

## Indicator P1.3 Student Engagement

Uses a variety of student-centered instructional methods. Provides opportunities for all students to communicate in meaningful ways, interact within authentic contexts, and develop critical thinking and problem-solving skills.

What Effective Math Teachers Know	What Effective Math Teachers Do	✓ Focus
<p>a. Mathematics <math>\neq</math> Calculation, as many have been led to believe. It is logical reasoning, problem solving, the study of patterns, and a set of connected ideas that help us understand our world.</p>	<ul style="list-style-type: none"> <li>● Present students with a variety of logic puzzles.</li> <li>● Use math examples from students' workplaces.</li> <li>● Provide flexible classroom groupings of students in problem-based learning.</li> <li>● Practice calculation through routine activities which allow students opportunities to investigate number properties and develop number sense.</li> <li>● Provide meaningful practice while minimizing the use of repetitive worksheets, flash cards, and other memory-only activities.</li> </ul>	
<p>b. Manipulatives and diagrams are important tools for students to use in problem solving. Make using these tools more generic.</p>	<ul style="list-style-type: none"> <li>● Help students become familiar with a variety of tools so they can make informed choices about what would be useful for solving a particular problem.</li> <li>● Stress independence in problem solving and encourage students to use tools that are meaningful to them.</li> <li>● Plan some math activities which require the use of particular tools (e.g., modeling equivalent fractions on a virtual geoboard).</li> <li>● If students are learning remotely, help them learn how to use some virtual manipulatives.</li> <li>● Have tools readily available in the classroom for students to use as needed. If students are learning remotely, either provide them with tools such as graph paper and cardboard or virtual or encourage them to use available materials such as dry beans or pennies.</li> <li>● Post examples of diagrams and tables that would be helpful in problem solving.</li> </ul>	
<p>c. Adult learners must have a concrete experience before moving to abstract concepts.</p>	<ul style="list-style-type: none"> <li>● Have students explore new ideas first using concrete models when possible.</li> <li>● When students are struggling with a topic they have been exposed to in their past education, back up by providing concrete experiences in order to build the conceptual understanding.</li> <li>● Begin new topics with an activity that requires students to show or explain their understanding with concrete materials, pictures, or other representations (tables, diagrams, graphs, etc.) before moving to a symbolic notation.</li> </ul>	
<p>d. The selection of meaningful math problems and activities is the key to student engagement and learning.</p>	<ul style="list-style-type: none"> <li>● Choose problems involving significant math ideas.</li> <li>● Select problem contexts meaningful to adult learners; draw from the work and cultural background of your students or from those in your community.</li> <li>● Select problems that allow for various entry points, multiple ways to solve, and multiple solutions.</li> </ul>	

What Effective Math Teachers Know	What Effective Math Teachers Do	✓ Focus
	<ul style="list-style-type: none"> <li>• Facilitate lesson discussion focusing on conceptual understanding so that math and learning are explicit.</li> <li>• Invite students to bring in their own materials, ideas, and real-life situations and experiences that required math.</li> </ul>	

**Notes to self**