

# GTA Boot Camp: A Training Program to Prepare First-time Graduate Student Teaching Assistants

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We tested two different intensive training models to prepare graduate teaching assistants (GTAs) for their first experience teaching laboratory sections. In the first model, GTAs attend two 4-hour training sessions for inquiry-based teaching, Socratic questioning, applying Bloom's Taxonomy, and providing the GTAs with opportunities to practice using each of these pedagogical techniques. In the second model, GTAs attend one six-hour training session to practice teaching by role-playing prepared scenarios. At ABLE, attendees will receive an introduction to both models with opportunities to practice using our training activities.

**Keywords:** GTA, teaching workshop, pedagogy, inquiry-based, Bloom's Taxonomy, Socratic questioning, role-play

## Link to Supplemental Materials

<http://www.ableweb.org/volumes/vol-35/v35/jordan/supplement.htm>

## Introduction

While everyone agrees it is necessary to train graduate student teaching assistants (GTAs) to teach laboratory sections, there is limited time to provide training. At the University of Wyoming and Boston University, we have designed "Boot Camp" models, intensive training in bulk, to provide new GTAs a basic introduction to teaching laboratories and guidance to handle various situations.

At the University of Wyoming (Model 1), GTAs are assigned to teach inquiry-based freshman and sophomore level courses in biology. Many Wyoming GTAs are in their first semester of graduate school and have no teaching experience. To provide them with a basic understanding of the inquiry teaching method, we hold an eight-hour training workshop for new GTAs at the start of each semester. These workshops include 16-24 GTAs, in a laboratory classroom where students can sit at large tables in groups of four. We provide white boards and markers at each table for brainstorming and demonstrating the results of a few small group activities.

Because we are aware that most graduate students are more familiar with the traditional format of labs that involve following a set of instructions to arrive at a pre-determined

end, we begin our workshops with an introduction to the concept of an inquiry-based lab in session 1. An important part of inquiry teaching is to not simply answer students' questions and tell them exactly what they need to do. Therefore, in session 2, we follow the inquiry activity with an introduction to the Socratic method, provide students with a live demonstration, and the students develop and practice their Socratic questioning skills. Session 3 is an introduction to Blooms Taxonomy and then GTAs 'Bloom' an exam. The workshop ends with role-playing exercises that ask GTAs to practice dealing with common classroom issues and potential emergency situations. Due to time constraints, the Student Outline only contains an abbreviated version of the packet provided to GTAs. The full packet is provided in Appendix A.

At Boston University (Model 2), GTAs are assigned to teach traditional laboratory courses in physiology to pre-medical or other health-related professional undergraduate students. All biology GTAs enroll in a 2-credit seminar course, A Bridge to Knowledge, the semester they begin teaching and over the course of nine 1-hour sessions, they receive an introduction to pedagogy, teaching tools, and pro-

fessional development (Spilios *et al.*, 2013). However, physiology laboratory courses are upper-level courses that require technical training as well as additional pedagogical skills. In addition, Undergraduate Assistants (UAs) are recruited and trained to prepare them to be an asset to the GTAs while they are teaching. The UAs are former physiology students who received at least an A- in the course and are assigned to one laboratory section per week as volunteers, or enroll in a 2-credit seminar course similar to the GTA course. While the addition of the UA program has improved the physiology courses, they must establish an effective partnership with their GTA that begins at Boot Camp. Each semester, approximately 4-8 GTAs and 10-25 UAs attend Boot Camp on the first Saturday of the semester for approximately six hours. The three sessions are: 1) scenarios and skits; 2) role play the first day of teaching; and 3) lab 1 GTA/UA and student perspectives (Seliga and Bhonsle, 2012). Since the third session is course-specific, only the first two sessions will be presented in the major workshop. These sessions are held in a laboratory classroom with four benches with groups divided into teaching teams, defined by the GTA and the UAs assigned to work with that GTA during the semester, if present at Boot Camp.

