

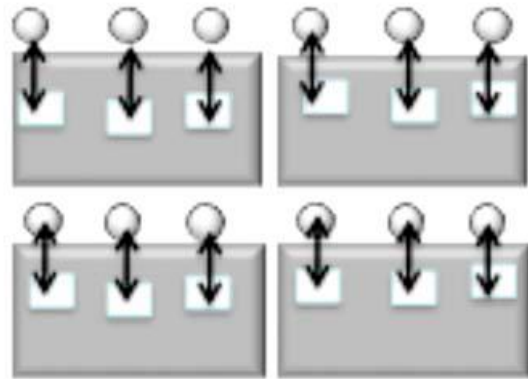
# Improving Educational Outcomes through Learning Assistants in Biology, Chemistry, and Physics

- Kathryn Spilios – CAS Biology
- Dan Dill, Nic Hammond, Adam Moser – CAS Chemistry
- Andrew Duffy, Bennett Goldberg, Manher Jariwala – CAS Physics
- Peter Garik, Nicholas Gross, Tom Hunt, Alexis Knaub, Meredith Knight – SED Science Education

# What is a Learning Assistant (LA)?

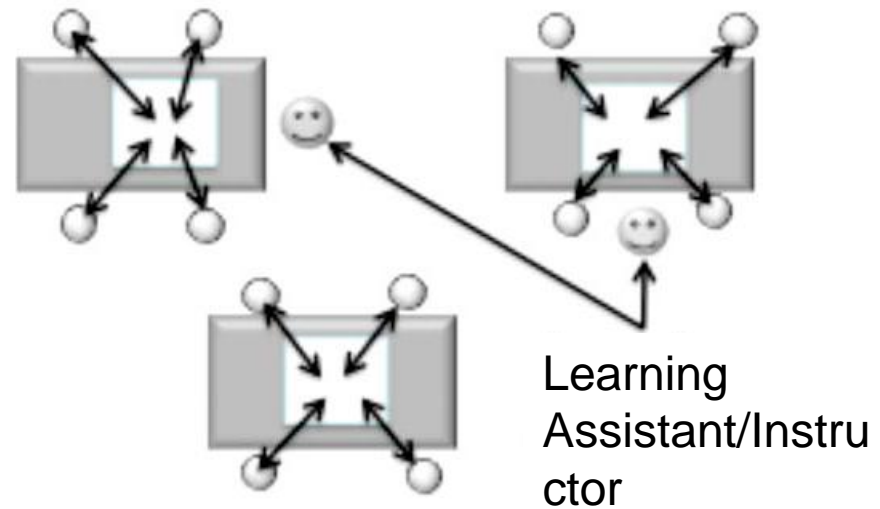
- A Learning Assistant is an undergraduate student who is hired to assist in teaching a course they have taken before.
- So what? How is this different from a UA/CA/TA?

Traditional Class/Recitation



Instructor

Transformed Class/Recitation



Learning Assistant/Instructor

# Three Key Elements of the LA Program

1. SED course on STEM education
2. Course integration and interaction with the staff
3. LAs work directly with students in a small-group-centered, active-learning environment



# SC521: STEM Education Theory & Practice

- Weekly 2-credit SED course focusing on STEM pedagogy, as well as specific discipline-based techniques



- Metacognition
- Mental Models & Misconceptions
- Multiple Intelligences

# Course integration at BU

Spr 2011

CH102

Fall 2011

CH101

Spr 2012

CH102

BI107

BI108

BI118

PY105

PY105

PY242

PY106

PY106

PY252

PY211

PY211

PY355

PY212

PY212

for majors

**11 LAs**

**40 LAs**

**43 LAs**



LAs are paid \$700/semester through CAS.

# Learning Assistants in Biology

- BI107, BI108, BI118
  - 2 lab sections per week
  
- Course integration
  - Weekly meetings with laboratory director
    - Curriculum updates
    - Develop new material to integrate active, inquiry-based learning
  - Weekly meetings with the teaching fellows
    - Plan weekly lab activities
    - Incorporate SC521 material into lab

# Learning Assistants in Chemistry

- CH101, CH102
  - Weekly discussion sections (x3)
  - Lecture
  
- Course integration
  - Discuss logistics of weekly discussions & feedback on discussion handouts
  - TFs and LAs work together
  - Meeting with lecturing faculty
  
- Other activities
  - Office hours, workshop development, ERC ambassador, discussion material editing, exam & challenging questions, etc

