

Large Lectures in Calculus: A challenge in Teaching and Research

S.I.G.M.A. Seminar

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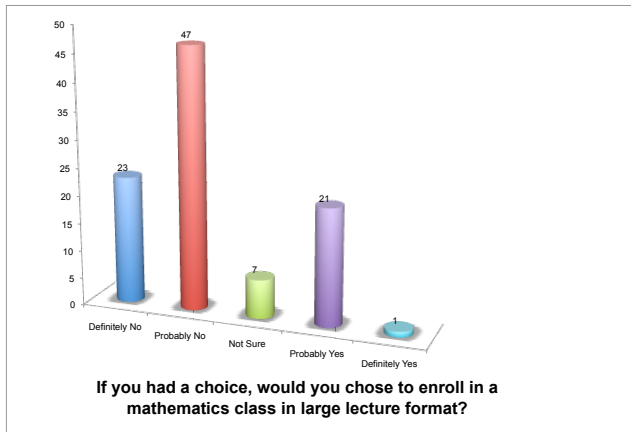
Department of Mathematics
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Outline

- Large lecture issues
- Three technological tools
- Preliminary Students Perceptions
- Research process

What do student think?



Large lecture issues

- 1 150+ students versus 32 students.
- 2 Projector, Document camera, Sympodiums Versus Blackboard/ Whiteboard.
- 3 Invisible versus Visible.
- 4 Uninvolved versus Involved.
- 5 Chaos versus Order.

Challenges

- 1 Student - Teacher interaction.
- 2 Are students on the same page as you? In-class interaction.
- 3 Organize study material.

Micro-videos

- Decide on a topic or concept.
- You need a white or black board.
- A handheld camera.
- A well lit room.
- Software to process the video.
- A server to host it. [Click here](#)

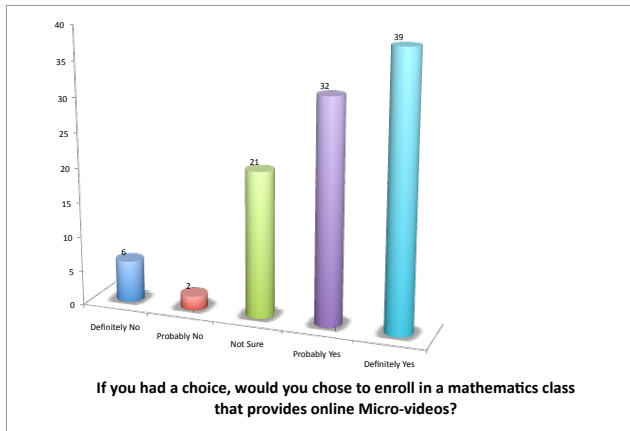
Interactive Response Systems: "Clickers"

- Prepare questions in advance.
- Be prepared to ask follow up questions.
- Key is in the response.
- Good questions leads to insightful data.
- Iterative process.
- Post them online

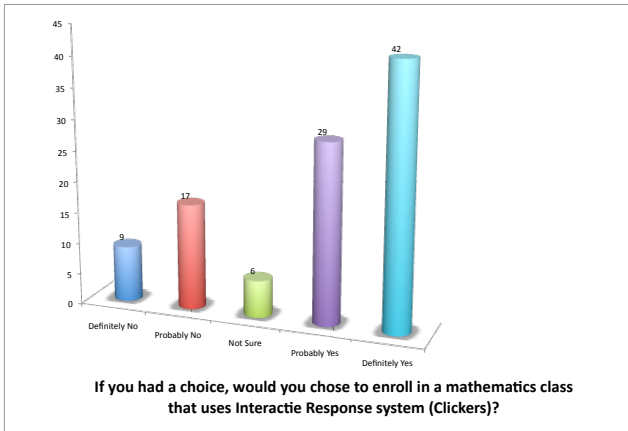
Flash Cards

- Pick concepts, formulae, identities etc.
-

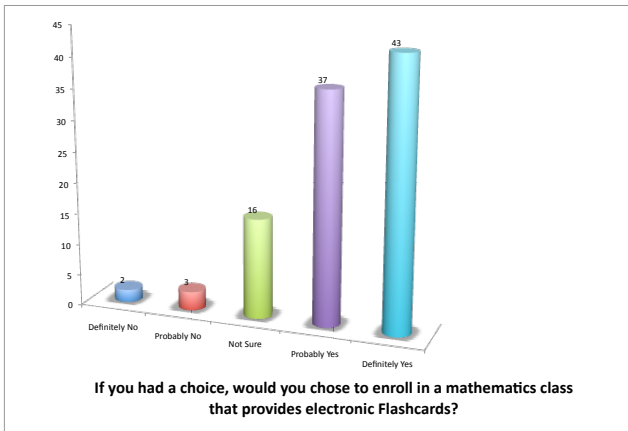
Preliminary Students' Perceptions



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Research Process

- 1 Preliminaries
- 2 Study Design
- 3 Preparations and Implementation
- 4 Data Analysis and Interpretation
- 5 Dissemination

Preliminary steps

- **Research Problem**
- Purpose
- Literature Review
- Research Question

Research Problem

A general problem, issue, or concern
Stands on its own

Preliminary steps

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- Purpose
- Literature Review
- Research Question

Purpose

Major intent of the study to address the problem

Narrows research problem down to a specific aspect

Preliminary steps

- Research Problem
- Purpose
- Literature Review
- Research Question

Literature Review

Justify the research problem and purpose Summarize present state of knowledge

Identify deficiencies in the evidence

Interface between Purpose and Research Question

Preliminary steps

- Research Problem
- Purpose
- Literature Review
- Research Question

Research Question

Specific Question(s) to be addressed in the study

Design Approaches

Research question determines the design approach

- Quantitative Study
- Qualitative Study
- Mixed Methods Study

Quantitative

Experimental research

Correlational research

Survey research

Design Approaches

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- Qualitative Study
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Qualitative

Grounded Theory research

Ethnographic research

Narrative research

Design Approaches

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Mixed Methods

Combination of quantitative and qualitative approaches to best understand and explain the research problem

Preparations

- Institutional Review Board (IRB)
- Honoring research sites
- Instruments (surveys, interview guides, observation rubrics)

Research on human subjects

IRB → protecting the rights of participants

UConn IRB

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Preparations specific to our study

- IRB protocol submission and approval
- Course Coordinator approval
- Preparation of all instructional materials and surveys
- Formatting, editing, uploading, and testing web-based tools

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Implementation

- Information sessions for participants
- Data collection
- Monitoring

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Data analysis and interpretation

During or immediately after data collection

- Data analysis (type of data)
- Results interpretation → restricted to data findings
- Discussion and Conclusion

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Reporting results

- Audience
- Type of Report
- Adhere to specific requirements

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Special thanks
Lucas David-Roesler and Ben Salisbury
and
Provost's Office

THANK YOU!

Questions?