Lessons Learned from Learners Around the World

42nd Annual AMATYC Conference
November 17 – 20, 2016
Denver, CO

Presented by:
Barbara Leitherer, Stephen Krevisky, Victor Odafe, and Judy Williams
Hamburg, host city of ICME 13
The conference starts with music
The Program - too many choices

• Plenary Sessions
• Lectures of Awardees
• Invited Lectures
• Over 50 *Topic Study Groups* alone
• Oral Communications
• *Mathematical Exhibition*
• Workshops
Examples of Topic Study Groups

• Distance Learning, e-learning, blended learning
• Role of mathematics in math education (ME)
• Equity in ME (including gender)
• ME in a multilingual and multicultural environment
• Mathematical Literacy
• Problem solving in ME
• Teaching and learning of statistics
• Subject areas such as algebra, calculus and so on
• Interdisciplinary ME
Teaching and Learning of Statistics

• Improve statistics education by focusing on conceptual understanding
• How can a sustainable change in the teaching and learning of statistics be supported?
• I learned about research topics of current dissertations
• A lot of discussion relating to "Is Statistics mathematics or data science?"
Mathematical Experiments

Professor Dr. Beutelspacher: Mathematikum Giessen
http://www.mathematikum.de/en/mathematikum.html

interactive exhibits + visitors = experience, understanding, pleasure, and fun
Benefits of Experiments

- Eye opening
- Conceptional
- Stimulating imagination
- Aha moments
- Feeling of accomplishment if experiments go right
- Really a first step into mathematics
Conic Sections
Leonardo’s Bridge

No tools

No nails

No glue
How to use a parabola for 7*8?
Contact Information

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A Monument in Bergen, Norway
A Fish Market in Bergen Harbor
A Doorway in Old Bergen
A Child Watching A Musician in Bergen
A Colorful Storefront in Old Bergen
A Narrow Pathway in Old Bergen
A Map of Norway
Steve K. Holding
Norwegian Musical Instruments
A House as Seen from the Train
A Rather Sleek Norwegian Train
A Nice View of Water in Norway
Outdoor Dining in Oslo, Norway
A Theater and Museum in Old Oslo
A Street Sign in Old Oslo
Colorful Character in Oslo Harbor
Old Wooden Norwegian Houses
Can You Play This Horn?
Animals at the Museum of Old Norwegian Wooden Houses
A Weaver in An Old Norwegian Wooden House
A European Street Car in Oslo
A Statue in Oslo
Boat Ride in Gothenberg, Sweden
Boat Ride from Gothenberg, Sweden
Harbor near Vinga Lighthouse
Water scene near Vinga Lighthouse, Sweden
Train on the way to Denmark
Cathedral in Aarhus, Denmark
Building sign in Aarhus, Denmark
A favorite street in Aarhus, Denmark
Would you like to live here?
A colorful street scene in Aarhus, Denmark
A colorful cathedral in Aarhus
A narrow, cobblestoned street in Aarhus
Another Train Scene in Denmark
Yet Another Train
A Doorway to a museum in Kiel, Germany
Bird on a beach in Kiel, Germany
Hamburg, Germany Train Station
Steve K. at the Math Congress in Hamburg
Banner for Math Congress in Hamburg
Approach to Math Congress Building in Hamburg
Water Scene in Hamburg
Another picture of Math Congress Venue
Children by Lake in Hamburg
Impressive Town Hall Building in Hamburg
Can you get a Danish Hotdog in Germany?
The Hamburg Subway System
Another shot of the Hamburg Train Station
Math Congress Excursion to Berlin
Entrance to Berlin Subway Station
Scenic Boat Ride on The Spree River in Berlin
Steve K. at the Brandenburg Gate in Berlin
Garden near Brandenburg Gate
Lessons Learned from Learners Around the World

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AMATYC 2016 Conference
Denver, CO.
General Impression of ICME-13

• Wonderful Experience/Opportunity
• Great Organization
• Would Recommend to any Mathematics Teacher
• Grateful to NSF/NCTM
Formative Assessment (FA)

