



Some working groups at the 2015 conference

## Empowering with Inquiry-Based Learning

The theme of the 2015 Legacy Conference in Austin reflected one of the main reactions reported by students that have benefitted from IBL courses, namely the feeling of empowerment, of being able to do mathematics on their own.

What better way to appreciate this than to hear from students? Thus, it was particularly valuable to have a session with a panel of students who gave brief presentations about their experience with an IBL calculus class, followed by a substantial discussion period with the audience. They were all pleased with it and recommended it for others, but they were frank about difficulties that some had initially in seeing how to participate. The key seemed to lie in the guiding role of the instructor, in this case Angie Hodge at the University of Nebraska, Omaha.

Please see *Empowering*, p. 2.

The IBL Forum & 19th Annual Legacy of R.L. Moore Conference  
4 August 2016  
at the MathFest meeting in Columbus, Ohio.  
See "IBL Conference" at [www.inquirybasedlearning.org](http://www.inquirybasedlearning.org)

## Beauregard Stubblefield: A Craftsman's Journey as a Mathematician

The Archives of American Mathematics includes over a hundred videotaped interviews that relate to R.L. Moore. Most are with students and colleagues, but some are with people with more indirect connections, such as Beauregard Stubblefield.

As the son of a watchmaker who studied the craft under his father, Stubblefield (1923–2013) attributed much of his later skill as a topologist to his ability to think in terms of concrete models, comparable to mastering the intricate workings of a mechanical watch.

After his graduation with a master's degree in 1945 from Prairie View A&M College, his mathematical talent was recognized and he was encouraged by Clarence Stephens to continue into graduate school. However, the only state university at the time with a program to match his talents was the University of Texas

Please see *Stubblefield*, p. 3.

### INSIDE

- 3 News Items
- 4 Research Workshops

*Empowering*, continued from p. 1.

The **role of the instructor**, especially one unaccustomed to IBL methods, was addressed by the pre-conference workshop conducted by Michael Starbird of the University of Texas at Austin. This opportunity for newcomers to hear from a master teacher proved as popular here as it did at the first offering at the 2014 conference.

A major topic stream was devoted to “**flipped classrooms**.” The basic idea of this inversion is to give students the equivalent of “lectures” outside of class, via short videos or interactive tutorials via the internet. This has been shown to be an effective method of learning provided what happens inside the classroom is not the equivalent of “homework” exercises, but deeper engagement with the mathematics and interaction in problem solving with fellow students under the guidance of the instructor. This is where IBL can play a big role.

The flipped topic was suggested by Robert Talbert of Grand Valley State University who has brought the notion before readers of his mathematics education blog, *Casting Out Nines*, which ran for a number of years in the *Chronicle of Higher Education*. His and other conference presentations provided not only some experienced-based examples, but also brought out some of the essential infrastructure needed to make a success of this method.

One of the most pressing concerns of the mathematical community, as well as the broader science and engineering communities, has been the need to increase **recruitment** into these fields, especially of members of underrepresented groups. Two presenters especially addressed aspects of



Xiao Xiao, Colin Schaefer, Riley Hester, Jack Buckley, Izzy Tollefsrud, Katie Wanek  
Students' Experience Taking IBL Calculus  
“Hands-On, Minds-On Calculus: Student Style”

this issue. Sandra Laursen of the University of Colorado, Boulder, described some results of a large-scale research study\*. As she expressed it: “Particularly striking, the use of IBL eliminates a sizable gender gap that disfavors women students in lecture-based courses. Other evidence suggests particular benefits to initially lower-achieving students.”

David Kung of St. Mary’s College of Maryland and Director of Project NEXt vividly laid out the challenge of **diversifying** the mathematical community. He pointed out that research suggests that interactive teaching methods, such as IBL, might help us successfully address issues of diversity.

The full conference program, with videos of many sessions, is available at

[legacyrlmoore.org/events.html](http://legacyrlmoore.org/events.html)

There is also a very informative report on the conference in *MAA FOCUS* for October/November 2015 by Jacqueline Jensen-Vallin that describes presentations by Edward Burger, Brian Katz, and G. Edgar Parker among others.

---

\* [www.colorado.edu/eer/research/steminquiry.html](http://www.colorado.edu/eer/research/steminquiry.html)

*Stubblefield*, continued from p. 1.



Irma Cruz-White; Barbara and Beauregard Stubblefield;  
Dante Tawfeeq  
Legacy of R.L. Moore Meeting, Austin, 2005

at Austin. As he put it, it was not just that he, as a black student, would not have been accepted there by Professor R.L. Moore (whom he did not know about at the time), the University would not have accepted him. He explained that the standard arrangement was for the state instead to pay tuition at an out-of-state university.

