

Transforming Modeling Instruction in a Large Classroom Environment

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100Kin10
ANSWERING THE NATION'S STEM CHALLENGE

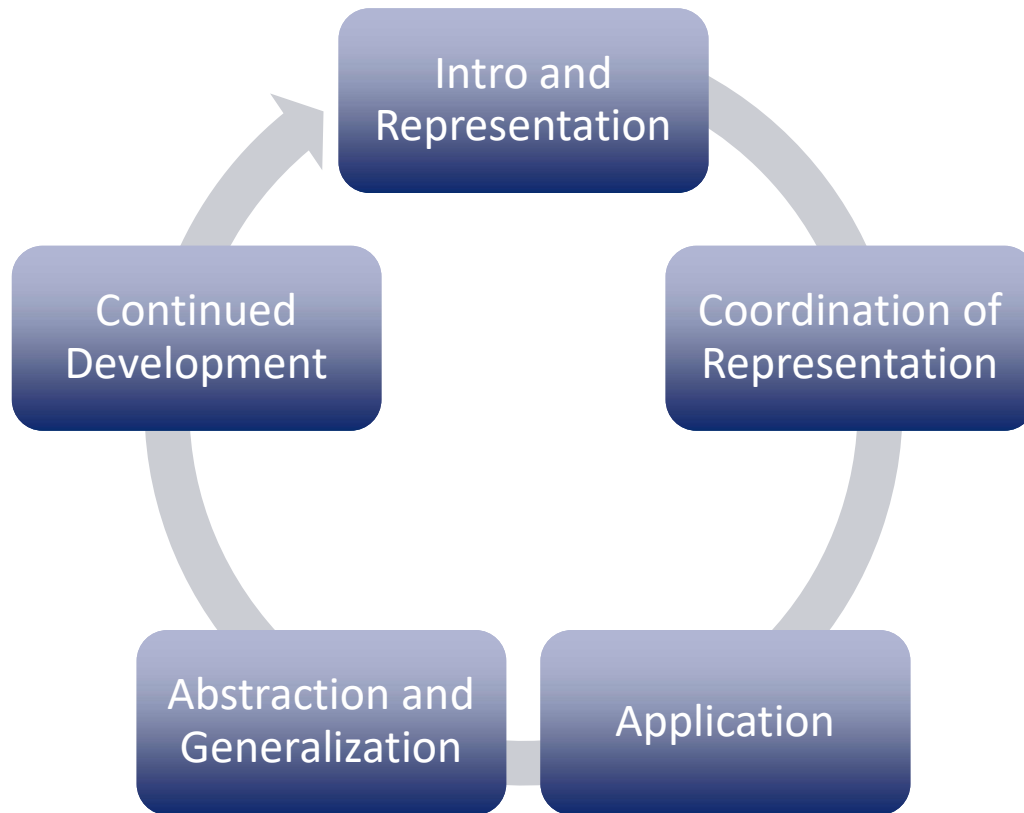
SMTI SCIENCE & MATHEMATICS TEACHER IMPERATIVE

What is Modeling Instruction?



- Student-centered studio class
- Integrated lecture/lab
- Student focus on group work
- Highly scaffold activities
- Student led discussion
- Includes both curriculum materials and pedagogical design.

What is Modeling Instruction?

