

# Language Differences by Environment in STEM Classroom Engagement Activities

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## Introduction

- Studies show that across most countries, there is an achievement gap between language minority students and native speaking students for both reading and math. However, it has also been found that speaking a minority language more often at home with parents is actually positively related to math and reading achievement
- The effects of an added digital environment have been found to promote students' active participation in the class and their overall relationship with the instructor.
- In blended learning environments, a significant reduction in the percentage of students identified as at-risk for reading failure has been found in both the English learning and non-English learning groups.
- Findings show that the BYOD (Bring Your Own Device) apps can help students improve their science knowledge without time and place constraints and gain a better sense of ownership in their learning.

## Objectives

- Understand how students are reflecting on their science learning and how these reflections are affected by their environment.
- Determine if students use more science-based vocabulary when recording videos at school and more experienced-based vocabulary when recording at home.

## Materials

Flipgrid is an online Social-Learning Environment used by educators participating in the ESPRIT project.

- Five separate prompts from 31 students,
- 44 responses were not coded based on exclusion criteria
- totaling 111 responses

## Participants

- Information from the school as a whole revealed a demographic composition of 87% African American, 5% Native American, 4% Hispanic, and 3% White students.

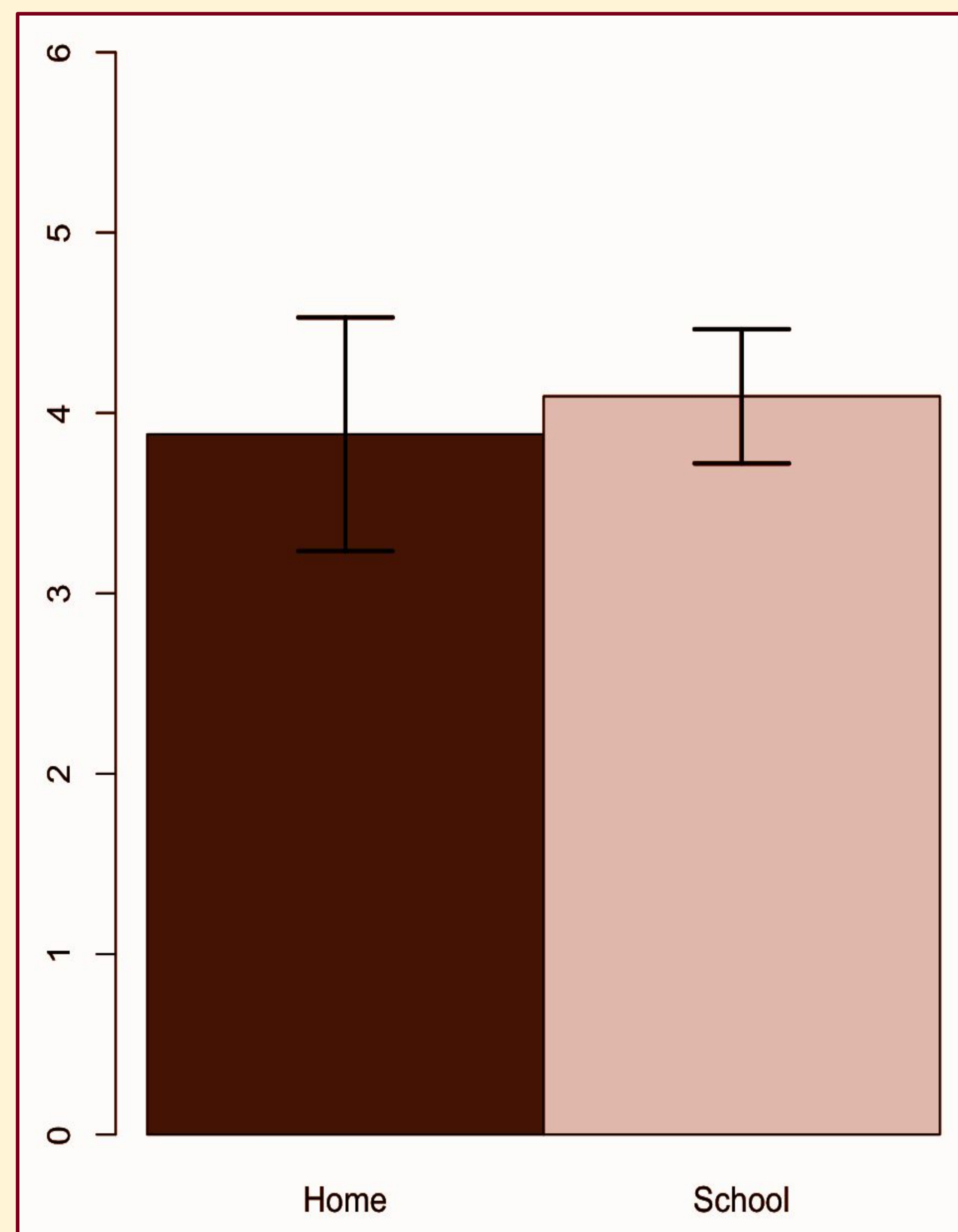
## Methods

	Personal Engagement	Science Engagement 1	Science Engagement 2	Science Engagement 3
Level 1	No	Yes	No	No
Level 2	No	No	Yes	No
Level 3	No	No	No	Yes
Level 4	Yes	Yes	No	No
Level 5	Yes	No	Yes	No
Level 6	Yes	No	No	Yes

## Procedure

- Responses were coded on a 6-level system. Personal Engagement was defined and identified as present or not present.
- Three tiers of Scientific Engagement were identified on each response.
- Researchers deliberated on each code to reach agreement.

## Results



For our analysis we ran an independent samples t-test to see whether there was a significant difference in the average ratings between responses recorded at home ( $M = 3.88$ ) and responses recorded at school ( $M = 4.09$ ).

$$t(109) = -0.572, p = 0.568.$$

Thus, there was a not a significant difference in mean rating scores.

Figure. Barplot graphing the average personal engagement ratings between home and school responses. Error bars are included.

## Conclusions

According to the independent samples t-test conducted, no significant language difference was found. Therefore, it can be understood that STEM classroom engagement activities conducted through social-media learning environment allows students to be flexible in thinking academically and showing personal engagement both at school and at home.

### Limitations

- Limited source of data.
  - More responses may increase validity and reliability
- Responses of parents and siblings were excluded
  - These responses showed high personal engagement and were exclusively at home

### Ideas for Future Research

- The language difference between students completing classroom engagement activities in English and those in their native speech.

### Sources

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<sup>2</sup>Biau, I., & Shamir-Inbal, T. (2017). Digital technologies for promoting student voices and co-creating learning experience in an academic course. *Instructional Science*, 46(2), 315-336. doi:10.1007/s11251-017-9436-y  
<sup>3</sup>Kazakoff, E. R., Macaruso, P., & Hook, P. (2017). Efficacy of a blended learning approach to elementary school reading instruction for students who are English Learners. *Educational Technology Research and Development*, 66(2), 429-449. doi:10.1007/s11423-017-9565-7  
<sup>4</sup>Song, Y., & Wen, Y. (2017). Integrating Various Apps on BYOD (Bring Your Own Device) into Seamless Inquiry-Based Learning to Enhance Primary Students' Science Learning. *Journal of Science Education and Technology*, 27(2), 165-176. doi:10.1007/s10956-017-9715-z