Preparing Physics Ph.D. Students as Instructors

(Developing a TA Training Program for Physics Ph.D. Students)

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Rutgers University
Department of Physics and Astronomy
The untrained TA...

miscommunication

time management

motivation problems

unrealistic expectations

Lack of accountability

inconsistency

grading issues

Frustration

For both students and TAs
Importance of training TAs

Undergrad Education
- More effective learning
- Student-specific learning
- Consistency
- Greater appreciation/motivation

Graduate Education
- Professional development
- Broader career options
- Public speaking skills

Department
- Teaching culture
- Teaching = ‘non-trivial’
- Better use of available resources
Teaching situation at Rutgers

Large classes

Many non-majors

Very diverse students

Many first-year TAs

Many international TAs

Serious course load for 1st year grad students
Rutgers resources

Program from graduate school, but...  ...too general

Oral tradition, but...  ...propagation of ineffective ideas

Plenty of expertise, but...  ...no central coordination
Completing the puzzle

- Graduate school
- Organizational structure
- Dept. chair, graduate director
- Endorsement, financial support
- Instructors, experienced TAs

Empowerment: skills and confidence
Incentives: motivation to excel
A TA training program for the physics department

$$\text{DELTA P} = \text{D}eveloping \text{E}ducatational \text{L}eaders \text{A}mong \text{TA}s \text{ in } \text{P}hysics$$

“To foster excellence and consistency among graduate student teaching assistants and to strengthen and unify the undergraduate educational experience”
# DELTA P program

## Fall 2010

<table>
<thead>
<tr>
<th>Participants:</th>
<th>First-year grad students + undergrad study group leaders</th>
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<tbody>
<tr>
<td>Content:</td>
<td>Experienced TA panel</td>
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<td>4 seminars/discussions</td>
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<td>2 labs</td>
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<td>Incentives:</td>
<td>Mandatory but not enforced</td>
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2010 results

✓ Good content from speakers
✓ Appropriate time commitment
X Irregular schedule, unclear structure of content
X Inadequate incentives

Poorest participation
<table>
<thead>
<tr>
<th><strong>Content:</strong></th>
<th><strong>Fall 2010</strong></th>
<th><strong>Fall 2011</strong></th>
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<tbody>
<tr>
<td></td>
<td>Experienced TA panel</td>
<td>Orientation +</td>
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<tr>
<td></td>
<td>4 seminars/discussions</td>
<td>10 weekly seminars</td>
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<td>2 labs</td>
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<td><strong>Participants:</strong></td>
<td>First-year grad students +</td>
<td>First-time physics TAs</td>
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<td><strong>Incentives:</strong></td>
<td>Mandatory but not enforced</td>
<td>Mandatory (faculty sponsor),</td>
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<td>but with certificate for attending 7/10 seminars</td>
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</table>
Dr. Baki Brahmia:  “Our Shortcomings as Teachers”

Gabe Alba:  “Selected Topics in Teaching Introductory Labs”


Prof. Daniel Friedan:  “An Informal Discussion about Teaching Undergraduates with Weaker Math Backgrounds”

Dr. Viviana Acquaviva:  “Tips and Tricks for Making the Most of Your Time as a Teacher”

Prof. Eugenia Etkina (GSE):  “Applications of Brain Studies to Learning Physics”

Prof. Clark Chinn (GSE):  “Methods of Promoting Effective Collaborative Learning”

Suzanne Brahmia:  “Sense-Making in Physics: What Assumptions Are We Making about the Students”

Heather Briggs:  “Keys for Student Motivation -- A Need to Know, Tools to Succeed, and Opportunities to Succeed”

Prof. Premi Chandra and Prof. Chuck Keeton:  “Making It Real for the Students”
2011 results

✓ Simple, efficient schedule
✓ Strong incentives
✓ Focused, relevant
✓ Faculty involvement
Results: evidence of impact

Strongly positive feedback from participants, administration, and teaching staff

Interest from Rutgers Graduate School

Interest from Graduate School of Education

New teaching opportunities for graduate students
Future outlook

Improvements
Paid TA position
Refining content and expanding online resources
Expanding role of faculty

Additions
Auditing system for TAs
Expanding teaching opportunities
Takeaways

Simple, easy-to-implement

Use existing resources

Don’t overestimate academic inertia
Acknowledgments

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Prof. Mohan Kalelkar, undergraduate director
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Abdelbaki Brahmia, instructor
Gabe Alba, instructor
Michael Gentile, instructor
AJ Richards, Ph.D. student
Prof. Daniel Friedan
Viviana Acquaviva, postdoc
Prof. Premala Chandra
Prof. Chuck Keeton

Graduate School of Education

Heather Briggs, Ed.M. student
(now at Watchung Hills Regional High School)

Prof. Eugenia Etkina
Prof. Clark Chinn