AC 2012-3420: ENGINEERING TEACHING ASSISTANT TRAINING: IN-CREASED ENGAGEMENT USING VARIED DELIVERY METHODS

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As manager of the professional master's of engineering degree, graduate programs, and as the Engineering TA Training Program Coordinator, this initiative falls into the UBC Faculty of Applied Science vision to provide support for graduate students to interact across all engineering disciplines.

Engineering Teaching Assistant Training –
Increased Engagement Using Varied Delivery Methods

1. Introduction

The University of British Columbia (UBC), Faculty of Applied Science (APSC) began a Teaching Assistant Training Program in 2009. The program, designed for and targeted at engineers, is mandatory during a student's first teaching assistantship (TA) appointment and students are paid to complete the program as part of their contracts. Senior TAs, currently enrolled in the Doctor of Philosophy (PhD) program in APSC, serve as the facilitators for the program and deliver the training, referred to as the "train-the-trainer" approach. The content and mode of delivery has been developed in consultation with the university's Centre for Teaching, Learning and Technology (CTLT (www.ctlt.ubc.ca)) and the APSC Centre for Instructional Support (CIS (cis.apsc.ubc.ca)). To date, over 430 students have completed the program.

UBC APSC engineering undergraduate and graduate student populations come from all over the world. While this diversity offers a variety of different viewpoints and this adds to a larger pool of ideas and experiences, it doesn't come without its share of challenges. The TA Training program aims to provide its students with the tools and skill set necessary to deal with these everyday challenges by having the students participate in guided activities and discussions centered around culture and diversity. The training program is a full-day seminar split into two sessions; one in the morning and one in the afternoon. The morning session focuses on marking strategies and planning skills while the afternoon session focuses on the TA-student relationship. Time management, task planning and communication skills are identified as crucial components of the TA experience and thus are the central themes of the training program. Through this training, TAs will be able to identify the wide range of needs in the classroom and be equipped with the tools and resources necessary to facilitate the learning in culturally diverse settings.

The individual sessions are run by the facilitators through five general steps:

Identify objectives
Discuss relevance
Expand discussion
Activities & Engagement
Share past experiences

Engagement is the main task here and the facilitators use open-ended scenarios, guided discussions and group activities to explain and explore the concepts of each session. It is found that the most successful activities are the ones in which the trainees do much of the discussion after being prompted by relevant questions and comments from the facilitators.

2. Program Outline

The four hours of training were delivered in two sessions. The *morning* session focused on time management, grading rubrics and assignment feedback. The *afternoon* session focused on the TA-Student relationship, cultural diversity, professional expectations and acceptable conduct.

We provide a full breakfast and lunch to all trainees, as well as an assortment of beverages. The extended lunch break at the middle of the training program not only offers a mental break to the trainees, but also provides an opportunity for students from different areas in the Faculty to network.

When not directly leading a section of the session, the facilitators are guided in methods to encourage participation without forcing contributions or "hovering" around groups. The choice of facilitators was based on overall experience at UBC previously being a TA and an enthusiasm for learning and teaching. The TA Training Program Coordinator appointed is a full-time university administrator in the Faculty, to provide long-term stability and guidance. Designated funding from the UBC Office of the Vice-Provost was provided with the mandate to enrich the experience of the students that will be taught by these new TAs and for these graduate students themselves to gain skills that would be used in their university programs and in life-long learning.

Activities were based on the principles of Team Based Learning, where incentives are given to work as a team and for every individual to participate. The objectives are referred to repeatedly and to how they will be used in their TA duties in the future. The typical skills of an engineer's training to problem-solve is combined with interpersonal interactions.

2.1 Resources and Materials

Several types of resources were chosen for the activities with the expectation they would increase engagement during the sessions and enforce learning of the skills to be taken away for future use. Physical resources included the room set-up, iClickers™, flip-charts, flash-cards, scratch cards, a quiz and a final survey.

2.1.1 Room Setup

Tables seating a maximum of five participants were arranged in a staggered or "V" pattern such that no person had his vision obscured for the front or sides of the room (Appendix C - Figure C1). The front of the room was used for projection of the questions and the sides for posting the flip-chart results (see Appendix C – Figure C3). This gave everyone full access to the content as it was presented and encouraged a higher level of contribution.

