

A large red sphere is positioned behind the title text. Below the title, there are several overlapping blue geometric shapes, including a large hexagon and a triangle, creating a modern, abstract design.

Implementation of Active-Learning During STEM Academy for Middle School Science Teachers

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Background Information

Professional development (PD) can assist teachers with gaining skills necessary for STEM implementation in their classrooms (Capraro et al., 2014).

Teachers also benefit from on-going support in implementation in their classroom through intensive coaching (Reinke, 2014).

Students learn more from skilled STEM teachers with expertise in effective PBL implementation, while teachers who ineffectively implement STEM PBL negatively affect student performance (Darling-Hammond & Youngs, 2002; Rice, 2003; Wayne & Youngs, 2003)



STEM Academy



STEM Academy for Science Teachers and Leaders was developed to enhance in-service science teachers' STEM pedagogical knowledge and implementation on their campuses.



Teachers received professional development over the summer months and ongoing coaching during the school year.



The purpose of this study was to explore changes in teachers' implementation of STEM PBL in their classrooms during the STEM Academy using a quantitative approach.

Exploring how the STEM Academy influenced teacher STEM implementation is important to establish STEM teacher-education best practices.

Research Questions

- (1) How do teachers progress in STEM implementation during the STEM Academy as evidenced by observations of enacted practice?
- (2) How does teacher growth in STEM implementation compare across observed domains (i.e., classroom environment, lesson structure, implementation and science content knowledge)?

