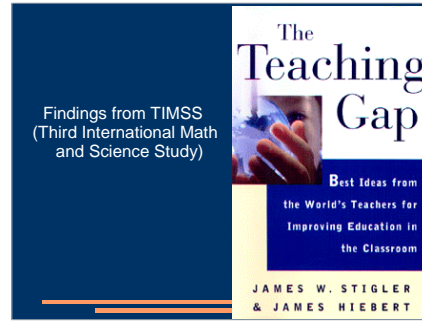


*Re-working developmental math:
a complete package*

20th ICTCM
San Antonio
March 7, 2008

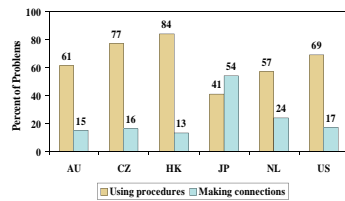
Bruce Yoshiwara
Los Angeles Pierce College



*International Data That Address the
Two Features of Teaching*

- TIMSS 1999 Video Study examined about 100 8th-grade math lessons in each of 7 countries
 - At least 80% of lesson time in every country is spent working on math problems
- How problems are worked on with students gets at the heart of how teachers and students interact about content

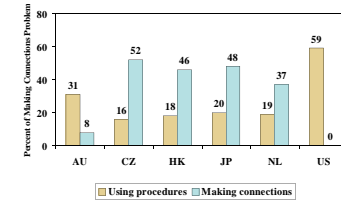
Percentage of Problems Presented as Each Type



*Example: Transforming a Problem From Making
Connections ⇨ Using Procedures*

- Problem: Find a pattern for the sum of the interior angles of polygons
- Worked on as Making Connections
 - Measure the sum of the angles for 3-, 4-, and 5-sided polygons; predict for 6-sided polygons; for n-sided polygons; develop a general formula
- Worked on as Using Procedures
 - Present formula [Sum = $180(n - 2)$] and ask students to practice

*Percentage of Making Connections Problems
Worked On in Each Way*



Guiding Principles

- Teaching matters.
- Effective teaching depends on a few key features.

Features of Effective Teaching

- *Make conceptual relationships clear.
Attend explicitly to connections between ideas.
- *Allow students to wrestle with ideas.
Avoid reducing conceptual problems to procedural problems.

The Tao of Teaching

Teach some subject matter in depth.
“Coverage” cannot be a primary goal; deep understanding is critical.

Features of the Mathematics Algebra Project

- Lessons have both reading and writing components.

From the California Basic Skills Initiative:

“A stronger emphasis on reading/math integration (i.e. analyzing word problems, building mathematical vocabulary, and teaching reading skills [can] help students see connections between vital components of a developmental curriculum.”

Features of the Mathematics Algebra Project

- Lessons have both reading and writing components.

From the California Basic Skills Initiative:

“Writing must become an essential part of the community college framework.”

Features of the Mathematics Algebra Project

- Classroom lessons are activity based.

From the California Basic Skills Initiative:

“Active learning methods [are] critical for adult learning because [they] have already been exposed to the typical lecture, discussion, drill and practice approach...and they have not worked.”

**Features of the
Mathematics Algebra Project**

- Classroom lessons are activity based.

From the California Basic Skills Initiative:

“Collaborative learning activities have a positive effect on the academic performance and persistence of developmental students.”

**Features of the
Mathematics Algebra Project**

- Mathematical concepts and skills are developed in context.

From the California Basic Skills Initiative:

“Students retain information longer and can apply it more effectively if it is learned in context.”

**Features of the
Mathematics Algebra Project**

- Mathematical concepts and skills are developed in context.

From the California Basic Skills Initiative:

“Often remediation involves abstract and repetitive practice. Unless students are challenged to think critically while they develop fundamental skills, they cannot begin to create the necessary cognitive framework.”

**Features of the
Mathematics Algebra Project**

- Study skills are incorporated in each lesson.

From the California Basic Skills Initiative:

“Metacognitive skills should be integrated into the curriculum.”

**Features of the
Mathematics Algebra Project**

- Study skills are incorporated in each lesson.

From the California Basic Skills Initiative:

“Teachers must assume responsibility for helping students to develop meta-cognitive awareness. Once students establish a perception of self-direction, they will more ably use self-management skills and learning strategies.”

**Features of the
Mathematics Algebra Project**

- Professional development is a key part of the program.

From the California Basic Skills Initiative:

“Highly effective developmental programs are characterized by formal, embedded mechanisms to facilitate...creation and exchange of instructional strategies among faculty.”

Activities

Activity 1 explores the scenario introduced in the reading.

Students are asked to read and interpret equations and graphs.

Algebra skills are practiced in the context of the problem.

Writing prompts are included.

Personal Response System (clickers)

Clickers are used to get immediate feedback on student progress.

- Assess student understanding of concepts.
- Help students monitor their own learning.

Homework

Homework assignments have three parts.

- Written explorations to reinforce the classroom activities.
- Skills practice delivered by an Internet-based course management system.
- Reading assignment for the next lesson.

Professional development for MAP instructors

- Workshops before and during the semester
- Peer observations of classes
- Online forums and wikis

Project assessment

Success rates of MAP students will be compared to non-MAP students:

- MET (Math Exit Test)
- Success in the next math class

Thank you!

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