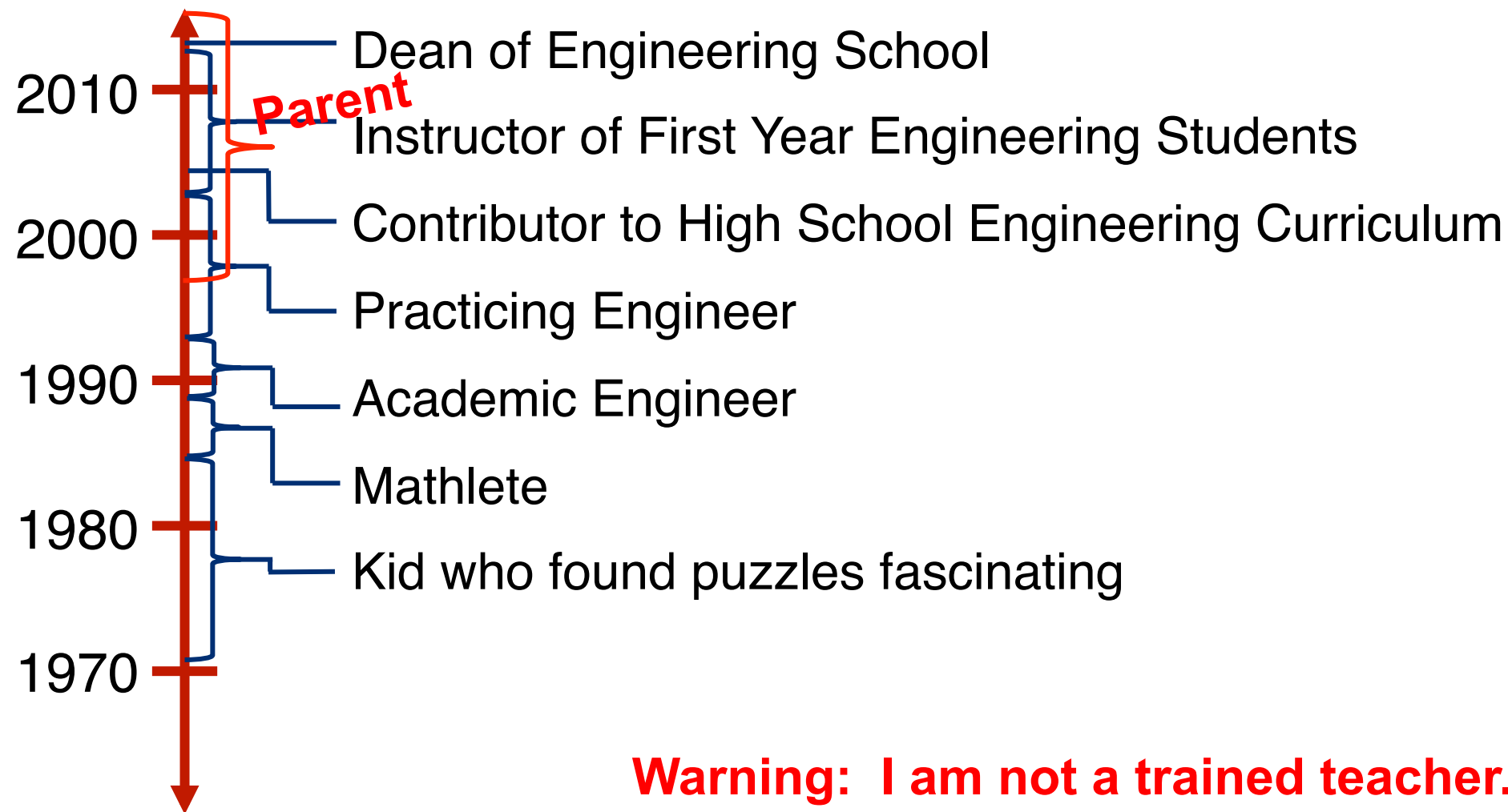# Understanding the New Texas Essential Knowledge and Skills in Mathematics
Research to Practice

February 28, 2014

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Dean & Bobby B. Lyle Professor of Engineering Innovation

My Perspective

2010 — Dean of Engineering School

Parent

Instructor of First Year Engineering Students

2000 — Contributor to High School Engineering Curriculum

Practicing Engineer

1990 — Academic Engineer

Mathlete

1980 — Kid who found puzzles fascinating

1970 —

Warning: I am not a trained teacher.

My Favorite Math Problem,

came from my daughter's Talented and Gifted Teacher:

Tonight for homework, find as many ways as you can think of to try to solve the following problem:

[*Insert word problem here*]

What I see in first year engineering students:

- They think about mathematics procedurally.
  - They have gotten good at following recipes, but never learned how to cook.

- They don't link math to the world or even models of behavior.
  - Sines and Cosines as functions.

- Certain important parts of math are completely forgotten:
  - Logorithms

- They have memorized, but not understood.
  - Can't "check" equations for themselves to make sure they've remembered correctly.

Word Problems: the Bane of Math Students!

