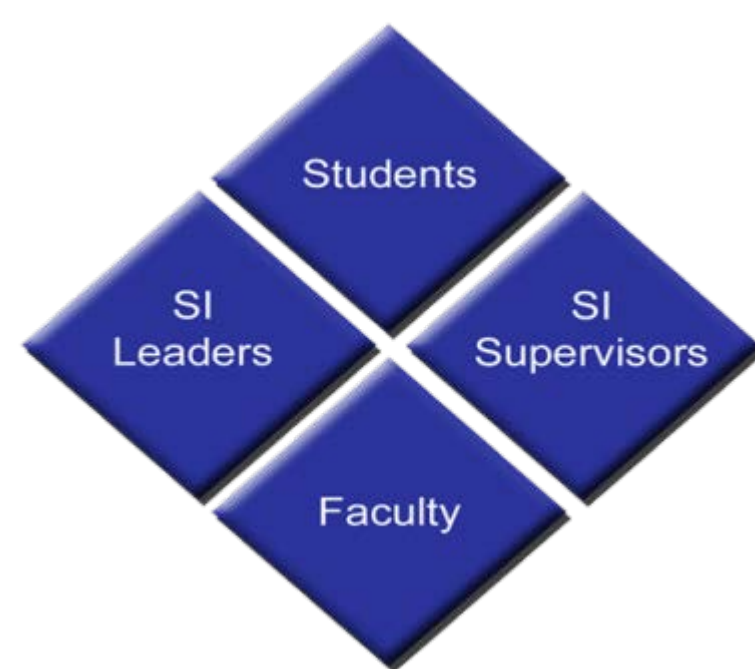# The Role of Embedded Tutoring in the Classroom and its Impact on Student Engagement and Performance

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## Abstract

The University of Houston-Downtown's Supplemental Instruction (SI) peer academic support program provides tutoring assistance for high DFW core curriculum courses. In the traditional SI model, SI Leaders hold free, voluntary out-of-class collaborative study sessions as a supplement to class lectures. At UHD, SI Leaders also facilitate in-class embedded tutoring in addition to their normal study sessions. This model is used in team-based learning (TBL) freshman biology and chemistry courses, as well as problem-based learning (PBL) college algebra, physics, and calculus sections.
In the 2014-2016 academic years, embedded tutoring was associated with a marked increase in out-of-class tutoring attendance. Additionally, comparison of course grade showed an average of 0.5 grade-point difference between students from embedded tutoring classrooms who attended SI sessions and those that did not. Data analysis (pending) will also determine whether there were any differences in overall impressions of the SI program between students who attended study sessions and those that did not. This data, coupled with end-of-semester grade data, will help determine whether in-class SI facilitation assisted in increasing engagement and performance, independent of whether students attended out-of-class study sessions.

## Introduction

Supplemental Instruction (SI), created at the University of Missouri-Kansas City, is an academic assistance program that utilizes peer-assisted study sessions. SI sessions are regularly scheduled, informal review sessions where students compare notes, discuss readings, develop organizational tools, and predict test items. Students learn how to integrate course content and study skills while working together. The sessions are facilitated by "SI leaders", students who have previously done well in the course and who attend all class lectures, take notes, and act as model students.

