DEVELOPING A TEACHING ASSISTANT PREPARATION PROGRAM IN THE SCHOOL OF OCEANOGRAPHY, UNIVERSITY OF WASHINGTON

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ABSTRACT

A program preparing graduate students to teach was developed in the School of Oceanography, University of Washington, in response to repeated graduate student complaints about the lack of a program. The program is based on surveys of groups affected by the program and research on TA preparation, rather than on the personal preferences of the faculty, to ensure partial ownership by all groups. It is aligned with the reform of science education, as are the educational perspectives of the graduate students. It consists of a two-day Orientation for new TAs, peer assistance and peer mentoring for TAs, and an ongoing series of courses and brown-bag discussions. Program preparation took two years: one to prepare a program plan, the second to develop, with the help of graduate students and postdocs, the workshops comprising the Orientation. The first Orientation was held in September 2000 and was evaluated very favorably by the participants. The ongoing part of the program consists of an autumn quarter course on teaching methods, winter quarter weekly brown-bag discussions, and a spring quarter course taught by the Lead TA. Participation in developing the program, leading Orientation workshops, and teaching a course as Lead TA is valued highly by graduate students.

Keywords: Education-graduate, education-geoscience, geoscience-teaching and curriculum, marine geology and oceanography

INTRODUCTION

Although the University of Washington requires International graduate students to attend a four-day Teaching Assistant (TA) Orientation, consisting of the SPEAK test and several workshops conducted by the Center for Instructional Development and Research (CIDR) (http://depts.washington.edu/cidrweb ITAPA.html), all new TAs are required to attend only a half-day session on general issues of teaching, which is conducted by the Graduate School and the CIDR (http://depts.washington.edu/cidrweb/NewTAOrientation.html). Further teaching preparation of new TAs is left to the departments.

For several years the University's exit surveys of graduate students in the School of Oceanography recorded low ratings for the School in preparing TAs to teach, in supporting and evaluating them while they teach, and in providing them opportunities to teach. Surveys of the School's graduate students by committees from the Graduate School and the Graduate and Professional Student Senate reported the same complaints. Finally, in the spring of 1998, the School was informed by the Graduate School to establish a program that would prepare its graduate students to teach and offer them teaching experience in the School. At the request of the Director of the School, I immediately undertook to plan a TA Preparation Program for the School.

From my experience as a Faculty Associate in the CIDR, I knew the program should be based on research in TA preparation and the reform of science education, not on the personal teaching preferences and experiences of the faculty, which can be idiosyncratic and usually are not aligned with the reform of science education. Therefore, my first step was to approach, not the faculty, but the graduate students, to learn their expectations and needs with respect to a program they had requested. In September 1998, a five-page questionnaire on interests, experience, and concerns about teaching was sent to all the graduate students present in the School (84). This questionnaire was a slightly altered version of the TA Questionnaire by Nyquist and Wulff (1996). Approximately 25 % of the questionnaires were returned. A follow-up two-hour discussion was held with graduate students for clarification. A group with tangential interest in the program was the undergraduate Oceanography majors with whom I met for an hour in December 1998 to learn their expectations and needs for a graduate TA Preparation Program. The third group from whom I sought comments was 60 former Oceanography graduate students who are now faculty members at liberal arts colleges or research universities or are employed by government agencies. A questionnaire very similar to the one sent to graduate students was e-mailed to them and approximately 30 % of the questionnaires were returned. I presented a summary of the results to the faculty at a special one-hour meeting in April 1999 and determined their expectations and needs.

After this research was completed, I reviewed the literature on TA preparation in the CIDR library, placing emphasis on the works by Chism (1987), Nyquist and Wulff (1992, 1996), and Gach et al. (1997). I was acquainted with the reform of science education. In May 1999, a first draft of the proposed program was reviewed by consultants at the CIDR, a second draft was sent to the Oceanography graduate students for their feedback at a meeting, and a revised draft was discussed with un-

dergraduate Oceanography majors at a meeting. A revised program plan was then presented to the Oceanography faculty in June 1999 and approved by them at a meeting in October. In this manner, each group directly affected by the program had the opportunity to contribute to the draft of the program, provide feedback, and assume partial ownership of the program.

