Transformations: MATH 104 and 184

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Outline of Talk

• Introduction: What are Math 104/184 and why transform them?

• Course-level transformations

• Student Engagement – Clickers, Pencasts

• The Future

• Q&A
MATH 104 and 184

- Differential Calculus for Commerce and the Social Sciences

- MATH 104: Students have a prior calculus course.

- MATH 184: Student have no prior calculus course.

- MATH 184 Workshops (a separate project).

- Equivalent to the science versions of differential calculus.

- Most students come from the Sauder School of Business and the Faculty of Arts. About 20% are from all other Faculties (including Science).


- Common Final Exam for both courses.
Course Transformation

- Situation: Given 14 instructors (11 novices and 2 experienced but novices at this course + 1 IIC) and 1400 novice students, how do we support instructors and students so this course is a good teaching and learning experience?

Keys: Clear learning goals, clear expectations, clear plan of attack, clear messaging.
Fresh Sheets

GOAL: Provide a useful resource for Instructors and students: each weekly sheet lists
- the learning goals for that week,
- potential pedagogic approaches and issues
- suggested problems and assignments

The teaching team meets each week to discuss how we might approach the week.

Students receive a student version with learning goals, suggested problems, and the weekly assignments.
Instructor Responses

- "should have these all the time"; a big help, liked Learning Goals with suggested problems
- "very very useful" to know where students should be for the common assessments; very convenient to help plan lectures and pacing
- Useful for planning in advance; permitted "paint by numbers" (did not need to be good at the planning part of instruction to do a decent job); promoted uniformity; very good for knowing what to do and keeping on track, knowing what the students _need_ to learn
- "infinitely better" than previous year; very helpful for workshop prep, for pacing and emphasis; indispensable
- "very useful" for keeping on track (otherwise would have been too slow on own)
Some Lessons I Learned

• Novice instructors are living in the moment most of the time.

• Most mathematicians have not studied economics or business.

• Most of us envision the course we took as students when we first teach, and MATH 104 (184) is not that course.

• **Opportunities for disagreement are important. **

• Even experienced teachers can be novices.
Student Engagement

GOAL: We want to increase student engagement both in and out of the classroom.

Mathematics is NOT a spectator sport!

WebWork homework assignments.

Long answer assignments.
Clickers!

Q: What makes a good clicker question in a mathematics?

Example:

At some point since you were born, your weight in pounds equaled your height in inches.

A. TRUE + confident

B. TRUE + not confident

C. FALSE + confident

D. FALSE + not confident
Example:

We informally describe a function $f$ to be continuous at a point $a$ if the graph of $f$ has no holes or breaks at $a$.

A. This description gives a clear and accurate description of continuity at a point.

B. I can think of an example for which this is not true.
Things with which I wrestle:

• The balance of conceptual and technical: ultimately students demonstrate their understanding by doing calculations and solving problems.

• Knowing when to keep data for later analysis – not always obvious

• Too much material!!!!
Pencasts

• Pencasts are a way to share ideas with students “on the fly” through the web or via apps.

• Best to see them in action……….
The Future

• Better integration of business problems into the course: not simply as examples, but as “sources” for engaging students.

• The Learning Cycle: how do we get students to do the things they need to be doing when they study?

• Is there an experiment to measure what effects, if any, high levels of classroom engagement have on student learning?

• Cross fertilization – compare to ECON 101, COMM 290
Questions???

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