The Impact of the Learning Assistant (LA) Model on STEM Gateway Course Failure, Retention, and College Completion

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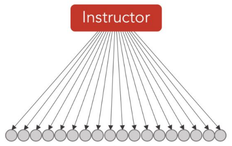
HEALTH SCHOLAR SHOWCASE

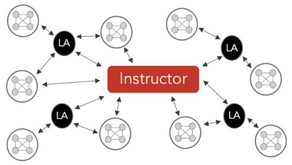
Background

Learning Assistants are undergraduate students who, through the guidance of weekly preparation sessions and a pedagogy course, facilitate discussions among groups of students in a variety of classroom settings that encourage active engagement.

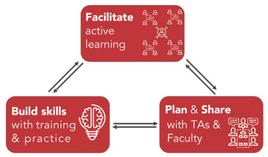
Traditional Model



LA Model



Pillars of the LA Experience



- The core mission of the STEM Communities and LA Program is to provide support for faculty-student instructional teams to collaboratively redesign and teach gateway STEM courses in ways that increase success for all students.
- The LA Program is currently supporting 20 faculty and 121 undergraduate LAs in teaching 9 courses across 3 departments: Biology, Chemistry, and Physics.

Literature

- Studies find that the LA program is associated with lower course failure rates in introductory STEM courses (Alzen, Langdon, & Otero, 2017; Alzen, Langdon, & Otero, 2018; Van Dusen & Nissen, 2020; Kramer et al., 2023).
- In addition, an active learning approach was associated with the retention of students in STEM majors (Wilton et al., 2019; Batz et al., 2017).

Research Questions

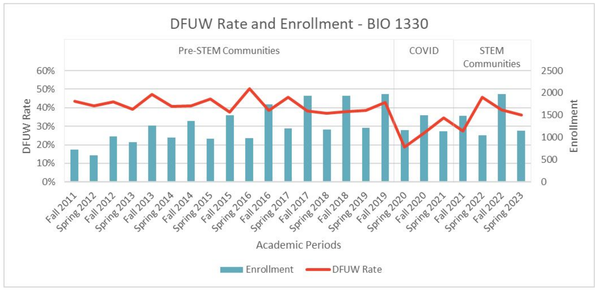
- 1. Do STEM gateway course failure rates go down after these courses are transformed into peer-lead, active learning, and LAs supported courses?
- 2. Does LA program participation lead to better retention rates and completion rates for students at Texas State University?
- 3. Are there differences in terms of different disciplines and students from different backgrounds such as gender, race and ethnicity, first-generation status, and college majors?

Data

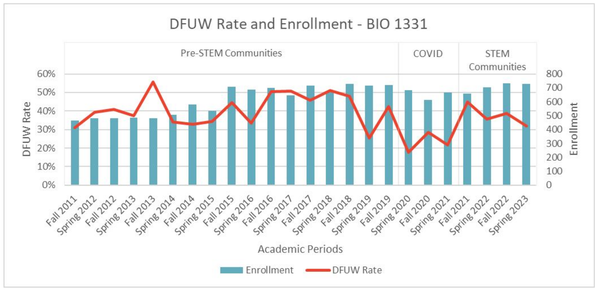
- We collected course-level data for all students who have taken one of the courses that have peer-supported LAs in either their lecture classes or lab classes from Fall 2011 to Spring 2023 at Texas State University.
- The data provides the course number, section, and title, the department and college that the course is offered, grades that each student received, and the instructor's name and ID.

DFUW Rate and Enrollment Trend

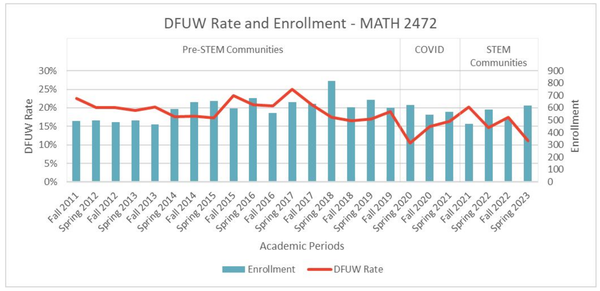
- BIO 1330 Functional Biology



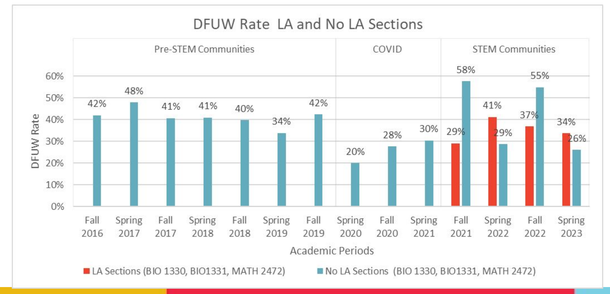
- BIO 1331 Organismal Biology



- MATH 2472 Calculus II



- LA and No LA Sections in BIO 1330 Functional Biology, BIO 1331 Organismal Biology, and MATH 2472 Calculus II



Difference-in-Differences Estimation for DFUW Rates

$$w_{it} = \beta_1 X_{it} + \beta_2 LA_{it} + \beta_3 POST_{it} + \boldsymbol{\beta_4 LA_{it} * POST_{it}} + \varepsilon_{it}$$

	Model 1 (Raw DID)	Model 2 (+Female +Race +First gen +Financial aid)	Model 3 (+Female +Race +First gen +Financial aid +ACT,SAT)	Model 4 (+Female +Race +First gen +Financial aid +ACT,SAT +Term admitted)	Model 5 (+Female +Race +First gen +Financial aid +ACT,SAT +Term admitted +HS percentile +Year FE +DEP FE)
Diff-in-Diff	-.0218*** (.004)	-.0209*** (.005)	-.0347*** (.006)	-.0397*** (.006)	-.0384*** (.006)

Discussion

- Preliminary findings suggest that LA course transformation works to reduce the STEM gateway course failure rates by 2 to 4 percentage points.
- In terms of implementation, one department has transformed almost all course sections, while another has selectively transformed certain sections but not others. A third department has developed new courses tailored to student needs, supplementing the existing LA-transformed classes.
- Our findings also reveal heterogeneity in the impact across various departments and courses. This variability is attributed to differences in the fidelity of implementation, the level of support, and the degree of buy-in from faculty, students, and leadership.
- Future research will focus on assessing the influence of the LA model on other student outcomes, including retention and graduation rates.

References

- Alzen, J. L., Langdon, L. S., & Otero, V. K. (2018). A logistic regression investigation of the relationship between the Learning Assistant model and failure rates in introductory STEM courses. *International journal of STEM education, 5*(1), 1-12.
- Barrasso, A. P., & Spilios, K. E. (2021). A scoping review of literature assessing the impact of the learning assistant model. *International Journal of STEM Education, 8*(1), 1-18.

Acknowledgement

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