What's My Structure?

Mathematics

Intermediate Grades 3–5

Purpose

Using this activity, students will:

- Use the language of mathematics to describe in words a 3-D structure created with one-inch cubes
- Interpret a written description of a 3-D structure and re-create it with one-inch cubes
- Use QuickTime Virtual Reality (QTVR) technology to represent a 3-D structure made of one-inch cubes
- Communicate mathematical ideas with others outside of their classroom

Description

Note: This project requires two classrooms working together. They do not need to be far apart, but distance enhances student motivation.

In each of two classrooms, students create individual structures using 10 one-inch cubes. They describe their structure in words, using mathematical language. Descriptions are shared with the partner classroom by e-mail. Students in the partner classrooms try to re-create the original designs based on the written descriptions. Clarifying questions and answers are exchanged. Once the structures have been created, students represent them with QTVR movies. These movies are either sent back to the original creators by e-mail or posted to a Web page. Students check the QTVR movies of their designs for accuracy.

Activities

	MATH STANDARDS	NETS PERFORMANCE INDICATORS GRADES 3–5
1 Select a partner classroom at the same grade level. To find partner classrooms, check the sites listed in Tools and Resources. Pair students in classrooms or in pair-student groups to facilitate direct communication. Have students get to know their partner through introductory activities such as exchanging information about interests—while honing telecommunications skills.		8, 9
2 Each student creates a structure using one-inch cubes. Suggested parameters include using all 10 cubes in at least two layers so that the structure stands freely on its own. Each structure must take up no more area than an 8-inch by 10-inch piece of paper. Every cube must have at least one face touching another cube. Remind students that they need to use precise language when describing their designs. Their designs, therefore, cannot be too complicated. *Note: This activity is best done with both classes designing structures and then exchanging the descriptions of the structures. All students, thus, are both designers and interpreters.*	MATH 3	
3 Review mathematically descriptive language that is appropriate to the setting and age level. Words and terms such as *vertex, edge, plane, face, top, bottom, left side, right side,* and *rotate* are important.	MATH 3, 10	

	MATH STANDARDS	NETS PERFORMANCE INDICATORS GRADES 3–5
4 Students write a description using mathematical language that is precise enough for another student to re-create their design. Have students e-mail their descriptions to their partners in the other class. Partners can, in turn, respond with clarifying questions.		1, 4, 6, 8, 9
5 Have the student designers use QTVR technology or QuickTime to make a movie that documents their design. This movie will be used to compare original designs with partners' conceptions of the structures.	MATH 3, 8	4, 5, 7
6 Students can either exchange movies by e-mail or post them to a Web site.	MATH 3, 8	4, 5, 6, 7
7 The designers check to see that the partners' movies correctly represent their designs. They communicate with their partners, letting them know the designs were correct or explaining how they were not. Students must provide feedback to designers on the strengths and weaknesses of their descriptions.	MATH 3, 6, 8, 10	4, 6

Extensions:

- Use simulation software to design cities, farms, and so on with specific dimensions and components.
- Use outlined LEGO blocks obtained electronically from LEGO at www.lego.com/worlds.asp/

Tools and Resources

SOFTWARE:

- Rendering or illustration (e.g., Dabbler, Adobe Illustrator, Adobe Photoshop, ClarisWorks for Kids, AppleWorks)

WEB SITES:

- For finding keypals/project partners:

  epals Classroom Exchange:
  www.epals.com/

  Global Schoolhouse:
  www.gsn.org/

  Intercultural E-Mail Classroom Connections:
  www.stolaf.edu/network/iecc/

  Global Rigby:
  www.reedbooks.com.au/rigby/global/keypal.html

  Web66:
  http://web66.coled.umn.edu/

  Kids' Space Connection:
  www.ks-connection.org/

OTHER:

- Enough one-inch cubes for each child to have 10 cubes
- To create a QTVR movie, students need a digital camera, free software available on the Web, a black backdrop, a turntable, and a tripod. Complete directions, equipment, and links to free software can be found at QuickTime VR (www.learningspace.org/qtvr/) and Apple Computer, Inc. (www.apple.com/).

Assessment

Students can be assessed in three areas:

- Their written description of their structures
- Their re-creations of structures based on other students' descriptions
- Their QTVR movies of the structures they re-created.

Note: A rubric for each area should be created in collaboration with students.

Credits

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Comments

This activity is a spin-off of a common activity done in classrooms in which students are paired but have a barrier between them so they cannot see each other's creations. Distance communication forces greater mathematical precision in their descriptions.

The written description is a meaningful experience for children that forces them to use correct geometrical terms such as face, edge, *and* planes. *QTVR is also a practical use of angles and distances. Students love the challenges of this project and really develop their communication skills in math and technology.*

QTVR can be attached to Web pages and HyperStudio stacks.