



Where is Knowledge in Teaching?

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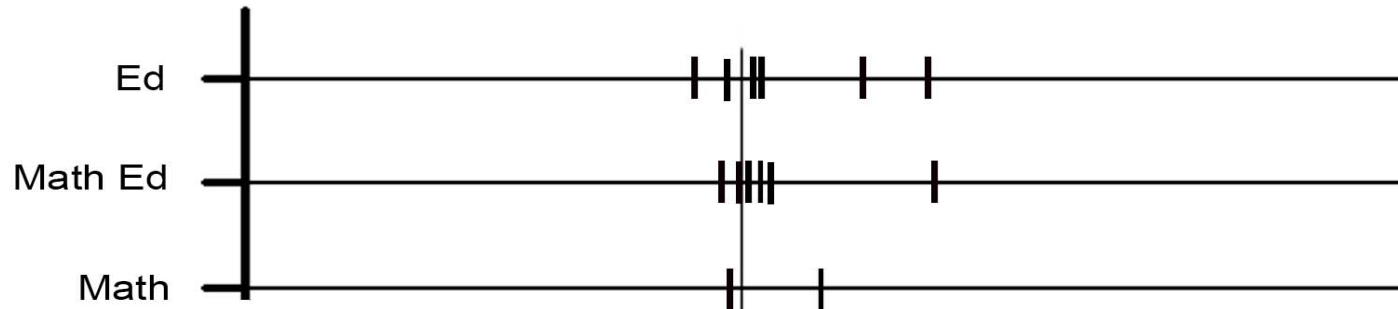
Teachers' Knowledge of Math and Their Students' Achievement Gains

Mean Correlation Coefficients

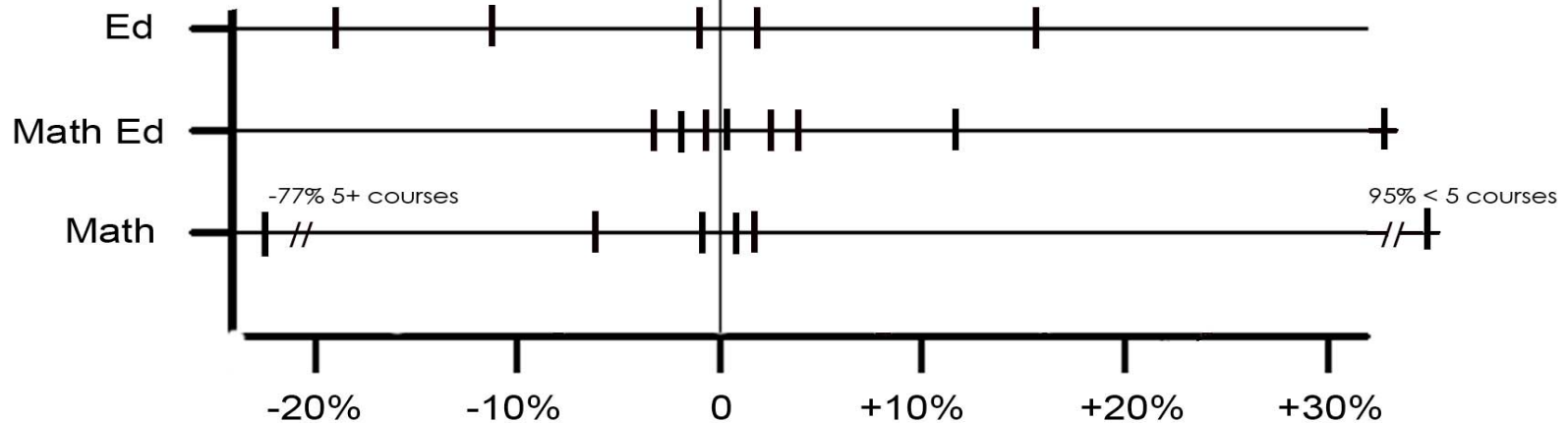
	Elementary	Secondary
Education*	-.05	.05
Test Scores	.11	.10

* Includes studies using N of courses, GPA, major or minor, and certificate

Elementary Teachers



Middle/Secondary Teachers



Change in student mathematics achievement as a percent of average annual gains


One additional study (Eberts and Stone, 1984) reported a very small achievement gain for elementary students whose teachers took a course in mathematics education. It is not shown here because we were unable to convert the data to this metric. Also one of the effects shown in the center cluster of effects is actually a combination of mathematics and mathematics education.

