The "Concept Teaching" Game: A Rationale

Hal Melnick

Follow this and additional works at: http://educate.bankstreet.edu/thoughtandpractice

Part of the Curriculum and Instruction Commons, Curriculum and Social Inquiry Commons, Disability and Equity in Education Commons, Junior High, Intermediate, Middle School Education and Teaching Commons, Pre-Elementary, Early Childhood, Kindergarten Teacher Education Commons, and the Social and Philosophical Foundations of Education Commons

Recommended Citation

This Article is brought to you for free and open access by the Centennial Collection at Educate. It has been accepted for inclusion in Thought and Practice: (1987-1991) the Journal of the Graduate School of Bank Street College of Education by an authorized administrator of Educate. For more information, please contact kfreda@bankstreet.edu.
THE "CONCEPT TEACHING" GAME
A Rationale

Hal Melnick

Teachers recognize the importance of motivation in successful children's learning and are looking for approaches to mathematics teaching that promote strong, positive feelings toward the subject. Thus, learning games have once again become part of the instructional repertoire.

The game has historically served cultural groups in many ways. As a social experience, games have provided young and old alike with a challenging experience. Like storytelling and other forms of oral history, games have given opportunities for sharing and passing on traditions. Games can enrich the classroom as well.

An impressive research monograph, Learning and Mathematics Games (National Council of Teachers of Mathematics, Monograph #1, 1985), points out that games can be excellent instructional tools. Unfortunately, the games used in most classrooms serve merely as a skill reinforcer. The document suggests the need for games of a different type.

For years students in the Graduate School at Bank Street have been developing the concept teaching game as part of the course Mathematics for Teachers of Regular and Mainstreamed classes (N-6). These games are designed to teach. They invite children to discover the essence of the concept they are being challenged with.

The instructional game has been defined as one that is: freely engaged in; a challenge against a task or an opponent; governed by rules; an arbitrary situation that in and of itself is of minimal importance; a finite state-space, with exact states reached during play unknown prior to the beginning of play; ending after a finite number of moves within the state-space.

A concept teaching game may be defined more broadly as a self-contained, concept-fostering experience that contains a challenge for a child or a group of children; has an element of chance or strategy building opportunity; has manipulatives embedded in the game process so children can prove that their answers are correct; and offers an exciting outcome.
With the current focus on problem solving, concepts (major ideas in mathematical study) are being taught via a problem-solving process. It is not uncommon for third graders to begin a study of long division by estimating how many bags of candy can be made from 250 candy bars if we place 15 in each bag. Children study fractions by sharing 4 cookies among 2, 3, 4, 5 or more people. The Piagetian view that children construct their own ideas about mathematical relationships by interacting with their physical and social environments seems more broadly accepted. Developmental considerations are now given a high priority. For instance, teachers are aware that $8 \times 7$ is merely an exercise for a 10 year old, but is a problem for a 7 year old. And teachers are searching for activities and approaches to ensure the experience of math problem solving for their children. The carefully designed concept teaching game is one tool to help serve this end.

Children should not be asked to regurgitate skills they have already memorized. They should be invited to enter a game that provides a concept-related experience using three dimensional models (or pictorial representations), where the social experience is enticing and the possibility for multi-level learning exists.

One concept teaching game, invented by me and a group of fourth graders, was named Fraction Tractions. The game helps solidify relationships between fractional parts for some children while it assists others in learning the skills of adding, subtracting, multiplying, and dividing fractions. Children use the commercial product Pattern Blocks (Cuisenaire) to play. We use the large yellow hexagon as the "whole" in Game #1. The gameboard consists of three yellow hexagons traced side by side [漪漪漪].

Because these children had built lots of things with the blocks they had come to know that the yellow block may be built with two red trapezoids [漪], three blue diamonds [漪] or six green triangles [漪]. At a whole class lesson, I introduce the question of how we might describe and read the fractional name for all these equal parts. After suggestions by children, we moved to introduce the conventional terms: sixths, thirds, and halves. The game proceeds with children picking designated fractional parts cards (one third, four sixths, one and one half, etc.) until someone collects enough parts to make three wholes. You often hear a player saying things like, "C'mon, I need a third. C'mon."
Melnick: The "Concept Teaching" Game

A third!" When else in school life do you really hear a third or fourth grader say I NEED a third? Yes, it can be argued that games provide an artificial need, yet at the same time evoke a personal investment in knowing how to problem solve for the express purpose of playing the game.

In Fraction Tractions children experience fraction skills other than just identifying fractional names:

They learn about equivalent and non-equivalent fractions:

\[
\begin{align*}
\frac{2}{6} &= \frac{1}{3} & \text{two sixths are equivalent to one third!} \\
\frac{1}{6} &< \frac{1}{3} & \text{one sixth is less than one third!}
\end{align*}
\]

They explore adding fractions concretely:

\[
\begin{align*}
\frac{2}{6} + \frac{1}{6} &= \frac{1}{2} & \text{two sixths added to one sixth is equivalent to one half!}
\end{align*}
\]

They learn subtraction of fractions by comparison or difference (when they have one and a half less than three wholes (3 - 1 1/2 =)

...Take away one whole and one half from three wholes... you get one whole and one half!

They find themselves concretely multiplying fractions to solve a problem that emerges if they want to rearrange the blocks to complete their wholes (one-half of the third is equivalent to one of the sixths).

\[
\frac{1}{2} \times \frac{1}{3} = \frac{1}{6} \quad \text{Here is one third} \quad \text{...Here is one half of that one third}
\]

It's worth only one sixth of the original whole!

They can even be stretched to divide fractions without worrying about inverting and multiplying by applying the simple concept of division (how many sixths are there inside one-third).

\[
\frac{1}{3} \div \frac{1}{6} = 2 \quad \text{Take one third} \quad \text{...How many one sixths are inside it? Answer...}
\]

2 of them!
Concept games such as Fraction Tractions may be used flexibly to accommodate the tactile learner, the child whose pace is slower than others, and the child whose learning disability or general learning style requires a more wholistic approach to support development of compensation strategies. Careful use of manipulative materials allows the child to repeatedly test out what he or she is learning by designing a modelled representation of his or her thought. Answers become visible to the child. The teacher is no longer the only outside force determining answers as right or wrong. The material becomes the medium to enable children to become confident in their own thinking ability.

Curriculum guidelines reflect a growing interest in multiple approaches to accommodate different children's learning styles, and games also serve that end. Since children learn by having positive experiences with ideas in context over and over again, it becomes critical for teachers to design classroom environments where such opportunities are available. The introduction to the New York Syllabus (Mathematics K-6: A Recommended Program for Elementary Schools) sums up the rationale for exploring new and challenging ways to teach concept and skill proficiency: "...mathematics must be understood in order to be lastingly useful. Rules and algorithms learned by rote may be remembered for a while but will eventually be forgotten. An over emphasis on memorization in the teaching of mathematics could result in confusion, resentment, and a lasting antipathy for mathematics. The(se) recommendations...support teaching for understanding."

Nevertheless, the use of concept games in a classroom raises questions for teachers as they plan their instructional program. Given children's varied learning styles in math, who will benefit most from games? How can a teacher monitor game-playing while working with the rest of the class? Can you really trust that learning is going on? How does a teacher balance game playing, independent work, and direct instruction in the course of a day? Can games provide healthy interaction among children without the stress of competition? And, finally, how do you communicate to parents that their children are learning through playing games?

Hal Melnick is on the graduate faculty in the Teacher Education program at Bank Street College. He is currently designing a degree program for leaders in math education.