

Physics 500 (Intro)

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Goal: Increase TA Effectiveness

- Approach, philosophy, and psychology
- Nuts-and-bolts tools
 - TritonED, Excel, LaTeX
- Lab TA Panel
- Dissection of problem presentation
 - experienced TAs will lead
- Practice problem presentation
 - meaningful feedback
 - from each other, experienced TAs, guest faculty
 - video for self-analysis
 - assignments geared toward constructive feedback

TA Duties

- Lecture TA
 - discussion session
 - problem session
 - homework solutions
 - grading
 - office hours
 - tutorial center
- Lab TA
 - setup
 - session patrol/help
 - lab book grading
 - tutorial center
- Tutorial Center
- Grader
- Proctor

Mission

- What is our mission in the classroom?
 - educate; student learning
- What does this translate into, physically?
 - neurons connecting in student's brain
- How do we best accomplish this?
 - guide student through thought process
- Don't chew a student's food for them

Failure Modes (Interactive)

- What do instructors do that is *not* effective?
 - lecturing from book
 - mumbling
 - disorganized
 - answer with no explanation
 - speaking to the board
 - repeating material after question; no new angle
 - bad penmanship
 - PowerPoint ☹
 - math mistakes
 - expressing confusion
 - reading from slides
 - not posing questions to students
 - trivially; obviously; clearly

Failure Modes (2016)

- What do instructors do that is *not* effective?
 - don't engage: just talk
 - don't justify assumptions; state facts
 - solving problem without context
 - from expert perspective
 - lack of communication and organization
 - not open for questions
 - no time for thinking/processing

Failure Modes (2015)

- What do instructors do that is *not* effective?
 - math via powerpoint
 - spewing facts with no context
 - not engaging
 - abstract without examples
 - too fast
 - too slow
 - too many examples; no theory framework
 - not prepared
 - no time for questions
 - misunderstanding questions; truck on

Success Modes (Interactive)

- What qualities/actions are seen in successful instructors?
 - stop and ask for clarity
 - adopt perspective of students; understand Q
 - motivating material
 - focused on subject matter
 - notation explanation
 - knowing students and background
 - involving students in problem solving process
 - open to feedback
 - good problem sets; right level
 - charismatic

Success Modes (2016)

- What qualities/actions are seen in successful instructors?
 - asking questions of students
 - excellent presentation, with humor
 - organization of knowledge
 - build from previous lessons
 - relevant assignments/questions
 - motivate concepts: why important (context)
 - example problems for new concepts
 - read the audience
 - care about student learning

Success Modes (2015)

- What qualities/actions are seen in successful instructors?
 - answer Q with leading Q
 - segue into next topic, leveraged off Q
 - engaging; personable
 - care about content/things exiting mouth
 - care about student learning
 - connect content with experience/context

Impedance Matching

- A 50 Ω transmission line delivering a pulse to a short or open results in 100% reflection
 - $R = |z - z_0|^2 / |z + z_0|^2$
 - only when $z = z_0$ (impedance match) is it all absorbed
- Requires understanding level/mentality of student
- Spend more time *in their head* than in yours
- Constantly ask self: "how did that sound to them?"
- Who's my audience; what *do* and *don't* they know?
 - this is also the key to good writing

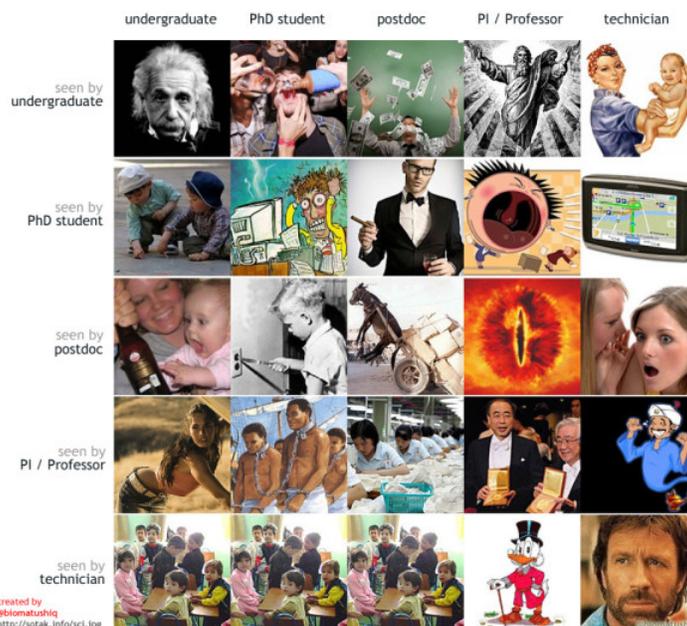
Examples of Impedance Matching

- What might you do/try to match?
 - terminology
 - understand background
 - analogies
 - connections/context
 - starting off on same page
 - ask for feedback; is that clear

Examples of Impedance Matching (2016)

- What might you do/try to match?
 - mini-quiz assessment at beginning
 - background and major/interests, etc.
 - conceptual questions and see how they think
 - possible language barriers/cultural references