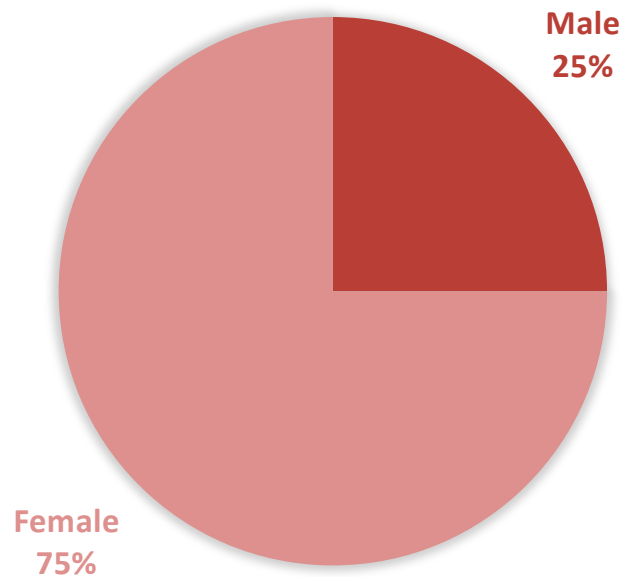


Research Design

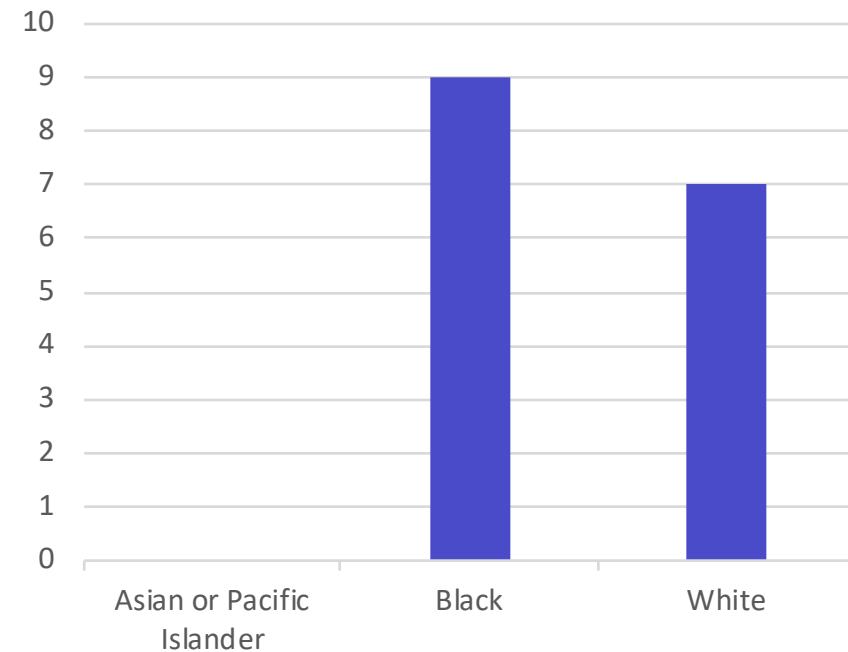


Sample (N = 16, n = 11)

GENDER