The 1999-2000 academic year was spent preparing the workshops that would form the New TA Orientation to be offered at the beginning of the 2000-2001 academic year.

THE QUESTIONNAIRES

The kind of information requested in the questionnaires sent to the graduate students and former graduate students is shown in Table 1. (The complete questionnaire sent to graduate students is available on-line at http://www.ocean.washington.edu/people/faculty/mcmanus/taprep.html.) Such a survey is particularly useful by revealing the graduate students' teaching experience and teaching interests. The results have contributed significantly to the content of the program and to engaging graduate student interest in the program.

Of the 25 % of graduate students who returned the questionnaire, almost one-fifth (4) had some experience teaching in community colleges or high school. Here is a teaching resource that had been ignored by the faculty. Further, it is more teaching experience than that held by most of the recent hires as assistant professor. How to build on the experience these students bring to their graduate education is a question yet to be addressed in the TA Preparation Program, but this experience was useful in developing the workshops for the Orientation.

The teaching interests rated highest by the graduate students are part of the reform of science education, which suggests that students most interested in teaching are already seeking to learn the requisite skills for reform. The highest interests—that is, those of the 22 aspects of teaching listed in Table 2 ranked an average of 4

TA QUESTIONNAIRE
I. Previous Teaching Experience and Interest
A. Identify your teaching experience, if any
B. List your previous teaching roles
C. Please briefly describe any training programs, short courses, or workshops on teaching methods or teaching effectiveness in which you have participated.
D. Survey—Please take a few moments to identify your level of experience and interest in each of the following 22 aspects of teaching by circling the appropriate numbers (from 1 to 5)
II. Teaching Strengths and Concerns
A. What do you think are your teaching strengths?
B. What are your major concerns about teaching?
C. As you anticipate your appointment as a TA, what do you feel you most need during our TA Orientation and ongoing training program?
D. If you are considering a possible career track in academia as a faculty member, what do you feel you most need to prepare you to be a future faculty member?
E. What do you think the assessment of your TA performance should include that would be particularly beneficial to you in your personal development as a teacher?

Table 1. Kinds of information requested in the questionnaire sent to the graduate students. The questionnaire for former graduate students differed only slightly from this.

Holding office hours for students
Assisting in large enrollment classes
Working with students of diverse backgrounds
Conducting labs
Conducting quiz sections
Developing demonstrations for labs or quiz sections
Lecturing to large classes
Lecturing to small classes
Leading class discussions
Using active learning methods (in which students are actively engaged in learning)
Organizing and managing small groups of students
Teaching quantitative courses
Conducting field work
Using technology in teaching (e-mail, computing, multimedia, Web-based, etc.)
Developing and evaluating writing assignments
Developing multiple choice tests
Developing essay tests
Developing problem-solving tests
Assigning grades
Designing courses and constructing syllabi
Responding to challenging classroom-management situations
Learning how to know the students better (their knowledge, skills, misconceptions)

Table 2. Twenty-two aspects of teaching adapted from Nyquist and Wulff (1996). In the questionnaires graduate students and former graduate students were asked to rank 22 aspects of teaching from 1 (lowest) to 5 (highest) in terms of "interest" (graduate students) or "importance" (former graduate students).

Hi,

Thanks to all of you for planning to be at the meeting to prepare the workshop on "Using Questions to Help Students Learn."

Here is the context for this workshop in the New TA Orientation. This workshop on using questions will be followed by a workshop on Leading Discussions, which will be the last workshop of the first day of Orientation. Following a day off for preparation, the new TAs will begin the second, and final, day of the Orientation with a practicum, in which each student will lead a discussion.

The goal of the workshop on using questions is for the new TAs to analyze the use of questions to enhance student learning and prepare a strategy for a hypothetical classroom lesson. (The application of what is learned here to leading a real discussion and the evaluation of a discussion will come in the practicum.)