2.1.2 iClickers

The iClicker technology was created in 1997 at the University of Illnois by Mats Selen and Timothy J. Stelzer[1] to increase student engagement in the classroom while incorporating "peer learning" (Appendix C - Figure C2). At UBC, more than 10,000 students are using iClickers in the classroom. The pace of the delivery is meant to be done over several seconds, after which, the results are displayed and discussed. While iClickers serve many purposes in the classroom, they are used as primarily as a pre-assessment tool and to increase the level of engagement and interaction during the sessions. A list of all iClicker questions and results can be found in Appendix A.

2.1.3 Scratch Cards

Following an introduction to the TA union and its responsibilities, scratch cards (see Appendix C – Figure C4) were used to administer a brief, closed-book, multiple-choice quiz on the material (see Appendix D1). The benefit of the scratch card is that if the trainee is unsure of the answer, s/he can scratch out all possible answers until the correct one is revealed. The use of scratch cards in this instance allows us to convey important material to the trainees in a quick and effective way. Because the answers are provided immediately to the trainees via the scratch card, discussion can be kept brief and to the point.

3. Objectives

Facilitators give a brief introduction of their academic background, past TA experience and why they are part of the Faculty TA Training Program. This is the beginning of establishing the curriculum to be delivered as "train-the-trainer." The facilitators can directly relate to the new TAs on the same level because they are part of the current University education plan. Participants also give a brief introduction of their background and their reasons for becoming a TA at the University. Groups of five were formed by having all the participants line up in order according to the distance they were born from UBC. This group formation exercise was designed to create a mix of cultural backgrounds and experiences at each of the tables.

The primary objectives of the TA training program were for students to be able to:
- Describe their role and extent of their responsibilities
- Develop a grading plan that will manage their time effectively
- Describe procedures for handling commonly encountered TA-ing situations

4. What is the Role of the TA?

This section was opened with an iClicker question, "Have you ever TA'd before?" The majority of participants had not held a TA position previously. Those that had past experience were split between institutions across Canada and those from a different country. Those with experience would, throughout the session, be encouraged to share stories from their past while becoming acquainted with the specific procedures and expectations at UBC for their current position.

4.1 The "Golden" TA Story

Personal stories from the facilitators have proven to be very effective within the training program. In addition to demonstrating the applicability of the program's content, the stories reveal a sense of vulnerability with the facilitator and make them more relatable to the TAs. Thus, the personal recollection of past TA experiences throughout the training has been a critical part of the program's success. We often begin the TA training with a facilitator recounting one of his earliest memories as a TA, describing the challenges he faced with marking, consistency, and maintaining a strong level of communication with the course instructor – all of which are relevant teaching points with the training curriculum.

In addition to the personal stories, the so-called, "Golden TA" story is also well-received as it places a sense of ownership and pride in the TAs work as educators. The story describes the unique position in which TAs often find themselves, in that they are the second point of educational contact. In other words, after a student attends class, the next person he will visit to review the lecture notes will be the TA, who is blessed with the opportunity to *repeat* what the course instructor has already said in class. Having heard the lecture material for a second time, students are more likely to absorb the material, and will automatically give full credit to the TA for his ability to communicate the information. And thus inevitably, TAs are viewed as the "true" deliverers of course content, and thus given the title, "Golden" TAs.

While this scenario is not always true for all classes, it does put some responsibility on the TAs, in that they are the ones with whom students will spend the most time when attempting to understand the course material. So their role in a given course should never be understated.

4.2 TA-ing at UBC

An overview of UBC's commitment to TA training was given as the introduction to an activity using a "Guide to Teaching for New Faculty at UBC" created by APSC. An individual reading assignment was given from the guide and each table answered the previously mentioned quiz using a scratch card. The quiz covered basic information such as the local union number, definitions of terms such as "unsatisfactory performance" and an example of an unrealistic request of the instructor. TAs are encouraged to be familiar with their union handbook and to ask the department (where they are appointed) for help with questions about their contract.

5. Core Content Material

5.1. Marking

Marking tends to be one of the most time-consuming yet controversial parts of TAing, which is generally followed by numerous complaints and grade appeals. The goal of this section was to offer various tips and techniques on consistent, fair, and efficient way of marking. We start the session by asking which individuals have had previous marking experiences and what, if any, instructions they had received from the instructor of the course before starting to mark.

Following the pre-assessment, we present the trainees with a hypothetical situation where they have been handed a stack of assignments to mark by their course instructor. We then asked the students to discuss what information they would need before they could begin marking these assignments. By answering this simple question, the class becomes engaged in a discussion and typically concludes that they need to know the context and objectives of the assignments, the amount of time necessary to mark the assignments, as well as any marking requirements issued by the course instructor. We concluded the discussion by emphasizing the importance of time management and having a grading scheme for a consistent and efficient marking.

