



# Equity and Access in STEM through Supplemental Instruction – A Qualitative Study

Dr. Robin L. Avant, Principal Investigator

Dr. Jeffrey Vance, Chair

University of Bridgeport

College of Engineering, Business and Education

University of Bridgeport, Bridgeport, CT

## Purpose, Aims, Objectives:

- The effects of Supplemental Instruction (SI) with Black and Hispanic STEM students to determine if this additional learning support will increase student grade point average (GPA), and retention rates while decreasing attrition rates at the research site.
- Aims at reducing the achievement gaps in marginalized students at the research site by enabling Black and Hispanic STEM students to achieve similarly with their White peers. The study will support the intentional need for academic skills enrichment which benefits at-risk students (Tinto, 2012). Urban two-year community colleges epitomize the drop out crisis (Kirp, 2019).
- Shift the disparities that negatively impact marginalized populations that reflect in attrition rates.

## Methods/Theoretical Framework:

### Research Questions:

- What are the effects of supplemental instruction on STEM students compared to students in STEM courses with no supplemental instruction at the research site?
- Will supplemental instruction positively impact retention rates in Black and Hispanic STEM students at the research site?

### Methodology:

- Qualitative Study – Focus Group with the use of secondary narrative data
- Cross comparative study reviewing grade point average and retention rates between Biology course with SI and Biology course without SI

### Theoretical Framework:

- (1975) Tinto – Retention/Sense of Belonging
- (1936) Piaget’s – Collaboration and Constructivism
- (1962) Vygotsky - Zone of Proximal Development
- (1969) Dale - Cone of Experience
- (1983) Keimig - Hierarchy of Learning Improvement
- (2004) Swail - Geometric Model of Student Persistence and Achievement

## Discussion, Conclusion, Implications and Limitations:

### Results:

- Comparison 25 students enrolled in a SI class to 22 students enrolled in a non-SI class.
- The focus group included 8 student participants from the SI supported class (Creswell & Guetterman, 2019).
- The comparative method was a supportive approach to deepen the clarity but could not provide conclusive reasoning and complete causality (Muijs, 2022; Szafran, 2012).
- SI class had a class retention rate of 100% and the class average grade point average of 75.47%
- Non-SI had a class retention rate of 95.7% and the class average grade point average of 79.03%
- Focus Group – All 8 participants indicate the significance and benefits of SI

Limitations that could have negatively impacted the data include the following:

- Low volume of participants being in a declared STEM major.
- Students enrolled in the course indicated the course was a pre-requisite or a course fulfillment for their non-STEM major.
- The overall length of the study would benefit from a longitudinal study of 2-5 years of examination of the effects of supplemental instruction on enrolled STEM students.

### Conclusion:

The findings underscore the importance of SI as a high-impact practice that can be used to improve academic outcomes, engagement, and retention, particularly in challenging STEM disciplines. By combining qualitative feedback from students with demographic makeup of the classes of interest, the study has offered a holistic understanding on how SI can influence students both academically and personally.

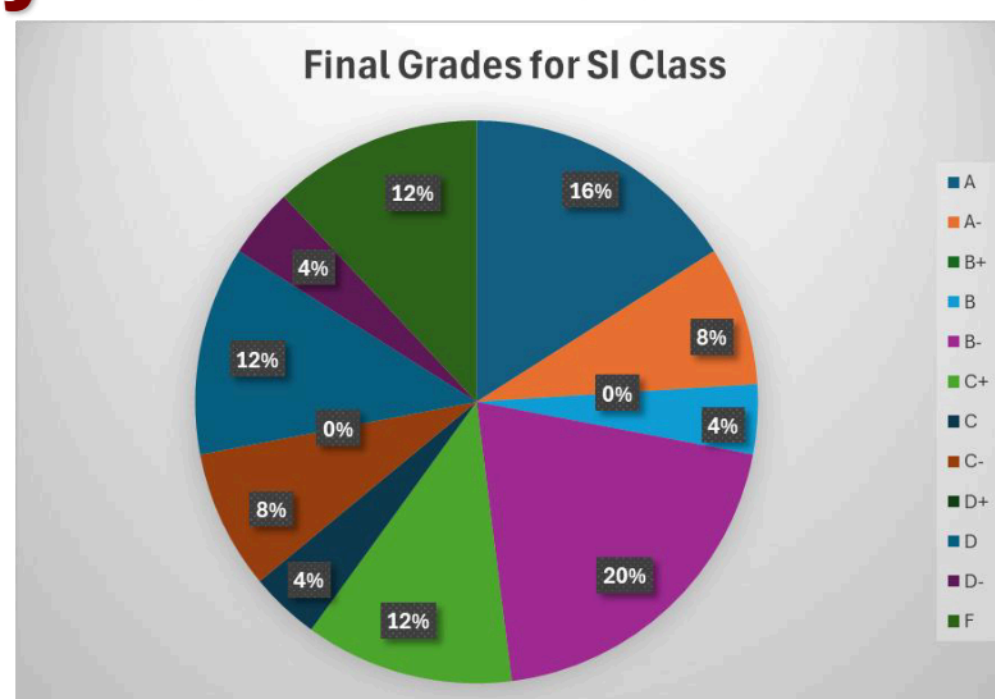
## Background Information:

Supplemental Instruction programming is based on the well-respected University of Missouri, Kansas City (UMKC) model developed in 1973 (Arendale, 1992).