## SI Sessions

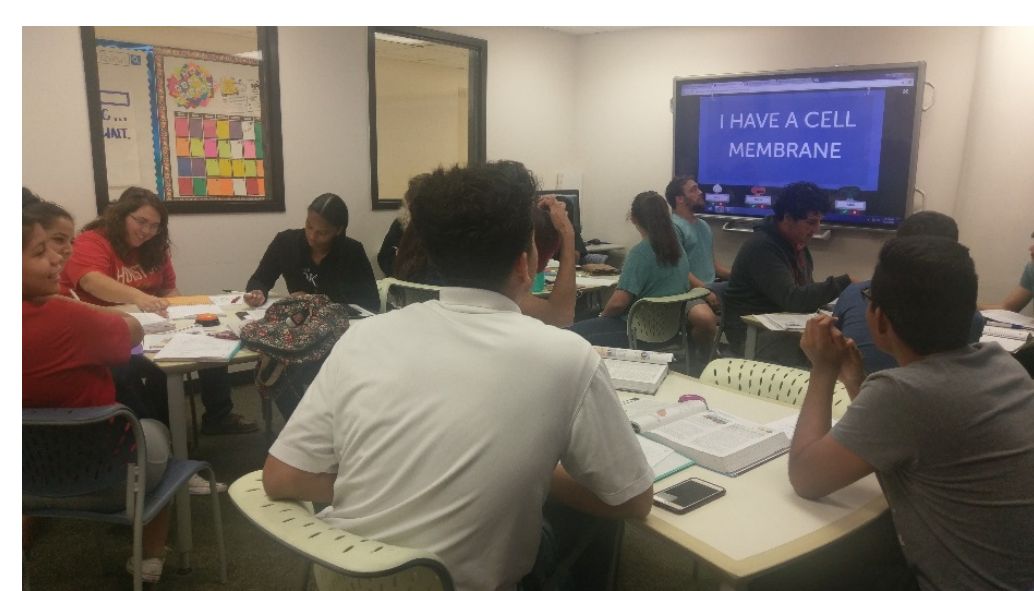Figure 2. History 1305 Session (Charades), Fall 2016

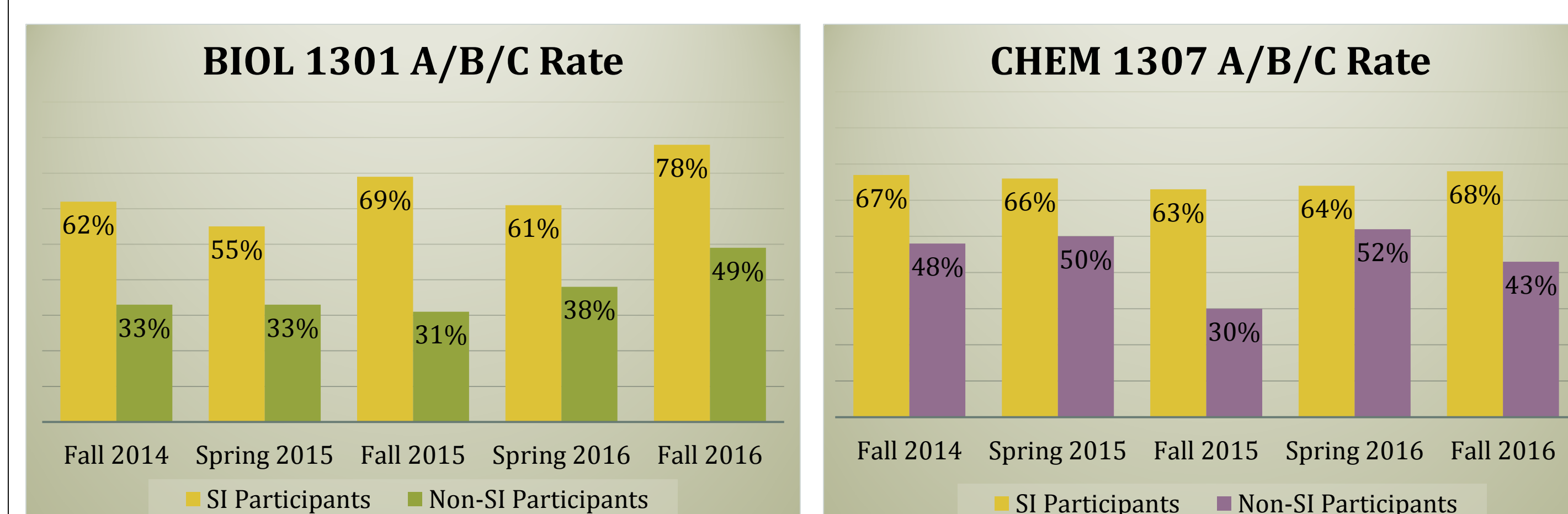Figure 3. Biology 1301 Session (Jeopardy), Fall 2016

