

The Role of the Teaching Assistants in a Senior Level Computer Engineering Technology Capstone Class

Farrokh Attarzadeh, Enrique Barbieri, Ankur Shukla, Prafulla Kesari

Engineering Technology Department
University of Houston

Abstract

The paper describes the role of the Teaching Assistants (TAs) in the capstone class in the Computer Engineering Technology (CET) program in the Engineering Technology Department, College of Technology (CoT) at the University of Houston. The TAs recruited are required to have the knowledge and experience in multiple subjects, and proficiency in English language in order to be able to assist the students with their project specific questions and course policies. This paper briefly discusses the hiring process including the extensive interviews and how potential TAs must demonstrate their technical expertise before they are selected. Prior project experience and industry experience are highly valued. Once they are hired, TAs immediately go through a mandatory two-day orientation in order to become acquainted with department, college and university culture and policies. The TAs are selected from a pool of Electrical and Computer Engineering and Computer Science applicants. The paper discusses the roles of the TAs, policies governing the grading of the various components of the course such as weekly progress reports, homework, exams, proposal reports, final project reports, and maintenance of the course website. Several survey instruments are used to assess many aspects of the student performance in the team and as individuals. All TAs are trained to quickly tally the results of the surveys and the results that are used to better guide the project teams and improve the management of the course. The TAs are also participating and assisting promising project members to publish their project results in scholarly journals and filing for patents through the office of Intellectual Property Management at the UH. The paper concludes by outlining short term and long term goals for the improvements of TAs roles and responsibilities.

Introduction

The role of a teaching assistant in a capstone class cannot be overlooked. He or she has a very important role as well as carries many responsibilities towards the functioning of the lab. The teaching assistant acts as a bridge between students and the instructor. The TA is their first point of contact with the instructor as well as the technology. This paper describes all the aspects of a TA of a capstone course from the recruiting process to his work and responsibilities in the senior project lab [1, 2, 3].

Recruiting process

The TAs selected for the senior project lab are usually graduate students from Electrical Engineering and Computer Science. Therefore, the lab provides a perfect environment for applying their combined software and hardware skills to help the students successfully complete their senior projects on time. Careful selection, interviews, background checks, and detailed questioning are some of the methods used to select competent TAs. Prior project experience and industry experience are highly sought in the recruitment process. The TA recruitment process consists of a simple procedure of submitting the resume by the candidates. These resumes are carefully analyzed by the staff members and then a pool of students is shortlisted for the interview process. The process seems simple enough but follows a defined model that is carried out by the department chair, faculty, and lab managers.

- ***Pre-screening***
The applications are separated based on educational background. Typically, candidates with bachelor degrees in Electrical Engineering, Electronics, Telecommunications, as well as Computer Science are selected.
- ***Pre-selection***
The applicants are selected based on: academic achievements, standardized test scores, hands-on experience, projects performed, papers presented at conferences, professional society memberships, as well as extra scholarly activities such as volunteer jobs and community involvement.
- ***Personal interview***
The interview provides first-hand information about the candidate's personal attitudes, communications and leadership abilities along with the validation of the technical skill set that he has mentioned on his resume. The selected candidates are also provided with detailed information about the TA duties and responsibilities, as well as the ET's work philosophy.
- ***Hands-on test***
Potential candidates are required to take a practical test in the senior project lab. The TAs need to design a given electronic system as well as program a specific code. The test provides the desired information about the candidate's hands-on expertise and knowledge.
- ***In-lab oral presentation***
Once the candidates have successfully completed the hands-on test, they are required to do a brief technical presentation about a topic assigned by Lab Management. They need to use auxiliary material such as blackboard, whiteboard, or projector as a medium for communicating their understanding of the topic

effectively. During the presentation, lab managers, faculty and senior TAs are present and provide feedback to the candidate in order to improve or correct their teaching methodologies and at the same time gauge their communications skills.

- ***Commitment***

The selected candidates and ET department create a mutual commitment in order to provide the best learning environment for the constituents. The TAs are given specific instructions about regulations, rules and policies formulated for the labs by the ET department and they sign an agreement to comply with the work philosophy.

