Supplemental peer instruction reduces DFW rate among Pell eligible students in a General Biology course

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Introduction

High enrollment, lecture-based introductory sciences courses are known to be a significant barrier to STEM student success and degree completion (Hunter *et al*. 2019). During a three-year period, students in General Biology I at Marist College earned grades of D, F or W at rates indicative of weed-out courses (Weston *et al*. 2019). In addition, DFW rates were disproportionately high among Pell-eligible and students of color (Table 1, traditional instruction). Supplemental peer instruction involves using students who have taken the course recently and performed well as 'embedded' tutors. These supplemental peer instructors or 'SPIs' attend class, work with faculty to identify areas of challenge for students, and then provide supplemental instruction sessions to students. In other contexts, supplemental peer instruction has significantly improved student success. To improve student success, we implemented supplemental peer instruction, in one section of General Biology I in the fall of 2022. In this project, we tested the effectiveness of the intervention in improving success of Pell eligible students at Marist College.

Methods

Supplemental peer instruction was incorporated into one section of General Biology I. Students were trained as peer instructors during a two-part training session, one for general tutors, and another for students and faculty involved in SPI. These sessions were optional for most students to attend. A subset of students was required to attend the sessions as a condition of a scholarship they were awarded. SPI sessions were held for 45 minutes, twice per week. The SPI session was led by a second-year student (peer instructor) who successfully (grade B or better) completed General Biology I the previous year and was recommended by the faculty instructor. The peer instructor attended lectures with the students and, during SI sessions, reinforced class concepts using active learning strategies such as the incorporation of problem-based learning, games, and hands-on activities.

During the semester, attendance was recorded at all SPI sessions. For a student to be included in our 'SPI intervention' group, they had to attend at least 10 sessions during the semester, which translated to approximately one session per week.

In this study, we report student success (as DFW rates) in non-Pell eligible students, and Pell eligible students who received traditional instruction only (no SPI) and those that participated in SPI. We also surveyed students on their use of academic resources, including SPI.

Results

677 students received traditional instruction, while 18 students participated in at least one SPI session. Notably, those who participated in 10 or more SPI sessions were only those students who were required to do so. Of the ten Pell eligible students who received the intervention (attended 10 or more SPI sessions), eight students successfully completed the first semester of general biology.

At-risk students who received the SPI intervention (Table 1, right column) had a lower DFW rate compared to those not receiving the intervention. We report data from a single cohort of the program, resulting in a small sample size (n=10 students), so results should be interpreted with caution.

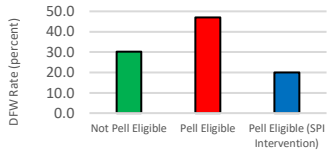

Figure 1: Mean DFW Rates in General Biology I for students who are Pell eligible who received traditional instruction only (n=132), not Pell eligible who received traditional instruction only (n=545), and Pell eligible who received the SPI intervention (n=10). Overall data include four semesters (Fall 2017 - 2019 and 2022). The SPI intervention was only offered during the Fall 2022 semester.

Table 1: DFW rates disaggregated by demographics for the Fall 2017 - 2019, and 2022 semesters (SPI intervention). At-risk populations are highlighted in bold.

Demographic	Traditional Instruction			SPI Intervention*		
	# DFW	Total #	DFW Rate	# DFW	Total #	DFW Rate
Pell Eligible	62	132	**47.0**	2	10	**20.0**
Not Pell Eligible	165	545	30.3	-	-	-
Black and Hispanic Ethnicities	65	159	**40.9**	1	6	**16.7**
White and Asian Ethnicities	155	485	32.0	1	4	25.0
Other	7	33	20.0	-	-	-
First-Generation	49	109	**45.0**	2	7	**28.6**
Not First-Generation	90	320	28.1	0	3	0.0

*students who attended 10 or more SPI sessions throughout the Fall 2022 semester

Student Feedback

22 students answered the survey, while 12 answered questions about SPI. These data were qualitative.

Survey data revealed that students who attended the SPI session found the it helpful and especially liked the near-peer aspect. Comments included:

- *I felt the SPI sessions were more helpful since I attended them the most and I had a peer who could relate.*
- *SPI sessions because it's people closer in age and it's easier to learn from your peers.*
- *The Supplemental Instruction was most helpful because it was hosted by someone who already took the class*

Conclusions

Historically, at-risk students (Pell eligible, underrepresented ethnicities, and first-generation college students) have higher DFW rates at Marist compared to their peers. Although our data are preliminary due to small sample size, our results suggest that SPI is a promising means to improve student success in General Biology I. We are continuing to monitor the effect of this program in General Biology II in spring 2023. Based on those results, we will determine the most appropriate way to incorporate SPI into future sections. The high DFW rate in the traditional instruction group and the disproportionate impact this has on Pell eligible students and student of color suggest that we should explore ways to incorporate active learning strategies into the classes, since students tended not to attend SPI unless they were required to do so.

References

Hunter AB and E Seymour (Eds.) 2019. Talking about Leaving Revisited: Persistence, Relocation and Loss in Undergraduate STEM Education. Springer, Switzerland AG. 528 pp.

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