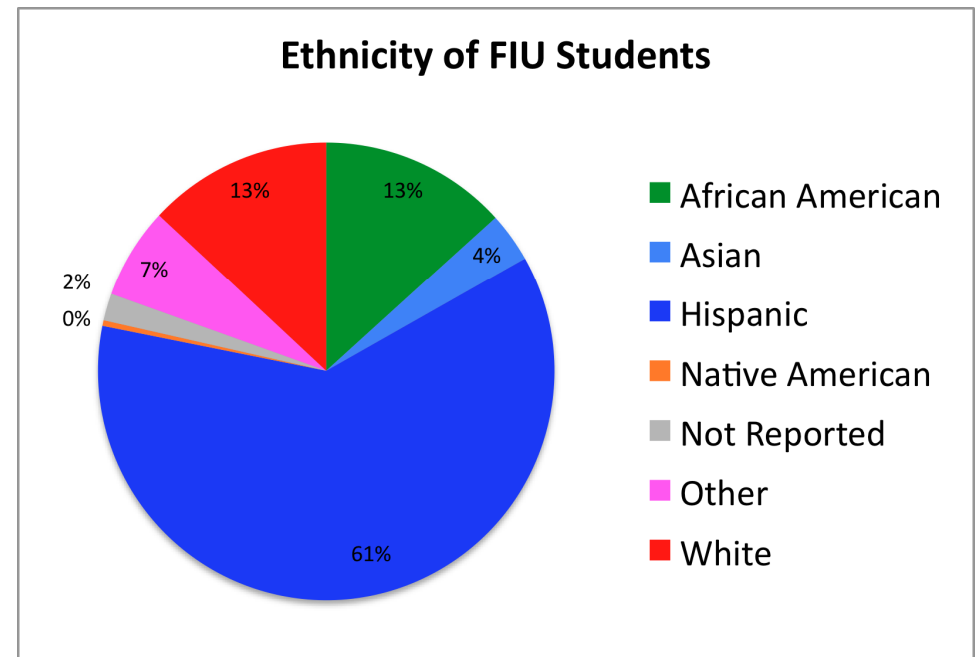


- Focuses on model development, testing, and refinement
- Physics content is uniquely organized around general physics models
 - Example: Energy before Forces



FLORIDA
INTERNATIONAL
UNIVERSITY

- Public, Urban, R1 Research University in Miami
- Hispanic serving institution
- 83% commuter students
- 79% students locally recruited



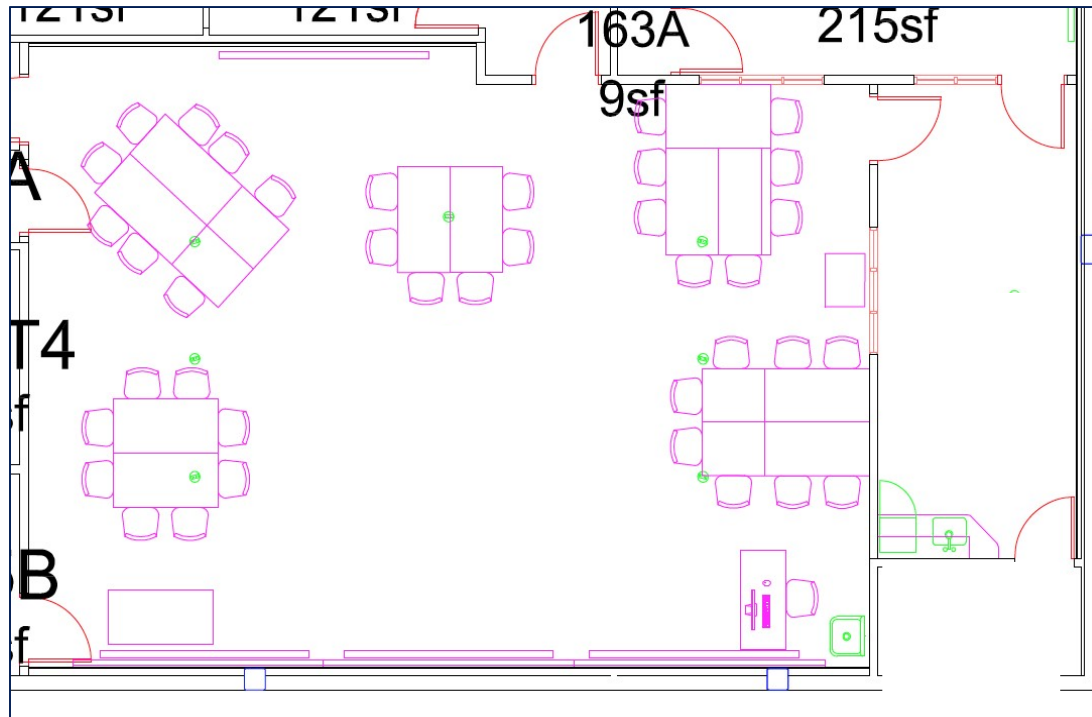
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Then: The First 10 years



