

Chapter 22

Effective Methods of Training Biology Laboratory Teaching Assistants

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Introduction

One of the most important factors in the success of undergraduate biology laboratories is the instructors who teach them. Often, especially in multi-section courses, this responsibility is left in the hands of graduate, or sometimes undergraduate, teaching assistants (TAs). Studies at many major research universities have shown that these TAs are responsible for a substantial amount of undergraduate biology instruction (Nyquist et al., 1989). They perform a wide range of duties ranging from conducting undergraduate laboratories, conducting quizzes, providing tutorial sessions, marking exams and assignments to being given complete responsibility for an undergraduate course.

Increasingly universities and colleges are realizing the need to train these TAs for the vast range of responsibilities that they will perform. There has also been a call for a collective responsibility of graduate schools to train the future professoriate of tomorrow to be effective teachers. Decisions thus need to be made to determine the best course of action for this training: what type of training is necessary, who is responsible for the training, and should it be mandatory for all TAs? Equally important are the issues of whether a program should be designed and administered centrally through teaching and learning centers or whether this training should occur at the level of departments or faculties.

This workshop presented three successful models of TA training that are currently in place at Clemson University, the University of Nebraska-Lincoln, and the University of Alberta. While there are many other effective programs at institutions across North America (see listing for the Association for American Colleges initiatives - <http://www.aacu.edu/Initiatives/ppffinprog.html>), this workshop afforded participants an opportunity to explore these three specific programs in more detail. It also allowed for a discussion of the pros and cons of several components of these programs. In addition, participants were introduced to some methodologies that have proven successful at each institution.

Materials

The following materials were distributed to all participants at the workshop:

A Guidebook for Clemson University Teaching Assistants

Instructional Guide for UNL Teaching Assistants

Teaching Resource Manual, University of Alberta (Naeth, A., 1993)

Clemson University TA Training Videotapes

Classroom Dilemmas (previously referred to as “Scruples”) – a board game centered around ethical dilemmas in the teaching experience. See ABLE website: (<http://www.ableweb.org/volumes/vol-21/TA-Training/tab.html>)

TA Training Programs

The TA training programs at Clemson University, the University of Nebraska-Lincoln, and the University of Alberta (see Appendix A) all are modeled on a collaborative effort between centrally administered teaching and learning centers and the biology departments where the actual instruction will take place. All programs include a series of workshops (~5 days) for all instructors before the beginning of the academic term followed by on-going instruction through weekly TA meetings. In some cases campus-wide workshops continue throughout the year.

The success of any TA training program requires that attendance at these workshops be mandatory. Additional incentives for participation may also include financial support to attend (scholarship or bursary), recognition of training on student transcript or inclusion of training as part of a credit course/program by the university or college. TA training is required by the three institutions presented, and financial incentives are used at the University of Alberta.

Departments are in the best position to teach TAs the specific knowledge and skills of a discipline, while centrally administered teaching and learning centers are often more qualified to teach aspects of pedagogy. Their involvement in the development and implementation of TA training programs on these campuses reflects the broader commitment (both philosophically and financially) of university administrators to the training of graduate and, in some cases, undergraduate teaching assistants. While the specific roles of the teaching and learning centers at these institutions differ, in general they are available to assist the departments by providing specific pedagogical workshops, materials and, in some cases, additional resources for TA training programs. For example, specific workshops may be related to teaching and learning methodology, problem-solving techniques, how to give effective lectures, leading discussions, recognizing and dealing with troubled students, training international TAs, and the general issues of academic dishonesty. Materials often include the development of campus-wide TA training manuals. Resources may address both financial resources as well as expertise in the methodologies of effective teaching for specific programs.

Successful TA training programs are those that are “customized” to meet the individual needs of departments (Gappa, 1991; Unruh, 1987). Ideally, departments should be working with

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the centrally administered teaching and learning centers for implementing aspects of TA training programs that are common to most disciplines and then looking to the expertise within their own departments for the formal training of the necessary skills to be effective biology teachers. This serves the added advantage of providing strong role models or mentors for TAs within the specific discipline.

