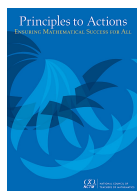


Teacher and Student Actions for Effective Mathematics Teaching and Learning

Build Procedural Fluency from Conceptual Understanding

Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

What are teachers doing?	What are students doing?
<ul style="list-style-type: none"> <input type="checkbox"/> Providing students with opportunities to use their own reasoning strategies and methods for solving problems. <input type="checkbox"/> Asking students to discuss and explain why the procedures that they are using work to solve particular problems. <input type="checkbox"/> Connecting student-generated strategies and methods to more efficient procedures as appropriate. <input type="checkbox"/> Using visual models to support students' understanding of general methods. <input type="checkbox"/> Providing students with opportunities for distributed practice of procedures. 	<ul style="list-style-type: none"> <input type="checkbox"/> Making sure that they understand and can explain the mathematical basis for the procedures that they are using. <input type="checkbox"/> Demonstrating flexible use of strategies and methods while reflecting on which procedures seem to work best for specific types of problems. <input type="checkbox"/> Determining whether specific approaches generalize to a broad class of problems. <input type="checkbox"/> Striving to use procedures appropriately and efficiently. <input type="checkbox"/>



National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: Author.

Writing Team: Steve Leinwand, Daniel J. Brahier, DeAnn Huinker, Robert Q. Berry III, Frederick L. Dillon, Matthew R. Larson, Miriam A. Leiva, W. Gary Martin, and Margaret S. Smith.

<http://www.nctm.org/pta>