- ***Approval***

Once the agreement is signed, the candidate is hired as a teaching assistant for the senior project lab.

These processes ensure that the TA selected is skilled enough to take care of the lab. The candidates chosen are not only technically equipped but also have leadership and management skills which they grow over the period they work for the lab.

TA Training and Orientation

Once a TA is hired, he or she is required to attend a 2 day mandatory LA (Lab Assistants) orientation organized by the CETE department. This orientation gives them a good exposure to the lab management philosophies and rules that are followed by the College of Technology. Lab managers also provide them with safety guidelines as well as a tour of all the labs in the department. After this two day training session begins the program specific training session where the senior project TAs are required to give a short technical presentation on one of the technologies used in the lab. This training session takes place along with TAs from different labs. This training session usually takes place on Friday morning for two to three weeks during the beginning of the semester. In addition to these, the TAs are also required to give a short presentation about themselves and their previous project experiences in front of the students of the capstone class.

Roles and Responsibilities of TA

The role of a TA in the senior project lab is multi-faceted. He or she is not limited to grading and distributing assignments and exams, but is an integral part of the lab. The TA continuously monitors the activities and students in the lab. From the very first day of the class, the students are made to realize the importance of the project. The students are required to brainstorm among themselves and discuss their innovative ideas with the TAs. The TA has to silently monitor the working ways, the team dynamics as well as the individual student attitudes from day one. This forms a part of the continuous semester long evaluation process. With respect to the lab, the TA for the senior project has the following roles and responsibilities:

- The TAs for the lab have to make sure that whenever there is a lab session or during open lab hours, the attendance of the students is taken and entered in the attendance sheet.
- He or she has to make sure that all the equipment and tools are placed properly and are appropriately checked out and in.
- The TAs must ensure that the students submit their Weekly Progress Reports (WPR) on time and should not accept any homework or WPR after the specified deadline.
- They ensure that the WPR and homework assignments are graded on time and returned within the week of submission.
- The TA maintains all the tools and parts inventory for the lab with updates when new tools or parts are added.
- The TAs provide constant feedback to the students which helps them improve their approaches and thinking to work towards greater productivity.
- The TAs prepare and proctor the mid-term and final exams for the class.
- The TAs makes sure that the lab is open seven days a week.
- The TAs are required to help the students with the ideas and any project related work making sure that the students complete the work themselves.
- The TAs prepare all the survey forms before any guest presentation, they sit in the presentation and takes notes, collect the forms after the presentation and record the survey results to the course server.
- It is their responsibility to ensure the discipline in the lab and keep the lab clean.

Above are the visible duties of a senior project TA with regards to the lab. Apart from the mentioned duties, the TA continuously monitors the progress of each team since they are in contact with them constantly. This evaluation plays an important role as they form a basis for the TA Evaluation which is 10% of the total grade for the class.

Every week all the TAs meet with the instructor and they discuss the progress and status of the lab over the past week. They discuss the requirements, if any, for the lab, concerns raised by students or TA and describe the progress student teams are making in their project work. The TAs are also submit a weekly progress report to the senior TA supervisor who compiles it, along with a summary of tasks done over the week, and sends it to the instructor. This way the instructor gets a documented update of the work done in the lab.

Another important work of the TA is the grading and evaluation of the proposal and final presentation of the student projects. These reports are lengthy and specific in format. Each report is evaluated by two TAs with the average of the two ratings given as the final TA evaluation grade.

Out-of-the-Lab Responsibilities of the TA

The responsibilities of a TA for the capstone are not limited to lab-related work. He or she plays an important role in the overall development and growth of the department. The TAs have some additional responsibilities and tasks associated with the job.