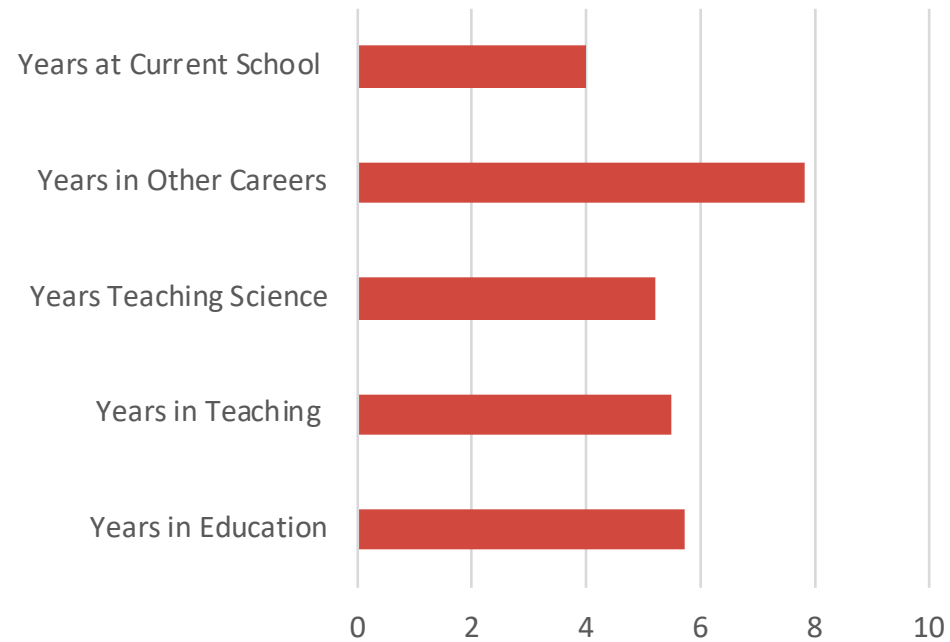


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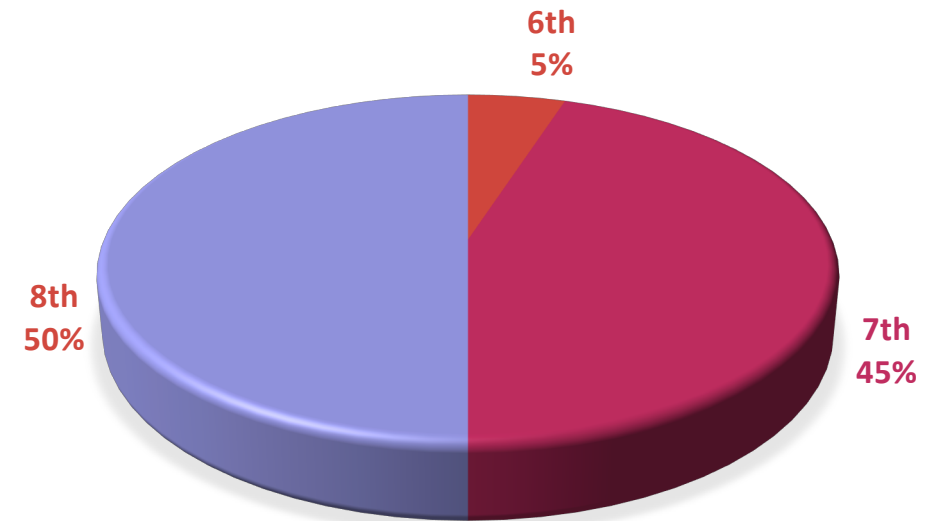


