



Grasping Geometry through Games

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Games for Math Class

- Meaning before abstraction (Diénès, 1971)

- Three suggested benefits: (Ernest, 1986)

- Gaining skill-based fluency
- Developing conceptual understanding
- Refining problem solving approaches

- Two additional benefits: (McFeetors, 2015)

- Improving mathematical processes
- Experiencing math in relevant contexts

Big Ideas in Geometry

- Geometric **results** inform measurement
- Geometric **thinking** is working with imagery
- Geometric **objects** are mental objects constructed with tools
- Geometric **actions** include: classifying, naming, defining, posing, conjecturing, justifying

(Sinclair, Pimm, Skelin, & Zbiek, 2012, pp. 7-8)



Learning through Experiences

It is through **manipulation** of familiar objects that people get a sense of **relationships and properties** that they then can **articulate**, for example, where they can describe in words how to work out a net for a surface.

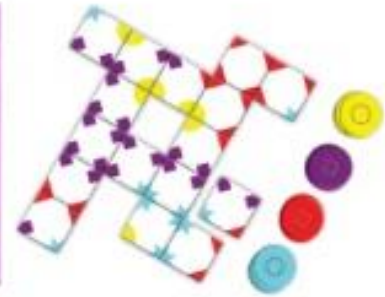
(Joshnston-Wilder & Mason, 2005, p. 98)

Learning through Experiences

... they are periods of **genuine reflection**
only when they follow after
times of more overt **action**
and are used to **organize**
what has been gained in **periods of activity**
in which the hands
and other parts of the body
beside the brain are used.

(Dewey, 1938/1997, p.62)

Explore a Game



Watch for moments of:

- Learning through games

(McFeetors & Mason, 2009)

- Exploring
- Analyzing
- Convincing

- Geometric thinking

- Actions
- Reasoning
- Concepts
- Language

Gallery Walk

- On flip chart paper record connections to POS
 - Goals for Students (pp. 2-3)
 - Mathematical processes (pp. 4-6)
 - Nature of math (pp. 7-8)
 - Specific outcomes (blue sheets)

Exploring Students' Thinking



References

Dewey, J. (1938/1997). *Experience and education*. New York: Touchstone.

Dièné, Z. P. (1971). An example of the passage from the concrete to the manipulation of a formal system. *Educational Studies in Mathematics*, 3(3-4), 337-352.

Driscoll, M., Egan, M., DiMatteo, R. W., & Nikula, J. (2009). Fostering geometric thinking in the middle grades: Professional development for teachers in grades 5-10. In T. V. Craine & R. Rubenstein (Eds.), *Understanding geometry for a changing world*, seventy-first yearbook (pp. 155-171). Reston, VA: National Council of Teachers of Mathematics.

Ernest, P. (1986). Games. A rationale for their use in the teaching of mathematics in school. *Mathematics in School*, 15(1), 2-5.

McFeetors, P. J. (2015). Developing mathematical processes through commercial games. *2015 Annual Conference Psychology of Mathematics Education – North America*. Michigan State University, East Lansing, MI.

McFeetors, P. J., & Mason, R. T. (2009). Learning deductive reasoning with games of logic. *Mathematics Teacher*, 103(4), 284-290.

Sinclair, N., Pimm, D., & Skelin, M. (2012). *Developing essential understanding of geometry for teaching mathematics in grades 6-8*. Reston, VA: National Council of Teachers of Mathematics.