How people in science see each other



The Many Layers Problem

- there's *you* standing in front (the *actual* you)
- there's a *student* sitting in the room (the *actual* student)
- there's the person you *think* the student is
 - often imagine more like yourself than they really are
- there's the person the student *thinks* you are
 - could think brilliant, moron, dork, clear, confusing, etc.
- there's the person you *want* the student to think you are
 - so you project an artifice to suit (expert, hip, godly)
- there's the person the student *wants* you to think they are
 - so they answer questions on pins and needles (conceal stupidity)
- there's the person you *think* the student thinks you are
 - based on projected image, imagining it works perfectly
- there's the person the student *thinks* you think they are
 - imagining their façade to be 100% effective
- there's the person the student thinks you think they think you are
 - they see through some façade: so this is how they imagine you see yourself reflected off their perception (“TA must think I’m buying the projection”)

Cut through the distracting/wasteful layers: be honest, true, real, humble—a servant

Common Tendencies and Pitfalls

- Demonstrate *smarts*/prowess; *impress* students
 - dominate like Kramer in Karate with kids
- Deviating from class presentation to show how the *pros* do things
 - can be well-intentioned, but premature
- Finally get to be the *lecturer* (ego boost; power trip)
 - after all these years on receiving end
 - students don’t need do-over lecture of material
- Fear of looking a fool: *insecurity*
 - don’t underestimate this huge influence!
- Not interpreting/*clarifying* questions correctly
 - growing up in inarticulate setting is very useful!
- Imagining student is an earlier version of *you*
 - you’re special, though, remember
- Being the instructor you wish *you* had
 - again, you were likely an exceptional student: not doing this for *you*

Direct Feedback: Difficult to Get

- “How am I doing?”
- Loaded question
 - impolitic to hurt TA’s feelings
 - don’t expect honest assessment
- Too confused to articulate suggestions
 - they’re not the pros: don’t know how to advise you on how to be an effective educator
- Insecurity: student feels personally at fault
 - may assume that problems are with them, not you
 - effective instructor promotes “I can actually do this”

What are Forms of Indirect Feedback?

- How might you assess your performance?
 - do the students seem engaged/responsive?
 - test scores
 - attendance
 - office hours, etc.; tutorial center

What are Forms of Indirect Feedback? (2016)

- How might you assess your performance?
 - anonymous survey
 - quiz assessment: gains in understanding
 - attendance
 - response/interaction/engagement

Indirect Feedback

- Number of questions coming from students
 - helpful instructor will get lots if student has confidence that instructor can help them
- Attendance
 - students are pragmatic about time investment
 - a helpful session is a well-attended session
- Office Hours
- Smiles; glow of mastered material
- Test/HW performance
- But this is not about you: make it about them

Accommodating Insecurity

- Rampant: student, TA, etc.
 - perceived “smartness” is most sensitive trait
 - we have elaborate protective mechanisms to shield us
- Brain cycles spent reflecting on abilities or lack thereof rob real thought
 - negative reflections are self-reinforcing
- Understand this in students, but also in yourself
 - short-circuit by forcing thought on problem at hand
 - stay focused on helping students learn

Dealing with Feedback

- We love to hear that we’re great
 - seldom question the accuracy of praise
- We cringe to hear negative assessments
 - prone to dismiss validity
- Do something about it!
 - take in the feedback as valid/legitimate: **own it**
 - spend some time devising improvements
 - it’s more in your control than you think
 - seek advice/help from peers, faculty on how to improve

Thinking about Thinking

- Often called metacognition: how do we approach problems
 - getting students to think about their thought process can be helpful
 - identify patterns in solving problems
- As instructor:
 - explain why you choose path in problem solving
 - role model for student thinking, if done “out loud”
 - even share internal missteps, however fleeting
 - “first I was tempted to think X, but then realized that was wrong” (and explain why)

Being Uncertain is Not Bad

- Better than giving wrong or mis-information to save face
- Opportunity to model thought process/ approach
- Key strength of science: how do I know this is right?
 - how we approach uncertainty and work through it is an extremely valuable learning experience

Accomplishing Mission (Interactive)

- What are some ways to accomplish our mission in teaching?
 - be responsible
 - prepare for each class; don't wing it
 - interact directly with students
 - enthusiasm for learning/physics
 - attention to detail/logistics
 - humble/humility
 - focus on skills not problems
 - care about student learning
 - point out resources
 - praise and motivation

Accomplishing Mission (2016)

- What are some ways to accomplish our mission in teaching?
 - model presentation after likely most useful to them: not for us or our ilk
 - get feedback & assess if working
 - be willing to change in response to feedback
 - guide them through thinking: effective/ineffective ways
 - not trying to prove anything

Assignments

- What, for you, was the most impressionable take-away from Lecture 1?
 - 1-2 paragraphs; due Oct. 9, in class
- Later assignments on LaTeX, Excel, and problem solving performance
- Website: [tmurphy home page]/phys500/
 - find my UCSD home page first...