# The Effects of Implementing Language Objectives in the Technology Education Classroom

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## Introduction

The Sheltered Instructional Protocol (SIOP) is a teaching model composed of 30 features that help address the specific needs of English as a second language (ESL) students and English language learners (ELLs) in the classroom (Echevarria, Vogt, & Short, 2008). In American public schools, the number of students who speak a primary language other than English has increased dramatically in recent years. In 2014, approximately 7.2 million students were either foreign born, or had parents who were born outside of the U.S. (United States Census Bureau, 2014). Many of these students have developed conversational English skills, however without English being spoken at home these ELLs are at a disadvantage for learning academic English that is required for academic success. Studies have shown that when implemented in schools with ESL or non-ESL students, SIOP students shown more academic growth (Short, Echevarria, & Richards-Tutor, 2011) (Collins, 2009).

## Location & Participants

This study was implemented in two sections of a 9th-12th grade Introduction to Engineering Technologies, at Washington Township High School in Sewell, NJ (*N*=33). The participants' academic levels ranged from special education to advanced placement students. Three participants speak a language other than English at home.

## Research Questions

***Topic Question:*** What effect does implementing "Feature 2: Setting Language Objectives" of the Lesson Preparation component of SIOP in a technology education environment have on students' achievement?

**Sub question 1:** In what ways does clearly defining language objectives impact students' mastery of content material in a technology education class?

**Sub question 2:** In what ways does clearly defining language objectives impact student engagement with peers in a technology education class?

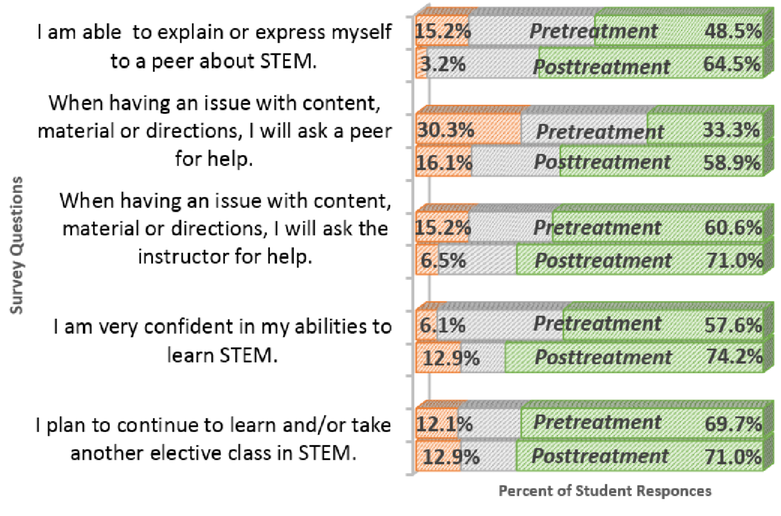
**Sub question 3:** How does increasing technical vocabulary impact student confidence in science, technology, engineering and mathematics?

**Sub question 4**: How does increasing technical vocabulary impact student interest in pursuing further opportunities in science, technology, engineering and mathematics?

**STEM stands for Science, Technology, Engineering and Mathematics*

## Data

### Student Survey responses




***Note.*** **(*N*=33, *N*=31)**

### Formative Assessment Performance

| | With Treatment | Without Treatment | Percent Change |
|---|---|---|---|
| *Design Units* | 92% | 80% | 15% |
| *Building Units* | 85% | 89% | -4% |
| *Overall* | 89% | 84% | 5% |

***Note.*** **(*N*=33)**

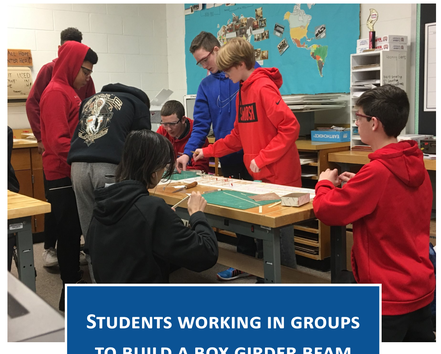
### Classroom Observations

| | WITH LANGUAGE OBJECTIVE | WITHOUT LANGUAGE OBJECTIVE | WITH LANGUAGE OBJECTIVE | WITHOUT LANGUAGE OBJECTIVE |
|---|---|---|---|---|
| **Percent of students...** | TALKING ACROSS THE ROOM | | SPEAKING IN A LOUD VOICE | |
| *Design Phase* | 7% | 11% | 5% | 2% |
| *Build Phase* | 10% | 12% | 9% | 9% |
| **Percent of students...** | NOT INVOLVED IN CLASS DISCUSSIONS | | WHO ASK PEERS FOR HELP | |
| *Design Phase* | 9% | 17% | 45% | 9% |
| *Build Phase* | 9% | 10% | 79% | 85% |
| **Percent of students...** | HOLDING OFF TOPIC CONVERSATIONS | | WHO ASK INSTRUCTOR FOR HELP | |
| *Design Phase* | 40% | 27% | 12% | 26% |
| *Build Phase* | 47% | 32% | 18% | 10% |

***Note.*** **(*N*=33)**

## Methodology

This classroom research project had the instructor implement a design unit with language objectives followed by a building unit without language objectives, and then a design until without language objectives followed by a building unit with language objectives. Data was collected on student academic achievement, student interactions, student confidence, and student interested using classroom observations, formal interviews, student journals, student surveys, and formal assessments.



STUDENTS WORKING IN GROUPS TO BUILD A BOX GIRDER BEAM

## Conclusion

When language objectives were clearly defined, students' perception of the content material was impacted. Student performance on assessments increased an average of five percent and language objectives had a more profound effect on achievement during traditional units, such as design, compared to hands-on, building units.

Language objectives also had an impact on student engagement with peers. During the design phase, students were 74.4% more likely to seek help from their peers, and students were more likely to be engaged in class discussions compared to the unit without language objectives.

By setting language objectives and increasing technical language, students became more confident in their abilities to learn STEM* concepts. Initially only 57.6% of students identified as being confident in their abilities to learn, but, posttreatment, the number increase to 74.2%. By setting language objectives during the design phase, students participated in more techniques for learning, and became more confident in their abilities to learn new information. However, there was no data that showed correlation between increasing technical language and student interest in pursuing further opportunities in science, technology, engineering and mathematics. As a result of this project, I plan on continuing to implement language objectives during design phases to increase student engagement and academic achievement.

## References

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