Envisioning the DATA SCIENCE DISCIPLINE
The Undergraduate Perspective

9/12/17 – Building Data Acumen (recording posted)
9/19/17 – Incorporating Real-World Applications (recording posted)
9/26/17 – Faculty Training and Curriculum Development
10/3/17 – Communication Skills and Teamwork
10/10/17 – Inter-Departmental Collaboration and Institutional Organization
10/17/17 – Ethics
10/24/17 – Assessment and Evaluation for Data Science Programs
11/7/17 – Diversity, Inclusion, and Increasing Participation
11/14/17 – Two-Year Colleges and Institutional Partnerships

Provide input and learn more about the study at www.nas.edu/EnvisioningDS
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Faculty Training and Curriculum Development

Michael Posner, Villanova University
Associate Professor of Statistics and
Director, Center for Statistics Education

Bob Panoff, The Shodor Education Foundation
Founder and Executive Director

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Faculty Training and Curriculum Development

Go To The People: Impactful Faculty Training in Data Science

Michael Posner, Villanova University
Associate Professor of Statistics and Director, Center for Statistics Education

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“Go to the people. Live with them. Learn from them. Love them. Start with what they know. Build with what they have. But with the best leaders, when the work is done, the task accomplished, the people will say 'We have done this ourselves.'” — Lao Tzu
The Venn Diagram

- Computational Thinking
- Statistical Thinking
- Machine Learning
- Data Science
- Traditional Research
- Substantive Expertise
- Danger Zone!
Another Venn Diagram

Data Science Venn Diagram v2.0

- Data Science
- Computer Science
- Machine Learning
- Math and Statistics
- Traditional Software
- Traditional Research
- Subject Matter Expertise

Unicorn

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• Data Science – Villanova University
  – Intro to Data Science – co-taught w/CS fac, Fall 2016
  – Data Science Using R - 2 sections, Fall 2017
  – Data Science For All (NSF DUE#1432438, $285k, Co-PI)

• Center for Statistics Education (Founding Director)
  – Summer workshops for in-service teachers
  – AP Stat teachers and college professors
  – Significant interest in learning R for data science
TANGO Stat Ed

• Training a New Generation of Statistics Educators (TANGO Stat Ed)
  – NSF-funded grant (IUSE, DUE#1432251, $572k, PI)
  – Co-PI Monica Dabos, College of the Canyons
  – 72 Next Generation Instructors (NGIs)
  – Four components
    • Training workshop (and refresher)
    • Pair NGI with mentors in stat ed community
    • Bring NGIs to USCOTS 2015 and USCOTS 2017
    • Create professional learning communities in 4 regional hubs
TANGO Stat Ed Map
Why “TANGO”?
Why Two-Year Colleges?

Data from CBMS 2015
“Test Your Knowledge about the Two Year College”
Poster at US Conference on Teaching Statistics 2017

<table>
<thead>
<tr>
<th></th>
<th>Actual Value</th>
<th>Guess of 4YC Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of stat students taught at 2YC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% growth in stat enrollment at 2YC since 2010 (note: 23% at 4YC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of 2YC stat instructors w/stat degree</td>
<td></td>
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</tr>
</tbody>
</table>
Evaluation of TANGO Stat Ed

• Some incomplete/early evaluation data
  – 86% improved attitude towards statistics
  – 100% improved attitudes towards statistics education
  – 79% improved statistics content knowledge
  – 100% improved statistics pedagogy
  – 0% said teach same way after TANGO Stat Ed

• Successes
  – Participants created sustainable infrastructure
  – Website (us), regional organizer, Zoom room, OER commons group
TANGO Stat Ed
From NGIs
(Next Generation of Instructors).

Lisa Grossbauer
Presents resources and tools from TANGO to her colleagues

Dustin Silva and Monica Dabos present at CMC3

Dustin Silva and Ambika Silva present at CSI

Joe Gerda and Roxy Peck present at CSI

Richard Corp and Monica Dabos present at CSI
Impactful Faculty Training Programs

• Why did TANGO Stat Ed succeed?
  – Recognized role of 2YCs in statistics education
    • The “bug”, lower level data scientists important, sheer #s
  – Created communities of learning
    • NGIs became advocates and seeds within their communities
    • Pedagogical choices of young faculty supported
    • Organizational approval was crucial (GAISE, authors)
  – Supported innovation and leadership of NGIs
    • “Leaders don’t create followers, they create more leaders”
  – Mentorship pairing
  – It was all paid for! Thank you, NSF!
Impactful Faculty Training Programs

• Additional Recommendations
  – Reach out to your community – be the leader!
    • Disciplinary partners at your institution
      – Data and methods for use in class/collaboration
      – Marketing to students
    • 2YCs
    • High Schools
      – Ex: mobilizecs.org – Introduction to Data Science
  – Identify local needs (connect with industry)
  – Incentives
    • Mix of intrinsic and extrinsic motivators
  – Cross-disciplinary collaborations on curricular reform
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Q & A

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ADD TITLE

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Faculty Training and Curriculum Development – Q&A

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