Prior to the day of Model 2's Boot Camp, GTAs and UAs are given the materials found in the Student Outline section. The GTAs are told to prepare a 3-5 minute non-PowerPoint presentation on any topic in our laboratory classroom. The UAs are asked to volunteer for various roles in Sessions 1 and 2, as described in the Notes for Instructor section.

In the workshop, the first 90 minutes will be an overview of both Boot Camp models and abbreviated versions of Sessions 1-3 of Model 1. The final 60 minutes will be Sessions 1 and 2 of Model 2 followed by a discussion of the development and adaptation of both models.

## Student Outline

### Model 1

#### *Session 1: Inquiry Teaching*

The primary feature of an inquiry-based lab is that students experience science as an experimental process that gives priority to explanations based on evidence. As explained in the Wisconsin Program for Scientific Teaching, students will:

- Learn essential concepts and information in biology, including content, lab skills, procedures, and methods.
- Think analytically and critically about experimental design.
- Take responsibility for their own learning in a way that is engaging and meaningful to them.
- Experience the collaborative nature of science as they negotiate with peers and
- Communicate their explanations.
- Give priority to explanations based on evidence.
- Witness the thrill of discovery and uncertainty in biology.

In part 1, we are going to watch videos (Bohrer et al., 2008) that illustrate the differences between an instructor-centered cookbook method and a student-centered inquiry method, then discuss the observations. The hallmark feature of a student-centered inquiry method is the 5E Instructional Scheme for Inquiry Teaching (Lord and Travis, 2011):

- ENGAGE – use to motivate the class in the topic
- EXPLORE – encourages the students (in teams) to examine the topics
- EXPLAIN – allows students to describe to others what their team discovered
- ELABORATE – permits students to expand on the topic
- EVALUATE – provides the students with a means of assessing what's learned

In part 2, consider each of the common situations encountered in groups (White, 2005) below. Circle the 5-6 you anticipate dealing with, or have dealt with before.

1. Student who confidently presents ideas that are incorrect yet goes unchallenged by the group.
2. Student who misses class or regularly comes late and requires class time for the more conscientious students to fill him (or her) in on what was missed.
3. Unprepared student who routinely comes to class but doesn't contribute to group discussions or projects.
4. Likeable talkative student who is unaware that he (or she) frequently interrupts others and dominates discussion thereby preventing contributions from other members of the group.
5. Student who readily understands the material but is not particularly interested in sharing that knowledge with other group members.
6. Student who thinks inquiry learning is not a good way to learn and deliberately or unconsciously disrupts the process.
7. Quiet student who has good thoughts to contribute but never seems to get the attention of the group.
8. Students whose friendship outside class creates a subgroup that frequently breaks off from the main one in discussion.
9. Student who, due to illness of some other reason misses a week or more of classes.
10. Group that gets along well and is satisfied with a superficial procedural understanding and doesn't seem to be aware or interested in a deeper conceptual understanding.
11. Student who has difficulty focusing on course material and frequently ends up discussing sports, the campus social scene or the previous night's TV show.
12. Student who ignores or puts down group members that have a different cultural background, racial background, or physical appearance.
13. Student who doesn't listen or seem to understand the points made by other group members.
14. Group that can't make progress without assistance, and show signs of frustration (and perhaps resentment) when the GTA doesn't provide the information desired.
15. Group in which the disparity in the abilities of members makes communication of concepts difficult.

16. Student who directs all of his (or her) questions to the GTA.

17. Students who do all necessary work, but do not seem to enjoy discussing problems and related concepts with each other.

### *Session 2: Socratic Questioning*

The biggest challenge instructors face when implementing inquiry instruction is how to encourage and lead students to develop an understanding of what they are doing without telling them what to do. As a GTA, your job is to “Pause, Listen, then Nudge” (Llewellyn, 2005). The Instructors will demonstrate Socratic Questioning and note the strategies listed below that are employed.

