Teaching Trek: Reflections on Participation in the Indo-U.S. Teaching Professorship Program

Catherine E. Vrentas
Iowa State University, Ames, IA 50011

The American Society for Microbiology’s Indo-U.S. Teaching Professorship program (sponsored by the Indo-U.S. Science and Technology Forum) provides an opportunity for cross-continental teaching exchanges in the microbial sciences. In this article, I reflect on my experiences as a 2017 Teaching Professor at the University of Delhi, where I developed and delivered a curriculum about prion diseases and a workshop on scientific communication. Tips for preparation, informal assessments, and portable classroom manipulatives are presented for educators who are interested in participating in similar programs. International teaching exchanges provide a unique opportunity to develop skills in assessment and adaptability while meeting new colleagues from across the globe.

INTRODUCTION

In 2016, at the time I submitted my application for the Indo-U.S. Teaching Professorship (a joint program of the American Society for Microbiology and the Indo-U.S. Science and Technology Forum), I had taught in a variety of settings, both informal and formal, ranging from microbiology lab courses for majors as a faculty member at a master’s level university to administration of biotechnology outreach activities atop of straw bales at the Wisconsin State Fair. However, all of my teaching experience thus far had been in relatively familiar educational settings in the United States. Through the Indo-U.S. Teaching Professorship (IUTP) program, I had the opportunity to connect with a faculty member on the opposite side of the world and to deliver a series of interactive presentations and workshops for master’s students in the Zoology program at a major public university in Delhi.

Teaching Professorship awardees can be either Indian professors visiting the United States or U.S. professors visiting India, for one to two weeks, in partnership with a collaborating professor who serves as a logistical host. The program requires integration of active learning and informal evaluation of student learning as key components of the curriculum design. The goal of the broader program, which includes both research and teaching professorship opportunities, is to develop collaborations in the sciences between the United States and India. For visiting professors from the United States, the experience is not only an opportunity to share information and your own teaching methods with students, but also a way to learn about microbiology programs in a different part of the world and to cultivate new connections and collaborations that might not otherwise have been easily achievable.

After being awarded the fellowship, I packed my flash drive and hands-on supplies in my bag and flew to India for a week and a half of teaching about the biochemistry of prion diseases and scientific communication strategies (Fig. 1). To aid others who are interested in participating in similar programs for the first time, I have prepared a series of tips based on my reflections.

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PROCEDURAL TIPS FOR THE INTERNATIONAL VISITING PROFESSOR

• Incorporate a day or two to sleep off jet lag before diving into your teaching assignment. I found the teaching required more energy than usual, somewhat similar to the challenges of the first week of a semester, when you are adapting to a new room and meeting new students.

• As with any guest presentation, collecting information about the general background (in terms of knowledge, skills, interests, etc.) of the students in the course is essential. While you can obtain background on the course (including a syllabus, with course prerequisites) from your collaborator prior to arrival, I recommend implementing a brief pre-assessment activity near the beginning of your first presentation. This can be as simple as asking students to share what they know about a topic, first in groups and then with the class, or a brief “minute paper” that students can complete individually. In my case, the goal of this assessment was to allow for adaptation of my plans across the course of the week to be consistent with students’ level of preparation and experience with the topic.

• Prepare presentation slides in advance of your trip, but build in time during the trip to make modifications based on the structure of the class and student interests. The course in which I taught was discussion-based, and I was able to add data and discussion topics from very recent research on chronic wasting disease based on student questions.

• If possible, observe a lecture, or inquire about typical teaching styles, before you begin teaching, if other professors are comfortable with you observing their classes. I find that in the United States, I have rarely had the opportunity in recent years to observe others’ teaching in a purely reflective setting; this is an excellent opportunity to do just that.

• Find out before your travels what your collaborator’s expected learning outcomes are for the students during your teaching module, and craft the daily goals for each presentation in that context. In the IUTP program, you will develop these educational goals as part of your application, in conjunction with your faculty host. When selecting my topics for presentations, I developed a list of ideas, based on my experiences and level of comfort with topics, and sent the list to my faculty host to select topics and learning goals that would be most beneficial for his course and graduate program in general.

• Pack simple manipulatives for an easy way to engage students in a hands-on activity. You might not have clickers or complex active learning kits readily available when visiting another classroom, but I was able to use the chenille stems (pipe cleaners) in my presentations to help students visualize the transition of the prion protein from an α-helical structure to a β-sheet-predominant structure in the misfolded form. Table 1 presents ideas for manipulatives that can be easily packed in your luggage. Many of these ideas would work equally well for aspiring professors planning ahead for a teaching demonstration at a faculty interview.

• A summative assessment can be incorporated via a brief written prompt at the end of the final class period. In this case, the goal was informal review and reflection, to identify concepts and examples that were notable and meaningful for the students. Note that formal assessment would require previous negotiation of human subjects protection guidelines, which may be complicated for short visits; be sure to confer with your host well in advance if you plan to collect any data for external presentation.

