Changes in Students' Epistemologies

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RAWR Rapid Assessment and Web Reports NSF DUE-0941889

KSUPER Kansas State University Physics Education Research

The RAWR System

Rapid Assessment and Web Response (RAWR) tests students over various physics topics

Online "tasks" allow large data sets, drawn weekly from Rochester Institute of Technology (RIT)

RIT introductory sequence is physics 1, 2, and 3, (N=100) with remedial-level classes (N=60)

EBAPS and CLASS

Epistemology tasks use Likert-style epistemology surveys, the EBAPS and CLASS

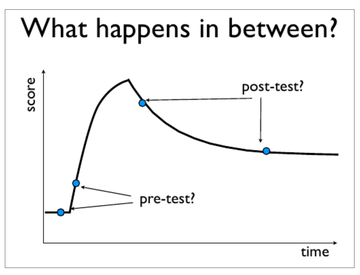
- EBAPS
  - Science's real-life applicability
  - Beliefs on the source of learning
- CLASS
  - Problem Solving Ability and Sophistication

Response Curve Methodology

Between-student sampling: Every student is assigned a different task every week

- Avoids test-retest effects
- Course factors (topic instruction, testing) most likely to influence task scores

Resulting response curve gives more information on within-semester trends than pre/post testing



RAWR also collects demographics information

- Gender, math exp., major, etc.
- Allows investigation of demographics factors

Questions

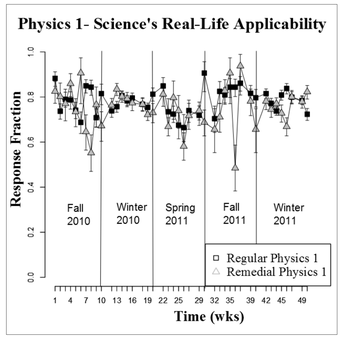
How do student epistemologies change during introductory physics instruction?

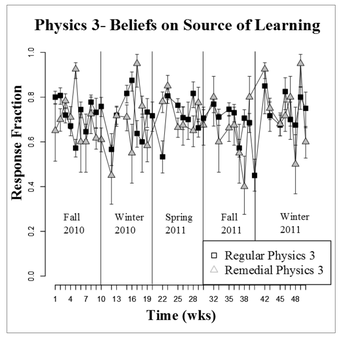
Are changes correlated to demographics groups?

Results

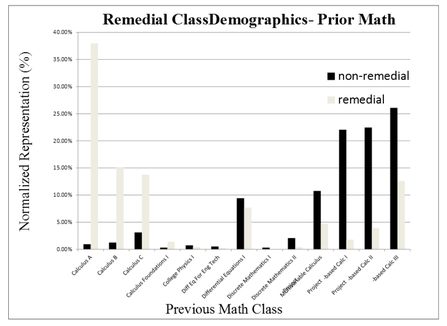
- No general decrease in epistemological sophistication during instruction
  - Poor negative linear fit to data
- Higher volatility observed in remedial-level physics classes
  - Possible correlation with math instruction

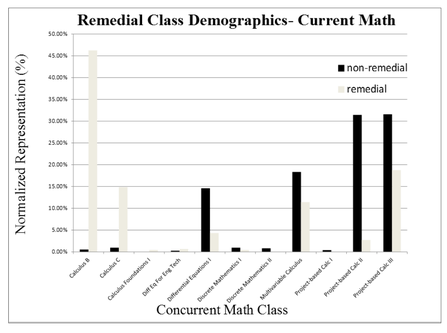
By task axis





Demographics





Conclusions

- Linear correlation shows very little ($|r| < 0.01$) correlation between data and negative linear model
- Data has no effects with semester-period indicating lack of testing or topic effects
- Remedial classes' scores vary extremely with time

Discussion

Developing sophisticated epistemologies is necessary to deep understanding of physics

Physics instruction does not necessarily harm epistemological development

Instruction in expert-held physics epistemologies could increase effectiveness of classroom education

Implications for instruction

Results suggest possible need for instruction reform

- Physics: Explicit instruction in expert epistemologies
- Math: Reform to studio-based instruction

References

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