I am placing the following reading in your mailboxes: 1) A 9-page chapter on Asking Questions, from the book "Tools for Teaching." 2) Eleven pages of a chapter on questions in leading discussions from the book "Education for Judgment: The Artistry of Discussion Leadership." 3) A 7-page condensation of Benjamin Bloom's Taxonomy of Educational Objectives. (The taxonomy expresses cognitive levels.)

Please read each article and time yourself on reading and comprehending the material in each. (Although our meeting on Friday is an hour and a half, the workshop itself will be only an hour. We cannot use all the hour for reading.) It should go without saying that no one at the meeting or in the workshop is expected to memorize anything.

Then assume that you are a new TA. How would you like the workshop to be structured in order for you to attain the workshop goal? That is, what would you have the new TAs do during that hour? Two constraints: 1) There is no time for them to read the material before coming to the workshop. 2) No one is going to lecture to them. You may decide that each new TA should read each article, or you may decide that the reading should be divided among the new TAs. You may want them to work in small groups, individually, or as a whole workshop.

At our meeting on Friday, we'll begin by having you work in small groups to share your ideas. Then the groups will report out to the whole meeting for discussion of how to structure the workshop. We shall end with a rough draft of the plan for the workshop. (Afterwards, I shall type it into a handout for the new TAs and send it to you for you to proof.)

If, after reading this, you think you will have no idea what to suggest on Friday, do not be dismayed. We are not competing. We are collaborating. We are all learning. None of us has done this before, including me. Responses to suggestions are just as important as the suggestions themselves. Learning, discussions, planning are all messy activities. Enjoy the mess!

The meeting is from 10:30 to noon in 207 Old Oceanography Building. I look forward to a stimulating meeting.

Dean

Figure 1. E-mail message providing instructions to the ten graduate students and postdocs who helped develop this workshop.

University of Washington
School of Oceanography

NEW TA ORIENTATION

Using Questions to Help Students Learn

GOAL

To develop a repertoire of types of questions to use in guiding a discussion and to generate questions that require students to use a variety of cognitive skills.

KEY CONCEPTS

- Asking and answering questions form the foundation of learning, but classroom research reports that university instructors in science classes use questions only 2.5 % of the class time (on average) and that 80 % of the questions asked by instructor and students are at the lowest cognitive levels.
- Asking students questions is an effective way to stimulate them to think at various cognitive levels about the course content.
- The instructor who has mastered the use of a variety of question types can guide a discussion both to include basic material and to engage student interest.

PROCEDURE

1. The use of questions to lead a discussion will be briefly demonstrated.
2. The whole class will discuss the demonstration: 1) How effectively was your interest engaged? 2) What sense of rapport did you feel with the instructor? 3) How encouraged were you to participate in the discussion? 4) How deeply were you encouraged to think about the material?
3. The next two pages are excerpts from the attached reading: 1) a list of "kinds of questions to ask" and "cognitive skills required to answer questions," and 2) a paragraph describing some types of questions not to ask, if you want to encourage discussion.
4. After reading the material, you will be divided into small groups, and each group will be given a chart or graph.
5. Generate questions about the information displayed on the chart or graph such that the questions probe different cognitive skills in Davis's (Bloom's) list of cognitive levels.
6. Groups will be picked at random to share their question for a cognitive skill with the whole class for discussion.
7. Resume in small groups and use the list of "kinds of questions to ask" to rephrase one or more of your group's questions into all the different kinds of questions. Which kind works best for starting a discussion about your chart or graph? Which for focusing the discussion?
8. Report examples of questions to the whole class for discussion.

ATTACHED READING

Bloom, B.S., 1956. *Taxonomy of Educational Objectives: Handbook 1—Cognitive Domain.* Longman, Inc., New York. (Handout is the Appendix.)

Christensen, C.R., 1991. The discussion teacher in action: Questioning, listening, and response. In, Christensen, C.R., Garvin, D.A., and Sweet, A. (Eds.), *Education for Judgment: The Artistry of Discussion Leadership*, Harvard Business School Press, Boston. (Handout is Chapter 9.)

Davis, B.G., 1993. *Tools for Teaching*. Jossey-Bass, San Francisco. (Handout is Chapter 10.)