In addition to the teaching experience, one of the highlights of my trip was the excursions to other parts of Delhi arranged by my host (Fig. 2), on which I was joined by graduate students in his laboratory. They were excited to share information about their city, and I learned about not only historical monuments, but the students’ culture, educational experiences, and career plans. Visiting professorships can also serve as a springboard for research collaborations...
VRENTAS: TEACHING TREK—INDO-U.S. PROFESSORSHIP

TABLE 1.
Ideas for portable educational manipulatives for microbiology topics.

<table>
<thead>
<tr>
<th>Item</th>
<th>Potential Uses</th>
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<tbody>
<tr>
<td>Chenille stems (pipe cleaners)</td>
<td>Creation of models of protein structure, creation of models of RNA structure (use lettered pony beads for either RNA bases or protein residues) (1)</td>
</tr>
<tr>
<td>Index cards in four colors, or colored popsicle sticks</td>
<td>These can be used as a simple way to survey student learning in response to poll or brainstorming questions (idea for popsicle sticks thanks to a workshop with the Biological Sciences Curriculum Study)</td>
</tr>
<tr>
<td>Colored hard candies (mixture of colors)</td>
<td>Distribute in small cups to demonstrate genetic diversity in a population (can demonstrate evolution of populations, such as microevolution of bacterial populations due to antibiotic resistance) (2)</td>
</tr>
<tr>
<td>Pre-cut paper models</td>
<td>Can pre-prepare as a simple but elegant means of demonstrating concepts such as nucleic acid–base complementarity, such as in (3); laminating, velcro, and magnetic strips can be used for a portable kit to demonstrate central dogma concepts (4)</td>
</tr>
<tr>
<td>Pre-cut shapes from foam-backed poster board, glued to magnets or other adhesive strategies</td>
<td>Demonstrate how biological molecules come together, such as the use of pre-cut antibody and antigen shapes to demonstrate agglutination or different types of ELISA assays (direct, indirect) on white boards in the front of the classroom (5)</td>
</tr>
<tr>
<td>Binder clips and clothespins</td>
<td>Use to model actions of molecules like RNA polymerase (lac operon), or tRNAs and associated amino acids in translation (6)</td>
</tr>
<tr>
<td>Modeling clay</td>
<td>While heavier than some of the other manipulatives, clay provides a variety of shape-shifting options, such as use in building ion channel structures or depicting nerve cell shapes and synapses when paired with beads to depict cellular ion channels (7)</td>
</tr>
</tbody>
</table>

These items are inexpensive, carry-on-friendly items that can be implemented in a wide range of classroom settings (see associated references for details).

CONCLUSION: SUMMATIVE REFLECTIONS

The reflections presented here can be applied not only to participation in the Indo-U.S. professorship program, but also to other opportunities for guest lecturing and brief visiting professorships that cross international boundaries. There is a growing literature, both research-based and reflective, on transnational teaching experiences. Much of this literature focuses on the context of preK–12 student teaching. As reviewed in Doppen and An (8), impacts of overseas student teaching programs on preservice teachers include gains in “professional growth, personal growth, and global awareness,” thereby providing the potential for benefits upon return to the U.S. classroom, such as via integration of a more global approach and content in curricula. Similarly, in a review specifically focused on “transnational teaching experiences” for academics in higher education, Smith (9) describes how the experience of teaching in a very different and unfamiliar environment can lead to eventual professional development gains for the educator. Smith (10) also presents faculty narratives highlighting the physical demands of the experience. Similar to the context of service learning, consideration of ethics and mutual benefit are key for transnational teaching work, and Bovill et al. (11) propose a series of guiding principles I recommend for consultation; they also highlight the importance of developing shared expectations.

FIGURE 2. Touring local areas as a learning component of the experience. International learning does not have to be limited to your own students embarking on study-abroad programs!

which was a part of my discussions with the host during the proposal preparation process. Garson (12) considers the challenges faced in a longer teaching experience, in Cairo, describing culture shock and stresses associated with expatriation, adjustments in daily life, and necessary modifications in the classroom. Importantly, Garson stresses how different classroom norms may impact the efficacy of different teaching strategies, including teamwork and active elements (12), which highlights the importance of learning about and/
or observing standard teaching styles, as described above. Finally, Mizzi (13) provides an outline of how visiting Western academics can adopt a decolonizing approach to experiences in non-Western countries that focuses on listening, learning, asking questions, and “invit[ing] storytelling.”

My own personal final reflections on my experiences with the IUTP program are consistent with the personal and professional gains described by Smith (9). I view the most important impact on my ongoing development as an educator is the experience gained in on-the-fly assessment of student knowledge and interests as well as classroom norms, and the associated adaptation of my teaching content and approach in this context. Indeed, my path as an educator began predominantly in a public science outreach setting, and I found that experiences in a similar vein (driving to a new school for a presentation, sharing a hands-on activity with hundreds of visitors at a public event) have been the ones that have defined my own teaching style, in which I adapt content to student questions and ongoing micro-assessments of student comprehension. If you have been looking for a new experience to learn, invigorate your teaching, and make new friends and colleagues, I highly encourage you to apply for the Indo-U.S. professorship and similar programs.

SUPPLEMENTAL MATERIALS

Appendix I: Examples of active learning activities from the Indo-U.S. Professorship program

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