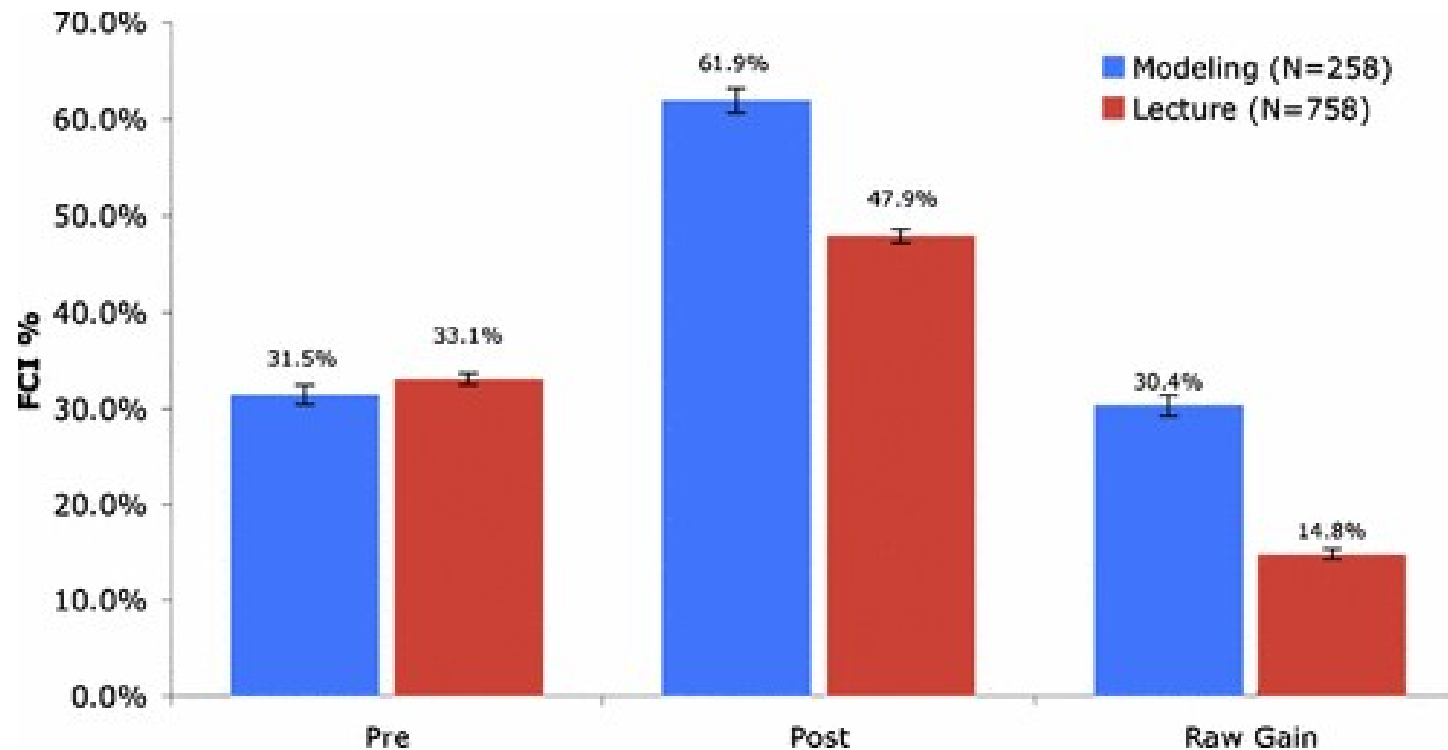
- Classroom of 30 students

Then: The First 10 years



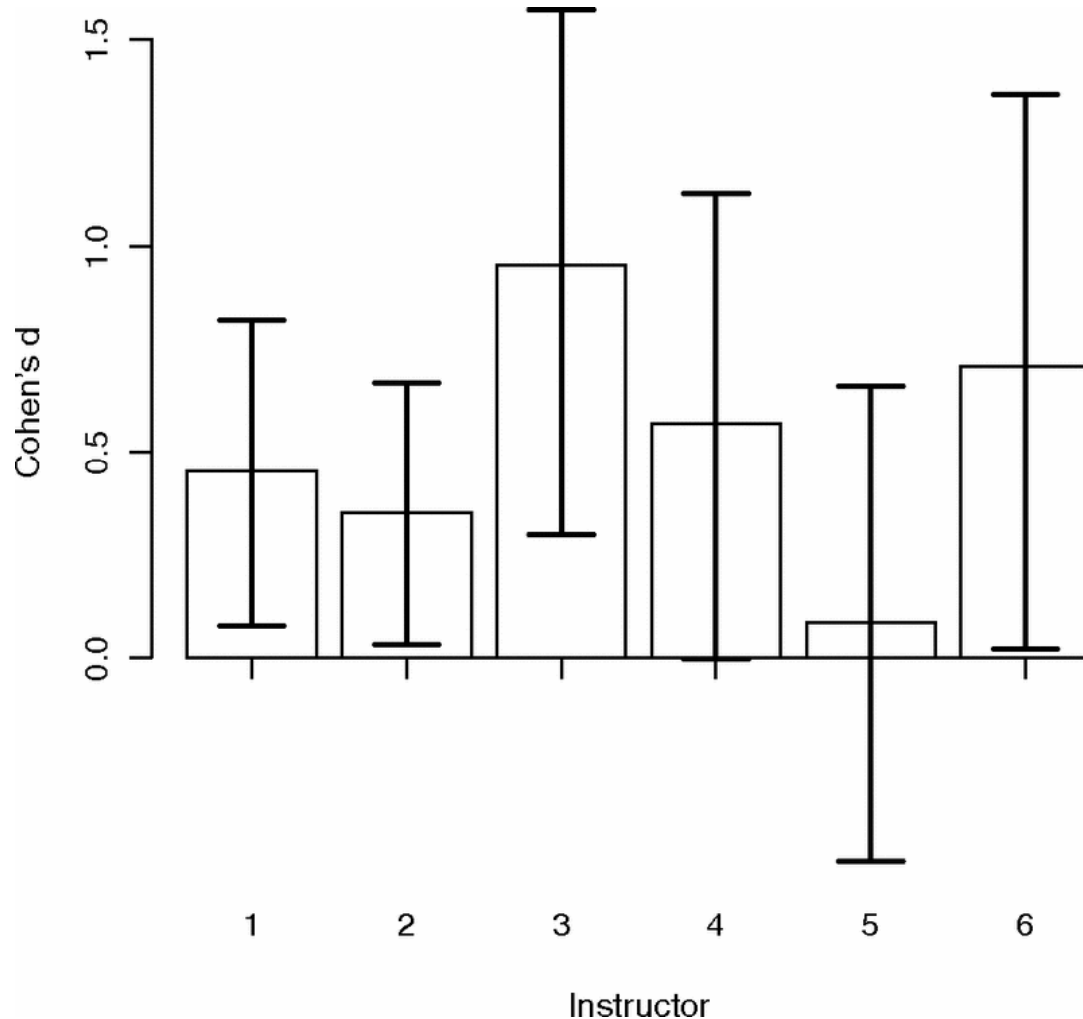
- Classroom of 30 students
- Ten tables arranged in a semi-circle

Then: The First 10 years



- Significant differences on FCI learning gains as compared to lecture courses
- The odds of success in MI is 6.73 larger than lecture

Then: The First 10 years



- Classroom of 30 students
- Ten tables arranged in a semi-circle
- Significant differences on FCI learning gains as compared to lecture courses
- The odds of success in MI is 6.73 larger than lecture
- First 6 MI Instructors achieved significant positive shifts on CLASS