Figure 2. Worksheet for Orientation workshop on "Using Questions to Help Students Learn."

or higher in a range of 1 (lowest) to 5 (highest) by all the graduate student groups—are: using active learning, knowing students better, lecturing to small classes, and leading discussions (Table 3). These results are similar to the recommendations made by several committees on science education reform (American Association for the Advancement of Science, 1990a, 1990b; National Research Council, 1996, 1997; and National Science Foundation, 1996). The accord of student interest with these recommendations is remarkable and augurs well for their careers as future faculty. It also buttressed the choice to include material on most of these topics in the program. In developing a program, one must be able to justify including some material and excluding other.

The ratings in Table 3 not only include rating of "interest" by the graduate students but also rating of "importance" of each of the 22 aspects by former graduate students who are now on the faculty at liberal arts colleges or research universities or are working in government agencies. The similarity in high ratings by graduate students (interest) and former graduate students (importance) further supported the choice of material for the program that supports the reform in science education.

Part II of the questionnaire, on teaching strengths and concerns, allowed the respondents to furnish more detailed information, which was helpful in planning the program. For example, many graduate students and former graduate students consider "rapport with students" a strength of their teaching. This personal characteristic is essential for success in creating an active learning environment in the classroom, but from my personal observation at research universities it is rarely considered a strength by senior faculty. The program could build on the value assigned this characteristic by these graduate students.

Major concerns about teaching included lack of experience, which the program would be designed to address; engaging, motivating, and helping students to learn, a very mature concern; and classroom management. These concerns are normal concerns in the reform of science education, again marking the alignment of these students' educational perspectives with the reform. The students wrote that what they needed most from the program, besides training in instruction, was a clear statement of expectations by the School and the faculty and a process of feedback and evaluation of TAs during their appointment. In particular, they requested assessment by both the faculty instructor and by the students in the course. These requests ensured that assessment and feedback, not normally a high priority in faculty interaction with TAs, would be part of the program.

Both the graduate students and the faculty recommended that positions of Lead TA and Faculty TA Coordinator be created. By university policy, Lead TAs at the UW are "to assist newly-appointed or less experienced TAs in preparing for instructional responsibilities. They have outstanding records as TAs and peer leaders in their departments, strong interest in the teaching aspects of scholarly work, and a desire to continue their teaching careers upon receiving their graduate degrees" (Center for Instructional Development and Research, 2001). The Oceanography Lead TA and Faculty TA Coordinator are responsible for managing the program and adapting it to the needs of the graduate students and faculty. Having both a student leader and a faculty leader strengthens the program.

NEW TA ORIENTATION

A survey of 36 TA preparation programs by Parrett (1987) for the years 1976-1986 reported a median length of the Orientation part to be five days. That the School of Oceanography does not have large required service courses, such as introductory chemistry, physics, or calculus, and does not employ TAs in the manner of language departments or English was reason to select two days as sufficient time for the Orientation, at least to begin with. The Orientation is required of all second-year Oceanography graduate students, rather than entering graduate students, because first-year graduate students in Oceanography, coming mainly from undergraduate programs in a basic science, do not know sufficient oceanography to be a TA. The purpose of the Orientation is to prepare new TAs for teaching responsibilities that will consist primarily of grading papers, holding office hours, and leading class discussions and review sessions in undergraduate Oceanography courses. These courses lack quiz or lab sections. The responsibilities selected are the most common duties reported by 1,400 TAs in eight major research universities (Diamond and Gray, 1987). Because Orientation is more effective if the topics covered will be of immediate use to the TAs (Gach et al., 1997), the emphasis during the Orientation is on assisting the new TAs to develop these skills rather than lecturing, a skill reserved for advanced TAs to use in the Oceanography 101 quiz sections.