- Definition: Assessing *for* students’ learning (comprehension and needs) while it is taking place as opposed to assessing *of* students’ learning after it has taken place (Universally the same idea).
Teacher’s Role in FA

• Providing Feedback
• When is this appropriate (during or after FA)?
• Use of scaffolding: benefits and drawbacks
• Universal lack of time for teachers to maximize the use of FA.
• How? (use student’s work for the benefit of the whole class, but with caution)
FA and Technology

- FA and technology (Haddif & Yerushalmy, Univ. of Haifa, Israel) E-Tasks: Design Considerations.
- Everything here is done electronically. As an illustration,
- CLAIM: There are functions that have one line tangent to their graphs at 2 different points
- ACTIVITY: Students to construct such functions or explain why it is not possible to do so.
- As NEXT steps, the requested number of such graphs is increased and/or constraints are added to the CLAIM as students continue to construct or explain depending on the situation. This enables the teacher to assess students’ concept images as they create their graphs.
  Misconceptions are identified and corrected.
Teacher’s Role in FA Contd.

• Is Teaching to tests bad?

• Is it possible to assess higher order thinking with Standardized tests?
Ethnomathematics

• Critical Mathematics or
• Mathematics for Social Justice (US).

• Definition: This has to do with mathematics and its relationship to society in terms of social, historical, political, and cultural considerations.
Mathematics Education & Culture: A Contemporary Moral Imperative

• Talk by Professor Bill Barton (University of Auckland, New Zealand).

• Considered 3 Principles:
  
  Perspective Principle---being aware of other ways of learning

  Reflexive Principle---do to others as you would have them do unto you.

  Pleasure Principle---act so as to increase pleasure
Bill Barton Contd.

• We all have personal responsibilities to challenge the status quo if it is immoral.
• Tracking of students in math and being complicit in high stakes testing violates students’ right to education.
• Access—an opportunity not only to learn, but the quality of that learning matters as well.
• Recall: NCTM Equity Principle
Conclusion (and Takeaways)

• Great opportunity for teachers from different educational systems (curricula and assessment).
• Similar challenges
• Teachers need better understanding of student thinking for instructional decisions.
• HOW? –Interviews, Observations, etc.
• There is a need to improve student understanding. HOW? Have students Solve problems in multiple ways and make connections between mathematical processes and topics.
Conclusion (and Takeaways )Contd.

• Teaching and Learning of mathematics should take into consideration the culture and socio-economic realities of a country.

• Roles of international assessments (e.g. TIMSS, PISA) and Conferences (e.g. ICME, and other large-scale assessments will continue to be vital in the teaching and learning of mathematics.
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AMATYC Conference
Friday, November 18, 2016
Denver, Colorado

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Your experience...

• The furthest you traveled for a conference

• The largest conference you attended

• The most unusual topic you discussed
ICME-13 by the Numbers

• 24th to 31st July, 2016
• 3750 participants
  – 580 from US and 535 from Germany
• 360 accompanying persons
• Representing 106 countries
  – Most Turkish scholars were denied travel
Plenary Session - Saturday
Deborah Loewenberg Ball, University of Michigan
Uncovering the Special Mathematical Practices of Teaching

• Teaching is maximizing the probability of learning
• More math knowledge does not insure better teaching
• The work of teaching focuses on what teachers do in the classroom, taking advantage of the moment in the moment.
Taking Advantage of the Moment

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Taking Advantage of the Moment

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NCTM Travel Award

• Applied last September, notified in December
• Approved by Dean and Provost, then President, worked with business office to complete paperwork over two fiscal years
• Requirements from NCTM
  – Collaborate with assigned theme group (Teacher Prep)
  – Provide comments on five questions from group
  – Share three slides for incorporation into group report
Sunday Meeting of all NCTM Travel Award Recipients
My thoughts ...

Students everywhere
• do not like math
• are underprepared
• in Asia excel in computation but can not interpret

Teachers everywhere
• do not like math
• are weak on content
• have to deal with immigrants and/or non-native speakers
Number Fun

• Write a two digit number
• Reverse the digits
• Subtract the smaller number from the larger
• Find the symbol for your number in the grid