Inquiry-Based Education in Mathematics: Models, Methods, & Effectiveness for Higher Education

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Why IBL?

One minute version of why IBL

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> *"Things my students claim that I taught them masterfully, they dont know." – Dylan Retsek*

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- I was sold from that moment on.

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You are peculiar!

We need to renormalize.

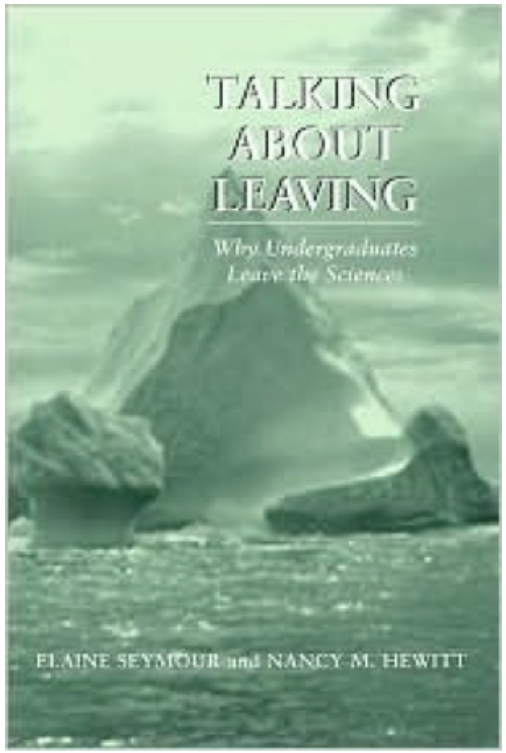
What is happening in STEM education?

- There exists a growing body of evidence suggesting students are dissatisfied with learning experiences in STEM.
- Math Education Research suggests that college students have difficulty with:
  - Solving non-routine problems,
  - Packing/Unpacking mathematical statements,
  - Proof.

Schoenfeld 1988, Muis 2004, Selden and Selden 1995/1999/2003, Dreyfus 2001, Sowder and Harel 2003, Weber 2001/2003, Weber and Alcock 2004, Tall 1994

Talking About Leaving

- About half of STEM majors switch to non-STEM.
- Top 4 reasons for switching are teaching related.
- Good ones leave, too.
- Loss of interest.
- Curriculum overload.
- Students dissatisfied with teaching of STEM classes and less so with non-STEM.
- Weed-out culture.



E. Seymour, N.M. Hewitt. *Talking about leaving: Why undergraduates leave the sciences*. Westview Press, 1997.

The Good News

Evidence from the math ed literature suggests that active, learner-centered instruction leads to improved conceptual understanding, problem solving, proof writing, retention, habits of mind, and attitudes about math.

Boaler 1998, Kwon et al. 2005, Rassmussen et al. 2006, Smith 2006, Chappell 2006, Larsen et al. 2011/2013/2014, etc.

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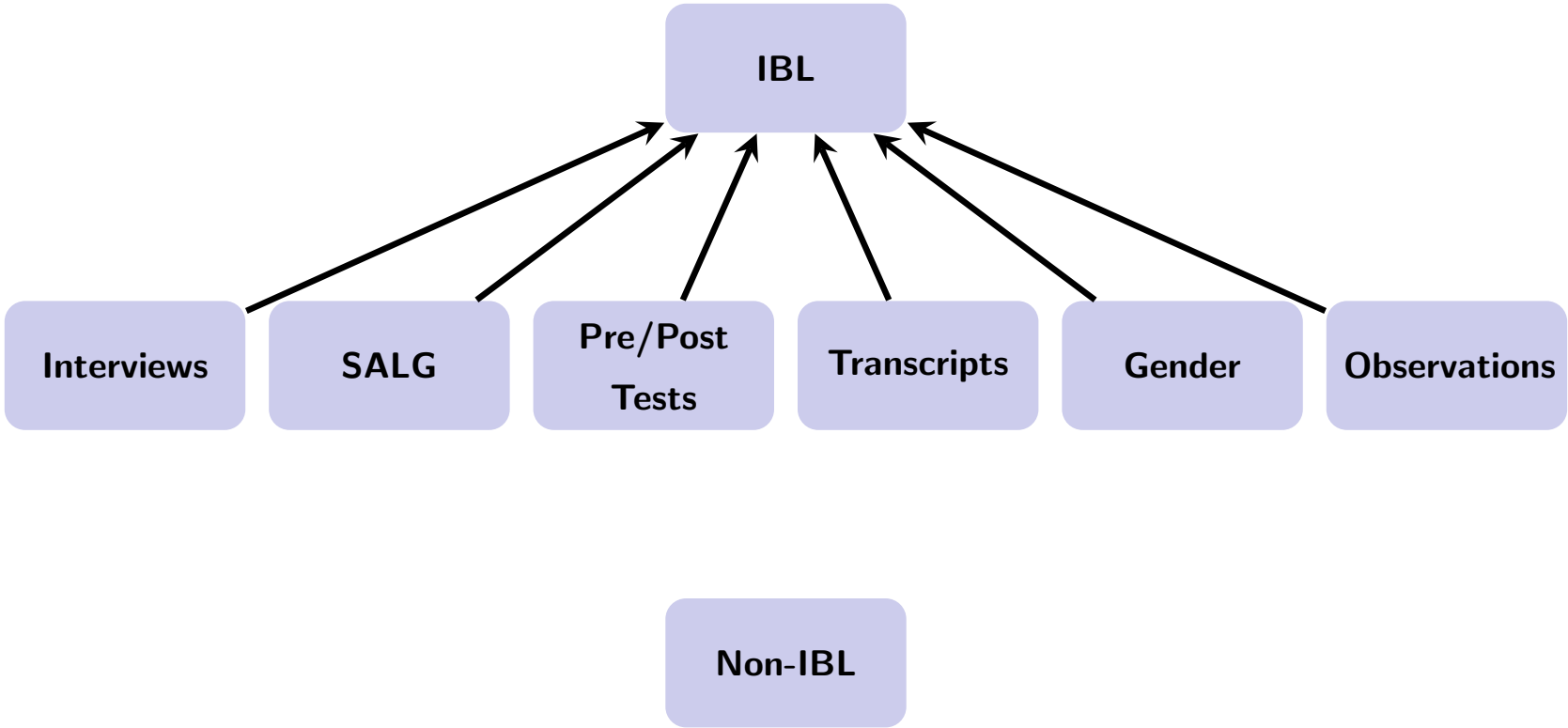

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"Despite variation in how IBL was implemented, student outcomes are improved in IBL courses relative to traditionally taught courses, as assessed by general measures that apply across course types. Particularly striking, the use of IBL eliminates a sizable gender gap that disfavors women students in lecture-based courses."