In the Fishbowl: Strategies for Conversations on Mathematics in the Partner Disciplines

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In the Fishbowl:
Strategies for Conversations on Mathematics in the Partner Disciplines

**Goals for today**

- Learn about Curriculum Foundations Project findings.
- Experience “Fishbowl” discussion format.
- Develop a strategy using findings and/or format for cross-disciplinary conversations on own campus.
Summit-P Project
A National Consortium for Synergistic Undergraduate Mathematics via Multi-institutional Interdisciplinary Teaching Partnerships

Improving College Mathematics in the First Two Years
In Collaboration with the Partner Disciplines
Through Multi-Institutional Faculty Learning Communities

Work supported by a collaborative grant from the National Science Foundation
Lead NSF Award No. 1625771
Summit-P Participants

**SITES – PRINCIPAL INVESTIGATORS:**
- Augsburg Univ., Minnesota – Suzanne Dorée
- LaGuardia Community Coll. – Tao Chen
- Ferris State Univ., Michigan – Victor Piercey
- LEE Univ., Tennessee – Caroline Maher-Boulis
- Norfolk State Univ. – Rhonda Fitzgerald
- Oregon State Univ. – Mary Beiseigel
- Saint Louis Univ. – Michael May
- San Diego State Univ. – Janet Bowers
- Unity College, Maine – Carrie Eaton
- Virginia Commonwealth Univ. – Rebecca Segal

**PROJECT LEADERS:**
- Susan Ganter, PI -- Embry Riddle Aeronautical Univ.
- Bill Haver and Rosalyn Hobson Hargraves – Virginia Commonwealth Univ.
- Stella Hofrenning – Augsburg Univ.
- Erica Slate – Appalachian State Univ., North Carolina
Curriculum Foundations Project

22 workshops where math faculty listened to partner discipline faculty discuss what math students needed to know in their disciplines.

Organized by the MAA’s (Mathematical Association of America) CRAFTY committee. Funded by NSF.

Flagship Reports available at maa.org
Math courses should emphasize:

<table>
<thead>
<tr>
<th>Conceptual Understanding</th>
<th>Problem-Solving Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on understanding broad concepts and ideas in all mathematics courses during the first two years.</td>
<td>Use multiple perspectives (graphical, numerical, algebraic, . . . )</td>
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<tr>
<td>Strive for depth over breadth.</td>
<td>Apply familiar techniques in novel settings.</td>
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<tr>
<td></td>
<td>Devise multi-stage approaches in complex situations.</td>
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### CFP Research Findings

**Math courses should emphasize:**

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<th>Mathematical Modeling</th>
<th>Communication Skills</th>
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<td>○ Expect students to create, solve, and interpret mathematical models and to describe their results.</td>
<td>○ Incorporate reading, writing, speaking, and listening skills into courses.</td>
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## CFP Research Findings

### Incorporate a variety of teaching methods

| Use **active learning** including in-class problem-solving opportunities, class and group discussions, collaborative group work, and out-of-class projects. | Use appropriate **technology** (paying attention to the technology used in subsequent courses and the partner disciplines). |
CFP Research Findings

Improve interdisciplinary cooperation

Select content appropriate for the needs of the partner disciplines.

Seek out projects from partner disciplines to be used in mathematics courses and increase team-teaching opportunities.

Use discipline-specific contexts to increase students’ ability to transfer knowledge from mathematics to partner discipline courses.
Fishbowl Discussion Technique

What?
- Small group of people sit in a circle or at a table, having a conversation in full view of a larger group of listeners.
- Structured roles

Why?
- Especially effective way for one group to listen to the perspectives of another group.
- Example: Mathematics faculty redesigning introductory courses (calculus/college algebra) want to know how mathematics is used in the partner disciplines.
Structured Roles

Example: Math faculty listening to partner disciplines

Facilitator (non-math faculty):
- Introduce structure/rules.
- Pose discussion prompts (questions).
- Direct discussion/recap as go.

Discussant (partner faculty):
- Respond to prompts.
- Talk to each other.

Observer (math faculty):
- Listen. Provide clarifying info if asked.
- (Follow up varies.)

Recorder:
- Record key comments and questions.
- Keep time.
How to Facilitate a Fishbowl

- Introduction to rules/roles & goals
  - In advance of meeting
  - Reinforced at start of meeting
- Discussion
  - Based on prompts from facilitator.
  - Observers remain quiet – or - can answer clarifying questions from Discussants
- Processing
  - Inversion (swap roles) – or -
  - Facilitator summaries – or -
  - Follow-up conversations – or -
  - Written reflections – or...
### QUESTION 1:

What conceptual mathematical topics must students master in the first two years?
### Into the Fishbowl (discussion prompts)

<table>
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<th>QUESTION 1:</th>
<th>QUESTION 2:</th>
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<td>What conceptual mathematical principles must students master in the first two years?</td>
<td>What mathematical problem-solving skills must students master in the first two years?</td>
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QUESTION 3:

How do we differentiate the mathematics curriculum/instruction to meet individual student needs?
### Into the Fishbowl (discussion prompts)

<table>
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<th>QUESTION 3:</th>
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<td>How do we differentiate the mathematics curriculum/instruction to meet individual student needs?</td>
<td>How do we make the mathematics relevant to engage students?</td>
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Recap:
What did you hear?
What are your take-aways?

Reflection:
How did process work?
How can it be an effective tool?
To develop cross-disciplinary competencies, programs should collaborate.

Many different situations benefit cross-disciplinary discussions.

We want to keep those discussions authentic (e.g. versus political).

Different discussion strategies might be effective in different situations.
## Cross-disciplinary Discussions on Your Campus

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### Cross-disciplinary Discussions on Your Campus

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<td>Which departments on your campus would benefit from cross-disciplinary conversations on curriculum?</td>
<td>What activities might work on your campus to initiate these discussions?</td>
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| | o Opportunities  
o Barriers |
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Curriculum Foundations Project Reports:
http://tinyurl.com/CFP-Voices
http://tinyurl.com/CFP-Partners

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