Stefanie DeVito

Exploring research outside the lab: Postdocs in Science Education Research
Background

- BS in Biochemistry
- PhD thesis on biochemistry, metabolism, virology
- Postdoctoral Teaching Fellow at the University of Kansas
  - Heading the Biology Dept Course Transformation Initiative
My story...

• Where I’ve been
  – Interest in teaching:
    • IND412: Graduate experience in science education
    • Adjunct instructor at St. John Fisher College
  – Interest in improving education
    • Reading literature on methods to improve undergraduate education
    • Presentations and attending workshops at a teaching conference

• Where I am:
  – Teaching postdoc working to improve large intro biology courses

• Where I want to go....
  – Teaching at an primarily undergraduate institution
  – Conduct research on improving undergraduate science education
Today

• When and how can teaching experience be useful?
• What is teaching as research?
• What are the different types of teaching postdocs? How can they help me achieve my career goals?
• My story: How I gained teaching experience and interest in education research
• How can you gain teaching experience?
How I became interested in teaching...

- Graduate Experience in Science Education (IND412)

- Introduces graduate students to:
  - The principles of learning and teaching
  - New methods in education (i.e. active learning, case studies)
  - Communicating science as an instructor at the college-level

- 3hr/week course, typically offered in the spring.

- Final project: A lesson designed around your research or topic of interest
Adjunct teaching

• Adjunct faculty at St. John Fisher College Dept of Chemistry
  – Organic Chemistry Lab
  – General Chemistry Lab

• Adjuncting a lab is a great way to gain teaching experience on a limited schedule
  – 1 lab/week (~3hr lab), plus grading responsibilities

• Bch208 at U of R
How can teaching experience be useful for my career?
So you’re interested in teaching?

• All faculty positions require some teaching.
  – Most positions require prior teaching experience
• The weight that different schools give to research vs. teaching expectations vary
• It’s important to understand the values of the type of school you want to teach so you are properly qualified.
Career options in teaching

• Teaching experience:
  – Gives you experience for faculty positions, especially for schools who place a high value on experience teaching using modern methods (more than lecturing)
  – If you want to teach at a community college or small undergraduate institution, you will likely need teaching experience
So you’re interested in teaching?

• What are my career options?

<table>
<thead>
<tr>
<th></th>
<th>Community College</th>
<th>Small Undergraduate Institution</th>
<th>Large Research Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated teaching to research ratio</td>
<td>100% Teaching</td>
<td>Varies from 70% teaching/30% research to 50/50</td>
<td>~10% teaching/ 90% research</td>
</tr>
<tr>
<td>Teaching experience and/or demonstration required</td>
<td>A year or more, often at community college level. Teach demo required</td>
<td>A year or more of teaching experience. Teaching demo required.</td>
<td>Very little. Teaching demonstration not always required.</td>
</tr>
<tr>
<td>Research Expectations</td>
<td>No research</td>
<td>Some: internally funded research for undergrads. Others expect external funding. Research talk sometimes required.</td>
<td>Full external funding. Research talk expected during interview.</td>
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</table>
How do I gain teaching experience during graduate school?
How do I find a adjunct position

- Persistence is key!
  - Talk to people (“network”)
  - Email dept. chairs. Especially in June, August and December
  - Don’t be afraid to go outside your comfort zone!
    - Reach out to biology AND chemistry departments
  - Don’t be discouraged!
    - Schools keep lists of adjuncts, it may take a few semesters for them to need you
  - Think about ALL the area schools!
    - Fisher, Nazareth, RIT, Brockport, MCC, GCC, Geneseo all hire adjuncts!
What if I can’t adjunct?

• Circumstances may prevent you from taking an official adjunct professor position

• Think outside the box!
  – Offer to unofficially teach part of a course
    • Does your PI teach part of a course? Do you have knowledge on a course you once TA’d?
    • Offer to teach a set of labs or lectures!
    • Let the professor sit in and give you advice/feedback
    • Suggest it as being beneficial to them so they don’t have to write lectures or quizzes
  – Ask to shadow a professor at a school that places a high value on modern educational practices (MCC, Fisher etc)
Teaching as Research
STANYS Conference

- Science Teachers Association of New York State
- Yearly conference for K-12 science teachers from all over New York, consisting of small workshops
- STANYS selects workshops which
  - Take a new and active approach to teaching specific material
  - Give a update on material from a practicing scientist
- Great way to present creative educational ideas and go beyond just instructing.
• IND412 Final project: A murder/mystery case study in diabetes and glycolysis
  – Presented as a practicing scientist
  – My workshop was an active way to present updated material
  – Take workshop participants through the lesson
• Teaching students how to dissect scientific literature through active learning
  – Use group work to teach students the difference between an abstract, introduction, materials and methods etc.
  – Inspired by my organic chemistry students
Scholarly research in teaching

• **Education Research/Teaching as Research:**
  – Designing and implementing innovations in teaching (course design, assessment, online communications etc.)
  – Collecting data demonstrating student learning from new innovations
  – Publishing scholarly articles describing the findings.