Stubblefield decided on Michigan, but, once there, discovered that as a non-resident he needed to pay more than his Texas stipend provided. To make up the difference he worked for a year in an Ann Arbor jeweler's shop and there the owner introduced him to one of the regular customers, R.L. Wilder, as "a fellow Texan." Wilder, a senior Michigan mathematics professor, was one of Dr. Moore's best-known doctoral students and Stubblefield eventually took two courses with him. He also took courses with two other former Moore students, Gail S. Young and Edwin E. Moise. Under Young, Stubblefield received his PhD in 1959. He later heard about the "Moore Method" and only then realized that that was the way his classes had been taught by these three at Michigan .

For his teaching, textbook-writing, research, and his special contributions to the National Association of Mathematicians, he was awarded their Lifetime Achievement Award in 2000.

## News Items

### NSF Grant for IBL Workshops

Continuing his record of success, the Director of the Academy of Inquiry Based Learning, Stan Yoshinobu of Cal Poly, San Luis Obispo, has been awarded a five-year, National Science Foundation grant for \$2.4 million for the proposal entitled "PROfessional Development and Uptake through Collaborative Teams (PRODUCT): Supporting Inquiry-Based Learning (IBL) in Undergraduate Mathematics through Workshops, Research and Capacity-Building." Building on previously funded work that produced and studied a successful professional development workshop model, new teams will conduct workshops and outreach activities on IBL teaching strategies (known as a "train the trainers" model). There will be twelve four-day IBL workshops and additional shorter workshops and meetings providing professional development for 320 undergraduate mathematics faculty.

The co-principal investigators are Julian Fleron and C. Yousuf George.

### New Editor of MAA FOCUS

Congratulations to Jacqueline Jensen-Vallin of Lamar University on being appointed editor of the newsmagazine of the Mathematical Association of America! Jackie has been a regular contributor to the Legacy conferences as presenter and program organizer and it is good to see her talents being recognized in this important way. It might be noted that FOCUS continues to publish a regular column by the archivist of the Archives of American Mathematics, Carol Mead.

Summer 2016 Workshops  
at Cal Poly, San Luis Obispo

Workshop #1: June 21-24  
Workshop #2: June 28-July 1

See under "IBL Workshops" at  
[www.inquirybasedlearning.org](http://www.inquirybasedlearning.org)

## Workshops

In addition to the programs organized by Stan Yoshinobu (see [News Items](#)), the following specialized workshops are noteworthy:

### Recent

Research on Inquiry Based Learning  
in Undergraduate Real Analysis

December 7-11, 2015

American Institute of Mathematics (AIM),  
Palo Alto, California

AIM provided the setting for this opportunity to initiate course-specific research projects on inquiry based teaching and learning.

Participants included experts in education research, curriculum development, instruction, faculty development, and assessment in IBL undergraduate real analysis. The focus was on refining research questions and designing high-quality studies to address these questions. It identified areas in which additional resources are needed to support IBL instruction in undergraduate real analysis and developed teams with diverse expertise to pursue resources and tackle the critical issues identified in the workshop.

Organizers: Paul Dawkins, Ted Mahavier, and Michael Oehrtman.

[aimath.org/pastworkshops/iblanalysis.html](http://aimath.org/pastworkshops/iblanalysis.html)

### Forthcoming

Active Learning  
in Collegiate Mathematics Instruction:  
Characteristics and Evaluation

August 2-3, 2016, Columbus, OH

As a workshop preceding MathFest, this will present current research on all types of active-learning teaching methods and examine barriers to the creation of new programs. Presenters will frame potential new national evaluation projects, especially focusing on “big data” analytics.

The resulting new research should extend support for active learning teaching methods (over traditional lectures) and, as a result, improve college mathematics teaching by improving students’ communication and problem solving skills.

Organizers: David Bressoud, Doris Zahner and Ron Douglas.

Sponsors: Sloan Foundation, Educational Advancement Foundation.

For further information see  
[workshop.eduadvance.org](http://workshop.eduadvance.org)

---

## *A Gift to the Future*

The Foundation is grateful for recent contributions from individuals who have joined the Friends of the Educational Advancement Foundation.

Such gifts help to shape our response to the urgent need to improve student performance in science, technology, engineering, and mathematics. Guided inquiry, as part of the total learning environment, improves students’ creativity and problem solving abilities. Your support will help us increase the impact of our existing programs and extend efforts to new initiatives.

You can send a tax deductible contribution to The Educational Advancement Foundation at:

*327 Congress Avenue, Suite 500, Austin, Texas 78701-3656*

Or, you can call us about planned or legacy giving and commemorative gifts through our development office at (512) 469-1700.