To transition into marking rubrics, the following iClicker question was asked: "Have you, as a student, ever appealed a grade to a TA?" The question, choices and results are shown in Figure 1, where the majority of trainees have appealed or felt the need to appeal their grades. Based on

these results, we pointed out the high possibility of receiving complaints as a TA and highlighted the significance of having a marking plan in order to reduce the number of complaints and/or deal with them effectively. We follow this clicker question by defining a rubric and discussing the difference between a rubric and a marking scheme. We explained to the class that while a grading scheme defines the mark breakdown for each part of an assignment, a rubric defines the criteria for assigning mark to each of those individual parts. In order to practice this, we asked the class to provide us with what they felt a good, average and bad assignment would have (or not have). For instance, a *good* paper would feature no more than 1 or 2 minor grammatical errors per page, whereas a *poor* paper would likely have several grammatical errors throughout the text, which would ultimately compromise the flow of the paper. Or, a *good* paper would contain all relevant plots and figures, with each properly referenced and labeled, whereas an *average* paper may contain all relevant plots and figures, but are inadequately labeled. This exercise is continued until the expectations of a good, average and bad paper were all well-defined. This rubric was summarized at the front of the room on a flip-chart for easy reference in the following activity. We then handed out three assignments (one good, one average, and one poor) to the students in small teams, and asked the teams to mark each using the newly created rubric. We imposed a tight time limit as well to force the trainees to manage their time effectively. After their time was up, each pairing was asked to justify their marks to the rest of the class.

The session was concluded by a brief discussion on effective ways of providing feedback while marking. We used two iClicker questions in order to assess whether and how the comments left by a TA can be useful for students. Following a discussion, the class reached the conclusion that concise and non-redundant comments are the most useful and effective feedbacks. They also deduced that the marginalia of an assignment are most appropriate for specific comments while general feedback is better to be left on the cover or at the end of the assignment. As an exercise, we asked each pair to decide on two pieces of feedback to leave on the weakest assignment they marked. This forced the pairs to think hard about the most important shortcomings of the assignment in order to maximize the effectiveness of the feedback left.

Figure 1 – iClicker Question 3 and Results

Have you ever appealed a grade to a TA?
A. Yes, but my grade was kept the same
B. Yes, and my grade was changed to what I was expecting
C. Yes, and my grade was changed, but not as high as I would have liked
D. No, I have never needed to
E. No, but I wanted to
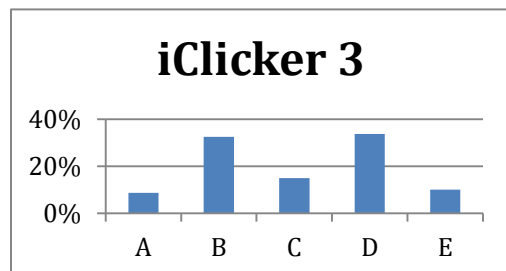
5.2 TA-Student Relationship

In the afternoon session, we talked about the roles, responsibilities, boundaries and ethics of being a TA and how they pertain to their relationship with the student. An iClicker question was used as a pre-assessment tool to gauge the type of relationships one has generally had with their past TAs. During this session, each group discussed various scenarios that could present themselves while being a TA. In their groups, the TAs were continuously encouraged to shift their paradigm and place themselves in the shoes of the student. We challenged them to try and understand the various factors that motivate a student's behavior by investigating possible cultural, emotional, and/or personal influences.

The scenarios we discussed dealt with TA-student boundaries, how and when they should be defined, the appropriateness of receiving financial remuneration for services beyond the TA's role and responsibilities, and lastly, dealing with personality conflicts and dynamics in group-related activities. Often, personal stories from the facilitators were used to initiate the conversations and add context to the scenarios.

Our primary focus was to encourage discussion and allow for the TAs to introduce their own experiences and subtleties as means to change the scope of the discussion. This was very effective in producing group discussions and debates. It also highlighted the notion that being a TA in these situations is often ambiguous so one should be fair, consistent and transparent. It was often mentioned that consultation with a professor is needed to reduce the responsibility of the TA in these situations.

