Learning Assistants in Introductory Physics: Successes and Challenges at WVU

P. M. Miller, J.S. Carver, K. Quedado, and B. Marsteller
West Virginia University, Morgantown, WV 26506

Abstract

In the fall of 2011, the West Virginia University Learning Assistants (LA) program began. Since the funding came as a component of a larger grant, our situation was well-suited to replication. Our program was designed after attending the LA Workshop at the University of Colorado. From the perspective of three years of LAs in our courses, we report successes, challenges, and lessons learned for both semesters of calculus-based introductory physics. We present content learning gains (from the FMCE and CSEM) and attitudes (from the CLASS) data. We show that the program has improved learning gains overall and in some targeted categories, such as first-generation students. Finally, we document and explore differences in course readiness between fall and spring enrollees that were revealed through program assessment.

Background

Baseline data: Spring 2011. LAs began in fall of 2011 (1st semester); fall of 2012 (2nd semester)
"Side project" on larger grant: well-suited to replication.
Based largely on LA program at the University of Colorado (I strongly recommend their excellent LA workshop, offered annually.)
LAs support University of Washington tutorials, implemented during weekly lab sections.
All LAs are enrolled in a science-focused pedagogy course during the fall semester.
We pre- and post-test for content learning gains (from the FMCE and CSEM) and attitudes (from the CLASS) data.
Goals: increased student learning and more students in the secondary-teaching pipeline

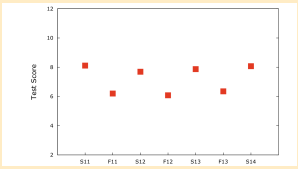
Gain trends up, but fall ≠ spring

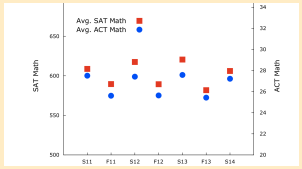
Course/Semester	Normalized Gain
Physics 111/Spring 11	0.27 (Baseline)
Physics 111/Fall 11	0.15 (1st LA semester)*
Physics 111/Spring 12	0.47
Physics 111/Fall 12	0.28
Physics 111/Spring 13	0.49
Physics 111/Fall 13	0.31
Physics 111/Spring 14	0.44

*This result included instructors who were not integrated into the LA program due to a last minute schedule change.

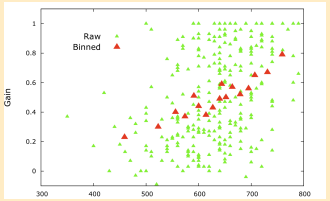
(Compare to average traditional 0.15±0.03 and research-based 0.63±0.06, Thornton, *et al.* 2009.)

Characterizing the population

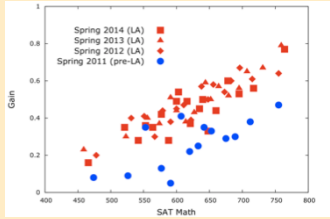




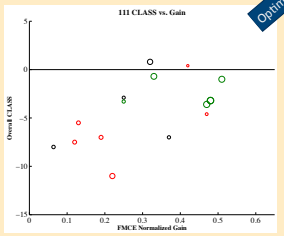
Binning learning gains



LAs boost gains



Instructor buy-in

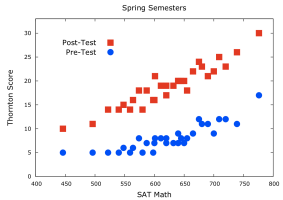


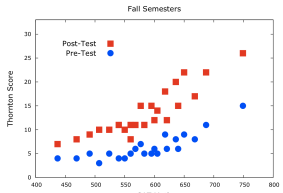
Optimal

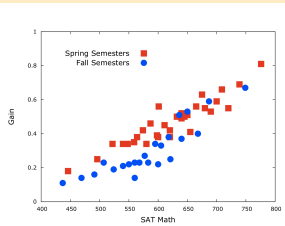
Bad

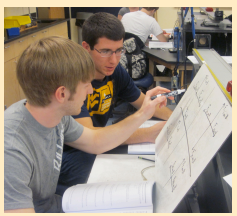
Above, each shape represents one section of each class. Three categories of CLASS results are displayed, along with "overall."
• The SIZE of the shape is scaled by the number of CLASS data pairs. (Note that larger shapes represent smaller uncertainty.)
• The BLACK shapes represent sections of the courses taught before LAs were used.
• The RED shapes represent sections of the courses taught with LAs but where the instructor chose not to take advantage of their presence by meeting with them and engaging with the program. These sections do not replicate the LA model.
• The GREEN shapes represent sections of the courses taught with weekly interaction between instructor and LA. These sections replicate the LA model.

Spring vs. Fall

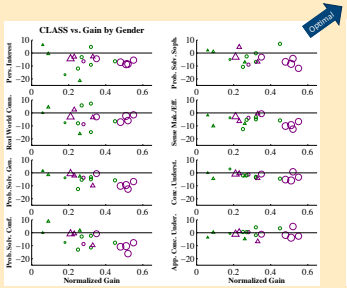








Gender and 1st Generation effects



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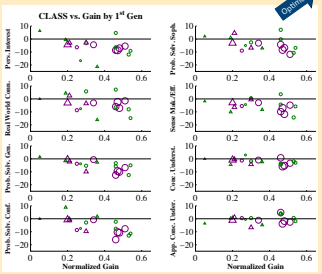

Optimal

Above, each shape represents one *section* that replicated the LA model.
• The CIRCLES represent 1st semester (and FMCE data), the TRIANGLES 2nd (and CSEM data).
• The SIZE of the shape is scaled by the number of CLASS data pairs.
• The PURPLE shapes represent data from MALE course participants.
• The GREEN shapes represent data from FEMALE course participants.

Above, each shape represents one *section* that replicated the LA model.
• The CIRCLES represent 1st semester (and FMCE data), the TRIANGLES 2nd (and CSEM data).
• The SIZE of the shape is scaled by the number of CLASS data pairs.
• The PURPLE shapes represent data from Non-1st-generation course participants.
• The GREEN shapes represent data from 1st generation course participants.

Successes

- Improved learning gains over baseline in both semesters.
- Established program
- Growing longitudinal data set
- Increased appreciation for data-driven improvement among faculty
- Momentum toward continued improvement

Challenges

- Fall semester students demographically weaker
- Room for improvement, especially in 2nd course
- Gender gap in achievement gains
- Varied involvement levels among course instructors
- Continuing beyond current grant with new model
- Teacher program: urgent need for revision

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For more information, contact Paul Miller at paul.miller@mail.wvu.edu

WestVirginiaUniversity.

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