- Avoid chorus questions
- Think about when to use a student’s name before posing a question
- Apportion questions equally and equitably by gender
- Avoid “guess what I’m thinking of” questions
- Avoid repeating student answers
- Rephrase a question when a student can’t provide an answer
- Follow up a student’s response by asking for supporting details
- Don’t interrupt a student’s answer in the middle of the response
- Move about the classroom when asking questions
- Avoid rhetorical questions that require students to confess to the class that they do not understand a particular concept
- Plan three to four discussion questions in advance to direct the conversation and stimulate critical thinking skills

### *Session 3: Bloom’s Taxonomy*

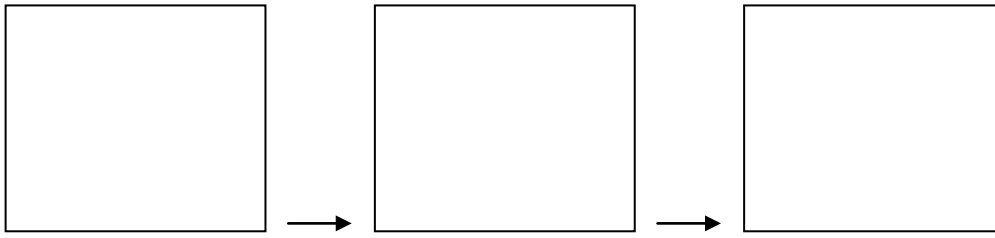
When creating an exam, it is important to consider Bloom’s Taxonomy of cognitive domains (Bloom et al., 1956). The following lists the six different levels and associated verbs.

- Knowledge: arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce, state
- Comprehension: classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate
- Application: apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write
- Analysis: analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test
- Synthesis: arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write
- Evaluation: appraise, argue, assess, attach, choose, compare, defend, estimate, judge, predict, rate, core, select, support, value, evaluate

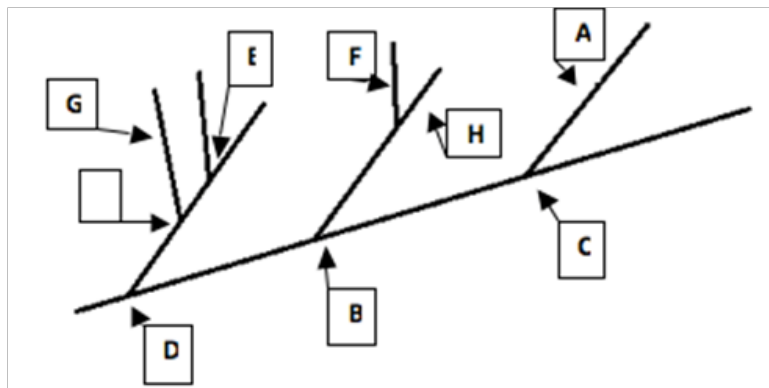
In part 1, review and discuss the Blooming Biology Tool (Crowe et al., 2008).

In part 2, examine and discuss the questions below and determine which Bloom’s level each question represents. Be prepared to defend your answers.

1. Ebola is an infectious disease. True/False
2. You are a scientist and are identifying species of fungi in the field. You come upon a fungus that appears to have a symbiotic relationship with a tree, where the fungal mycelium has grown around and within the cells of the tree’s roots. Which type of mycorrhizal fungi have you found, and how do you know this?
  - a. Ectomycorrhizae, because the mycelium has penetrated the cells of the tree.
  - b. Ectomycorrhizae, because it is the only type of fungus that can form a symbiotic relationship.
  - c. Endomycorrhizae, because the mycelium has penetrated the cells of the tree.
  - d. Endomycorrhizae, because it is the only type of fungus that can form a symbiotic relationship.
3. In the three boxes below, illustrate how evolution could occur through natural selection in a population of tuberculosis. Then, describe what is taking place in each step. In your description, include the following terms: *resistant*, *mutation*, *natural selection*, *evolution*, *susceptible*, and *suitable trait*.



