

The Measurement of Success: A Study of Inquiry-Based Mathematics Courses

One of the largest studies ever devoted to an evaluation of undergraduate mathematics classes that focuses on inquiry-based learning methods has recently been completed.

Multiple, complementary measurements of student and instructor outcomes were made at four IBL Mathematics Centers within the mathematics departments of:

University of California, Santa Barbara,
University of Chicago,
University of Michigan,
University of Texas at Austin.

After two years of data gathering and a year of processing, the next phase now begins, namely to disseminate the results among other education researchers and the broader education community.

The report was released at the 14th Annual Legacy of R.L. Moore

Please see *Measurement*, p. 2.

Convergence of Learners: Lamar University

The four centers mentioned above are an important influence in making IBL mathematics courses more widely available. On a national scale, however, it depends on what happens across the broad and diverse range of colleges and universities.

The following is the first in a series of reports from places where IBL courses are available. It comes from Lamar University in Beaumont, Texas, a member of the Texas State University System.

The Mathematics Department at Lamar has a strong Moore Method tradition and boasts six Moore-Wall-Ettlinger descendants on its

Please see *Lamar*, p. 3.

INSIDE

- 3 Academy of Inquiry-Based Learning
- 4 Journal for Inquiry-Based Learning in Mathematics



MAA Past Presidents Lida Barrett and David Bressoud at the 14th Annual Legacy of RL Moore Conference, 2-4 June 2011.
(Photo courtesy of MAA.)

Measurement from page 1

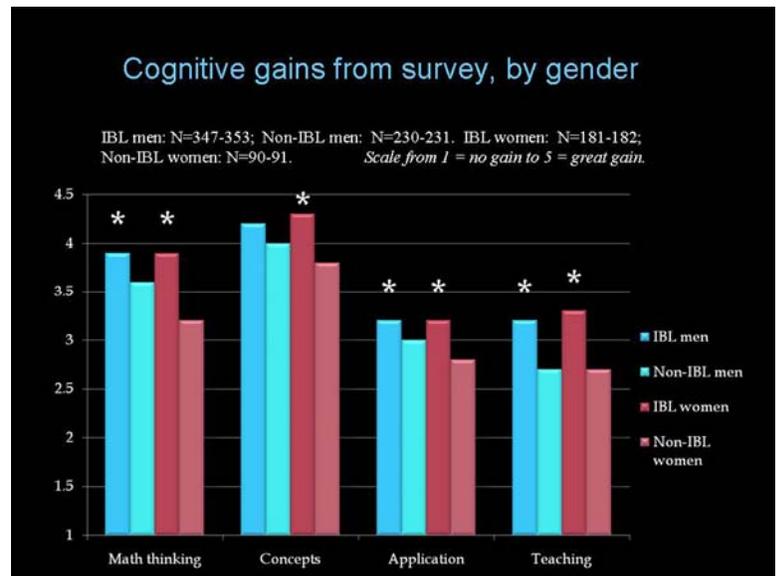
Conference in Washington DC, co-hosted with the Mathematical Association of America. The presentation was made by Sandra Laursen, lead investigator of the University of Colorado team that conducted the study.

The potential connections among these measurements have yet to be exploited.

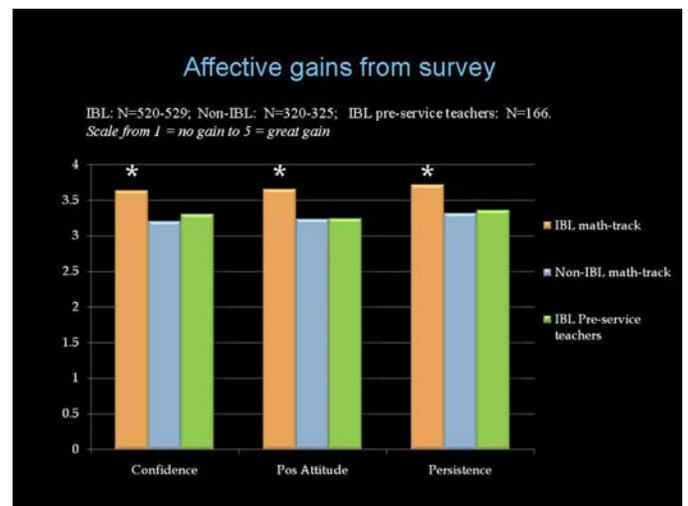
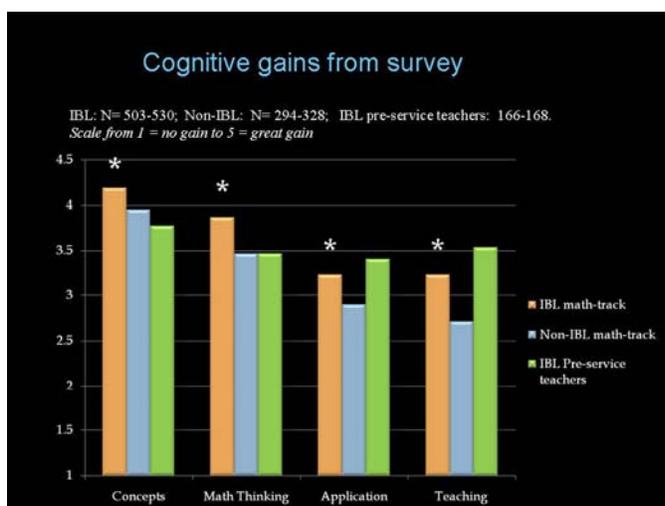
Some Highlights of Initial Study

It appeared that non-IBL courses tended to reinforce prior achievement patterns while IBL courses seemed to offer an extra boost to lower-achieving students, especially among pre-service teachers. All of the universities have selective undergraduate enrollment but differences were noted among “lower achieving” students, i.e. entering with low math GPAs (<2.5), compared with those with higher math grades.

