Instructional Awareness of Graduate Teaching Assistants: Expectations, Practices, and Buy-In for Reformed Courses

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Part 1

Learning about learning – becoming aware of the learning styles of you and your students.

Part 2

Teaching awareness in your TA role – are you accomplishing what course designers expect of you?
Students have different\textsuperscript{[1]}:  
Levels of motivation
Attitudes about teaching
Attitudes about learning
Responses to classroom environments
Responses to instructional practices

\textbf{Student (mental) diversity categories}\textsuperscript{[1]}:
Students’ intellectual development (attitudes about knowledge)
Students’ approaches to learning (how they study)
Students’ learning styles (learning tendencies)
**Intellectual development** – the act of students changing their approach to acquiring, judging, and using new knowledge

*Students enter college believing*:  
Certainty of knowledge  
Omniscience of authorities  
Something is right or wrong, true or false  
“Ignorant certainty”

*Students should leave college with*:  
The understanding that knowledge has uncertainty  
Acceptance of responsibility for determining truth  
The inclination and ability to gather evidence for judgments  
The openness to change if new evidence arises  
“Intelligent confusion”
**Students orient their studying practices in one of three ways**[1]:

Reproducing orientation (regurgitation)
Meaning orientation (significant learning, personal meaning)
Achieving orientation (success above all else)

**Based on their orientations, students may be inclined to approach courses in one of three ways**[1]:

Surface approach (memorize material)
Deep approach (understand material)
Strategic approach (do only what is necessary)

**Which orientations and approaches did you use during undergrad?**

**Which do you use now? (they may depend on the situation)**
What are *learning styles* or *learning preferences*?

- Students preferentially focus on different types of information and tend to operate on perceived information in different ways.

How can we characterize an individual’s learning preferences?

- The *Felder-Silverman model*[^1] provides one framework.

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[^1]: Referenced model for characterizing learning styles.
What type of information does the student preferentially perceive?

<table>
<thead>
<tr>
<th>Sensory</th>
<th>Intuitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>sights, sounds, physical sensations</td>
<td>memories, thoughts, insights</td>
</tr>
<tr>
<td>tends to be concrete, practical, methodical</td>
<td>more comfortable with abstractions (theories, mathematical models)</td>
</tr>
<tr>
<td>oriented toward facts and hands on procedures.</td>
<td>more likely to be rapid and innovative problem solvers.</td>
</tr>
</tbody>
</table>

What type of sensory information is most effectively perceived?

<table>
<thead>
<tr>
<th>Visual</th>
<th>Verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>pictures, diagrams, flow charts, demonstrations</td>
<td>written and spoken explanations</td>
</tr>
</tbody>
</table>
How does the student prefer to process information?

<table>
<thead>
<tr>
<th>Active</th>
<th>Reflective</th>
</tr>
</thead>
<tbody>
<tr>
<td>engagement in physical activity or discussion</td>
<td>Introspection</td>
</tr>
</tbody>
</table>

How does the student characteristically progress toward an understanding?

<table>
<thead>
<tr>
<th>Sequential</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>in a logical progression of incremental steps</td>
<td>in large “big picture” jumps</td>
</tr>
<tr>
<td>tend to think in a linear manner</td>
<td>may have trouble applying new material until they fully understand it and see how it relates to material they already know about and understand</td>
</tr>
<tr>
<td>able to function with only partial understanding of the material</td>
<td>once they grasp the big picture, they see innovative solutions that sequential learners take longer to reach</td>
</tr>
</tbody>
</table>

What are your learning preferences?

Take the ILS! [5]
How to abuse learning styles

- Measure that most students are on one end of a particular continuum, so you focus on that end of the continuum in an attempt to improve knowledge uptake.
- Place students in fixed categories based on their learning styles (it’s a dynamic continuum, not static and discrete), ILS is not 100% accurate measure!
- Using learning styles to segregate students – e.g., “If active and sensing then experimentalist; if reflecting and intuiting, then theorist!” or “If you’re not a reflector and an intuitor, there’s no way you can be an engineer or scientist!”

How to productively use learning styles

- Gain insight into how your students learn, promote metacognition about their learning – give students the ILS
- Use results to inform how to create a more balanced course structure
- Help all students improve their skills with the opposite learning style to become better learners overall
Characteristics of a “traditional” course

- Lecture is a large component of class time.
- Students acquire knowledge by listening to speaker or reading text and practicing problems – “passive learning”
- Students demonstrate understanding via written quizzes, tests, homework.
- Recitation component is a mini-lecture, TA completes problems at the board.

Impact of a purely “traditional” course

- Surface or strategic approach favored
- Lectures favor verbal learners, intuitive learners, and reflective learners. \[^{2,3}\]
- **Problem!** Engineering students are typically visual learners, sensing learners, and active learners!\[^{1}\]
What is a “reformed” course?

Characteristics of a “reformed” course

- Lecture is balanced with small class discussions (~20 people) and group activities
- Group work is emphasized, productive group functioning is explicitly taught
- Students participate in discussions – learner-centered approach: students construct their own knowledge – “active learning”
- Deep approach and meaning orientation encouraged – active and collaborative learning facilitates deeper understanding

Dialogic discourse – no one person dominates speaking\(^{[2,3]}\)

- should characterize study groups and recitation conversations
- fosters an atmosphere in which students’ ideas are valued

How do we successfully transform a course?