- The TAs of the senior project lab help the instructor in publication of various papers in technical conferences and scientific journals. The TAs use extensive data mining techniques on the semester survey, guest surveys and grade sheet as their data and gather statistics and pattern which help in drawing trends and conclusions.
- The TAs have to write a technical paper on the potential patentable projects after the semester ends. As a part of the post semester activity, the instructor identifies projects that can be patented and proceeds with the process of applying for a patent. These technical papers are very important part of this process.
- During the semester, often the TAs present the project from the previous semesters in various conferences and exhibits held in the university like the DoD (Department of Defense) conference. They present and market the usefulness and uniqueness of the projects to government officials which have received appreciation from time to time.
- The senior project TA are volunteers in the organization of many associated activities like the BotBall Event, the First Lego league (FLL) events that are held annually in the university campus.
- The TAs also act as presenters and volunteers during high school student visits to the senior project lab. They explain the projects to these high school students and try to induce their interest in the field of technology.

Conclusion

Apart from getting scholarship towards their graduate studies and a healthy monthly salary, the senior project TA also expands and improves his or her interpersonal skills and industry specific writing skills and management skills. Often, papers written as part of the job are published with TAs name which gives a solid addition to his or her resume. Thus the role of the TA is not limited within the traditional grading and proctoring work but had a multi-faceted value. He or she is a part of the entire course and his inputs are valuable as it helps determine the future of the students. The TA not only acts as a catalyst for student growth but also plays an important role supporting students in an unconventional and holistic way. In this manner, the TA is a part of development process for the class, the department as well as himself.

References

1. Farrokh Attarzadeh, Enrique Barbieri, "Training Requirements for the Graduate Assistants in the Capstone Course," *Proceedings of the 2007 ASEE Gulf-Southwest Annual Conference*, UTPA, March 28-30.
2. Farrokh Attarzadeh, Victor J. Gallardo, Enrique Barbieri, "Toward Best Laboratory Management Practices," *Proceedings of the 2007 ASEE Gulf-Southwest Annual Conference*, UTPA, March 28-30.
3. Farrokh Attarzadeh, Victor J. Gallardo, Deniz Gurkan, Enrique Barbieri, "Teaching and Graduate Assistants Training," *Proceedings of the 2007 ASEE Gulf-Southwest Annual Conference*, UTPA, March 28-30.

FARROKH ATTARZADEH

Dr. Attarzadeh is an associate professor in the Engineering Technology Department, College of Technology at the University of Houston. He teaches software programming, operating systems, digital logic, and is in charge of the senior project course in the Computer Engineering Technology Program. He has developed a concept referred to as EMFA (Electromechanical Folk Art) as a vehicle to attract young students to the STEM fields. He is the Associated Editor for student papers at *the Technology Interface* (<http://enr.nmsu.edu/~etti/>), Manuscript Editor for the *International Journal of Modern Engineering* (IJME, <http://www.ijme.us/>), and Conference Associate Chair for the *IJME-NAIT Joint International Conference* (http://www.ijme.us/IJME_Conference_2008/index.htm). He is a member of ASEE and has been with the University of Houston since 1983.

ENRIQUE BARBIERI

He received a Ph.D. in Electrical Engineering from The Ohio State University in 1988. He joined Tulane University where he served on the faculty of the Electrical Engineering Department (1988-96) and was a tenured Associate Professor and Chair of the Electrical Engineering & Computer Science Department (1996-98). In 2002 he joined the University of Houston as Professor & Chair of the Department of Engineering Technology. His research interests are in control systems and applications to electromechanical systems. He is a member of IEEE and ASEE and Chairs the Executive Council of the Texas Manufacturing Assistance Center.

ANKUR SHUKLA

Ankur Shukla is currently pursuing his Masters in Computer Science (Majoring in Software Engineering) from the College of Natural Sciences & Mathematics, University of Houston and plans to graduate in Summer 2008. He is interested in the field of Software Engineering and IT Project Management and Enterprise Application Development. He is a lead Teaching Assistant in the department of Engineering Technology.

PRAFULLA KESARI

Prafulla Kesari is currently pursuing his Masters in Electrical Engineering (Majoring in Microelectronics) from the Cullen College of Engineering, University of Houston and plans to graduate in summer 2009. He is interested in the field of VLSI Circuit Design, Layout, ASIC and FPGA Design and Verification. He is a Teaching Assistant in the Department of Engineering Technology.