SI is one of the most common and well researched academic curricula supports for underrepresented minority (URM) students. URM students are designated as students of color, Hispanic or non-white students.

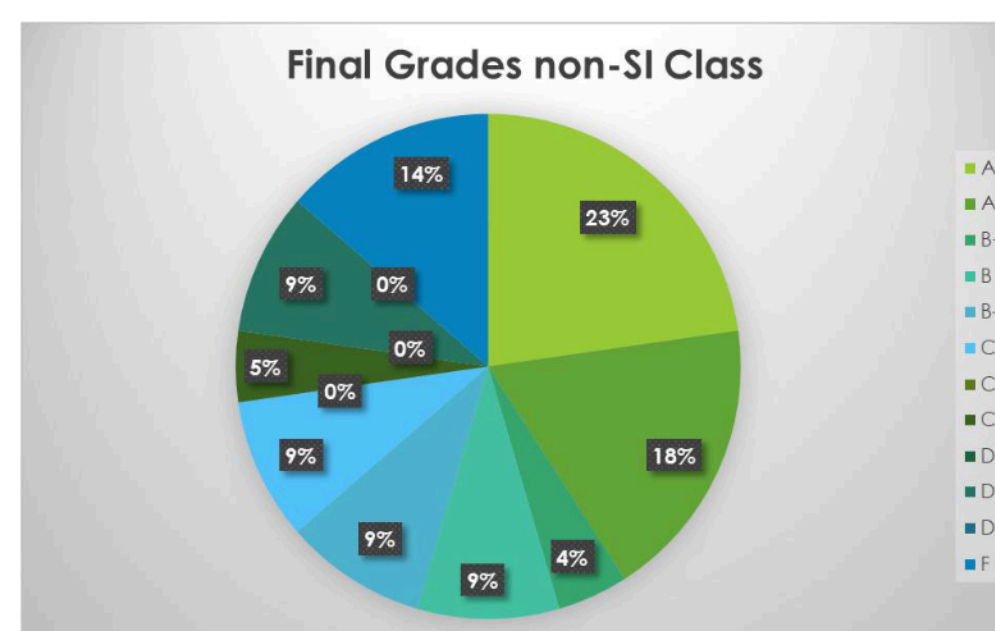
The SI program is available for courses with high rates of Withdrawal (W), F and D grades which are primarily in STEM courses. SI has demonstrated increases in STEM course grades and student grade point averages.

## Analysis/Results/Outcomes:



- 100% Class Retention – no one withdrew
- Average Class GPA = 75.47%
- Class Size: N= 25

NOTES: Four students earned a D grade and were identified as two Black Female, one Hispanic Female, and one Hispanic Male. There were three students who earned a F grade, they were identified as one Black Female, one Black Male and, one White Male.



- 95.7% Class Retention – one student withdrew\*
- Average Class GPA = 79.03%
- Class Size: N= 23 (original)
- Class Size: N = 22 (end of semester)

\*Student who withdrew was a Black Male Student, 1<sup>st</sup> Time in College, Finance Major

NOTES: Two students earned a D grade and were identified as one Black Female and one Hispanic Female. The three students who earned a F grade were identified as one Black Female, one Hispanic Female, and one Hispanic Male.

## References

Arendale, D. (1992). *Understanding the Supplemental Instruction model. Supplemental Instruction: Increasing achievement and retention*. Jossey-Bass

Creswell, J. & Guetterman, T. (2019). *Educational research. Planning, conducting, and evaluating quantitative and qualitative research*. (6th ed). Pearson

Dale, E. (1969). *Audiovisual Methods in Teaching*. Holt, Rinehart, and Winston

Keimig, R. (1983). Raising academic standards: A guide to learning improvement. <https://files.eric.ed.gov/fulltext/ED233669.pdf>

Kirp, D. (2019). *The college scandal*. Oxford University Press

Muijs, D. (2022). *Doing quantitative research in education with IBM SPSS statistics*. 3rd ed. Sage

Piaget, J. (1936). *Origins of intelligence in the child*. London: Routledge & Kegan Paul

Swail, W.S., (2004). *The art of student retention: A handbook for practitioners and administrators*

Szafran, R. (2012). *Answering questions with statistics*. Sage

Tinto, V. (1975, 1987, 1993). *Leaving college: Rethinking the causes and cures of student attrition*. The University of Chicago Press. <https://conservancy.umn.edu/bitstream/handle/11299/200466/foundation%20and%20theoretical%20framework.pdf?sequence=3&isAllowed=y>

Tinto, V. (2012). *Completing College. Rethinking institutional action*. Chicago

Vygotsky, L. (1962). *Thought and language*. Cambridge, MA.

Vygotsky, L. (1962). *Thought and language*. Cambridge, MA.