Why these Ambiguous Patterns?



- Student standardized tests not good indicators of learning?
- Other method problems (attrition, passage of time, etc)?
- Courses don't provide knowledge needed for teaching?
- *Knowledge really doesn't contribute much to teaching?*

Conditions that Encourage Habit and Discourage Thought



- Limited planning time
- Inflexible time slots
- Uncertain relationship between teaching and learning
- Students

Lessons as “Plug and Play”




Insert one of the following to fill space as needed:

- Homework reviews
- Mini-lecture
- Demonstration
- Q&A routine
- Decentralized learning activity

Sequence can vary, pieces can be added or removed to fit remaining time

Ms Buford's Plug and Play "Problem of the Day"



Today is neither Sunday nor Friday.

Tomorrow will be neither Tuesday nor
Thursday.

Yesterday was neither Monday nor
Wednesday.

What day is today?

Two Solutions to Buford's Problem

Today not Sun or Fri

S M T W T H F S

Tomorrow not Tues or
Thur.

S M T W T H F S

Yesterday not Mon or
Wed

S M T W T H F S

Today is Saturday

Today not Sun or Fri

S M T W T H F S

Tomorrow not Tues or
Thur.

S M T W T H F S

Yesterday not Mon or
Wed

S M T W T H F S

Today is Saturday

Three Thoughts Provoked by Unexpected Student Ideas



- Substantive merits of the idea?
- Source of the idea?
- How to respond?

Ms Scott:

Q: What have we learned about
dinosaurs?

A6: Dinosaurs don't have ears.

↔ Substantive merits of the idea?

↑ Source of the idea?

↓ How to respond?

Ms Katlaski:

Q: How to convert the 9 to a fraction?



A: Multiply 9 by $4/4$

↓ Substantive merits of the idea?

↔ Source of the idea?

↓ How to respond?

Ms Toklisch:

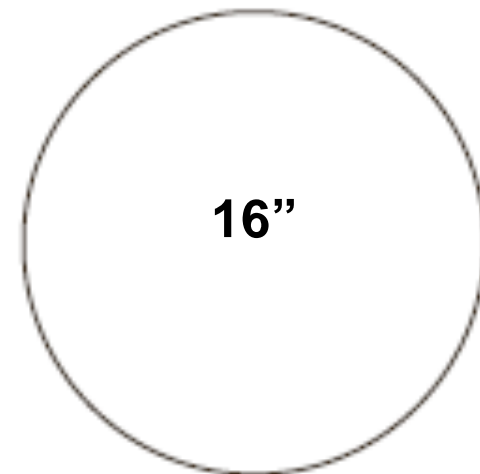
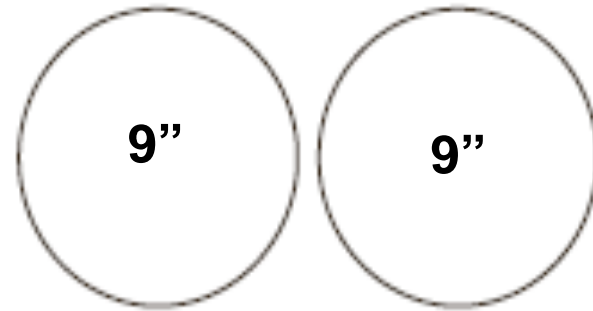
Q: Which offers the most pizza to eat?

Already on the board

9" → about 63 sq inches

15" → about 115 sq inches

16" → about 180 sq inches



Ms Toklisch:

Q: Which offers the most pizza to eat?



All: Two 9" pizzas, because sum of diameters is 18," more than the 16" diameter of the other pizza

↑ Substantive merits of the idea?

↑ Source of the idea?

↓ How to respond?

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