- Most reformed courses use traditional lecture and reformed recitation or lab.
- Reformed courses have many measurable benefits to STEM students, especially in physics!
Part 1
Learning about learning – becoming aware of the learning styles of you and your students.

Part 2
Teaching awareness in your TA role – are you accomplishing what course designers expect of you in a reformed course?
Active learning increases student learning across STEM fields compared to passive learning or traditional classes

TAs who implement RBIS can improve student performance\[^6\]

TAs who match course designer’s intentions show even greater gains\[^7\]

Pedagogical training for TAs is especially important in reformed classes, most reformed departments have extensive TA training programs

TA “buy-in” for the reformed curriculum plays significant role

TA training generates belief-level buy-in, not practice-level buy-in

Both students and TAs enter a class with prior experience and attitudes

TA attitude and student in-class behavior influence practice-level buy-in. Students will initially resist change just like anyone else!
The types of interactions between TAs and students, and among students, vary depending on the course structure:

**Reformed courses** depend on dialogic interactions among students and TA.

**Traditional courses** depend on univocal interactions from teacher to students.

Transforming from traditional to reformed recitations requires TAs to modify their teaching strategies – possibly using unfamiliar tactics or methods.

The TA tendency is to teach as they were taught or to revert back to traditional methods, especially in stressful or unfamiliar situations.

Being metacognitive about your own instruction tactics and how they align with course goals benefits transformations.

**It’s easy to not change; it’s hard to improve.**

Change requires work, patience, time, and support.

**Metacognition**

thinking about thinking
To align TA teaching strategies with course expectations

Think critically about how you teach

Summarize your teaching activities and compare with the course design

If you don’t know your teaching strategy, tools exist to help

RIOT – Real Time Instructor Observation Tool[4]

Used by TAs to reflect on their activity tendencies, i.e., how much time do they spend on a particular activity

What kinds of activities?
1. Read instructions on survey

2. Refer to the table for definition of terms

3. For each question indicate in each column the relative amount of time that a TA would spend on each action:
   - High
   - Medium
   - Low
   - None

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking At Students</td>
<td>Clarifying instruction, reading from worksheet</td>
</tr>
<tr>
<td>Explaining</td>
<td>Explaining a concept without student input</td>
</tr>
<tr>
<td>Shared Student/TA Dialogue</td>
<td></td>
</tr>
<tr>
<td>Student Question</td>
<td>Listening to a question</td>
</tr>
<tr>
<td>Closed Dialogue</td>
<td>TA controls conversation, students give short answer</td>
</tr>
<tr>
<td>Open Dialogue</td>
<td>No person is controlling the conversation, student responds with sentences</td>
</tr>
<tr>
<td>Observation</td>
<td></td>
</tr>
<tr>
<td>Passive Observing</td>
<td>Listening briefly to group conversations</td>
</tr>
<tr>
<td>Active Observing</td>
<td>Listening to one group but does not participate</td>
</tr>
<tr>
<td>Student Presentation</td>
<td>Listening to students presenting work to class</td>
</tr>
<tr>
<td>Students Talking Serially</td>
<td>Listening to students responding to each other in a whole class discussion</td>
</tr>
<tr>
<td>Not Interacting</td>
<td>Reading notes, grading, preparing to teach</td>
</tr>
</tbody>
</table>
Q4: How do you think you actually spend your time during the recitation?

### Traditional Recitation

<table>
<thead>
<tr>
<th>Clarifying Instructions</th>
<th>Explaining Content</th>
<th>Student Question</th>
<th>Closed Dialogue</th>
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</thead>
<tbody>
<tr>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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### Reformed (or Transformed) Recitation (PHY-115, 123, 193, 227, 229…)

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</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>None</td>
</tr>
</tbody>
</table>

- Primary activities in reformed courses:
  - Open Dialogue
  - Listening to Question
  - Active Observing
  - Student Presentation
  - Students Talking Serially

- Do your activities align with course expectations (i.e., with Question 1)?
- What does your course leader expect you to do in your TA assignment?

What influences TA actions?

Your teaching activities should align with course design
Average of all TAs’ profiles in the study

Poor alignment of TA activities with course expectations – Why?

Wide range of TA tendencies – Why?

FIG. 4. Average of all TAs’ actual profiles as coded by RIOT.

TABLE III. The profile of an ideal TA based on the design of the curriculum as agreed upon by the authors.

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<td>Medium</td>
<td>Medium</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>
What factors inside the classroom and outside the classroom influence TA’s actual activity when teaching a recitation? [4]

Being aware of what influences your teaching is a step toward modifying your strategies to match course design.

What influences your teaching practices in your recitation?
Do you feel you were thrown into a TA position with no experience?

Do you feel there wasn’t enough support from your course leaders?

How do you feel about the following possible ways that the department can help you improve your educational strategies:

1) Professional development during staff meetings – if these exist in your course, are these sessions useful to you? (i.e., is it enough information for you to try out the methods in class? Would you like more practice first?)

2) Professional development and education instruction via a for-credit education course, mandatory for all first-year TAs? (Learning Assistants have this, yet TAs don’t…?)

3) Observations and feedback from other TAs in the course?

4) Observations and feedback from veteran instructors / course leaders?

Do you have suggestions for how can we help you align your teaching strategies with course expectations?
Any questions?

Thanks for coming!