One of the scenarios that we discussed is shown in Figure 2. We provided a few sample answers in addition to the scenario and, within their group, had the TAs debate the appropriate course of action. After some time, each group displayed their choice(s) via a set of flash-cards (labeled A-E Appendix C – Figure C5) and the disparity between each group's answers sparked a debate until a social consensus was reached. This process was repeated for each scenario. We ended this session by having each group create a decision tree for this Scenario, which outlined their entire solution process. An example of a decision tree is shown in Figure 3. The session ended with each group presenting their decision tree and justifications for their choice of action.

Figure 2 – Scenario – Decision Tree

You are a TA for an engineering project course. Students are put into groups of 4. In one group, the following situation has occurred:
1) Member 1 is lazy and is just not contributing to the group at all. He has no known excuses
2) Member 2 is working hard, but lacks the technical knowledge to do things in a timely manner
3) The remaining two members of the group are worried that they can't handle the extra workload and won't be able to finish the project on time. Plus, they feel it's just not fair that they should have to do all the work. They come to you for help.

How should you handle this situation?
A. Talk to member 1
B. Talk to the member 2
C. Talk to the whole group
D. Talk to the whole class
E. Talk to the instructor

Figure 3-Decision Tree Scenario Example
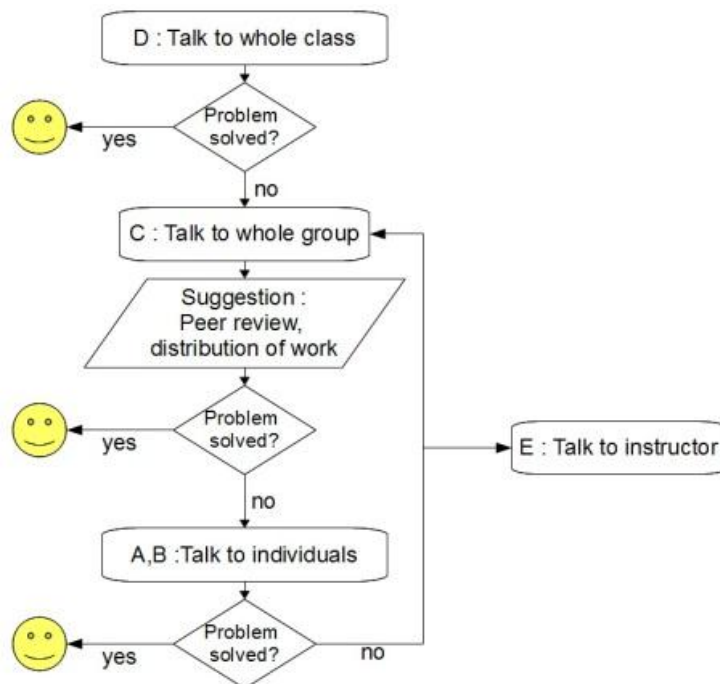
6. Closing

We concluded the session by once again revisiting the training objectives. A final opportunity was given to the trainees to ask any other questions that may not have been covered during the training. We also take this opportunity to inform the students any resources available on campus that may be of value to them during their TAship. The facilitator who shared the "Golden TA" closed with reflections on how their own attitude had changed after they had finished their first TA appointment at the University.

6.1 Survey

At the end of the two sessions, we administered a brief survey to gauge the overall effectiveness of the program. The survey consisted of eight five-point Likert-item[2] questions and three freeform questions. For administrative purposes, we also ask the trainee to disclose his/her department (Appendix D2).

Overall feedback was positive in the Strongly Agree-Agree range. For example average score for the question "The activities aided my understanding of the concepts" (Appendix D2: Question 1. g) was Agree (4.10)

The majority of the written feedback was positive with respect to the content of the sessions and the delivery. Listed below is a small sample of the feedback received:

- Time management, defining boundaries and my responsibilities are now better understood
- Scenarios were helpful, student will be more confident in their duties
- Make more of an effort to solicit involvement from every participant

7. Summary

The delivery methodology chosen combined the expertise of the facilitators with intellectual activities and physical resources. The individual sessions are run by the facilitators through the five general IDEAS steps: identifying the objectives of the session, establishing the relevance of the session, assessing what ideas and experiences the group has already had, engaging the groups and closing.

Throughout the session, discussion was driven by resources that increased interactions and the overall energy level of the class. Engagement was achieved by the facilitators using open-ended scenarios, guided discussions and group activities to explain and explore the concepts of each session.

The program was designed and targeted for engineers and the facilitators delivered the training, using the "train-the-trainer" approach. It is found that the most successful activities are the ones in which the trainees do much of the discussion after being prompted by relevant questions and comments from the facilitators.

