## Dimension 3: Learning Environment

When the classroom is perceived to be an organized, safe, and positive learning environment, students will feel encouraged to interact and learn mathematics. There are many ways a teacher can facilitate an inclusive and nurturing environment.

*It is essential that students feel they have a safe environment where they are comfortable to take risks.*

### PHYSICAL ORGANIZATION

Classroom materials and displays should be organized so that students can find things easily (for example, manipulatives, calculators, posted math definitions or hints). Seating arrangements should allow for students to move easily around the room to retrieve materials and interact with classmates. An organized classroom models for students what is valued about learning and doing mathematics.

### GROUPING FOR LEARNING

A positive learning environment also means a "safe" environment where students feel comfortable taking risks. Allowing students to work in groups with other students can help them feel safe. It also means on-going support is given so that students will persevere in completing mathematical tasks. This is particularly important for problem solving, which requires students to interact, persevere, and take risks. Group members can also provide encouragement as well as new ideas and a fresh approach when a task begins to feel insurmountable.

With the increased focus on communication in mathematics, particularly oral communication, grouping allows students to interact to discuss strategies and solutions.

Effective instructional grouping also allows time for the teacher to observe and assess individual students.

There are many different cooperative learning strategies that teachers can use to make working in groups effective and interesting for students. As well, it is important that the teacher set clear and fair guidelines for students in terms of respecting other students' opinions and feelings during group work. This also applies to whole class discussions.

**EFFECTIVE GROUPING**

With effective grouping, students

- learn to take ownership and responsibility for completing assignments individually and as a part of a group
- learn to refine the clarity and precision of their mathematical terminology through interaction and group talk
- clarify their thinking and learn concepts through interaction by sharing solutions, focused discussion, and writing in pairs and small groups

*Group work fosters communication and supports problem solving.*

### TEACHER FEEDBACK

A positive learning environment also includes providing support and encouragement. This is accomplished by recognizing and valuing student effort and helping students recognize and grow in their mathematical ability by ensuring that feedback to students is fair and constructive.

### STUDENT INPUT AND CHOICE

A teacher can develop a positive learning environment by actively encouraging student input and ensuring students feel their opinions are valued and relevant.

Teachers can ask for student input with respect to contexts for activities and tasks. Students can also be given choice with activities or tasks. Teachers can also be receptive to new directions suggested by students when they come up with unexpected yet legitimate solutions. Teachers can also allow students to select their own grouping arrangements from time to time. Students can help out with the organization of the room and with deciding what to display in the classroom and hallway.

Along with the privilege of choice comes the expectation that students explain the reasoning for their choices; for example, the rationale behind choosing a certain item for a display of student work or why a certain context might be better than another for a mathematics task or project.

**STUDENT INVOLVEMENT**

Students can be involved in making designs about

- contexts for activities and tasks
- grouping arrangements
- classroom displays
- classroom organization

### HOW THE ADMINISTRATOR CAN SUPPORT THE TEACHER

The administrator can help the teacher in this dimension by

- being supportive when rooms are rearranged to facilitate student interaction
- providing a teaching/learning space where a certain level of "productive" noise can be tolerated
- encouraging teachers to allow students to discuss mathematical ideas and to work collaboratively
- encouraging and supporting professional development activities that focus on effective grouping strategies for mathematics instruction
- providing spaces in which student work can be displayed for other classes, parents, and visitors to see
- encouraging the display of varied, rather than uniformed, student work

### LINKING THE NCTM PRINCIPLES AND STANDARDS

This dimension links most strongly to the following NCTM principles and standards (see pages 4–7 in Section 1):

- *Learning* by focusing on a positive environment for student learning
- *Assessment* by acknowledging that teacher feedback must be fair and constructive
- *Problem solving* by creating a learning environment that fosters risk taking and collaboration in solving problems
- *Reasoning* by encouraging students to provide input, but encouraging them to support their choices and input with their rationale
- *Communication* by using grouping strategies to foster student interaction and discussion