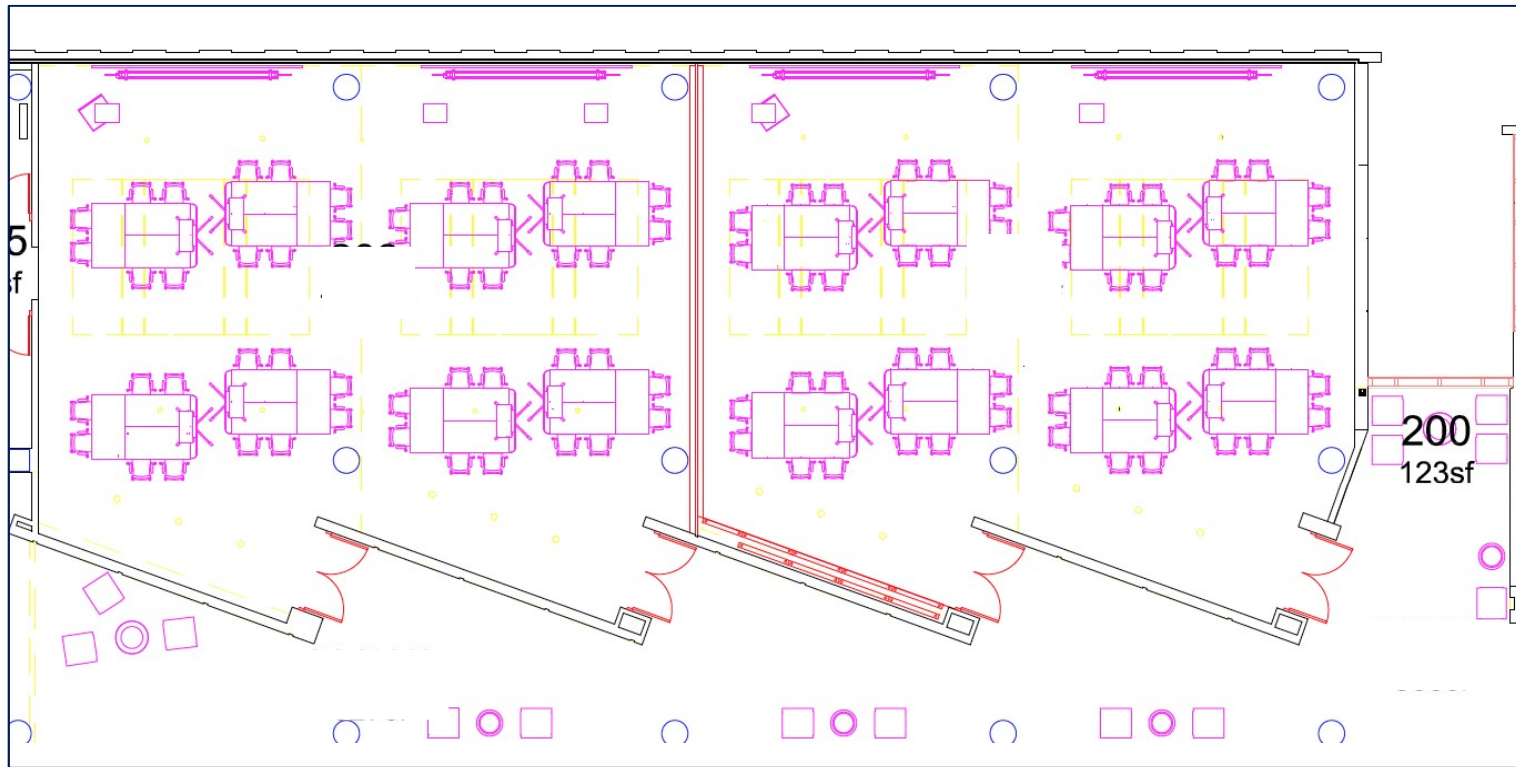
Now: Large class



- Classroom fits 96 students



Now: Large class



- Classroom fits 96 students
- 16 tables of six students with room partitions if needed

Now: Large class



- Classroom fits 96 students
- 16 tables of six students with room partitions if needed
- We hold 3 coordinated discussion meetings in parallel
 - Anchored with instructor guide
 - And weekly planning meetings
- LAs lead discussion circles
 - New LAs are matched with more experienced LA