The next step was to develop the Orientation workshops. It is important that all groups have an opportunity to participate in the development. Accordingly, at the beginning of the 1999-2000 academic year I e-mailed the Oceanography faculty, postdocs, graduate students, undergraduate majors, and staff an invitation to attend a meeting to plan the content and structure of an interactive workshop in the Orientation. Graduate students and postdocs were the main groups to attend this and subsequent meetings. People who volunteered to attend a meeting received another e-mail message with instructions for the meeting (Figure 1). These meetings provided an opportunity for me to introduce active learning methods. In return, the graduate students and postdocs used their interest and imagination, and often their teaching experience in a teaching-intensive institution,

	Students with no teaching experience	Students with TA experience	Students with instructor experience	Liberal arts faculty	Research university faculty	Government employees
Using active learning	X	X	X	X	X	X
Knowing students better	X	X	X	X		
Lecturing to small classes	X	X	X		X	X
Leading discussions	X	X	X		X	
Diversity	X		X			
Office hours	X				X	
Using instructional technology	X					
Developing problem-solving tests	X			X		
Conducting field work		X	X	X		
Course and syllabus design		X	X		X	
Developing demonstrations		X		X	X	
Developing writing assignments		X		X	X	
Conducting labs		X		X	X	
Organizing small student groups			X			
Teaching quantitative courses			X	X	X	
Developing essay tests				X		
Lecturing to large classes					X	

Table 3. Aspects of teaching ranked 4 or higher by graduate students with no teaching experience, by graduate students with experience as a TA, by graduate students with experience as sole instructor, and by former graduate students who are now faculty members in either liberal arts colleges or research universities or are government employees.

to develop some innovative workshops that were very well received by students participating in the Orientation in the fall of 2000. I have no doubt that having graduate students and postdocs help develop the workshops allowed the Orientation participants to connect better with these workshops than with workshops that I, or a faculty committee, could have developed. It also gave graduate students part ownership of the workshops.

The handbook for the students attending the workshop consisted of a worksheet and selected readings for each workshop (Figure 2). (No copies of the handbook are available, but the worksheets may be viewed at http://www.ocean.washington.edu/peole/mcmanus/taprep.html.) Joining me in leading the workshops were three graduate students, two postdocs, and a lecturer. (Having their peers instruct them was later rated by the Orientation participants as one of the workshop strengths.)

Seventeen persons attended the Orientation, including one postdoc. The workshops on the first day (Table 4) began by laying a foundation of educational context. Then came workshops on relating to and motivating students, because better personal relationships between the TAs and their students will better enable the TAs to lead discussions. After the workshops on using questions and leading discussions, the participants had a free day to practice leading a discussion on their own research, a one-page handout of which they distributed to groups of four or five students at the end of the first day. On the morning of the third day, the workshop leaders facilitated concurrent discussions of the student groups. The workshops on the third day included formative learning assessment, classroom management, and holding office hours, all of which were rated as items of interest by students on the questionnaire, as well as teaching goals and grading, which were items that, though not rated highly in student interest, I knew must be considered.

At the end of the workshop a consultant from the CIDR assessed the Orientation. The participants were divided into new small groups and asked to answer the two questions: "What are the strengths of the program?" "What changes would you recommend in the program and how would you recommend those changes be made?" Then they reported out, giving the consultant the opportunity to establish the extent of consensus and intensity of feeling and to clarify the meaning of statements. The consensus main strengths of the Orientation were deemed: "1) a lot of good material, in good detail—well chosen; 2) collaborative/consensus approach; 3) interactive, group was engaged; 4) variety of people leading sessions, including students; 5) food." The main changes they recommended: "1) spread the material over three days instead of two (that is, same amount of material, shorter periods each day); 2) different formats for some sessions—for example, office hours, leading discussions (lacked focus, could be combined with 'using questions'); 3) getting article or handbook sooner, and/or better instructions about the handout for leading discussions; refresher or follow-up session." With this constructive feedback, improving the Orientation for 2001 was easy.

NEW ASSISTANCE FOR NEW TAs

In my open meeting with the graduate students in the fall of 1998, and in responses to the questionnaire, I learned that, when new TAs had a problem, they were commonly loath to seek help either from the instructor or from another TA for fear of seeming incompetent, a situation of which the faculty can easily be unaware. Therefore, peer assistance should be available. An intensive interview study of new TAs by Darling (1987) discovered that the most important persons for new TAs to approach for discussions at the beginning of their teaching experience were other new TAs. They gained confidence from one another as they discussed ideas for class or for responding to challenging situations and came to realize that the concerns of each were shared in large part by the others. Therefore, new Oceanography TAs for each quarter are now called to a meeting at the beginning of the quarter by the Lead TA to introduce them to one another. They are expected to meet informally and often, particularly during the early weeks of the quarter, in order to foster mutual support in building confidence and solving problems arising from being a new TA. The Lead TA may have to meet with them more often than first planned, however.