## SI Leader

- Taken and mastered the course (B or higher)
- Minimum 3.0 cumulative GPA
- Faculty recommendation (required)
- SI Leader recommendation (recommended)
- 3-part hiring process that looks for the following attributes:
  ❖ Professionalism
  ❖ Written communication skills
  ❖ Oral communication skills
  ❖ Personality
  ❖ Performance under stress
- Training in:
  ❖ Collaborative study techniques
  ❖ Customer service
  ❖ FERPA
  ❖ Title IX
  ❖ Blackboard Learn

## Team-Based Learning

- BIOL 1301/1302
- CHEM 1307/1308
- Students are placed into permanent groups at the beginning of the semester
- Students are expected to have read textbook chapters and/or watched lectures prior to class
- 2-Part Readiness assurance process (RAP) conducted during beginning of class:
  ❖ iRAT: Individual assessment
  ❖ tRAT: same assessment, completed as a team
- Based on RAP performance, lecturers tailor mini-lecture around difficult concepts

## GPA Comparison for BIOL 1301 & CHEM 1307

**BIOL 1301 A/B/C Rate**

| | Fall 2014 | Spring 2015 | Fall 2015 | Spring 2016 | Fall 2016 |
|---|---|---|---|---|---|
| SI Participants | 62% | 55% | 69% | 61% | 78% |
| Non-SI Participants | 33% | 33% | 31% | 38% | 49% |

*Fall 2014: N=120, N=113; Spring 2015: N=58, N=87;*
*Fall 2015: N=125, N=133; Spring 2016: N=57, N=77;*
*Fall 2016: N=125 , N=110*

**CHEM 1307 A/B/C Rate**

| | Fall 2014 | Spring 2015 | Fall 2015 | Spring 2016 | Fall 2016 |
|---|---|---|---|---|---|
| SI Participants | 67% | 66% | 63% | 64% | 68% |
| Non-SI Participants | 48% | 50% | 30% | 52% | 43% |

*Fall 2014: N=155, N=131; Spring 2015: N=138, N=90;*
*Fall 2015: N=97, N=115; Spring 2016: N=60, N=109;*
*Fall 2016: N=105 , N=88*
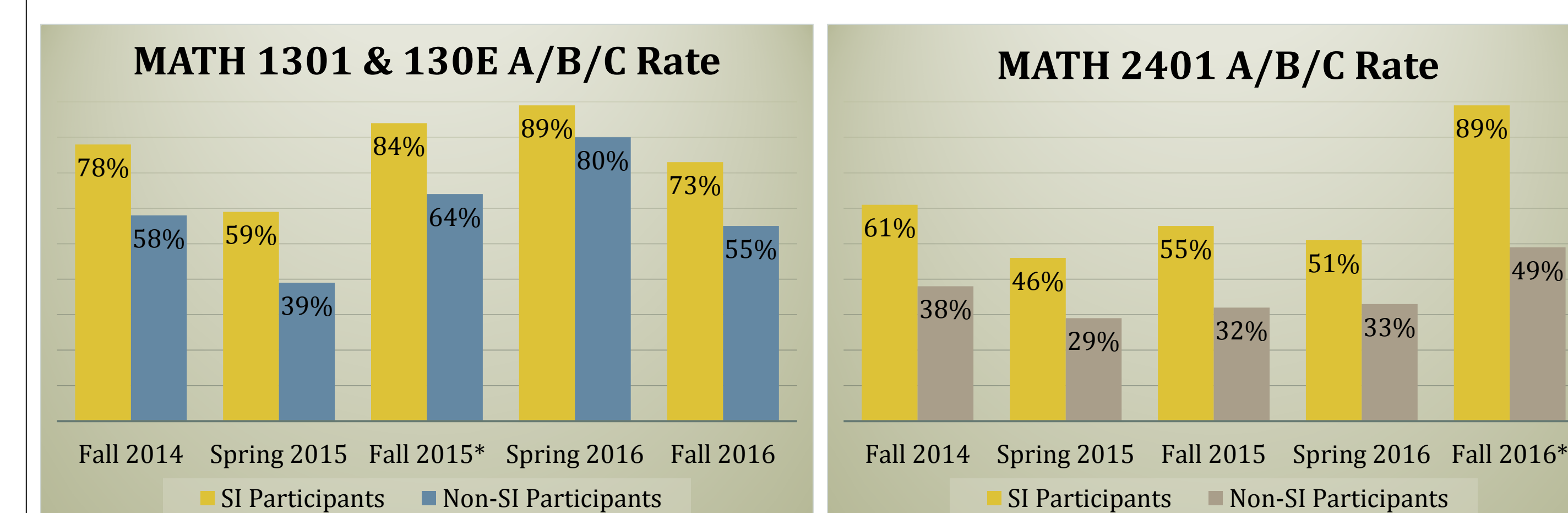
## Percentage of Withdrawals