4. Tera is a 4th grade student in your classroom. She believes that the antibacterial dish soap that her mom uses at home does not inhibit bacteria from growing on their dishes. Her theory is that plain water will have the same effect as the dish soap. She sets up an experiment, dips 3 paper dots in the dish soap, and then arranges them on a nutrient agar Petri dish that has been swabbed with *E. coli*. She waits two days, and then measures the width of no-growth around each of her paper dots. She comes to class really excited and tells you that her theory was proven wrong, and that the dish soap really did inhibit bacterial growth! What mistakes can you find in this scenario? List the mistakes that you have identified in the space below.
5. Briefly describe phagocytosis.
6. You hypothesize that one particular potato variety, the “lumper” variety, will grow well at low elevations. Design an experiment to test the affects of varying elevation on potato populations. Do not forget to include the components we have discussed all semester regarding proper experimental protocol.
7. Scientists identified resistance genes in a potato from South America, where farmers have preserved the genetic variation of potatoes by growing many cultivated varieties alongside the potato’s wild cousins. Despite the warnings of evolution and history, much agriculture continues to depend on genetically uniform crops that have been genetically engineered to exhibit desired traits. Would you recommend genetically modifying potatoes that are presently grown in the U.S. to be resistant to such diseases as *Phytophthora infestans*? Why or why not?
8. In the diagram below, what would happen if the positions of F and H were flipped?



- a. All relationships would remain the same.
  - b. F would become more related to A.
  - c. Node B would represent a more derived group.
  - d. The length of time between F and H would increase.
  - e. Nodes I and E would also flip positions.
9. Protists feed by one of three methods:(1) ingesting packets of food, (2) absorbing organic molecules directly from the environment, (3) performing photosynthesis. For one of these methods, describe an example seen in lab. Name the organisms and the structures they used during this feeding event.
  10. If a hydra lost its nematocysts, what could be one possible outcome?

In part 3, on the white board, write three questions at three different Bloom’s levels.

## Model 2

### *Session 1: Scenarios and Skits (adapted from Lumsden and Morgan, 2003)*

In part 1, teaching teams sit with each other gathered around one of several scenarios written on a white board. Each teaching team will get 30 seconds to discuss and write one appropriate answer to the question on the board in front of them. Then, the teams will rotate to the next board. Once the teams are back at their original board, each team will present the question, and the responses. Then, the teaching teams vote on which response is the best.

In part 2, the Ethics Skit, Person A and Person B are students in Molecular Biology, a mixed undergraduate and graduate student course. That course had a midterm yesterday and a group of students, both people included, went to a classmate's apartment afterwards to unwind. From the beginning of the semester, these students have shared notes and studied together often. Last night, Person A brought food and beer for everyone, even though some students were underage, Person B included. Person A is Person B's GTA for Physiology this semester. Today, Person A needs to discuss something with Person B.

After the Ethics Skit, in teaching teams, on the white board, identify one thing Person A did incorrectly. Has anyone in your group been to a social event in a mixed graduate/undergraduate setting As a GTA or a UA, what should you do if you know any of your students?

In part 2, the Lab Policy Skit, Person A is the GTA and Person B is the student. It is the end of lab and Person A has just given Person B last week's graded post-lab. Person B is unhappy with the grade. Person C is the UA who is not showing initiative and merely standing off to the side. Meanwhile, two other students want to submit their post-lab and see their quizzes. The remaining students must also finish their post-labs.

After the Lab Policy Skit, in teaching teams, on the white board, identify one thing Person A and Person C did incorrectly. As a GTA, what is one option for each of the following conditions: 1) a student arguing a grade during lab; 2) multiple students finishing lab at the same time; 3) multiple students not finishing lab on time? As a UA, what should you do under the same conditions? Do you wait for the GTA to instruct you?

### *Session 2: Role-Play First Day of Teaching (adapted from Haag et al., 2000)*

Each GTA, and potentially new UA, will take turns giving a prepared lecture on any subject. The UAs were given roles to play during the lectures to act as "bad students". The goal of the teacher is to handle the situation and finish the lesson. The goal of the UAs is to prevent the teacher from teaching with respect to their roles.

