

Applying the Education Theory to Mathematics Teaching

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- 1 Preparation and first day lecture
- 2 Lecturing and providing feedback to students
 - Teachers' tips for good teaching
 - Students' tips for good teaching
- 3 Learner centered teaching

3. Preparation and first day lecture.

How do we put to use the education theory Donna gave us to teaching math courses at the University of Utah? Are some points obvious or difficult to implement in mathematics teaching?

Donna made these articles available on her [UOnLine Blackboard](#)

- Math TA Teaching Resources

<http://teaching.berkeley.edu/bgd/firstday.html>

- 1 Visit the classroom.
- 2 Build a sense of community.
- 3 Address student's concerns.
- 4 Set the tone for the rest of the semester.
- 5 make the time worthwhile.
- 6 Expect some awkwardness.

5. Lecturing and providing feedback to students.

Educators and Mathematician/Educators love making lists of what constitutes good (and bad!) teaching.

Chickering and Gamson’s seven principles of good college teaching practice.

- 1 Encourage student-faculty contact.
- 2 Encourage cooperation among students.
- 3 Encourage active learning.
- 4 Give prompt feedback.
- 5 Emphasize time on task.
- 6 Communicate high expectations.
- 7 Respect diverse talents and ways of learning.

Fourteen general research-based principles for improving higher learning in our classrooms.

- 1 Active learning is more effective than passive learning.
- 2 Learning requires focused attention, and awareness of the importance of what is to be learned.
- 3 Learning is more effective and efficient when learners have explicit, reasonable, positive goals, and when their goals fit well with the teachers goals.
- 4 To be remembered, new information must be meaningfully connected to prior knowledge, and it must first be remembered in order to be learned.
- 5 Unlearning what is already known is more difficult than learning new information.
- 6 Information organized in personally meaningful ways is more likely to be retained, learned and used.

8. From “A ‘Teachers Dozen’ ” cont.

- 7 Learners need feedback on their learning, early and often, to learn well; to become independent, they need to learn how to give themselves feedback.
- 8 The ways in which learners are assessed and evaluated powerfully affect the ways they study and learn.
- 9 Mastering a skill or body of knowledge takes great amounts of time and effort.
- 10 Learning to transfer, to apply previous knowledge and skills to new contexts, requires a great deal of practice.
- 11 High expectations encourage high achievement.
- 12 To be most effective, teachers need to balance levels of intellectual challenge and instructional support.
- 13 Motivation to learn is alterable; it can be positively or negatively affected by the task, the environment, the teacher, and the learner.
- 14 Interaction between teachers and learners is one of the most powerful factors in promoting learning; interaction among learners is another.

Cohen and Seaman’s characteristics of good teaching.

- 1 Confidence in knowledge of subject matter.
- 2 High-quality explanations.
- 3 Attention to individual differences.
- 4 Sense of humor.
- 5 Management through high awareness.
- 6 Students engaged in active learning.

Reynolds and Muijs elements of effective mathematics teaching.

- 1 Students have many opportunities to learn; that is, the amount of time that students are actively engaged is large.
- 2 Teachers are academically oriented (versus socially oriented or other orientations.)
- 3 Teachers manage the classroom well.
- 4 Teachers have high expectations.
- 5 Students do not spend much time on their own (without the teacher leading).
- 6 The teaching is heavily interactive.

Pólya's Ten Commandments for Good Math Teaching.

- 1 Be interested in your subject.
- 2 Know your subject.
- 3 Know about the ways of learning: the best way to learn anything is to discover it by yourself.
- 4 Try to read the faces of your students, try to see their expectations and difficulties, put yourself in their place.
- 5 Give them not only information, but “know-how” attitudes of mind, the habit of methodical work.
- 6 Let them learn guessing.
- 7 Let them learn proving.
- 8 Look out for such features of the problem at hand as may be useful in solving problems to come—try to disclose the general pattern that lies behind the present concrete situation.
- 9 Do not give away your whole secret at once—let the students guess before you tell it—let them find out by themselves as much as feasible.
- 10 Suggest it; do not force it down their throats.

Intersection of views of researchers, student evaluations and comments on RateMyProfessors.com of what constitutes good mathematics teaching.

- 1 The professor must be available to the students and even encourage student-faculty contact.
- 2 The professor must explain things well.
- 3 The professor must be fair in grading and prompt in feedback.

13. Student centered teaching.

It is difficult for me to teach in any way different than the traditional.
I've been the the Sage on the Stage.

But the trend is to emphasize student learning over professors
speechmaking. Be the Guide on the Side.

- 1 **Content:** about using content, not just receiving it.
- 2 **Role of Instructor:** resource for learning and mentoring.
- 3 **Balance of Power:** flexible, community of learners.
- 4 **Responsibility for learning:** students take some responsibility.
- 5 **Process of evaluation:** self, peer and expert assessment.

Thanks and Break a Leg Teaching!