Resources

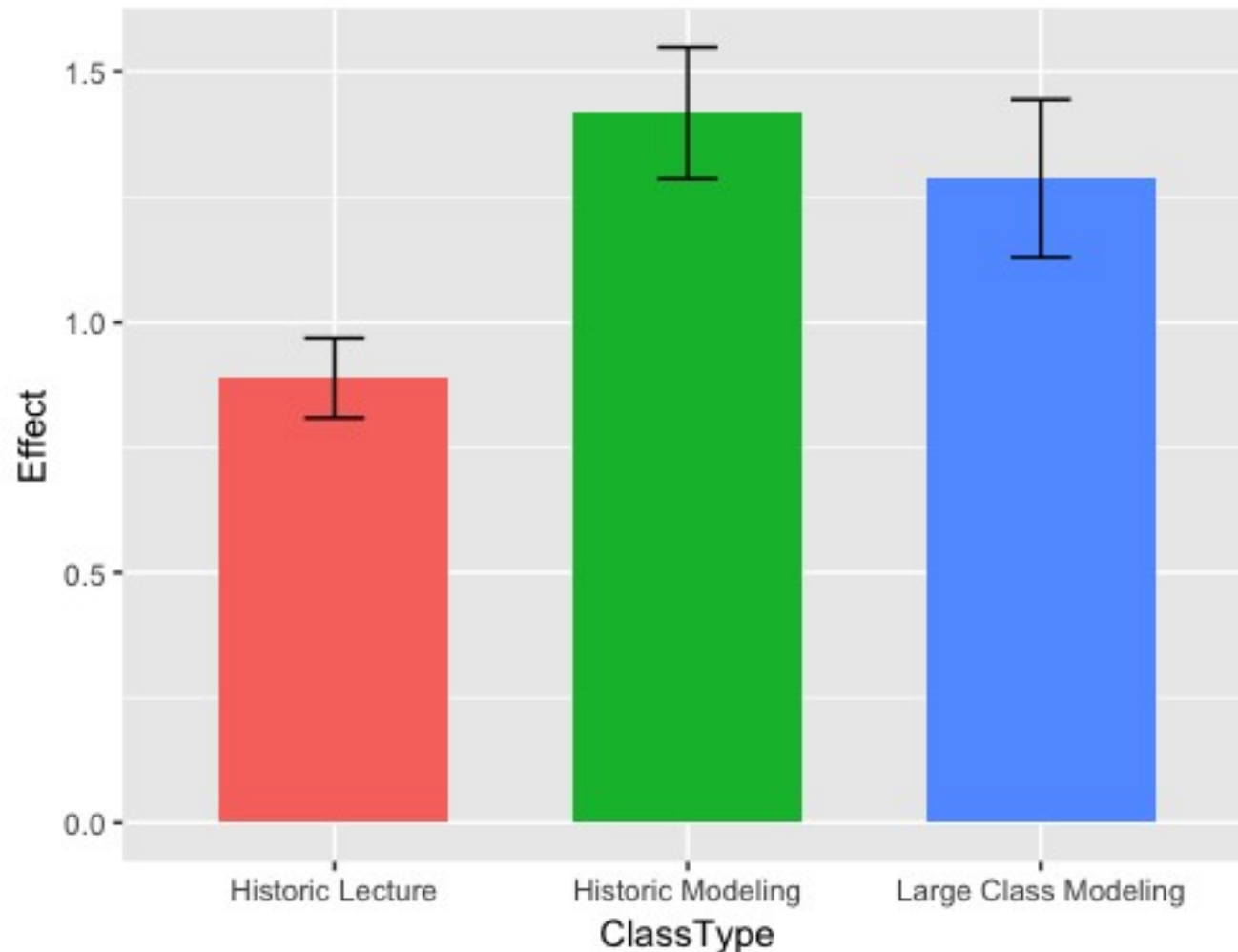
Then

- 30 student class
- Instructional Team
 - One faculty
 - One Learning Assistant
- Institutionally cost ineffective*

Now

- 75+ student class
- Instructional Team
 - One faculty
 - One Graduate Teaching Assistant
 - Two Learning Assistants
- Institutionally cost effective

Learning Gains



- Current Large Modeling Class learning effect is averaged at **1.28** (CI 1.13-1.44)
- Historic Modeling effect is **1.41** (1.28,1.54)
- Historic Lecture effect is **0.88** (0.81-0.96)

Conclusion

- Scaling to a larger classroom environment, Modeling Instruction has effective learning gains
 - Proper implementation relies on coordinated parallel discussion circles
 - LA recruitment and training for leadership
- Note our outcomes in the context of our diverse student population
- More information in my poster
 - PST1C24, Monday July 30th 9:15-10:00pm
 - PERC Poster Session II # B72, Wednesday, August 1st, 8:00pm