Several lines of evidence indicate that IBL experiences were more powerful for students earlier in their college career. Younger students benefitted most from IBL instruction, but it had positive effects on students’ learning at all stages.



IBL methods helped both men and women but particularly benefitted women’s study of college mathematics. Women reported higher learning gains in IBL courses for mathematics majors than do men, but in non-IBL courses women reported lower gains than their male peers. Both men and women in IBL courses reported higher gains overall than did their peers in non-IBL comparison classes.



The full report may be seen at the website for the Ethnography & Evaluation Research unit at the University of Colorado at Boulder:

www.colorado.edu/eer/research/steminquiry.html

The graphics above are from Laursen’s talk and are available at:

legacyrlmoore.org/Reports/legacyrlm14_program.html

Lamar continued from p 1.

faculty: Joanne Baker, Charles Coppin, Dale Daniel, Judy Kennedy, Michael Laidacker and Ted Mahavier. Additionally, Jennifer Daniel, Kumer Das and Tim McNicholl use some variation of the method. Mohsen Maesumi has students view video-taped lectures outside of class and spend class time working on and presenting problems.

Students in math courses at Lamar may well encounter the method in their first two years of study since calculus, discrete mathematics, geometry and trigonometry are often taught using modified Moore Methods. All math majors encounter the method in four of their upper-level undergraduate courses since advanced linear algebra, analysis, introduction to advanced mathematics and modern algebra are taught exclusively via the method. Additionally, graduate-level abstract algebra, advanced linear algebra, differential equations, real variables and topology are Moore Method courses, as are various special-topics courses. Math majors at Lamar have come to expect courses taught this way, so Lamar faculty experience quick starts and minimal resistance as compared to institutions where students might encounter only one such course.

Lamar is pleased to have received joint funding from the Educational Advancement Foundation and Lamar for the Moore Method Apprenticeship Program (M2AP) under which graduate students will earn a master of science in mathematics and personalized experience implementing the method. Students will be paired with a mentor their first year and will observe that faculty member teaching a specific course during their first semesters. The students will co-teach during the second semester. During the second year of study, the student will be given supervised responsibility for his/her own class during both fall and spring

semesters. Upon completion of the program, students will be well prepared to serve as a teaching assistant in a doctoral program, teach at a community college or pursue a career in industry or government.

Lamar has approximately 14,000 students and is one of the most diverse campuses in the country with large African-American, Hispanic and international populations. Lamar serves many students who are first generation, non-traditional or from lower socio-economic backgrounds. The Moore Method works for all our students, giving them the confidence and ability to succeed in all their academic and career choices.

—Judy Kennedy, Ted Mahavier



Judy and Ted at the 14th Annual Legacy Conference.

The national Academy of Inquiry-Based Learning, offers a place on-line for exchange of ideas, support, developing new materials, and leads to IBL workshops.

www.InquiryBasedLearning.org

Featured Publication

Journal of Inquiry-Based Learning in Mathematics

JBLM publishes university level course notes that are freely downloadable, professionally refereed, and classroom tested. Each issue of the Journal consists of a set of class notes for a full course, serving as a textbook in IBL format.

JIBLM notes primarily serve three populations:

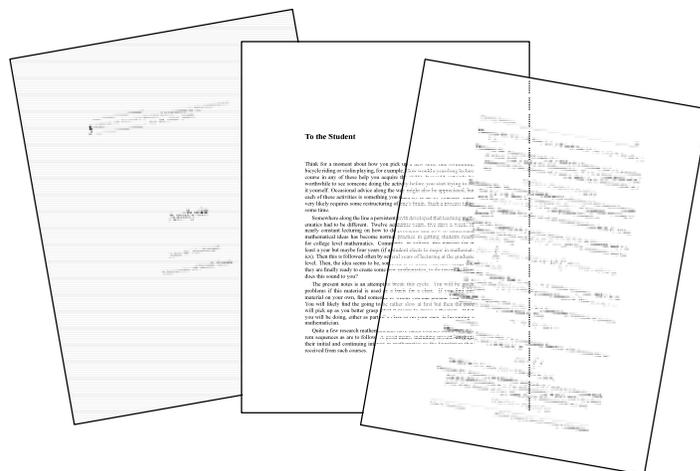
Instructors new to IBL who wish to use well-tested notes as a stepping stone to creating their own IBL courses,

Experienced IBL instructors teaching an unfamiliar subject, and

Students wanting to learn a new subject on their own.

More than your usual journal

Publications come with an address for each author, and instructors are encouraged to contact authors for guidance in the use of their course notes.



Experienced IBL instructors who have designed and successfully taught an IBL course are encouraged to compose the course in a written format that would be useful for other instructors and submit it to JIBLM.

The Journal interprets inquiry-based learning in the broadest sense, as any pedagogy that replaces traditional lectures and textbooks with some form of student centered activities.

It publishes only notes that consist primarily of a sequence of problems to solve and/or theorems to prove.

For access to the Journal and further information for authors, visit the website: www.jiblm.org.

A Gift to the Future

The Educational Advancement Foundation welcomes contributions and legacy gifts. The urgent need to improve student performance in science, technology, engineering and mathematics points to the need for inquiry based learning's improvement of students' creativity and problem solving abilities. Your support will help us increase the impact of our existing programs and extend efforts to new initiatives.

During the year 2011 all gifts will be matched one-to-one by EAF up to a total match of \$100,000.

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Or, you can call us about planned giving and naming projects through our development office at (512)469-1700.