

Curriculum, Instruction & Assessment Department

Best Practices of Teaching Mathematics

Teacher **makes students aware** of the standards related to mathematics.

Critical Elements – Evidence of all elements must be present in the instruction and learning of mathematics in order to be considered standards based.

- Worthwhile mathematics tasks.
- Discourse on mathematics – reading, writing, and discussing mathematics.
- Learning environment that fosters students’ mathematical development.
- Analysis of teaching and learning.

Worthwhile Mathematical Tasks

The teacher of mathematics:

- Poses tasks that relate to students’ understandings, interests, and experiences.
- Engages students’ intellect.
- Develops students’ mathematical understandings and skills.
- Stimulates students to make connections and develop a coherent framework for mathematical ideas using other subjects, and real world topics.
- Calls for problem formulation, problem-solving strategies, and mathematical reasoning.
- Promotes communication about mathematics orally and in written form.
- Represents mathematics as an ongoing human activity.
- Displays sensitivity to, and draws on, students’ diverse background experiences and dispositions.

Discourse on Mathematics – Reading, Writing, and Discussing Mathematics

The teacher of mathematics encourages discourse by:

- Posing questions and tasks that elicit, engage, and challenge each student’s thinking.
- Listening carefully to students’ ideas.
- Asking students to clarify and justify their ideas orally and in writing.
- Deciding what to pursue in-depth from among the ideas that students bring up during a discussion.
- Deciding when and how to attach mathematical notation and language to students’ ideas.
- Deciding when to provide information, when to clarify an issue, when to model, when to lead, and when to let a student struggle with a difficulty.
- Monitoring students’ participation in discussion and deciding when and how to encourage each student to participate.

The teacher of mathematics promotes classroom discourse in which students:

- Listen to, respond to, and question the teacher and one another.
- Use a variety of tools to reason, make connections, solve problems, and communicate orally and in written form.
- Initiate problems and questions.
- Make conjectures and present solutions.
- Explore examples and counter examples to investigate a conjecture.
- Individually try to solve the validity of particular representations, solutions, conjectures, and answers.

The teacher of mathematics, in order to enhance discourse, uses and has students use:

- Computers, calculators, and other technology when appropriate.
- Concrete materials used as models.
- Pictures, diagrams, tables, and graphs.
- Invented and conventional terms and symbols.
- Metaphors, analogies, and stories.
- Written hypotheses, explanations and arguments.
- Projects, oral presentations, and dramatizations.

Learning Environment that Fosters Students' Mathematical Development

To create a context that supports mathematics achievement, the teacher of mathematics:

- Provides and structures the time necessary to explore sound mathematics and grapple with significant ideas and problems.
- Uses the physical space and materials in ways that facilitate students' learning of mathematics.
- Respects and values students' ideas, ways of thinking, and mathematical dispositions.
- Evidences consistent expectations and encouragement as students:
 - Work independently or collaboratively to make sense of mathematics.
 - Take intellectual risks by raising questions and formulating conjectures.
 - Display a sense of mathematical competence by validating and supporting ideas with mathematical argument.

Analysis of Teaching and Learning

The teacher of mathematics engages in the ongoing analysis of teaching and learning by:

- Observing and listening to students on an on-going basis.
- Tailoring their questions or tasks to provoke and extend students' thinking and understanding.
- Using multiple assessments, including multiple-choice, open-ended, written, and oral questioning, demonstrations, and projects with a rubric.