

# Teaching Math

Everything I know

## Pedagogy

*Nothing works.*

- **Pacing the course**
  - “Covering” vs. discovering
  - Review / View / Preview
  - When to move on
  - The “parallel paths” system
    - “Lagging” the homework
- **Heterogeneous classes**
  - Alliance with the best students
  - Support for the weakest
  - Diversity of levels and techniques
- **Cooperative groups**
  - To go over homework
  - To solve big problems
  - As general policy
- **Class discussion**
  - The elevator: too easy / too hard / just right
  - No putdowns
  - How to handle wrong answers
    - Postpone revelation
    - Poker face (sometimes)
    - Students call on students
  - Praise participation not correctness
  - Ask students to restate things
  - Make “mistakes”
  - Get responses from all students
    - (votes, writing, hand signals, ...)
  - “Talk to your neighbors.”
  - New problems, not same
  - Move around
  - Nonverbal techniques
  - Don’t answer questions they don’t have
    - Seed with questions and discussion
  - When appropriate, lecture!
    - Fanfare vs. silence
- **Writing**
  - Exploratory: routine
  - Finished product:
    - Reports
    - Problem sets
    - Projects
  - Posters, other media
- **Assessment**
  - Homework
  - Quizzes
    - Participation quiz
    - Homework quiz
  - Cumulative tests
  - Notebooks
  - Test corrections / “recycles”

## Curriculum

*This is not 1900.*

- **Skills vs. concepts**
  - Balance!
- **Problem-solving**
  - Reversal
  - Flexibility
  - Open-ended questions
- **Tool-based learning**
  - Manipulatives
  - Technology
    - Graphing, spreadsheets
    - Interactive geometry, statistics
    - CAS
- **Connections**
  - Within math
  - To science
  - To life, art, culture, literature
  - Using the Web
- **NCTM, Common Core Standards**
  - Less emphasis on
    - Simplifying
    - Memorized algorithms
  - More emphasis on
    - Reasoning and sense-making
    - Applications
    - Communication
    - Discourse

## Professional Development

*You are as important as your students.*

- **Reasonable expectations**
  - Attainable goals
  - Being willing to not attain them
- **Constant forward motion**
  - Too fast: exhaustion, depression
  - Too slow: rut, depression
  - Just right: excitement, inspiration
- **Focus**
  - Curriculum: one course at a time
  - Pedagogy: one technique at a time
- **Working with colleagues**
  - Buddy
  - Mentor
  - Collaborator
- **Keep on learning**
  - Teachers' mathematics
- **Beyond the classroom**
  - Discussion of department policies
  - Staying in touch with other schools
  - The Internet
    - Escape from the Textbook! network
  - Conferences