As North American graduate schools have become increasingly dependent on international students, many universities have established a separate program for the training of international teaching assistants (ITAs). In most cases, these programs have been designed to meet the needs of the particular campus. According to Smith (1994), these programs are generally composed of a testing component (in addition to the TOEFL and/or Test in Spoken English) along with instructional components in spoken language, intercultural communication as well as teaching skills. A successful model for ITA training exists at the University of Nebraska-Lincoln. A smaller program exists at the University of Alberta. Students in these programs must achieve a number of performance indicators, mostly in the areas of communication, before they are allowed to begin teaching positions in the classroom or lab.

For further readings on setting up effective TA training programs, see Selected Bibliography.

Examples of Successful Methodology

Clemson University TA Training Videotapes

Clemson University has developed a series of TA training videos that are used as a focal point for workshops administered by the Colleges of Agriculture, Forestry and Life Sciences, and the Colleges of Engineering and Sciences. The titles of the five sessions are: "The First Day," "The Unprepared TA," "Cheating," "Involving Students," and "Sex, Lies and TAs." These videotapes demonstrate various aspects of effective and non-effective methods of teaching and serve as a focus for discussion and critique. Engaging participants to discuss the pros and cons of various aspects of teaching methodologies is a beneficial approach to TA training. As with all students, being active in one's learning is often the most successful.

At this workshop, participants viewed the videotape "Sex, Lies, and TAs." Participants were divided into small groups and were asked to critique various aspects of the video. The video is designed so that short clips can be viewed and critiqued as needed. Discussions focussed on the various aspects of student/teacher relationships and the necessary code of conduct for TAs. For example, should a TA ask his/her students out for a date? Is this acceptable behavior? The video showed several examples and the workshop provided viewers with the opportunity to discuss and make their own assessment. Participants then reported back to the larger group on some of the key issues discussed. All participants received copies of these videotapes.

Classroom Dilemmas – a game

Being an effective teacher requires more than teaching content. New TAs must learn to develop a positive environment for learning. To be successful in the classroom or lab, they must establish and maintain a professional image, and also ensure that all their students are treated fairly. Experience is the best teacher in this regard. However, new TAs will be stepping into the classroom within days of completing their TA Training program. The *Classroom Dilemma* game was adapted from the Milton Bradley board game “Scruples.” This game draws on the experiences of veteran teachers to give newcomers a crash course in handling themselves and their students in real-life classroom or lab situations.

Participants in this workshop were introduced to the game *Classroom Dilemmas*. The game consists of a playing board and a stack of “dilemma” cards. It is played by teams of 2 or 3 players to encourage small group discussions. For each turn, one team reads another team a question from the dilemma cards. For example: “When you give back a quiz, a student raises his hand and challenges your grading. Other students agree and look like a very angry mob might be developing. Do you agree to give everyone full credit for the questions?” The other team then discusses how the situation would best be handled. They must state their answer as “Yes, No, or It Depends” and also justify their answer. The dilemma card has a suggested preferred answer, including an explanation written on it. If the answering team has the correct answer, they move their marker on the game board. The number of spaces to move is stated on each card. This varies as there are some desirable spots to land on where the team would get an extra turn. There are also some undesirable spots with pitfalls.

The idea of the game is to get the new TAs to recognize, think through, and discuss possible situations they might encounter in the lab or classroom. During the course of the game the room is abuzz with animated discussions. The facilitators (experienced TAs are preferred in this role) circulate among the teams and discuss specific issues. The various topics of the cards include cheating, social relations with students, handling conflicts in student groups, use of humor, dealing with large enrollment (standardized) courses, and working with a supervising professor.

After most teams have had a chance to get through a stack of game cards, the entire group reconvenes for a lively discussion of the issues raised. Participants often question the suggested answers and explanations which generates further discussion of the issues. Typically TAs want to talk more about the specifics of handling cheating, encounters with students in social situations, resolving conflicts with students, and the use of humor in the classroom. This is when veteran TAs are essential to provide examples from their own experiences.

