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Learning Through Inquiry: Makerspaces, Manipulatives, and Boardgames

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Why Use Manipulatives...to Achieve Differentiated Instruction

Differentiation means tailoring instruction to meet individual needs. Whether teachers differentiate content, process, products, or the learning environment, the use of ongoing assessment and flexible grouping makes this a successful approach to instruction.

At its most basic level, differentiation consists of the efforts of teachers to respond to variance among learners in the classroom. Whenever a teacher reaches out to an individual or small group to vary his or her teaching in order to create the best learning experience possit that teacher is differentiating instruction.

Teachers can differentiate at least four classroom elements based on student readiness, interest, or learning profile:

- Content- what the student needs to learn or how the student will get access to the information;
- Process- activities in which the student engages in order to make sense of or master the content;
- Products (assessment)—culminating projects that ask the student to rehearse, apply, and extend what he or she has learned in a unit
- Learning environment- the way the classroom works and feel.

Tomlinson, Carol Ann. "What is differentiated instruction?" Reading Rockets. Version Article 263. WETA, n.d. Web. 23 Mar. 2012. www.readingrockets.org/article/263/

One method to differentiate one's instruction is by incorporating the use of **manipulatives** in the classroom.



image from www.rocketlear

Using Manipulatives in Your Classroom

Manipulatives have been used in the classroom for years. Teachers understand that manipulatives provide a concrete foundation for learning abstract ide However, it can be challenging at times to implement the use of manipulatives into your classroom's daily routine. Consider the following when planning ϵ lesson that will require the use of manipulatives:

- 1. Manipulatives have been chosen to support the lesson's objective.
- 2. Significant plans have been made to orient students to the manipulatives and corresponding classroom procedures.
- 3. The lesson involves active participation of each student.
- 4. The lesson plan includes procedures for evaluation that reflect an emphasis on the development of reasoning skills.

Ross, R., & Kurtz, R. (1993). Making manipulatives work: A strategy for success. The Arithmetic Teacher, 40(5), 254

Setting Guidelines for Use of Manipulatives

7 Musts for Using Manipulatives

By Marilyn Burns

You find them in classrooms across the nation — buckets of pattern blocks; trays of tiles and cubes; and collections of geoboards, tangrams, counters, ar spinners. They've been touted as a way to help students learn math more easily. But many teachers still ask: Are manipulatives a fad? How do I fit them it my instruction? How often should I use them? How do I make sure students see them as learning tools, not toys? How can I communicate their value to parents? Are they useful for upper-grade students, too?

I've used manipulative materials at all levels for 30 years, and I'm convinced I can't — and shouldn't — teach without them. Here are my strategies:

- 1. I talk with students about why manipulatives help them learn math (or any other subject). These discussions are essential for first-time users and t refreshers to refocus from time to time. I precede discussions by giving children time to explore a manipulative. Then we talk about what students noticed and I introduce the concepts they'll learn with the material.
- 2. From day one, I set ground rules for using materials. We talk about the similarities and differences between using manipulatives in class and playi with toys or games. With toys or games, children can make up their own rules. With manipulatives, they are given specific problems and activities. make clear, however, that they're free to make discoveries and explore new ideas.
- 3. It's also important for students not to interfere with one another. I step in when I hear a howl of protest as a student who needs one more yellow till takes it from another group's table. Sometimes I open up the discussion to the entire class. These impromptu reminders help keep students on tra
- 4. I set up a system for storing materials and familiarize students with it. It's important for students to know where and how to store materials. A clear system makes the materials more accessible. Some teachers designate and label space on bookshelves. Others use zip-top plastic bags and por materials into quantities useful for pairs or groups. Still others place a supply of each material at students' tables so they're always within reach.
- 5. Time for free exploration is worth the investment. Whenever I introduce a new material, I allot at least one math period for this. Teacher demonstra alone are like eating a papaya in front of the class and expecting children to know how it tastes.

Free exploration time also allows students to satisfy their curiosity so they don't become distracted from the assigned tasks. Expect children to see tiles can fall like dominoes; build tall towers with rods; or construct rockets out of cubes.

After children have explored a material, I ask what they've discovered and record their observations on a chart so their classmates can get insight from their ideas. Then I assign a specific task.

- 6. For easy reference, I post class charts about manipulative materials. Charts not only send students the message that I value manipulatives, but al help students learn materials' names and how to spell them. In September I post a chart that lists all the materials we'll use during the year. For so materials, I post separate charts to list their shapes and colors. And I leave posted charts of students' discoveries about materials.
- 7. Manipulatives are a natural for writing assignments. They provide concrete objects for children to describe.
- 8. I let parents get their hands on manipulatives, too. It's important for parents to understand why their children are using materials. Follow up by hav children take home materials and activities to do with their families. (Hint: I wait until students have had some experience.)

Burns, M. (n.d.). 7 Musts for Using Manipulatives | Scholastic.com. Scholastic | Children's Books and Book Club | Scholastic.com. Retrieved March 26, 2012, from http://www.scholastic.com/teachers/article/7-musts-using-manipulatives-0

Articles on the Use of Manipulatives in the Classroom

· Elementary School Teachers' Manipulative Use

Using data from 503 inservice elementary teachers, this study investigated the relationship between teachers' background characteristics, teachers' b about manipulatives, and the frequency with which teachers use manipulatives as part of their mathematics instruction. Findings from the study show teachers' grade level and beliefs about manipulatives are important predictors of teachers' use of manipulatives in their mathematics instruction.

· Revisiting Mathematics Manipulative Materials.

Abstract:

The article discusses the importance of mathematics manipulative materials on teachers. It mentions the research conducted by Bob Perry and Peter Howard regarding how the mathematics manipulative materials were used by primary and middle school teachers in Western Australia. It says that Be Ten blocks (MAB), Unifix cubes, and counters are the most common manipulatives used by teachers. It also mentions the benefits that manipulative o in learning and teaching mathematics.

• So Many Devices, So Little Use

Abstract:

The article discusses a study by the education nonprofit organization Mid-continent Research for Education and Learning (McREL) using classroom observation data from their Power Walkthrough observation process to show that teachers and students rarely utilize technology in the classroom. The usage of interactive whiteboards (IWBs), even in schools where every classroom is equipped with one, is discussed. The article suggests that a lack of effective professional development in technology for educators and a lack of technological resources contribute to this limited use by teachers and

- A Teacher's Guide to Alternative Assessment: Taking the First Steps Corcoran et al describe an assessment ladder that provides a framework for classroom teachers to reflect on their use of traditional vs. alternative, or authentic, assessment techniques. Furthermore, they provide suggestions on how teachers can progress up the assessment ladder to incorporate mc authentic ways of assessing student learning in their classroom.
- Making manipulatives work: A strategy for success Involving concrete materials in math lessons can help motivate students and give them a foundation for abstract thought. The use of manipulatives in mathematics, including a game played in one second grade classroom, is discussed.
- A Comparison of Concrete and Virtual Manipulative Use in Third- and Fourth-Grade Mathematics The primary purpose of this classroom experiment was to examine the effectiveness of concrete (hands-on) manipulatives as compared with virtual (computer-based) manipulatives on student review of fraction concepts in third grade and introduction of symmetry concepts in fourth grade. A pretest posttest design was employed with a sample of 91 third-grade students and 54 fourth-grade students who were randomly assigned to complete a less using either concrete or virtual manipulatives. Students used a variety of manipulative materials during the lessons. Results of the posttest suggest the student learning was unchanged by lesson condition.

Manipulatives Available in the CMMC

Manipulatives by Subject

Search this listing for Math Manipulatives.

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