Evaluation of Technology-Assisted Supplemental Instruction (TASI) on Underrepresented Minority Students' Sense of Belonging

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Background

- Underrepresented minority or URM students are equally likely to pursue careers in STEM compared to their counterparts, but disparities still exist (Chen, 2013)
    - Graduation/time-to-degree rates and grades (Herrera, 2011; Long et al., 2018)
- Latinx STEM degrees trail counterparts who do not identify as URM (Fifolt & Searby, 2017)
- Supplemental instruction (SI) aims to enhance outcomes for students in STEM
- Traditional markers of student success (e.g., grades) are not enough to understand the lack of degree attainment
    - Sense of belonging

Introduction

- Technology Assisted Supplemental Instruction (TASI) is a peer-led tutoring service for upper division STEM courses with high failure rates.
  - Informed by the Anti-Deficit Lens (Mejia et al., 2018; Harper, 2010)
- For each STEM course, there are two TASI sessions throughout the week
  - Most sessions happen during U-Hour which happens Tuesday and Thursday from 11:15AM –1PM
  - Second sessions are scattered throughout the week
- Since, the university is a Hispanic-serving institution (HSI), there is an emphasis on URM students.
- Thus, the present study observed the impact TASI might have had on URM students' education and sense of belonging in their field and university.

Method

- The present study began in Fall 2020. Students completed two surveys each semester
  - Pre-survey measured students' sense of belonging, socio-emotional measures of confidence and motivation, and intent to stay or leave the STEM field.
  - Post-survey measured students' confidence in courses, potential challenges students might have encountered and student engagement

- Students' academic data was collected in three courses
  - Vector Statics (ME), Applied Statics (ETM), Engineering Statics (CE)

- TASI attendance was recorded, and students were then grouped into "attended" and "not attend"

- Academic data and TASI attendance were both analyzed in SPSS

- Focused on URM status and TASI's impact on course grade by case control matching

Results

- Sense of Belonging:
  - Regardless of race, participants felt welcome at their school (M=5.52, SD=1.089) and their major (M=5.56, SD=0.966).

- Many students questioned their ability to do well in their field of study when comparing themselves to others

- Barrier to education:
  - In post-surveys, many students indicated challenges they face during the semesters. Certain issues were: time needed to do well, taking exams, completing course assignments and balancing life priorities and course expectations

Results

Course Name	Number of URM's in the course	URM's who attended TASI	TASI course grade	Non-TASI course grade	Significance (Case-Control Matching Results)
Vector Statics	264	70	2.3	1.9	$p = 0.003$
Applied Statics	67	8	2.9	2.4	$p = 0.003$
Engineering Statics	452	25	2.5	2.1	N/A

Discussion and Limitations

- Results highlight that TASI can reduce educational equity gaps for URM students
  - TASI can serve as a buffer between students' negative experiences and academic success by promoting critical thinking and reflection by engaging with a peer-led tutor.

- TASI moves beyond traditional approaches in order to address the needs of students

- The findings highlight how attending TASI made a difference in whether students had to retake a course
  - Many students who attended TASI earned passing grades, became more persistent, and stayed in their field of study

- Limitations:
  - Lack of TASI attendance (COVID-19 and TASI scheduling)
  - Lack of promotion

Conclusion

- With the anti-deficit framework, TASI can assist students needs to increase academic achievement.

- There is way in which TASI can improve:
  - Making TASI sessions more accessible by having more sessions throughout the week
  - With faculty promoting TASI as a support system earlier in students' academic career

- With the improvements, students will have more information and ease of accessing TASI which will help students' retention rates, sense of belonging, and stop any potential challenges

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