

Workshop 5

Idea-Making

This workshop will focus on student idea-making in mathematics. Constance Kamii will explain how you can adapt your teaching to help students construct their own mathematical ideas. You will see video of students engaged in “mind mathematics” articulate and defend their strategies to classmates, and you will consider the value of using games to facilitate mathematics teaching and learning.



CONSTANCE KAMII

Professor of Early Childhood Education at the University of Alabama at Birmingham, Constance Kamii studied under Jean Piaget for a dozen years, first as a postdoctoral research fellow and later as an adjunct professor at the University of Geneva. She developed a preschool curriculum based on Piaget’s theory, especially in science, mathematics, and the sociomoral realm, and is now developing an elementary math program based on his theory. Kamii is the author of *Young Children Reinvent Arithmetic; Young Children Continue to Reinvent Arithmetic, 2nd Grade*; and *Young Children Continue to Reinvent Arithmetic, 3rd Grade*.

Workshop 5 timeline

GETTING READY

30 minutes

15 minutes—Game Play

You were asked to bring in some common household board, card, and dice games. Divide into small groups and select a game to play. While you are playing, think about what (if any) math skills students would need to play the game successfully. What are some math concepts (if any) that students might learn from playing the game?

15 minutes—Game Discussion

Rejoin the large group and discuss the following: How does playing games compare to more traditional math exercises such as worksheets, flash cards, or problem sets? What are the advantages of games? Disadvantages?

WATCH THE WORKSHOP VIDEO

60 minutes

GOING FURTHER

30 minutes

30 minutes—Tricks and Procedures

When asked in her interview what headline she would give to a newspaper article about her approach to learning, Dr. Kamii said, “Traditional math education harms children’s development of numerical thinking.” She went on to explain her belief that teaching children to memorize rules and algorithms such as carrying, borrowing, and long division prevents them from inventing their own solutions to problems and forces them to give up their own thinking.

Do you agree that teaching algorithms and procedures, tricks and equations, has a negative effect on student learning? What are the advantages of algorithms from a teacher’s perspective? From a learner’s perspective? What are the disadvantages? How would your school district react to Dr. Kamii’s statement?

For next time



HOMework ASSIGNMENT

How comfortable are you with letting students develop and pursue their own inquiry? To test your comfort level, try this—during the next week, incorporate into a lesson some sort of class discussion in which students can talk about their opinions or rationales for solving something. During this class discussion, see how many times you can let the comments pass from student to student without an intervening question or comment from you. It's not easy!

How many students were able to speak consecutively before you spoke? When did you intervene? Why? What sort of discussion was happening when you jumped in? What could you do next time to let the discussion go further on its own?

READING ASSIGNMENT

In preparation for Workshop 6, please read “Developing the Spectrum of Human Intelligence” by Howard Gardner. (All readings are included in the Appendix.)



MOON JOURNAL

You might want to reflect on the following in your Moon Journal:

Why does the Moon appear to shine?

Why does the Moon appear to change its shape?

Is there an order to the Moon's phases? If so, can you determine the order?

Suggested activity



Modeling the Phases of the Moon

To do this activity effectively, the room must be as dark as possible. Darken the room by closing the blinds and covering all window and door cracks with black paper or cloth and tape.

MATERIALS:

Lamp
Extension cord
Clear light bulb (75 watts or more)
3-inch Styrofoam ball
Craft stick

INSTRUCTIONS

1. Make a “handle” for your Styrofoam ball by carefully pushing a craft stick into the ball. Hold the handle so the Moon ball is positioned upright.
2. You will be part of a model that portrays the phases of the Moon. In the model, your head will represent the Earth, the Styrofoam ball will represent the Moon, and the lamp will represent the Sun.
3. Place the lamp in the center of the room and turn it on. Turn off the room lights and then stand approximately two arm-lengths away from the lamp.
4. Hold the Moon ball directly in front of the lamp and at arm's length from your body, pointing upwards approximately 45 degrees. Notice that as you hold the Moon ball in front of your body and turn around, sometimes part of the ball is lit, and sometimes the whole hemisphere facing you is lit.
5. Keep turning until you can see a thin crescent lit up on the Moon ball.
6. Continue moving in the same direction until the Moon ball looks like a half-lit circle.
7. Continue moving in the same direction until the ball looks completely lit.

QUESTIONS

1. Is the brightest side of the Moon facing towards or away from the Sun?
2. For the Moon to appear “fuller,” how does it have to change its position relative to the Sun?
3. When the Moon is full, is it on the side of the Earth that's closest to the Sun, or the side that's farthest away from the Sun?
4. Are the phases of the Moon the same in the northern and southern hemispheres?

EXTENSIONS

On a sunny day when the Moon is visible, go outside with your Styrofoam Moon ball. Stand facing the Moon, holding out your Moon ball at arm's length "covering" the Moon in the sky. The Sun will shine on the ball and illuminate it exactly as it illuminates the Moon.

Adapted from:

Foster, G.W. (1996). Look to the Moon. *Science and children*. 34(3), 30-33.

Braile, S. (1994). Moon phase modeling. In N.B. Ball, H.P. Coyle, & I.I. Shapiro (eds.), *Project SPICA*. Kendall/Hunt Publishing Co: Dubuque, Iowa.