A Case Study of the Development of CS Teaching Assistants and Their Experiences with Team Teaching

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Teaching assistants

- Graduate students who participate in course delivery (some ugrad)
- Closed labs
- Tutorials
- Assistance with in-lecture activities
- Grading, office hours
- Most heavily used in North America

Introduction

- TAs play a big role in teaching CS at many institutions; have effect on student grades [1], retention [2], diversity [3]
- 30-50% of the contact hours at American research-oriented unis [4]
- Most professors get their first teaching experience as TAs [4]
- Challenge: understand how to support CS TAs

Teacher development

- Teachers of all varieties develop in stages [5]
- Knowledge transfer is "pull transfer" not "push transfer" [6]
- Motivation: we want to understand TA development to improve TA training/support

Context

- UBC: labs are taught by pairs of TAs
- 20-30 students in a lab, 2-3 hours in length
- 200 TAs in the department (grad and undergrad); teach about half of the contact hours in first/second year CS
- Convention: TAs who have taught a course are rehired to that course

Methods

- TAs sampled to get a range of experience
- Focus on first and second year courses
- Semi-structured interviews with nine TAs
- Lab observations of those TAs + eight additional TAs
- We sorted TAs into three stages (Novice/Intermediate/Expert) based on Sprague's stages of TA development (see paper for more)

Part I

How do first-time TAs differ from experienced TAs in terms of teaching technique?

Preparation

- Novice TAs were diligent about preparing, but had a hard time
  - They would read through the labs, but not do them
  - They lacked the PCK to tell where students would stumble

- Intermediate TAs were less diligent! TAs who had taught a course more than once would be lazy about preparation.

- TAs of all levels benefit from weekly TA meetings where the TAs go through the labs: first-timers learn how to prepare; experienced TAs are kept fresh on the material

Triage

- First time TAs did not discriminate between student questions
- Experienced TAs would carefully triage questions

Teamwork with fellow TA

- *Recall:* TAs teach in pairs.
- First time TAs would ignore their partners, feeling "too overwhelmed" with student questions (see: triage!).
- Experienced TAs would collaborate with their partners (more on that later), and seek help from them when stuck.

Authority

- First-time TAs reported a hard time with maintaining authority
- For many this was the hardest part of the job.

Approach to answering questions

- First time TAs were more focused on answering the question;
  - If they did not know the answer, they would minimize the question or "make something up"
  - They were afraid for their status as an authority
  - They could take a long time to answer questions if they had to work through it themselves
  - Would not ask their partner for help.
- Experienced TAs were more Socratic
  - Would tailor their approach based on the student.

Communication skills

- First-time TAs also reported being stuck on communication skills
- They were worried they weren't speaking loud or slowly enough

Difficulties

For Novice TAs:

- Lack of PCK when preparing for labs
- Inability to triage
- Maintaining authority
- Communication skills

For Intermediate TAs:

- Hubris in preparation
- Shifting to a more Socratic, personalized approach to answering questions
- Effective collaboration with their partners (and other course staff)

Part II

How do first-time TAs differ from experienced TAs in terms of perception of the job?

Changes in perception

- Least favourite part of the job: students failing vs. structural parts of the course
  - Examples of the latter: 8am staff meetings, Blackboard, unhelpful profs
- Relationship with students: being a friend vs. being a mentor

Part III

What promotes growth from the Novice stage to Intermediate stage and Intermediate to Expert?

Novice to Intermediate

- Practice on same course
- Useful staff meetings, guidance from instructors and senior TAs
- Encouragement
- Student feedback

Intermediate to Expert

- Teaching a different course
- Mentorship from instructors and senior TAs
- Critical feedback
- Collaboration and reflection with partners in lab

Part IV

How do TAs work together in the lab?

How TAs Work Together in Lab

- Active observation: seeing the other TA explain issues
- Strategizing: how to handle difficult students, questions, etc
- Debugging the lab handouts
- Clarifying TAs' own (mis)understandings of the lab, logistics
- Socializing

Knowledge Transfer

- Alpha TA to Beta TA
- Alpha TA would take the lead in class announcements; Beta would ask them for support more than vice versa
- Consistent through term

Social learning from the Alpha

- The beta TA learns from the alpha TA: *"I would not [be as good a TA] had I not the lab with [alpha TA] and access to what she was doing"*

Who is the alpha?

- The member of the dyad who has more experience *with the labs* would wind up as alpha
- A first-time TA who has a lab earlier in the week would be alpha in a team with an expert TA who is new to the course!
- The TAs respond to who has more course PCK – not who has more teaching ability!

TAs enjoyed working in pairs

- Division of labour: *"makes the lab more efficient"*
- Security: *"it's nice to have somebody covering your back"*
- Teamwork: having another TA to socialize with during lulls in questions, or *"bounce ideas off of"*
- Diversity: *"sometimes you just can't see something and you need another view"*; *"we could combine our knowledge"*

Conflict can happen

- Sources of conflict:
  - Differences in marking
  - Differing standards for punctuality, professionalism and preparation
- Expert TAs would be proactive about these issues

Implications for TA training

- Two-stage training: Novice to Intermediate, Intermediate to Expert
  - Stage 1: focus on communication, triage, authority, preparation
  - Stage 2: focus on instructional techniques, managing partners/instructors, adapting to new material
- Evidence that 1-on-1 observations are more effective than training sessions [8]

Implications for course management

- Run staff meetings for the benefit of TAs; give them advice, encouragement, and solicit their feedback
- Weekly TA meetings where TAs work through the labs (recommended: have a head TA run this)
- Consider experience and development when assigning TAs to tasks and lab sections

Conclusions

- TA quality can be improved by improving TA support

- TAs *develop*; novice TAs are focused on things like communication, not instructional technique

- Effective TA training needs to happen at multiple points in a TA's development, not just the beginning

- Staff meetings are an important source of TA support; instructors need to view TA-training as part of their role

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