Another form of assistance for new TAs is the experienced TA, serving as mentor. New TAs are more likely to ask a fellow graduate student for help than a faculty member (Puccio, 1987; Gach et al., 1997). For mentoring, each new TA is introduced to an experienced TA who has been a TA in the course before, preferably with the same instructor. Although these arrangements are made at the beginning of the quarter, research suggests that the new TA may choose not to explore the mentoring until he or she has gained some confidence as a TA (Darling, 1987). The TA mentor can likewise benefit from this experience by having to reflect on his or her own teaching experience in the course. The Lead TA should monitor the mentoring arrangements closely to ensure they operate effectively.

ONGOING INSTRUCTION

The TA Preparation Program also consists of an ongoing part, which will develop with time. In autumn quarter 2000, I offered a graduate-level course that was taken by eleven graduate students. The course met once a week for 90 minutes. The students decided which sections of McKeachie's (1999) "Teaching Tips" they wished us to discuss and in what order. We did manage to include a microteaching exercise, but the absence of opportunities to practice the methods was an obvious drawback to the

course that has been corrected in 2001. A course like this may provide graduate students their first classroom forum in which to discuss teaching and learning and thereby accord this experience the same value assigned to courses on science content and technical skills.
For spring quarter 2001, the Lead TA offered a graduate-level course on "Oceanographic Instructional Technology," which was only the second time that a graduate student had offered a course in the School and established a precedent that the Lead TA can expect to teach a course.

Many of the Advanced TAs and former graduate students answered the questionnaire question "What do you feel is most needed to prepare a graduate student to be a future faculty member?" with the suggestion that a department must place a value on teaching as well as research. It is important that new TAs have the opportunity to take part in discussions about teaching and that these discussions lead to a departmental habit of talking about teaching in the discipline and how to meet the needs of the students (Nyquist and Sprague, 1992). These discussions can provide another forum for TA assistance (Gach et al., 1997). Therefore during winter quarter 2001 the Lead TA and the Faculty TA Coordinator facilitated a weekly brown-bag lunch called Talking over Teaching and Learning (TOTAL). Although the meetings were well attended at the beginning, attendance dropped off sharply, apparently a victim of competition with research seminars.

IMPLICATIONS FOR FACULTY

The presence of a TA Preparation Program has implications for the faculty that may be unanticipated, because the program opens to discussion the subject of teaching and learning. For instance, it is University policy that the experience of holding a Teaching Assistantship is part of the graduate student's graduate education and the course instructor is expected to supervise the teaching education of the TA, just as the research advisor is expected to supervise the research education of the research assistant (RA). Some faculty members have been exercising this responsibility. Impressing others with this responsibility will take time.

A particularly important part of this supervision is feedback to the TAs. Guidelines can be supplied to assist the instructor in meeting this responsibility, for faculty often are prepared only to evaluate the scientific content presented by the TA. While constructive feedback will be greatly appreciated by many TAs, it can also send the message to others that minimal competence in teaching is not good enough (Nyquist and Sprague, 1992).

The TA Preparation Program informs graduate students that they are entitled to collaborate with the faculty instructor in planning the structure and content of the course, which can benefit TA, instructor, and students in the class. Incidentally, such collaboration was strongly urged by the undergraduate Oceanography majors.

THE FUTURE

The program has been institutionalized in the School. A Lecturer is leading the program for the 2001-2002 academic year; I serve as mentor. The Teaching Oceanography course has been successfully expanded to include practice in teaching methods, including lecturing with microteaching feedback. An occasional brown-bag lunch discussion (TOTAL) is well attended.

CONCLUSIONS

1. Graduate students can ensure that their education includes preparation for teaching if they persist in their efforts to have it included, even if that effort consists only of complaining about the lack of such preparation.