After each role is played out, in teaching teams, on the white board, identify one strength and one weakness of the GTA's presentation and why for each. List all the techniques the GTA used to handle the situation and discuss if it was appropriate or not. Has anyone in your group seen the situation happen and thoughts on how the teacher handled it?



## Materials

Materials for both training models are minimal as Boot Camp is in a discussion format. Model 1, Session 1 requires audiovisual equipment to play the inquiry videos. The limitations are due to the size of the classroom, but both models can accommodate a maximum of 24 GTAs in groups of approximately 3-4 GTAs per group. Each group is provided a 2' x 2' white board, markers, erasers, notecards for writing questions during the activities, and extra paper. In Model 1, each GTA is supplied with a 3-ring binder with the hand-outs for each session along with syllabi, grading rubrics, and teaching expectations for the course they will be teaching. The GTA's could be assigned to up to four different laboratory courses in the same program in a semester. In Model 2, each GTA is supplied with a laboratory manual, textbook, and Prep Notes, which include the syllabi and grading rubrics for assignments. All GTAs in Model 2 could be assigned to one of two different physiology laboratory courses.

## Notes for the Instructor

### Model 1

This training was originally developed for an 8-hour session but depending on time and the size of the group, can easily be completed in 6 hours. For this ABLE workshop, we will present an abbreviated version of selected activities. Table 1 is a timetable for the order of exercises that the Instructors will lead, and how long GTAs typically take to complete them.

**Table 1.** Timetable for Model 1's Boot Camp.

Session 1, Part 1: 5E Instructional scheme for inquiry teaching	40 min
Session 1, Part 2: Common situations encountered in groups	
Session 2: Socratic questioning demonstration and practice	35 min
Session 3, Part 1: Biology in Bloom tool	55 min
Session 3, Part 2: Bloom an exam	
Session 3, Part 3: Write assessments	

### *Session 1: Inquiry Teaching*

#### 1.1 Activity Overview

In this activity, GTAs are introduced to the inquiry-based format by comparing them to the traditional format via watching teaching videos generously provided by Dr. Kristen Miller (Bohrer et al., 2008) and discussing the challenges and benefits of inquiry teaching. This activity aids in GTAs buying in to an inquiry-based model.

#### 1.2 Pre-lab setup

The setup is minimal; it only requires the audiovisual equipment to show the video. The video is approximately 10

minutes long, and shows the same lab topic (factors influencing enzyme activity) taught in two different ways. First, we see the lab taught using an instructor-centered cookbook method, and then we see the lab taught in a student-centered inquiry method.

#### 1.3 In-class Instruction

In part 1, prior to the showing of the video, GTAs are asked to make observations about the actions and interactions of GTA and students in the two teaching methods.

In part 2, for approximately 10 minutes, the GTAs are asked to circle any situation they anticipate dealing with or have dealt with before, and then solicit their ideas about how they might handle them.

#### 1.4 Discussions and Extensions

After the videos, Instructors facilitate the discussion of the video observations, and the challenges and benefits of inquiry teaching. An explanation of the 5E instructional scheme is explained to the GTAs as means of easily creating a good student-centered lesson. Within the discussion of both parts, it is important to solicit GTAs' concerns or questions about implementation and comments on their past experiences in traditional or inquiry settings.

### *Session 2: Socratic Questioning*

#### 2.1 Activity Overview

This activity is designed to provide GTAs with methods for how to encourage and lead students to develop an understanding of what they are doing without telling them what to do utilizing the "Pause, Listen, then Nudge" model.

#### 2.2 Pre-lab Setup

Instructors perform a short demonstration of Socratic Questioning performed well between a student and instructor.

