Materials as Tools for Learning

Students of all ages benefit from being able to use tools and materials to model and solve problems and explain their thinking. Encourage all students to use tools and materials and to explain how they use them. If used only when someone is having difficulty, students can get the mistaken idea that using materials is a less sophisticated and less valued way of solving a problem or modeling a solution. Therefore, they should see how different people, including the teacher, use a variety of materials to solve the same problem.

To make effective use of materials as tools for learning, teachers need to:

Get to Know the Materials. Teachers need to be familiar with the materials students will use. Depending on the grade level, these might include connecting cubes, pattern blocks, Geoblocks, Geoboards, geometric solids, and Power Polygons. In some units, Teacher Notes describe particular materials in detail. For example, the Teacher Note about the Geoblocks provides the names and definitions of the shapes in the set, illustrations of each shape, and information about how to talk about them with students.

Organize the Materials. Many of the *Investigations* materials come in large containers. Most teachers split these into smaller, equivalent subsets and store each in a clear container or shoe box, labeled with the name and a picture of the material. Many include a small cup to use as a scoop. It is important to store manipulatives where they are easily accessible to students, perhaps on a bookshelf or along a windowsill. In addition to pattern blocks, Geoblocks, and connecting cubes, items such as calculators, coins, 100 charts, and paper (blank and grid) are important mathematical tools that should be available to students. Individual units also provide suggestions on preparing some manipulatives for classroom use.

Introduce New Materials Thoughtfully. Students need time to explore a new material before using it in structured activities. By freely exploring a material, students will discover many of its important characteristics and will have some understanding of when it might make sense to use it. Although some free exploration is built into regular math time, many teachers make materials available to students during free time or before or after school.

Make Materials Accessible. The more available materials are, the more likely students are to use them. Having materials available means that they are readily accessible and that students are allowed to make decisions about which tools to use, and when and how to use them. Because particular tools work best for certain projects or tasks, students should be encouraged to think about which material best meets their needs. While students may need materials close by initially, they should gradually be expected to decide what they need and get materials on their own.

Establish Clear Expectations. In order to use materials as tools for learning, students need to be clear about how such materials should (and should not) be used and cared for.

- **Sharing Materials.** Even though a scoop should guarantee an ample assortment and quantity of materials, students might not get the exact piece they desire. Conversations about sharing are critical.

- **Using Materials Appropriately.** Rules and policies for the appropriate use of manipulatives should be established at the beginning of the year. This might include things such as not throwing the materials, not drawing on them, and so on. Consider asking the students to suggest rules for how materials should and should not be used. Students are often more attentive to rules and policies that they have helped create.

- **Cleaning Up Materials.** Making an announcement a few minutes before the end of a work time helps prepare students for the transition that is about to occur. Then, give students several minutes to return materials to their containers and shelves and to double-check the floor for any stray materials.

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