Classroom Dilemmas is only an introduction to the intricacies of classroom or lab management, but it gives a good overview of the range of issues that TAs may face and sets

them on the right path. A copy of this game may be downloaded from the ABLE website (<http://www.utoronto.ca/able/conf/able99/index99.htm>).

Effective Marking

Evaluating student learning is a crucial activity of all teachers. It is also a very time consuming endeavor. Many TAs may be responsible for most of the student assessment in a course whether marking student lab reports, quizzes, class discussions, projects, or even lecture exams. Becoming a fair and consistent marker requires a considerable effort and practice, and it is a task for which TAs must be given training and guidance. After all, the mark given to an assignment or exam is a valuable indicator about what and how a student is learning. It can also help motivate students and improve their performance and help them manage their time. Being effective with this feedback may affect all aspects of the student's further learning.

Approaches to testing and marking may vary among different courses and disciplines. It is essential that TAs be given specific directives for the course for which they are teaching. In general all TAs should expect to be given a framework for their marking (e.g. answer guidelines, holistic vs. analytical methods, etc.) as well as general policies regarding this marking (e.g. penalties for late assignments, format, etc.).

First and foremost to being an effective marker, a TA must understand the theories and concepts being tested. One must be able to follow a student's thinking to interpret incomplete or partially incorrect answers. Without this knowledge, a TA will not be able to assess student performance beyond the answer key.

Second, TAs must ensure that they are marking for the course level. Knowing the expectations of the course and objectives of the course should be good indicators for the level of student performance. Marking guidelines should be reviewed with the course lecturer or coordinator whenever there are questions about expectations.

A paper returned with a grade and no comments is useless as a learning tool as students are left with no indication of how to improve. While TAs should not attempt to rewrite lab reports or assignments for their students, feedback on where the student erred is essential for improving future performance. TAs should keep in mind:

- 1) Write comments judiciously and legibly.
- 2) Do not make sarcastic or rude comments.
- 3) Do not obliterate the text, use the margins or back of the page.
- 4) Feedback needs to be specific.
- 5) Remember positive as well as constructive criticism.
- 6) Draw attention to areas that need further explanation or work.
- 7) If you are repeating the same comments on all student's papers, consider making a summary sheet of ways to improve student performance for the entire class.
- 8) Encourage students who are doing poorly.

- 9) Avoid the temptation to edit the paper for the student. Give students enough information to guide them with improvements for subsequent assignments. Perhaps give students a chance to re-write poorly written work.
- 10) Mark an “X” or slash mark through blank spaces.
- 11) Use ink to mark, in a color other than that used in the assignment. Avoid red ink.
- 12) Double check addition and the mark given.
- 13) Keep a duplicate copy of all student records.

Effective and consistent marking is a difficult task but it is attainable with practice and guidance. Establishing consistency among laboratory sections is often more difficult because of differences in experience, knowledge, and approaches to learning. Two examples were presented to achieve this end, one example on marking assignments using one on one discussions with the course coordinator and one example that uses an open forum of discussions among TAs for effective marking.

In the first example, participants are asked to mark a sample student lab report based on a marking guide established by the course coordinator. The report is to be marked (i.e. comments are provided as necessary) by the TA. It is then returned to the coordinator who provides the TA with written comments about their marking:

- Was the assignment marked too hard?
- Was the assignment marked too leniently?
- Were the written comments on the assignment descriptive enough to help the student improve performance for subsequent assignments?

The course coordinator and TA then meet to discuss the finer aspects of the marking of the student report. In addition, all the TAs will meet as a group with the coordinator for a general discussion of the marking.

In the second example, TAs develop their skills through group work. They are introduced to an assignment used in the specific course that they are teaching. For example, students taking Biology 208, Introductory Ecology (University of Alberta), are required to write formal lab reports for a number of the experimental labs. Guidelines for the production of student lab reports are found in the course lab manual. In addition to seeking advice and assistance from their TAs, students are also referred to Ambrose and Ambrose (1995), Day (1994), or Pechenik (1993) for additional guidance for developing these reports.