#### 2.3 In-class Instruction

The GTAs are given an overview of Socratic Questioning, directed to the Questioning Techniques section of the packet (Appendix A), and observe the Socratic Questioning demonstration. Then, the GTAs work in groups of 3-4 for approximately 15 minutes to create a quick demonstration of their own using at least three of the techniques described, and present to the entire group. After each group presents, for approximately 15 minutes, the entire group comments on which of the techniques they have employed.

#### 2.4 Discussions and Extensions

Instructors could assign each group specific techniques and/or specific topics to illustrate the variety their students may task them with. This activity could be extended to include at least two rounds per group to practice their techniques. For example, a group chooses their technique and topic, presents, and based on feedback from the audience they could choose a second technique for the same topic.

*Session 3: Bloom's Taxonomy*3.1 Activity Overview

In this activity, the GTAs are introduced to Bloom's Taxonomy and how it is useful for teaching by gaining practical experience. First, they will Bloom an exam and then create their own exam questions.

3.2 Pre-lab Setup

Again, the setup is minimal. A sample exam was prepared and can be easily adapted for a variety of topics.

3.3 In-class Instruction

In part 1, the GTAs will review and discuss Tables 1 and 2 of the Biology in Bloom Tool (Crowe et al., 2008).

In part 2, the GTAs work in groups of 3-4 for approximately 10 minutes to "Bloom" the sample exam questions using the tool. The entire group then discusses each question together, allowing groups to make a case for why they ranked each as they did, for approximately 10 minutes.

In part 3, the GTAs then spend approximately 15 minutes to create three assessment questions at different Bloom's levels. They share with the entire group and discuss how they could modify their questions to increase or decrease the level for another 15 minutes.

3.4 Discussions and Extensions

During the entire group discussion, Instructors should explain how prior knowledge affects the ranking of a question, and how to change the language or structure of a question to increase or decrease Bloom's level.

**Model 2**

This training was originally developed to supplement the training our GTAs receive in our 2-credit course, A Bridge to Knowledge (Spilios et al., 2013), which students enroll in during their first semester of teaching. However, approximately 40% of the Physiology GTAs are also first time GTAs, which necessitates overlap with the course. Fortunately, Boot Camp is the first Saturday of the semester and after only the first of nine seminars. Table 2 is a timetable for the order of exercises we will present at the ABLE Major Workshop, and how long participants typically take to complete them.

**Table 2.** Timetable for Model 2's Boot Camp.

Session 1, Part 1: Scenarios	20 min
Session 1, Part 2: Skits	20 min
Session 2: Role-Play First Day of Teaching	10 min/GTA

*Session 1: Scenarios and Skits*1.1 Activity Overview

Part 1's activity on scenarios and Part 2's activity on Skits are used to help teaching teams establish the dynamic of the GTA/UA relationship while also becoming familiar to the most common scenarios that occur during a semester of teaching our laboratory courses. In Part 1, teaching teams rotate around questions on white boards in a lightning round whereas in Part 2, teaching teams watch and discuss improvised role-playing skits performed by veteran GTAs and UAs.

1.2 Pre-lab Setup

In Part 1, write one of each of the following questions on the top of white boards, leaving plenty of room for answers below the questions and space the boards around the room, leaving face down. Numbering the questions facilitates easy rotation between rounds.

1. Lab starts at 9 am and you passed out the quiz promptly. A student comes in at 9:04 am. What should you do?
2. A student complains to you about how you graded their post-lab. She said her friend is in another GTA's class and they worked together on that question. That GTA gave the student full credit, but you did not. What should you do?
3. A student emails you after he missed lab saying he was sick and wants to attend a make-up section. What should you do?
4. It is the blood lab and a student is wearing shorts and flip flops. What should you do?
5. You cannot find the quiz databank. You have searched everywhere you can think of. What should you do?