| BIOL 1301 | SI Participants | Non-SI Participants |
|---|---|---|
| Fall 2014 | 5.0% | 15.9% |
| Spring 2015 | 12.1% | 23.0% |
| Fall 2015 | 0.8% | 11.3% |
| Spring 2016 | 7.0% | 14.3% |
| Fall 2016 | 4% | 13.6% |

| CHEM 1307 | SI Participants | Non-SI Participants |
|---|---|---|
| Fall 2014 | 6.5% | 7.6% |
| Spring 2015 | 7.2% | 14.4% |
| Fall 2015 | 5.2% | 17.4% |
| Spring 2016 | 5.0% | 14.7% |
| Fall 2016 | 6.7% | 14.6% |

## Problem-Based Learning

- MATH 130E, 2401*
- PHYS 1307*/1308*
- Students work through exercises individually or in loosely formed, non-permanent groups
- Activities can be in-class assignments or homework
- Some assignments can be started in class and finished/continued in SI sessions
- Modeled in traditional and flipped classrooms

*Not all sections implemented PBL design.

## GPA Comparison for MATH 1301/130E & MATH 2401

**MATH 1301 & 130E A/B/C Rate**

| | Fall 2014 | Spring 2015 | Fall 2015* | Spring 2016 | Fall 2016 |
|---|---|---|---|---|---|
| SI Participants | 78% | 59% | 84% | 89% | 73% |
| Non-SI Participants | 58% | 39% | 64% | 80% | 55% |

*Year embedded tutoring began

Fall 2014: N=135, N=301; Spring 2015: N=39, N=171;
Fall 2015: N=31, N=72; Spring 2016: N=9, N=15;
Fall 2016: N=42 , N=77

**MATH 2401 A/B/C Rate**

| | Fall 2014 | Spring 2015 | Fall 2015 | Spring 2016 | Fall 2016* |
|---|---|---|---|---|---|
| SI Participants | 61% | 46% | 55% | 51% | 89% |
| Non-SI Participants | 38% | 29% | 32% | 33% | 49% |

*Year embedded tutoring began

Fall 2014: N=49, N=50; Spring 2015: N=60, N=62;
Fall 2015: N=54, N=91; Spring 2016: N=62, N=53;
Fall 2016: N=44 , N=58

## Percentage of Withdrawals

| MATH 1301/130E | SI Participants | Non-SI Participants |
|---|---|---|
| Fall 2014 | 2.7% | 6.6% |
| Spring 2015 | 2.6% | 11.1% |
| Fall 2015 | 0% | 1.4% |
| Spring 2016 | 0% | 6.7% |
| Fall 2016 | 2.4% | 6.5% |

| MATH 2401 | SI Participants | Non-SI Participants |
|---|---|---|
| Fall 2014 | 4.1% | 6.0% |
| Spring 2015 | 3.3% | 16.1% |
| Fall 2015 | 3.7% | 17.6% |
| Spring 2016 | 1.6% | 7.5% |
| Fall 2016 | 2.3% | 6.9% |

## Testimonials

- "Rajni was awesome in class especially when completing class assignments."
- "Ashley was a great SI very clear material and was a major help to surviving chemistry II"
- "I think SI sessions are really helpful and I'm grateful the school provides these services."

## Future Directions

Currently, data collection and analysis related to student engagement in the classroom is ongoing through the administration of qualitative end-of-semester surveys. Furthermore, course redesign efforts are being made in more classes with assistance from Supplemental Instruction. This data, along with data collected in future semesters, will help in further understanding student learning styles with the goal of increasing student retention in freshman and sophomore gateway and barrier courses.

## Acknowledgements