

Theory and Practice: Teaching and Learning of Mathematics

Theory:

“Conceptual understanding is an important component of proficiency, along with factual knowledge and procedural facility.” – Bransford, Brown, and Cocking (1999)

“Guiding means striking a delicate balance between the force of teaching and the freedom of learning.” – Freudenthal (1991)

“...we need to pay attention to the subject-matter knowledge of teachers, their pedagogical knowledge (general and content specific), and their knowledge of children as learners of mathematics.” – Bransford, Brown, and Cocking (1999)

Practice:

- Teachers select appropriately cognitively demanding math tasks that provide concrete experiences with room to generalize and that leads to important math ideas.
- Tasks may include a series of sub-tasks or questions to help build students’ thinking and be increasingly challenging.
- Teacher push students to reason, invent and/or use productive strategies, communicate their thinking to others, and evaluate other people’s thinking that may be different from their own.
- Multiple representations and ways of thinking are encouraged, even if there may be only one correct answer.
- Process of thinking is valued, not just getting the right answer.
- Teachers include an appropriate amount of direct instruction of basic computation skills, memorization, and repetitive practice.
- Teacher design and implement learning activities and discussions that help students make connections between their prior knowledge and new ideas, between different mathematical ideas, and with real-world applications.

References

Freudenthal, H. (1991). Revisiting mathematics education: China lectures (pp. 47-55). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Bransford, John, Brown, Ann L., & Cocking, Rodney R. (Eds.). (1999). How People Learn: Brain, Mind, Experience, and School. Washington, D.C.: National Academy Press.

MIT OpenCourseWare
<http://ocw.mit.edu>

11.124 Introduction to Education: Looking Forward and Looking Back on Education
Fall 2011

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.