In Part 2, prior to the day of Boot Camp, recruit volunteers and provide the following instructions the morning of Boot Camp on how to role-play one of two skits. Typically, the same people play the GTA and student in both skits. In the Ethics Skit, the two volunteers are friends and know each other well. The scene begins with Person A sitting at the GTA desk when Person B walks into the classroom. Person A noticed this morning that Person B forgot to turn in his/her post-lab last week. Person B wants to use the friendship to convince Person A to give him/her an extension. When Person A refuses, Person B threatens to go to the department chair to discuss his/her unprofessional conduct during the semester. The volunteer playing Person A is told to try to be the GTA, but know that it is difficult by pretending Person B is a roommate or lab mate, someone he/she is close with. The volunteer playing Person B is told to treat Person A as a friend and not a GTA, until it is apparent the GTA will not give an extension and to then become verbally combative with the GTA.

In the Lab Policy Skit, three additional volunteers are re-



cruited. The scene begins with Person A sitting at the GTA desk with piles of papers. Person B turns in his/her as and Person B returns last week's graded post-lab. Person C is the UA and will only respond to directions from Person A and will only obey minimally. The volunteer playing Person B is told to at first ask reasonable questions regarding his/her grade, but will gradually become more defiant and disrespectful. The volunteer playing Person A is told to manage the lab with this student, the UA, the two additional volunteers who wish to at first politely interrupt the conversation to submit their own post-labs and see their own grades. As the argument between Persons A and B continue, the volunteers gradually become impatient. Also, lab needs to end promptly and the rest of the students are struggling to finish on time.

### 1.3 In-class Instruction

For Part 1, ensure the teaching teams are situated around the white boards. Provide the directions, which are to flip over the boards, read the question, discuss and write an appropriate answer to the question in 30 seconds. Once the teams answer all of the questions, they should return to their original board. For Part 2, position the volunteers and teaching team such that everyone can view the skit. Each skit should not take more than a couple of minutes and it is up to the Instructor to end the skit. After each skit, the teaching teams will discuss what happened.

### 1.4 Discussions and Extensions

For Part 1, during the discussion, depending on the number of people in a group, give teaching teams about 30-60 seconds at their original board to review the answers and decide who and how they will present the questions and answers to everyone. Emphasize it is meant to be a group presentation. Throughout the activity, this rapid format will allow the Instructor to identify individual personalities, effectiveness of teaching teams, and presentation styles.

For Part 2, after each skit, give the teaching teams approximately 3-5 minutes to discuss and write on the white board one thing Person A did incorrectly. For the Ethics Skit, comment on if anyone in the team has been to a social event in a mixed graduate/undergraduate setting and what GTAs or UAs should do if they know any of their students. For the Lab Policy Skit, provide one option for each of the following conditions as both a GTA and UA: 1) a student arguing a grade during lab; 2) multiple students finishing lab at the same time; 3) multiple students not finishing lab on time? Then, similar to Part 1, each team should present, but usually their answer to only one question as the answers tend to be similar.

Extensions or modifications should be focused on brief scenarios or skits that are most relevant to your GTAs. Longer scenarios and/or more ambiguous scenarios also work well, but the teams should be given more time to discuss per round. If white boards are not available, poster paper is effective as well. If Instructors were able to recruit veteran GTAs to this session, it is useful for them to share their own experiences relevant to Parts 1 and 2. This enhances credibility to the ap-

proximately 60 minutes the GTAs and UAs have just spent doing Session 1.

## Session 2: Role-Play First Day of Teaching

### 2.1 Activity Overview

This activity allows the Instructor to see each GTA's oral presentation skills, but also their ability to handle the unexpected.

### 2.2 Pre-lab Setup

Prior to the day of Boot Camp, recruit volunteers, in our case, the UAs, but veteran GTAs is also appropriate. Provide the following instructions the morning of Boot Camp on how to role-play their individual acts (Table 3), which are normally provided on index cards.