Sample (N = 16, n = 11)

Work Experience



GRADE-LEVEL



UTeach Observation Protocol (UTOP) (Walkington & Marder, 2013)



**Classroom
Environment**



Lesson Structure

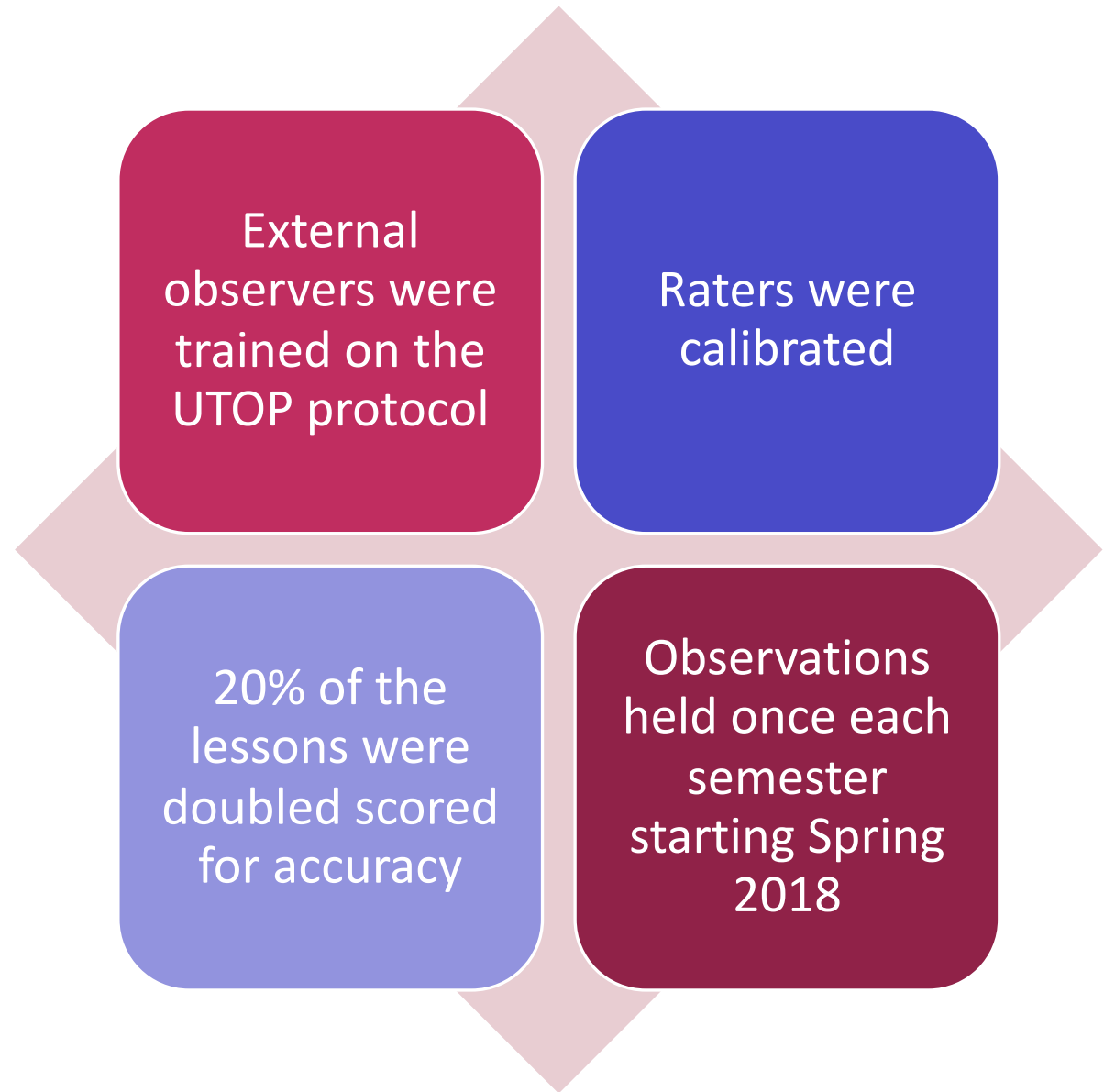


