

## Elementary Mathematics Professional Learning

### Potential Misunderstandings

Misconceptions	In reality...
Teachers should teach mathematics through discovery	Teachers use their professional judgement to select the instructional strategies that will help their students develop deep, conceptual understanding of the mathematical outcomes. Different strategies will work best for different outcomes and for different students.
Students do not need to memorize basic facts. OR Students must memorize the basics facts.	Students need to develop flexibility and fluency with numbers. Through repeated exposure and a variety of experiences, students will master number facts. Teachers should constantly help students connect unknown facts to known facts in order to progress towards mastery.
Teachers have to teach all the different mathematical strategies to get to the answer.	Through classroom activities, such as Number Talks, students should be exposed to a variety of strategies. They are not expected to master them all as long as they find strategies that are efficient, effective and explainable for the developmental stage they are at.
All the students need to use manipulatives.	Every student should have an opportunity to explore new mathematical concepts through the use of manipulatives. When an individual student is able to demonstrate a thorough understanding of a particular abstract concept, they will no longer need the support of the concrete manipulative. Each student reaches this stage in their own time.
If a student is unable to explain how he found an answer, the student does not understand the concept.	<p>There are several reasons why students may not be able to communicate how they found an answer.</p> <ol style="list-style-type: none"> <li>They may understand the strategy but are unable to communicate that understanding. These students may need to learn the math vocabulary associated with the concept or develop their communication skills.</li> <li>Students may be applying a procedure they do not understand. These students may need help in making connections to the concrete representations of that strategy or they may need a different strategy altogether.</li> </ol>
The only good resource is the Alberta Education authorized resource.	<p>Authorization indicates that the resources meet Alberta Education's evaluation criteria. However, the use of authorized resources is not mandatory for program delivery. <a href="#">Source</a></p> <p>Therefore other resources can be used.</p>

Misconceptions	In reality...
Problem solving is a set of procedures. When followed correctly, students can find the correct answer every time.	<p>Using a set of known procedures in order to solve a word problem is not problem solving.</p> <p>“When students encounter new situations and respond to questions of the type How would you ...? or How could you ...?, the problem-solving approach is being modelled. Students develop their own problem-solving strategies by listening to and discussing with partners and trying different strategies.</p> <p>A problem-solving activity must ask students to determine a way to get from what is known to what is sought. If students have already been given ways to solve the problem, it is not a problem, it is merely practice. A true problem requires students to use prior learnings in new ways and contexts. Problem solving requires and builds depth of conceptual understanding and student engagement.</p> <p>Problem solving is a powerful teaching tool that fosters multiple, creative and innovative solutions. Creating an environment where students openly look for, and engage in, finding a variety of strategies for solving problems empowers students to explore alternatives and develops confident, cognitive mathematical risk takers.” <a href="#">Source</a></p>
The 7 mathematical processes are suggestions that a teacher can choose to ignore.	<p>The Alberta Mathematics K-9 Program of Studies states “There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and embrace lifelong learning in mathematics.” Several Mathematical Processes are associated with every mathematical outcome. Mathematical processes are the vehicle that drive the learning of the outcome.” <a href="#">Source</a></p>
If the majority of my students are capable of doing something symbolically, I should not waste any time teaching the concept with the manipulatives.	<p>The use of manipulatives is not mandatory. However, concrete materials are imperative for exploration and experimentation with math ideas as students develop meaning. We want all students to be confident mathematicians who can explain and represent their thinking accurately, effectively and efficiently. With many experiences building and representing using manipulatives, students can deepen their understanding of abstract math concepts. <a href="#">Source</a></p>
The flipped classroom is only for the secondary level.	<p>The flipped classroom is possible at the elementary level. Grades 4 to 6 students are capable of productive learning in this manner. If unsure, take a moment to view the video and explore the <a href="#">in-class flip</a> which is a mixture of Math Centres and Flipped classroom.</p>

Misconceptions	In reality...
Parents' attitude towards math does not influence their child's attitude towards math.	<p>"In an important study researchers found that when mothers told their daughters they were not good at math in school, their daughter's achievement declined almost immediately (Eccles &amp; Jacobs, 1986). In a new study neuroscientists Erin Maloney and colleagues found that parents' math anxiety reduced their children's learning of math across grades 1 and 2, but only if parents helped their children on math homework (Maloney, Ramirez, Gunderson, Levine, &amp; Beilock, 2015) If they did not help them on homework, the parents' math anxiety did not detract from their children's learning.</p> <p>"The parents' math knowledge did not turn out to have any impact, only their level of math anxiety." (<a href="#">Jo Boaler, 2015</a>)</p>