

# Effective Practices in Mathematics Classrooms

Teaching and learning mathematics in a 21st century classroom is about thinking, doing, intuitions and deliberations.

## Fostering Positive Mathematical Attitudes



The learners are encouraged. Everyone is able to learn mathematics, and everyone learns differently. It is all about putting forth effort towards understanding the concepts. This is essential to save their enthusiasm from changing into fear.

*“Their view of mathematics shifts gradually from enthusiasm to apprehension, from confidence to fear.”* — National Research Council, 1989

## A Collaborative Learning Environment

It should be active learning an active learning environment where they can share ideas and work in groups. A place where they feel comfortable learning in their own style, can readily access the tools they need, and invent strategies that work for them. Use of concrete materials (math manipulatives) and technology is essential for consolidating the concepts, and connect to the big ideas.

*“It is an essential fact that children learn mathematics primarily through... doing, talking, reflecting, discussing, observing, investigating, listening, and reasoning.”* — Copley, 2000



## Learning with Developmentally Appropriate Tasks

Considering the cognitive, linguistic, physical, and social - emotional development stages of the learner. Connecting the tasks and problems to their real world, makes their learning authentic and concrete.

*“Developmentally appropriate means challenging but attainable for most children of a given age range, and flexible enough to respond to inevitable individual variation. That is, expectations may have to be adjusted for children with different experiential backgrounds.”*

— Clements, Sarama, & DiBiase, 2004

## Focus on significant Mathematical Concepts - “Big Ideas”

Many students struggle with computational speed, and get demotivated about learning mathematics. Focusing on Big Ideas encourages students to take risks and make connections.

*“A big idea is an idea that connects numerous mathematical understandings into a coherent whole.”* Marian Small, 2000

## Building on Prior Knowledge

If math is everywhere, then every student comes to learn with some prior knowledge. The level of exposure varies greatly across cultures and socio-economic groups, but the extent is often greater than is traditionally assumed. Building on their prior knowledge by making connections to the real world strengthens their conceptual understanding.

*“Young children possess an informal knowledge of mathematics that is surprisingly broad, complex and sophisticated.”* — Broody, 2004



## Metacognition

The invaluable learning takes place when students come up with their own problem solving strategies. They gain confidence, and embrace learning.

*“Good problem solvers regularly and consciously reflect on and monitor their own thought processes. By doing so they are able to recognize when the technique they are using is not fruitful and to make a conscious decision to switch to a different strategy, rethink the problem, search for related content knowledge that may be helpful, and so forth. . . . Even very young students should be taught to examine their own thought processes this way.”* — Ontario Ministry of Education, 2005

*“The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.”* — Albert Einstein