- Why is that?
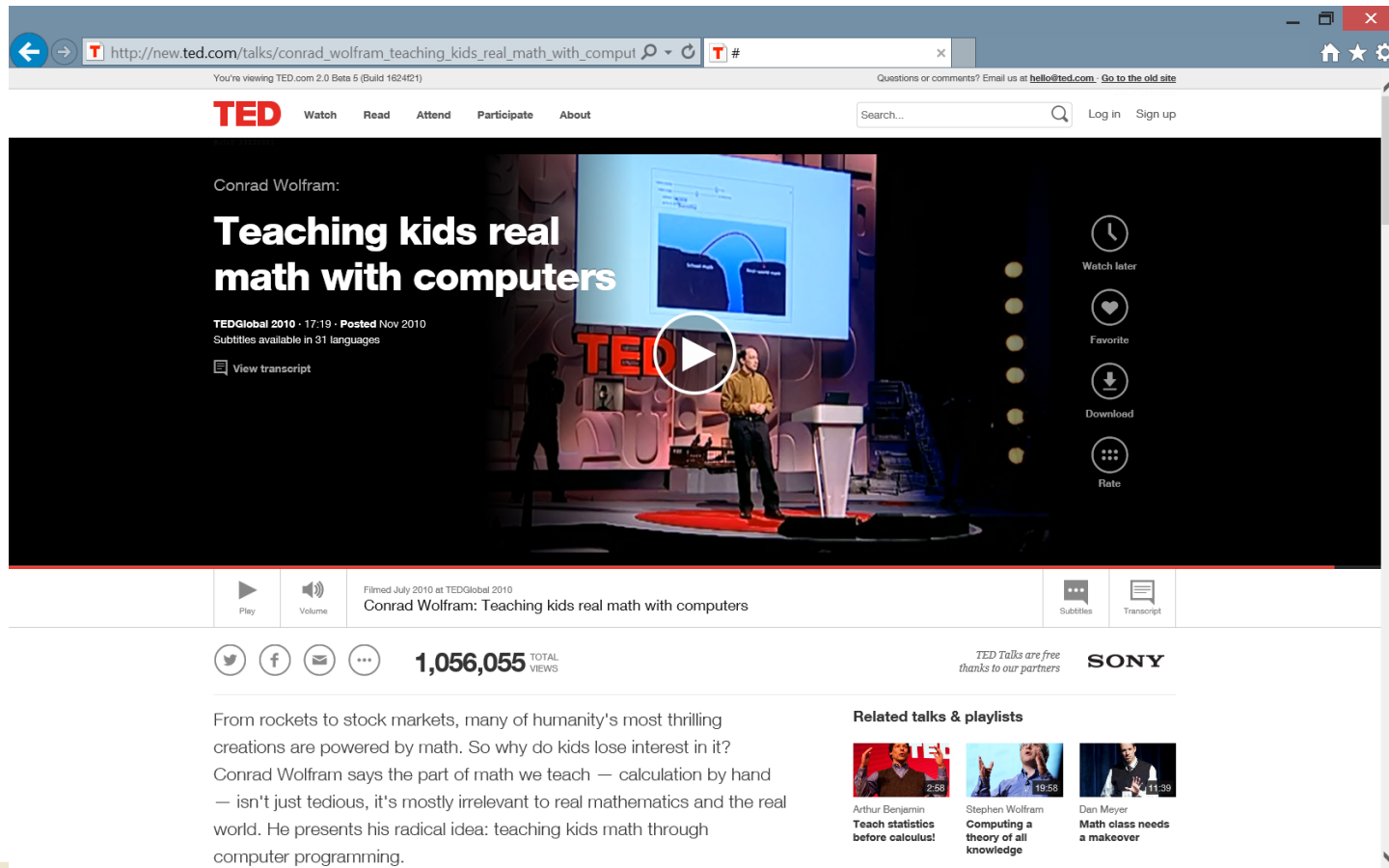
Another Favorite Math Problem

- This one comes from Math Mama's Blog:

  http://mathmamawrites.blogspot.com/2010/04/murder-mystery-project-for-logarithms.html

- A murder mystery full of logarithms.

A Homework Assignment: (if you haven't already done so)

- Go watch Conrad Wolfram's TED talk.

The Highlights:

- "Stop Teaching Calculating, Start Teaching Math"

- Math is:

  - Posing the right question.

  - Mapping the real world to a formulation.

  - Computation.

  - Verifying the Math formulation in the Real World.

80% of our time spent here, and doing it by hand!

Flipping this would prepare everyone to use math in their lives, whether comparing mortgage approaches or designing the next Iphone.

Mathematics & Science for the Real World

- Math and Science are toolboxes which allow you to solve real world problems.

- How to we assess thoughtful problem solving rather than the mechanics of computation?
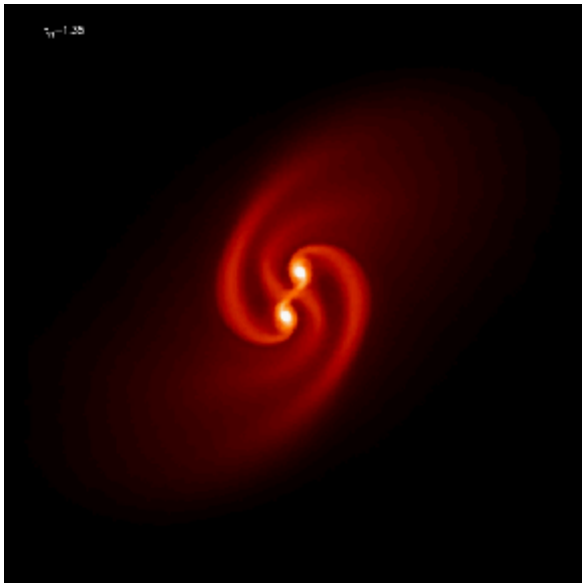
- We can expose students to beautiful concepts while abstracting away the complexity for which they are not yet prepared.