The TAs go from this training to influence APSC's engineering undergraduate and graduate student populations who have come from all over the world. They are now better equipped to approach this diversity with its variety of different viewpoints, ideas and experiences. The TA Training program has provided them with the tools and skill set necessary to deal with these everyday challenges centered around culture and diversity.

The training program covered a range of concepts such as marking strategies, time management skills, TA-student relationships, task planning and communication. With this training, TAs are able to identify the wide range of needs in the classroom and are equipped with the tools and resources necessary to facilitate the learning in culturally diverse settings.

8. References

1. Selen, Mats A.; Stelzer, Timothy J. "Certified two way source initiated transfer" iClicker Patent Application No. 20080276264, June 11, 2008.
2. Likert, Rensis "A Technique for the Measurement of Attitudes". *Archives of Psychology* **140**: 1–55, (1932).

Appendix A – iClicker Questions and Results

iClicker Question A1: Have you ever TA'd before?

    A. Yes, I have TA'd before at the University
    B. Yes, I have TA'd before at another university in this country
    C. Yes, I have TA'd before in another country
    D. No, I have never TA'd before

iClicker Question A2: What is the role of a TA?

    A. To give the students the answers
    B. To teach the students the course material since most professors only care about their research
    C. To help facilitate student learning and provide academic support
    D. To sit in a room and mark assignments
    E. To scare students into working harder

iClicker Question A3: Have you ever appealed a grade to a TA?

    A. Yes, but my grade was kept the same
    B. Yes, and my grade was changed to what I was expecting
    C. Yes, and my grade was changed, but not as high as I would have liked
    D. No, I have never needed to
    E. No, but I wanted to

iClicker Question A4: Do you ever read the feedback left by a TA?

    A. No, I only care about my grade
    B. Yes, but only when I get a bad mark
    C. Yes, all the time – its helpful
    D. No, most TAs don't know what they're talking about
    E. Yes, but only if its on the same page as my grade

iClicker Question A5: As a student, did you ever use feedback from one assignment to improve the next?

    A. Never
    B. Sometimes
    C. Always

iClicker Question A6: How would you describe your relationship with your former TAs?

      A. Very good. We're best friends now.
      B. Pretty bad, he/she didn't care about me at all
      C. Cordial and professional. He/she helped me when I needed it and was very fair.
      D. Too afraid to answer - one of my former TAs is in the room
      E. None of the above

iClicker Results

Response	iClicker 1	iClicker 2	iClicker 3	iClicker 4	iClicker 5	iClicker 6
A	19%	1%	9%	6%	39%	17%
B	6%	1%	33%	28%	48%	2%
C	22%	86%	15%	53%	13%	64%
D	53%	6%	34%	10%	0%	1%
E	0%	6%	10%	3%	0%	15%
Total	100%	100%	100%	100%	100%	100%

Scenario B1: Time Management

You are a TA for an engineering course. In addition to providing office hours, as part of your responsibilities, you are required to deliver a 1 hour tutorial from 12-1pm every Wednesday. However, after every tutorial, students will come up to you ask questions about the material or about a mark the professor gave them. As a result, you rarely leave before 2pm. Furthermore; students constantly email you and then get upset when you don't reply to their emails right away. Students needing help are always hounding you in your office several times a week. So now, instead of spending 1 hour a week on tutorials, you are committing 5-6 hours a week on this course. How should you handle this situation?

A. Hide in your office
B. Gently confront the student behavior directly
C. NOT so gently confront the student behavior directly
D. Contact instructor for guidance

Scenario B2: Cheating

You are a TA for an engineering course and you are responsible for marking all of the assignments. As you are marking, you discover two assignments which absolutely identical. What should you do?

A. Shrug your shoulders and move on
B. Give each student half the marks since they did half the work
C. Give each student a zero
D. Do nothing right away, contact instructor
E. Forget the instructor, go straight to the Department Head or Dean

Scenario B3: Plagiarism

You are a TA for an engineering course with over 100 students, and you are responsible for marking all of the assignments. As you are marking, you come across an assignment that looks familiar, although you're not sure if it's enough to be considered plagiarism. What should you do?

A. Do nothing and mark the assignment like all the others
B. Give the student a zero
C. Review all the assignments again and try and bust the student
D. Talk to the instructor
E. Tell the student that you're onto him and hope he confesses

Scenario B4: Bribery

You are a TA for an engineering course and you are responsible for marking all of the assignments and quizzes. A student happens to be performing poorly on most of his quizzes and has come to you for help. He has offered to pay you in exchange for upgrading his mark. How should you handle this situation?

