipe cleaners, popsicle sticks)
- experience with structures (e.g. familiar with concepts related to stability, balance, etc.)

Note: The design challenge should be an opportunity for students to apply what they have learned with materials they are generally familiar with. Completing this challenge should not require the teaching of NEW information or skills.

Guiding Student Planning

The following questions can be used to help facilitate student planning:

- What are all the different ways...
 - to join materials?
 - to make materials stronger?
 - to make structures more stable?
 - to make a structure aesthetically pleasing?
 - to support the plant
- What different shapes are strong and stable?

Assessment Suggestions:

Use the following table to assess whether students have met the criteria (this can also be a self or peer assessment). The emphasis is NOT on how well they met each criteria, but on continuing to modify their support until it meets all of the criteria.

Meeting Criteria

| Criteria | YES | NOT |
|---------------------------------|-----|-----|
| raise the plant 25 cm higher | | |
| hold a mass of 200g | | |
| allows easy access for watering | | |
| stable | | |
| *aesthetically pleasing | | |

*Should just be an indication that students **made an attempt** to improve the aesthetic appearance of the plant holder, NOT how well they succeeded.

Skills Checklist

The student...

- understands the problem
- actively participates in brainstorming and development of a plan
- contributes to the development of criteria
- helps construct the structure
- tests the structure based on given criteria
- identifies and makes improvements to the structure
- works cooperatively
- shares group responsibilities

Student/Group Assessment of the Process

As a group, we...

planned our structure before building

reflected on our plan before the construction

cooperated and shared ideas as we were building

tested our structure and made changes

reflected on what we did well and what we would change the next time

Blackline Masters for general self and group assessments are also provided in *Kindergarten to Grade 4 Science: A Foundation for Implementation*.

Other possibilities:

- Students could do an oral presentation describing their final product, how their plan evolved, and what they would do differently next time with an appropriate oral presentation assessment tool utilized for assessment.
- Students could hand in their Design Process Recording Sheet (see BLM section, *Kindergarten to Grade 4 Science: A Foundation for Implementation*)

(Original idea from *Alberta Classroom Assessment Materials Project - CAMP*)