After reading the marking guidelines in the lab manual, TAs are asked to mark the lab report “Vegetation Patterns and Microclimate of Two Sites in the North Saskatchewan River Valley” which is distributed to the TAs by the course coordinator. The assignment was:

“Write a complete scientific report on Vegetation Patterns and Microclimate in the North Saskatchewan River Valley. A well written scientific report must fulfill two objectives. First, it must clearly and completely describe the procedures that were followed and the results that were

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obtained. Second it must place these in perspective by relating them to the existing state of knowledge and by interpreting their significance for further study. While it is necessary that a scientific report be complete, it is also essential that it be organized and concise. The general format for the structure of scientific reports in ecology is Abstract, Introduction, Materials and Methods, Results, Discussion and Literature Cited. A title must also be included. Each of these sections is discussed in detail in Ambrose and Ambrose (1995), Day (1945), or Pechenik (1993) and on pages 5-11 in your manual. Read this material before attempting to write your assignment (Biology 208 Lab Manual)."

TAs are then placed in random groups of 3 or 4 and are asked to discuss their approach to marking the assignment. They are given 20-30 minutes for this exercise. Once a consensus is reached, each group presents their assessment to the rest of the TA team. Pros and cons of different methods of grading are then evaluated (holistic vs. point form) in the context of this exercise.

A separate discussion of the university's policy on cheating and plagiarism should also be reviewed at this time.

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Appendix A

TA Training Programs

Clemson University

Welcome

Workshops:

- Orientation for New TAs
- Roles and Responsibilities of the GTA
- Experienced TA Panel
- Safety Training
- The First Class Meeting – TA Training Video
- Preparing to Teach
- Methods for Active Teaching and Learning – TA Training Video
- Question and Answer Techniques
- Teaching Problem Solving
- Dealing with Potential Problems in the Classroom – TA Training Video, game
Classroom Dilemmas

Weekly TA Meetings

University of Alberta

Orientation for New Graduate Students – Department of Biological Sciences

Introduction of the Peer TA Mentor Program

Department of Biological Sciences Safety Seminar

Roles and Responsibilities of Biological Sciences TAs

University Teaching Services' Graduate TA Symposium

Workshops:

- Teaching and Grading Practices in the Sciences
- Marking Lab Reports for the Biological Sciences
- Successful Lecturing
- Effective Laboratory Teaching in the Biological Sciences
- Leading Discussions
- Teaching International Students
- International Teaching Assistants – Success in the Canadian Classroom
- Gender Issues in Teaching and Learning
- Ways to Interact with Difficult Students
- Creating a Positive Classroom Atmosphere
- Getting up to Speed with the Library
- Teaching and Learning Using Educational Technologies
- Using the WEB Strategically in Your Teaching
- Communicating Visually
- The Teaching Dossier

Specific Course Meetings

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Weekly TA Meetings

Graduate Student Retreat (optional) – a two day session given by graduate students for graduate students with concurrent sessions on graduate life, roles and responsibilities of graduate TAs, and professional goals.

University Teaching Program (optional) – a collaborative effort between the Faculty of Graduate Studies and Research, participating departments, and University Teaching Services. Successful completion of this program is indicated on the student's transcript.

Pedagogical Requirements – 40 hours of formal course instruction

Practicum Requirements – two full terms of undergraduate teaching, two videotaped sessions

Teaching Record – a complete teaching portfolio of the student's work.

Final Assessment and Evaluation.

University of Nebraska-Lincoln

Arts and Science Welcome

Workshops:

Motivating Students

Science in an Excited State

School of Biological Sciences Welcome

Overview of TA Training Workshops and Introduction to the School of Biological Sciences

Workshops:

Academic Dishonesty

Recognizing and Assisting the Troubled Student

Student Reasoning

Questioning Skills

Ethics in Science

Graphing Calculators

Using Live Animals in Teaching and Research

Meeting of Biological Sciences TAs

Campus Safety Training

Equal Educational Opportunities/Multicultural Perspectives

On Becoming an Effective Lab TA: Analysis of Common Problems Confronting TAs

CPR Training

Microteaching 1 & 2

Scenarios 1 & 2

Specific course meetings

Weekly TA Meetings