• As more schools recognize that modern methods in teaching help them to distinguish their undergraduate programs, they are hiring faculty and postdocs who are capable of assisting them with education research.
Why is education research important?

Why change our approach to teaching?

Science Standards Draw Climate Change Debate Back Into Wyo. Classrooms

Why Some Parents Are Sitting Kids Out Of Tests

Parents, Educators Rally Against New York State Common Core Plan
My story in education research

- I was applying for faculty positions at small schools when I found the posting for Kansas.
- My objective: To be a faculty member with a research focus on improving undergraduate science education.
What will I be doing as a postdoc?

- **40%:**
  - Develop educational materials to improve student learning
  - Develop tools to demonstrate achievement of learning in large introductory courses
- **20%:**
  - Enhance online course resources
  - Develop active learning activities to maximize concept mastery
- **15%:**
  - Partner with regular faculty to teach and implement mechanisms for improving student learning and engagement
- **10%:**
  - Engage and collaborate with members of other departments working under the same initiative to enhance knowledge of practices
- **10%** Contributing to College-Wide Course Transformation Initiative Reports
- **5%** Misc.
How can I use teaching postdocs to achieve my career goals?
Types of Teaching Postdocs

• Two different types: Postdocs in Education Research
  – Beneficial for those with teaching experience who want to move into the field of education research.
  – They go by many names including Postdoctoral Teaching fellowships, Teaching as Research, etc.
  – Purpose: To work on a project that frequently involves curriculum development and/or assessment of a undergraduate STEM course, followed by analysis and publication of the results
    • You will usually not be teaching your own class
    • Typically hired to assist with a NSF grant for a specific project that has already been designed.
  – Typically post openings 1-2 months prior to when the job would start
• Requirements for these jobs often include:
  – PhD in the field of interest
  – Teaching experience in a university/college setting
  – A strong interest or demonstrated experience in biology education research.
  – Demonstrated interest in improving course teaching (aka pedagogical design)
  – Excellent written and verbal communication skills
Education Research Postdocs

• Examples from past job openings:
  – “…seeking to hire a post-doctoral scholar to contribute to a study of how pedagogical innovations in university STEM classrooms are developed, disseminated, and institutionalized.
  – “…currently recruiting for a postdoctoral research and teaching position in Biology Education. The focus of this position is on formative assessment and feedback in undergraduate STEM classrooms.”
  – “…the new postdoc, funded primarily by a grant from NSF, will be involved in curriculum development, web communications, and assessment of a series of new materials designed to make a genomics research experience accessible to beginning college students.”
  – “This individual will participate in research on problem solving among biology undergraduates… This longitudinal research aims to determine the extent to which undergraduates’ problem-solving skills are predictive of success and persistence in science.”
Education Research Postdocs

• Links:
  • SABER: Society for the Advancement of Biological Research. Has a page for job openings
  • http://saber-biologyeducationresearch.wikispaces.com/
  • Useful job search sites that will include post-docs:
    • Chronical of higher education:
      – https://chroniclevitae.com/
    • Higher ed jobs:
  • http://www.higheredjobs.com
Traditional postdocs with teaching experience

• Two different types: Postdoctoral Teaching Fellowships
  – Beneficial for those who want to teach at a small undergraduate school and would like to gain teaching experience during their traditional postdoc
    • This makes you more attractive for a faculty position at a small undergraduate institution that places equal or greater value on teaching than bench research
    • Allows you to spend ~30% of your time teaching a course
    • Amount of faculty support/feedback in your teaching varies from school to school
  – NIH Award: IRACDA Program (Institutional Research and Academic Career Development Awards) aka K12
    • “Combines a traditional mentored postdoctoral research experience with an opportunity to develop academic skills, including teaching, through workshops and mentored teaching assignments at a partner institution”
How do I learn more about education and education research?

• Can’t take a class? Do you want to know more about education and education research without the commitment?

• CBE-Life Science Education
  – http://www.lifescied.org/
  – Publications on new methods in teaching Biology at the college level

• How learning works
  – Basic principles of teaching, targeted towards college level learning

• More resources: UR Center for Excellence in Teaching and Learning
  – http://www.rochester.edu/college/cetl/
  – List suggested books on education and journals on education research
How do I learn more about education research?

- University of Rochester Center for Excellence in Teaching and Learning
  - Offers teaching as research fellowships to graduate students
  - Spend 1 semester designing a education research project and the 2nd semester implementing your research
  - http://www.cirtl.net/CoreIdeas/teaching_as_research
Questions?