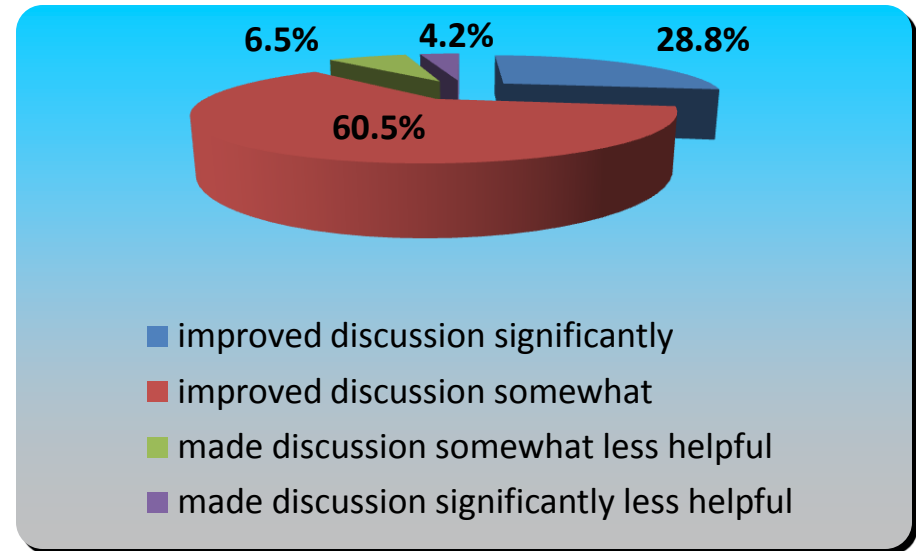
# Learning Assistants in Physics

- PY105, PY106 and PY211, PY212
  - Weekly discussion sections (x3), lecture, course preparation meetings
  
- PY242, PY252, PY355
  - Expanding to other introductory as well as upper-division courses
  - Building a vertical learning community within the department
  
- The LA program is an integral part of the department's goal of course transformation (PhysTEC project).



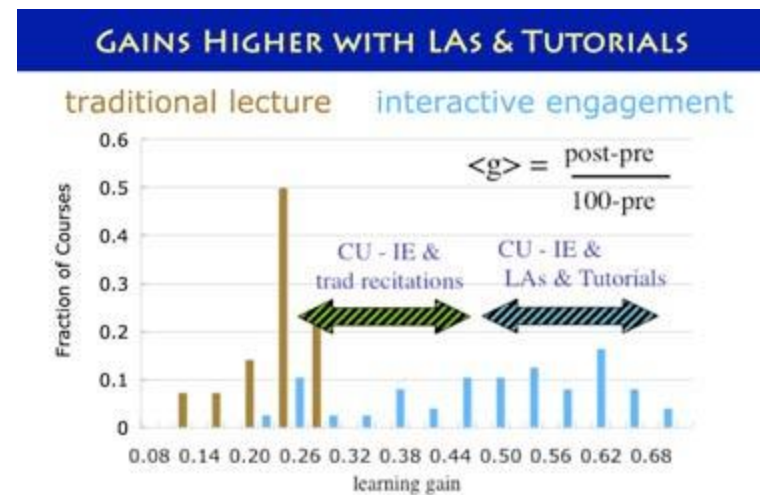
# Benefits to Students

- “gives very constructive advice if the group is not understanding a problem or does it incorrectly”
- “very good at leading you to the answer rather than telling you straight out”
- “helped me to think about it in a different way that made more sense to me”
- “upbeat and made it fun to learn, motivating us to explore the content further.”



# Benefits to Students (cont.)

- Students find it easier to approach LAs for help
  - LAs know what it is like to be “in their shoes”.
- LAs serve as role models for students
  - Balance their teaching duties with heavy course loads as well as research.
- Pre/post-test assessments show significant gains in conceptual understanding of the material, in addition to problem-solving ability.



# Benefits to Learning Assistants

- LAs improve their own foundational knowledge.
  - Significant gains in the pre/post assessments
  
- LAs do better in their own classes compared to their classmates who have not been LAs.
  - Higher scores on the MCAT or GRE
  
- The LA program provides a low-barrier, early teaching experience for interested STEM students, opening the door to a career in science teaching.

# Benefits to the Course and Department

- The Learning Assistant program has transformed the introductory biology, chemistry, and physics courses at BU, improving the undergraduate STEM experience (RULE).
- The LA program provides a mentorship experience for graduate student TFs, plus feedback on pedagogy, in line with the goals of preparing future faculty (CIRTL).
- The LA program has engaged faculty across our departments in thinking about active-learning and course transformation.
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