A. Depends on how much money
B. Say no
C. Say no and contact instructor
D. Say nothing, contact instructor

Scenario B5: Decision Tree

You are a TA for an engineering project course. Students are put into groups of 4. In one group, the following situation has occurred:

4) Member 1 is lazy and is just not contributing to the group at all. He has no known excuses
5) Member 2 is working hard, but lacks the technical knowledge to do things in a timely manner
6) The remaining two members of the group are worried that they can't handle the extra workload and won't be able to finish the project on time. Plus, they feel it's just not fair that they should have to do all the work. They come to you for help.
How should you handle this situation?

F. Talk to member 1
G. Talk to the member 2
H. Talk to the whole group
I. Talk to the whole class
J. Talk to the instructor

Appendix C – Figures

Figure C1- Seating Plan
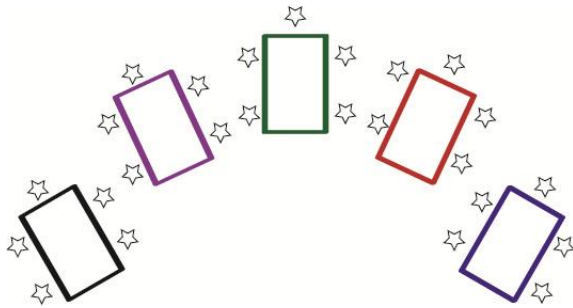
Figure C2 - iClicker™

Figure C3- Example of Flip-Chart
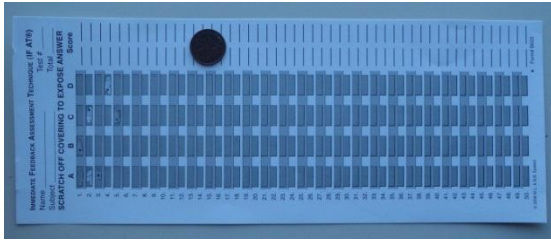
Figure C4 – Scratch Card

Figure C5 – Letter Flash-cards

Appendix D – Quiz and Survey

D1 - "Guide to Teaching for New Faculty at UBC" Quiz

Resource 7: Working with TAs pg 72-77
Read this section and answer the following questions. Scratch for each question ONE choice.

1. How many hours in total can a TA work in a 0.5 TA-ship or one-term appointment?
   a. 96 hours
   b. 192 hours
   c. 48 hours
   d. 384 hours

2. Which of the following duties could a TA have included in their contract?
   a. Paying a student's lab fees and then being refunded
   b. Talking to a student's parent about their performance
   c. Office Hours
   d. Getting coffee for the instructor

3. Which is the TA appointment classification for a person that already holds a master's degree or is registered as a PhD student?
   a. GTA I
   b. GTA II
   c. UTA
   d. Marker

4. What is one of the consequences of non-performance?
   a. Resolve issues by talking with your fellow TAs
   b. Review appointment tasks and hours with the Dean
   c. Your appointment is terminated and you have to pay back the funds
   d. Discuss issues with the instructor and seek to clarify and resolve them

5. Which union is responsible for TAs at UBC?
   a. CUPE 2950
   b. CUPE 5
   c. CUPE 2278
   d. CUPE 116

D2 - TA Training 2011-2012 End of Session Survey and Results (based on 103 participants)

1. Please provide feedback on today's session.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

a. The session was appropriately challenging

      Average **3.60**   5   4   3   2   1

b. The session expectations were communicated effectively

      Average **4.18**   5   4   3   2   1

c. The facilitators communicated instructions clearly

      Average **4.36**   5   4   3   2   1

d. The facilitators were sensitive to individual participant needs

      Average **4.16**   5   4   3   2   1

e. The facilitators kept the session on task

      Average **4.11**   5   4   3   2   1

f. The activities aided my understanding of the concepts

      Average **4.10**   5   4   3   2   1

g. The activities helped me prepare further for my role as TA

      Average **4.07**   5   4   3   2   1

2. Overall Experience

      My expectations for the session training were met

      Average **4.17**   5   4   3   2   1

3. Provide specific comments about the session and activities.

4. Ideally, how could you use the skills gained from this session to change how you perform your TA duties?

5. Any comments and/or suggestions for future sessions?

6. What Department are you from?