TA Training that Integrates Pedagogy and Content

Thomas C. Pentecost1,2 & Laurie S. Langdon1,2, Margaret Asirvatham1, and Robert Parson1,3

Department of Chemistry & Biochemistry University of Colorado Boulder, CO; The Science Education Initiative, University of Colorado Boulder; 1JILA, National Institute of Standards and Technology, Boulder, Colorado

**Introduction**

The chemistry department at CU-Boulder makes use of graduate teaching assistants (TAs) in the delivery of undergraduate chemistry instruction. The vast majority of these TAs are used in the general chemistry program. The TAs play an important role in this course at CU Boulder. They are the primary student contact for the majority of the course. Therefore any course improvement efforts must take the role of the TAs into account.

As part of a broader effort to improve undergraduate chemistry instruction a new TA training program for incoming graduate students has been developed. Goals of this new training are to have incoming graduate students review general chemistry topics and to prepare TAs to lead student-centered recitation sections. It was anticipated that this new training would emphasize the importance of TAs to the teaching responsibilities plays in their development as graduate students and support the implementation of a new “student-centered” recitation model.

**Evaluation of Training**

**Background**

CHEM 1111 @ CU
- Largest 5 credit class on campus
- ~ 1000 students fall semester
- Students are science majors (separate engineering chemistry course)

Course consists of:
- Three hours of lecture per week in lecture hall (class size 180 - 400)
- One hour per week in recitation (class size of 20)
- Three hours per week in lab, immediately following recitation

**TA Responsibilities:**
- Lead recitation sections, supervise, and grade lab activities (typically 2 sections per week 20)
- Two hours per week in course help room
- Attend weekly recitation and lab meetings
- Proctor group exams

**Existing TA Training:**
- Not specific for incoming TAs.
- General training that included:
  - Safety training
  - Microteaching experience
  - Procedural & administrative orientation

**New TA Training**

The schedule from Fall 07 is shown below. The Fall 08 training followed a similar schedule with slight changes to the content reviewed. One significant change was giving the TAs an opportunity to practice leading a section. Each TA was assigned one of the materials and given time to review and then lead a “mock” recitation section with the other TAs as the students.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Fall 2007</th>
<th>Fall 2008</th>
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<tbody>
<tr>
<td>Incoming grad students</td>
<td>10%</td>
<td>12%</td>
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**New TA Training**

The training sessions were targeted for improvement as part of a larger course improvement project. The design and running of these sessions had been left to the individual TAs in the past. Sets of problems were available for TAs to use and most recitations were run as problem sessions with the TA at the board working problems. In the Fall of 2007 a new model for recitation was being implemented that put the emphasis on the students’ work. Materials for these “student-centered” recitations were created for use by all TAs. These materials were used as part of the TA training to review general chemistry content and to expose the TAs to the a student-centered learning environment.

**Need for New Training**

There were two drivers for the creation of the new TA training program.

**TA Professional Development**

Faculty felt that TAs were not getting the most from their teaching experience. The teaching experience offers the graduate students an opportunity to review their basic chemistry knowledge and improve their teaching skills. The training was viewed as a way to emphasize the importance of this aspect of their graduate school experience by providing support for them in this aspect of their professional development.

**Implementation of New Recitation Model**

The recitation sections were targeted for improvement as part of a larger course improvement project. The design and running of these sessions had been left to the individual TAs in the past. Sets of problems were available for TAs to use and most recitations were run as problem sessions with the TA at the board working problems. In the Fall of 2007 a new model for recitation was being implemented that put the emphasis on the students’ work. Materials for these “student-centered” recitations were created for use by all TAs. These materials were used as part of the TA training to review general chemistry content and to expose the TAs to the a student-centered learning environment.

**TA Professional Development**

We used multiple data sources to evaluate the effect of the training on the TAs professional development.

**Influence Instruction - TA Course Evaluations**

An analysis of variance was done on student responses to the ratings of the recitation/lab sections. The faculty interview data suggest that the new training is fostering the development of the TAs by providing support for them in their training. The TAs might be interpreting this as an indication of the importance of this aspect of their graduate education training.

**Implementation of “Student-Centered” Recitation Model**

Data used are from end-of-term student questionnaires. We have included survey data from CHEM 1111 (Spring 2007). This course is an adequate control because there were no uniformly used recitation materials for this course and the TAs running these recitations had not been through the new training.

Students were asked to indicate the amount of time spent working with other students during recitation.

**For Fall 07 and Fall 08 students were asked to explain their value rating of the recitation section.**

Student comments indicate that the recitation was indeed “student-centered”
- “small group practice using questions similar to test questions helped a lot.”
- “I liked that we could work in groups and talk about the concepts...”
- “the recitation part of labs was quite useful because it was a time for me to bounce ideas off of other students and the TA.”

Some responses indicate a level of discomfort with the pedagogy used in the recitation.
- “We just never went over the material thoroughly”
- “Our TA didn’t really go over the material with us; it felt like we were kind of glossing in the dark with some questions.”

**Summary**

The training seems to have had an impact on the instruction. Care must be exercised when interpreting these results since the effect of the presence of the undergraduate learning assistants might be influencing the student evaluations of the recitation/lab sections. The faculty interview data suggest that the new training is fostering the development of the TAs by providing support for them in their training. The TAs might be interpreting this as an indication of the importance of this aspect of their graduate education training.

The TA training seems to have facilitated the creation of a “student-centered” recitation experience. Students are spending much more time working in groups and some seem to value this experience. However there are some that seem find this pedagogy uncomfortable. The ratings of the value of recitation bear this out. Students seemed to put a higher value on recitation sessions that were more “traditional problem based” (spring ’07).

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**Acknowledgements**

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**Analysis of variance indicates that all three of these means are statistically different.**