Student-Centered Instruction at WSU: WSU-WIDER Program
(Widening Implementation and Demonstration of Evidence-Based Reforms)

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and

Andrew Feig, PhD
Associate Professor, Chemistry

Academic Senate
Policy Committee Presentation
Sept. 16, 2013
Introductions

Brief update regarding OTL

National backdrop regarding teaching and learning

Externally funded initiatives at Wayne State related to teaching and learning

• WSU-WIDER Grant from NSF
Matt Ouellett

2006 – 2010 - Multicultural Scholars Grant Higher Education Program. Grant from USDA

2012 – Professional and Organizational Development Network in Higher Education Lifetime Achievement Award for Faculty Development

2013 – 2014 - *Center for the Integration of Research, Teaching & Learning (CIRTL) for the Nation: A Growth Plan*. Grant from NSF

2005 – 2008– President of Professional and Organizational Development Network in Higher Education

Andrew Feig

2002 – Cottrell Scholar Award

2004 – 2006 HHMI Educational Grant (at IU, co-PI with Lynda Delph)

   Founder of the IFLE Program – Integrated Freshman Learning

2012 – Collaboration with AAU on STEM Education Initiative

2012 – Founder, CSC New Faculty Workshop in Chemistry

2012 – CLAS Teaching Award

2013 – President’s Award for Excellence in Teaching

2013 - 2015 – PI: WSU-WIDER Grant from NSF
Staffing

- Dr. Sara Kacin, Assistant Director

Fall 2013 Program Priorities

- Support external grants and alignment with national education initiatives
- Mid-Semester Assessment Program (formative feedback for instructors)
- Technology Resource Center to Teaching Commons (integrated services for instructors)

Spring / Summer 2014

- GTA Orientation
Why is there a disparity between what education researchers have discovered about the practices that promote good learning and what most faculty actually do in college classrooms despite repeated calls for change?
• US currently graduates 300,000 STEM BA/BS/AS degrees annually

• Engage to Excel looked at employment trends and estimated that the US needs to produce 1 million additional STEM graduates between 2012 and 2022 to satisfy workforce development needs

• Proposed a series of programs to:
  • Improve persistence in STEM majors
  • Enhance competencies of STEM graduates
  • Diversify base of students majoring in STEM fields to include greater participation from student of color

• WSU institutional priorities align with PCAST goals
  • Improve graduation rates and STEM persistence
  • Provide opportunities for diverse students
  • Give all students the best possible education for their tuition dollars
  • Enhance economic opportunities for graduates
• **Recommendation 1:**
  Catalyze wide-spread adoption of evidence-based teaching

• **Recommendation 2:**
  Replace traditional lab classes with discovery-based labs (project labs)

• **Recommendation 3:**
  Improve post-secondary mathematics education to close the “Math Gap”

• **Recommendation 4:**
  Spur greater partnership among STEM stakeholders (universities/students/employers)

• **Recommendation 5:**
  Create a presidential advisory council on STEM education
Issues for faculty and university administration

- Institutional reward structure at universities favors research over teaching
- Many faculty lack knowledge regarding evidence-based teaching methods

Student perception and desirability of STEM majors

- STEM majors have lower GPAs than non-STEM majors
- STEM courses are perceived as being more difficult and having higher workloads
- Many 2-year colleges where students start their college work do not have full programs in STEM disciplines

Wayne State faces these same challenges providing opportunities for growth
Successful, lasting change requires contributions from all stakeholders.

C. Henderson, A. Beach, and N. Finkelstein, “Four Categories of Change Strategies for Transforming Undergraduate Instruction, Transitions and Transformations in Learning and Education.”
### What is Meant by Evidence-Based Teaching?

From 2012 PCAST Report, Engage to Excel

<table>
<thead>
<tr>
<th>Types of active learning with feedback</th>
<th>Examples of studies that demonstrate enhanced learning</th>
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<td>Small group discussion and peer instruction</td>
<td>Anderson et al. (2005); Armbruster et al. (2009); Armstrong et al. (2007); Beichner et al. (1999); Born et al. (2002); Crouch and Mazur (2001); Fagen (2002); Lasry et al. (2008); Lewis and Lewis (2005); McDaniel (2007a, 2007b); Rivard and Straw (2000); Tessier (2004 and 2007); Tien et al. (2002)</td>
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<td>Testing</td>
<td>Steele (2003)</td>
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<td>One-minute papers</td>
<td>Almer et al. (1998); Chizmar and Ostrosky (1998); Rivard and Straw (2000)</td>
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<td>Clickers</td>
<td>Smith et al. (2009, 2011)</td>
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<td>Problem-based learning</td>
<td>Capon and Kuhn (2004); Preszler et al. (2007)</td>
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<td>Case Studies</td>
<td>Preszler (2009)</td>
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<td>Analytical challenge before lecture</td>
<td>Schwartz and Bransford (1998)</td>
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<td>Group tests</td>
<td>Cortright et al. (2003); Klappa (2009)</td>
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<td>Problem sets in groups</td>
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<td>Concept mapping</td>
<td>Foncseca et al. (2004); Prezler (2004); Yarden et al. (2004)</td>
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<td>Writing with peer review</td>
<td>Pelaez (2002)</td>
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<td>Computer simulations and games</td>
<td>Harris et al. (2009); McDaniel et al. (2007); Traver et al. (2001)</td>
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<td>Combination of active learning methods</td>
<td>Freeman et al. (2007); O’Sullivan and Cooper (2003)</td>
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Note: All studies cited compare treatment and control groups. Full references are found in Appendix I.
NSF’s Widening Implementation and Demonstration of Evidence-Based Reforms

Programmatic Goals

• Improve student learning through implementation of EBTMs
• Increase population of STEM majors in college, especially among under-represented groups
• Improve retention in the first 2 years of STEM majors
NSF WIDER proposal was funded (Start date 9/15/13)

WSU-WIDER Team:

- Biology – Karen Myhr
- Chemistry – Andrew Feig
- Math – Bob Bruner
- Physics – Peter Hoffmann
- Education – Asli Koca
- OTL – Matt Ouellett

External evaluators:

- Brian Coppola – Chemistry, University of Michigan
- Diane Ebert-May – Biology, Michigan State University
Aims for the WSU WIDER Grant

1) Assess current classroom practices of WSU STEM

2) Offer professional development activities to instructors (faculty and graduate students) and interested post-doctoral fellows
   - Faculty learning communities to support effective implementation of EBTMs
   - Discipline-based workshops to introduce faculty to EBTMs
   - Cross-disciplinary and cross-institutional opportunities

3) Measure program progress through longitudinal tracking of student success and effective implementation of evidence-based pedagogies by faculty

4) Prepare a final report on the opportunities and challenges for broad implementation of EBTMs across WSU STEM disciplines
   - Focus point for discussions regarding STEM teaching practices
   - Preparation for future grant opportunities from NSF
Success Requires Broad Buy-In by Stakeholders

Please encourage colleagues to participate in the survey that will be forthcoming in September.
Help make effective teaching and student success a priority at WSU:

- Encourage colleagues to participate in the baseline and subsequent surveys so that we know how to help implement EBTMs on campus
- Promote attendance at workshops and professional development events in your departments and across campus

Make good teaching visible:

- Consider institutional policy revisions that recognize innovative teaching and support student learning
- Facilitate the discussions of peer observation of teaching to make this policy an effective, formative and developmental activity across campus