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).
- Enrolment: Math 104: 900. MATH 184: 500.
- 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; indispensible
- "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 an 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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