Implementation



Science Content

Data Collection



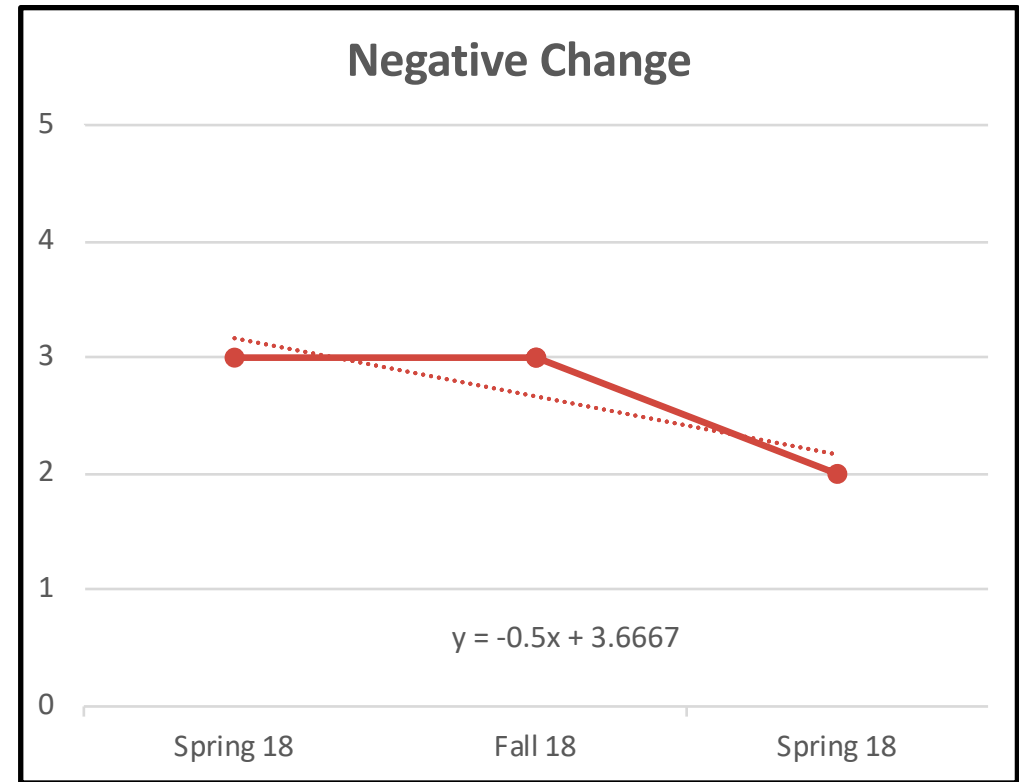
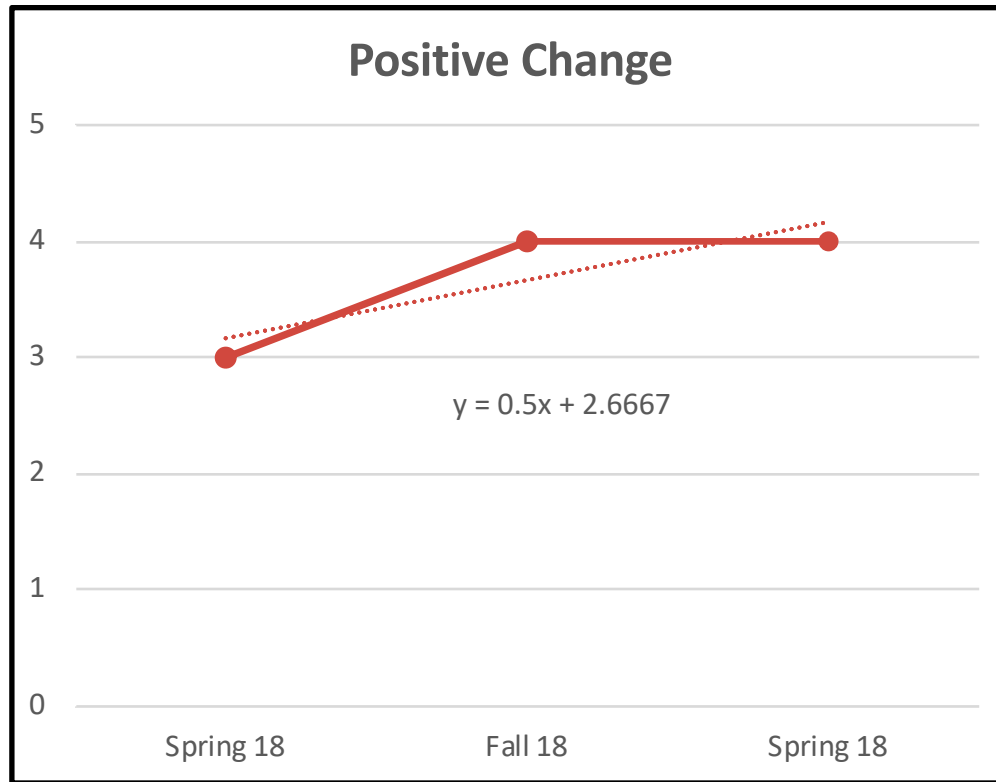
Means of Teacher STEM Implementation