2. Developing a program to teach graduate students to teach should begin with a survey of the teaching experience and interest of those students, not with the personal preferences of the faculty. Partly, the survey results are of value in ensuring that the program developed will be of interest to the students. If the students are interested in innovative teaching, such as that recommended in the reform of science education, then the results can be used as support for a program based on that reform. A similar survey of former graduate students provides research results that may well record a continuity of outlook on teaching between former students and present students, thus removing any doubts that the interests of the present graduate students are anomalous. Further, the former students who are now faculty members elsewhere may report more demanding teaching responsibilities than those of the faculty in this department and thereby underscore the importance of providing graduate students with preparation for teaching. These surveys may also disclose values of teaching and learning not held by faculty members.

3. One should expect only 25 to 30 % of the graduate students to be interested in participating in a TA preparation program. The challenge for a New TA Orientation that is required of all graduate students is both to satisfy those already interested in the program and to engage the interest of the majority who are not.

4. The development of a program may take two years. The first year may be devoted to determining the expectations and needs of the graduate students, former graduate students, undergraduate majors in the department, and the faculty; to reading in the extensive literature of TA preparation; to working with consul-

	Tuesday	Wednesday		Thursday
8:00	School of Oceanography Opportunities, Expectations, Responsibilities, and Resources for TAs, and TAs' expectations for orientation	Free Day	8:00	Individual Practice in Leading Discussions on TAs' Own Research. (Based on handouts of Tuesday afternoon.)
8:30	The Two Paradigms of Education			
10:00	Break		10:00	Break
10:15	Relating to Your Students (includes issues of diversity)		10:15	How to Determine Your Teaching Goals and Assess Your Students' Learning
11:45	Lunch		11:45	Lunch (*Faculty who supervise TAs are invited*.)
12:45	Motivating Students to Learn		12:45	Challenging Encounters with Students
1:45	Using Questions to Improve Thinking		1:45	Grading
3:15	Break		3:15	Break
3:30	Leading Discussions (TAs hand out a brief description of their research as reading assignments for Thurs.)		3:30	Holding Office Hours
			4:30	Closing Session and Orientation Assessment
5:00	Adjourn		5:00	Adjourn

Table 4. Schedule for the New TA Orientation, 19 and 21 September 2000.

tants at the university's teaching center; and to writing a program plan; obtaining feedback on the plan from all the groups interviewed; and presenting the revised plan to the faculty for approval. The faculty must be committed to the program for it to succeed. The second year may be devoted to developing the workshops for the New TA Orientation.

5. Relying on graduate students and postdocs to help develop the workshops for the New TA Orientation and introducing them to active learning methods in the process can result in workshop structures that will engage the interests of students participating in the Orientation and give graduate students partial ownership of the Orientation. Teaching experience held by some graduate students and postdocs can enhance the development of these workshops.

6. Having graduate students and postdocs lead workshops in the Orientation may be valued by the workshop participants as a strength for the workshop, because the workshop leaders are their peers, are demonstrating an ability to understand the pedagogy, and are validating its importance.

7. The Orientation and the entire preparation program should be developed specifically for the department. TA teaching opportunities and responsibilities vary with departments, and the concepts, facts, and requisite professional skills taught vary with disciplines. An excellent program for one department should not be expected automatically to satisfy the needs of another department.

8. All aspects of the program must be assessed and held open to modification that will improve student learning.

9. A support structure for new TAs, such as peer groups and peer mentors, is essential but may require closer attention by the program director than first expected.

10. The ongoing part of a program, which may be elective, should provide graduate students with opportunities to develop syllabi and practice teaching methods.

11. Even if a forum is provided for regularly scheduled discussion of teaching issues and challenges, attendance may be small when a department, such as the School of Oceanography, averages two research seminars each day of the week, collaborating departments each offer several research seminars each week, courses are being taught and taken, and research is being conducted. The discussion may have to be scheduled occasionally, rather than regularly.

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For beginning teachers, there is often a progression from acting like you are in charge of the classroom to feeling like you are in charge of the classroom. This is normal. Unless you give them reason not to, students will generally accept your authority no matter how you feel about your qualifications as a teacher.

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