**Table 3.** Role-playing cards.

Act 1: (1 student) (Listen outside classroom. Wait for about 2 minutes or so into the teacher's lecture). Walk in, walk in front of teacher as they are teaching, and noisily sit down.
Act 2: (1 student) (Listen outside classroom. Wait for about 2 minutes or so into the teacher's lecture). Walk in, interrupt teacher's lecture and ask if this is chemistry. You have been looking for 15 minutes for your class, you're late, and you're upset. Interact with the teacher with that mindset when they don't tell you where chemistry is.
Act 3: (2 students) (After about 2 minutes or so into the teacher's lecture). Start whispering to each other. Gradually increase your volume, or laughter, until the teacher notices you. When the teacher asks you to stop, stop for a little bit, and when you think they aren't paying attention to you, start again.
Act 4: (1 student) (From the beginning of the teacher's lecture). Look pale, weak. Rub your head, put your head down on your desk. After about a minute or so, or if the teacher asks you how are you feeling, stand up, tell the teacher you aren't feeling very well, and pretend to faint (land on the desk, or on another student, or teacher).
Act 5: (1 student) (Pay close attention, as soon as you can manage). Ask the teacher a question related to what they are talking about. Raise your hand the first time. If they don't call on you, ask it out loud. Keep asking questions, whatever you can think of.

The names of the GTAs are written on the board so they know their order. As the role-playing ensues, the GTAs do realize the difficulty of the challenge increases, but it makes it easier for volunteers to role-play. The Act number is the

order of the presenters the volunteers should role-play for to eliminate confusion. The volunteers for Acts 1 and 2 are told to sneak out of the back of the classroom to wait in the hallway. The volunteers for Act 3 can sit anywhere in the room, but usually the middle of the room and off to the side is best so that they can be heard, but are difficult to see unless the GTA walks around while teaching. The volunteers for Acts 4 and 5 are most effective in the front of the room so the GTA has difficulty ignoring them. If fewer than five GTAs are at Boot Camp, Acts 3 and 4 can be combined and/or Act 2 is eliminated.

### 2.3 In-class Instruction

Remind the GTAs that during their presentations, the audience will evaluate their lesson, but some will act like “bad students” that will interfere with their lesson. The GTAs should handle the situation and attempt to finish their lesson. It is up to the Instructor to end the act. After each act, the teaching teams will discuss what happened.

### 2.4 Discussions and Extensions

After each act, on the white board, give the teaching teams approximately 3-5 minutes to identify one strength and one weakness of the GTA’s presentation and why for each. Then, the teams should list all the techniques the GTA used to handle the situation and discuss if it was appropriate or not. Finally, discuss if anyone in the group has seen the situation happen and thoughts on how the teacher handled it. This structure will allow the Instructor to assess each GTA’s presentation style and ability to improvise while under pressure.

Similar to Session 1, the extensions or modifications should be focused on role-playing that is most relevant to your GTAs. If Instructors wish to evaluate more of a presentation, the acts could begin later into the presentation, a mandatory inclusion of a visual aid utilized in the laboratory course, and the GTAs could be assigned topics rather than choosing for themselves. Also, Model 1 incorporates role-playing as well at the end of Boot Camp and the scenarios are provided in Appendix A.

## Acknowledgments

Model 1 of this graduate student teaching assistant training workshop was developed in partnership with Brianna Wright at the University of Wyoming, who is also involved in implementation each semester. The videos shown in Model 1 were recorded and generously shared by Dr. Kristen Miller at the University of Georgia, and were also presented at a previous ABLE workshop (Bohrer et al., 2008). The development of Model 2 is the combined efforts of numerous GTAs and UAs since Spring 2009 and the results of the first year were presented as a poster at a previous ABLE workshop with one of the UAs, Ms. Girija Bhonsle (Seliga and Bhonsle, 2012).

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## Citing This Article

Jordan, C.N., A.M. Seliga and E.A. Flaherty. GTA Boot Camp: A Training Program to Prepare First-time Graduate Student Teaching Assistants . Pages 221-231 in *Tested Studies for Laboratory Teaching*, Volume 35 (K. McMahon, Editor). Proceedings of the 35th Conference of the Association for Biology Laboratory Education (ABLE), 477 pages. <http://www.ableweb.org/volumes/vol-35/?art=12>

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