Domains	Spring 2018	Fall 2018	Spring 2019	F Statistic	P-Value
Classroom Culture	2.7	2.5	3.4	3.06	.069
Lesson Structure	2.8	2.7	3.4	2.19	.141
Implementation	2.6	2.6	3.2	4.22	.029
Content Knowledge	2.4	2.9	3.5	5.40	.013

n = 11



Sample Teacher Trajectories (Domain 4)



Sample Teacher Grouping (Domain 1)

Positive



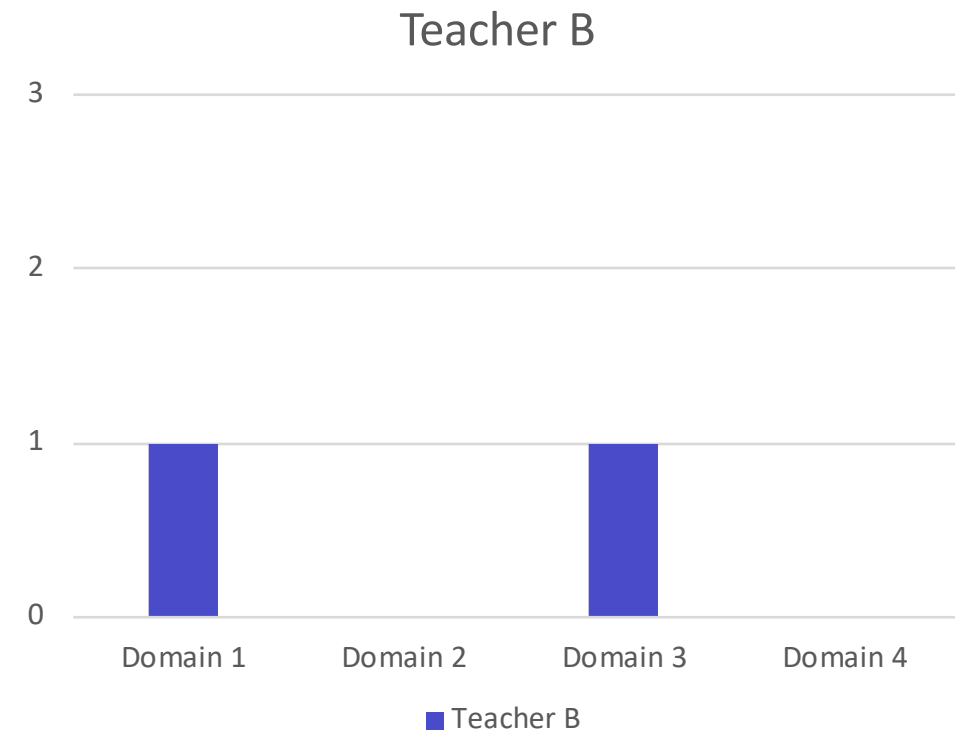
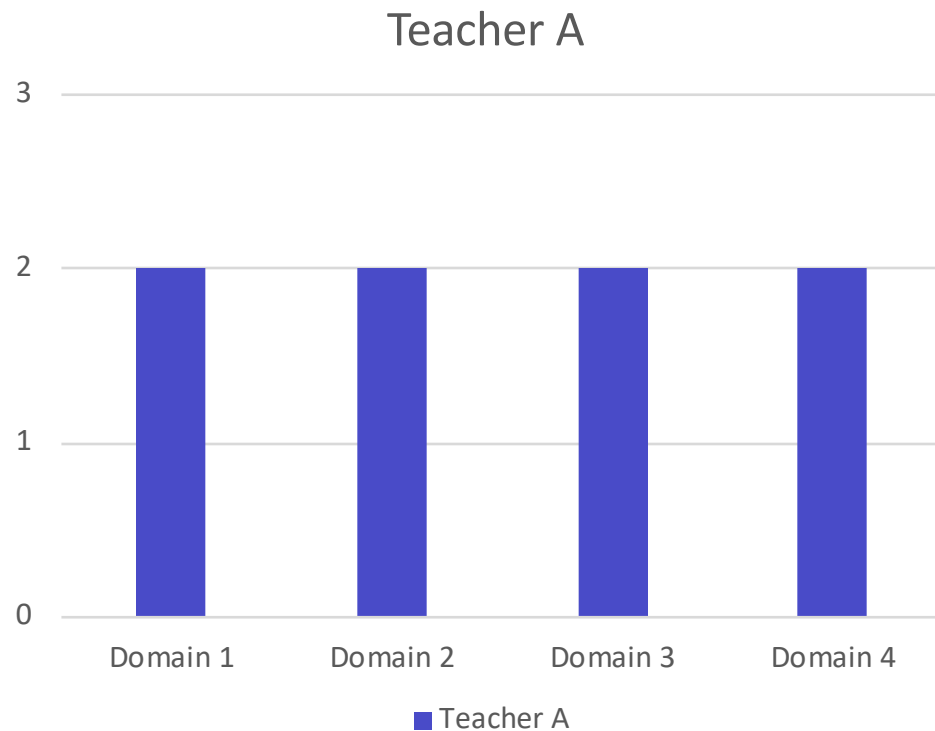
Negative



Neutral



Examples of Two Teachers' Growth Scores (range 0-2) Across All 4 Domains



Limitations

SMALL SAMPLE SIZE

Conclusions

RQ1. Evidence that teachers increased their implementation of STEM practices.

RQ2. Variability in change in STEM implementation across the 4 domains of the UTOP.

Observations:

Teachers who showed a decline in implementation in any one of the domains did not display growth in any other domain across the three time points.

Next Steps



Teacher interviews



Qualitative Evidence on the UTOP



Lesson plan analysis



Increase sample size



Run analysis with nonparametric results



Domain with most decrease



Control for teacher experience across the domains



Develop a list of best practices and recommendations to control for reduction of teacher implementation of stem

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