

NGSS Outcomes Measures Development

1. Initial review of program curriculum by evaluation staff with content expertise in chemistry and astronomy.
2. Review of curriculum alignment of program curriculum to NGSS
3. Drafting of assessment items
4. Review of items by program staff with content expertise in astronomy to ensure alignment
5. Internal reliability analysis of assessment data via Cronbach's alpha

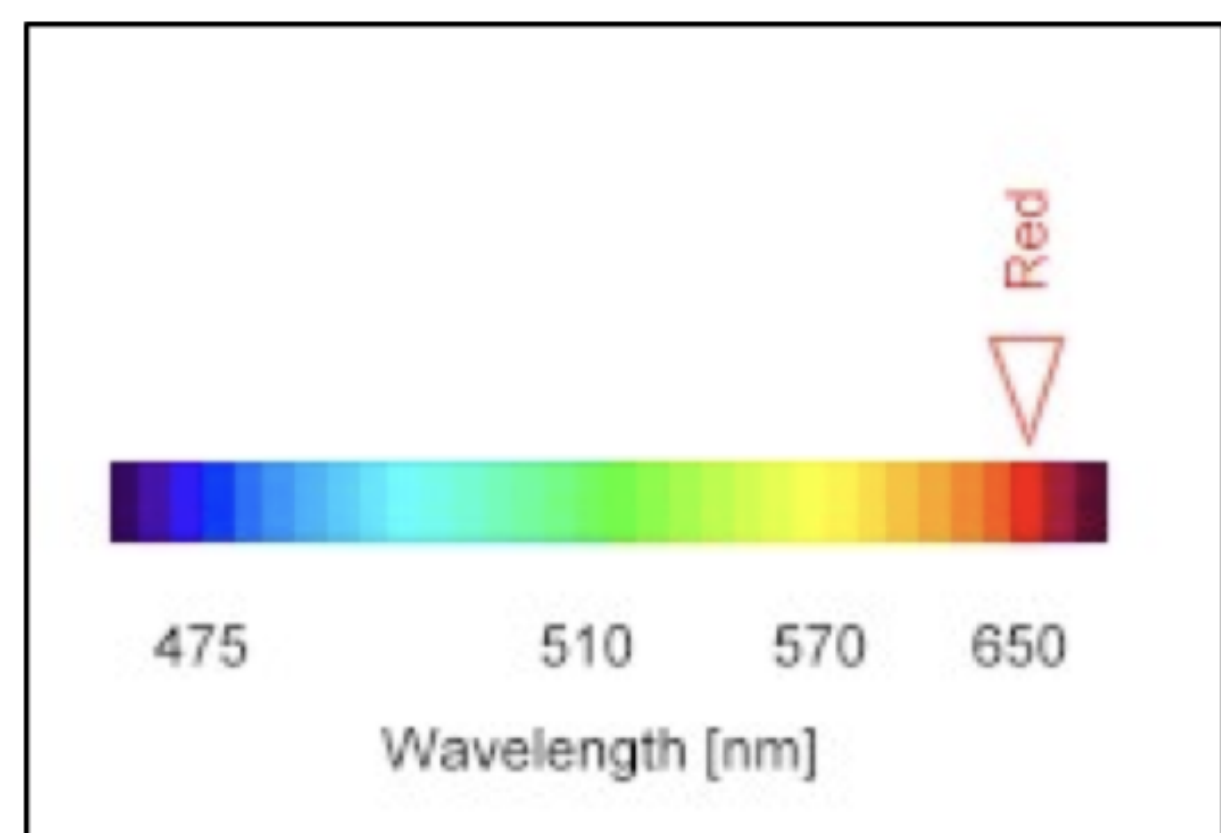
RCT Design & Implementation

1. Program agreed to recruit twice the normal number of program participants (teachers).
2. Evaluators randomly assigned teachers to intervention or waitlisted comparison
3. Study IDs were used to track student pre and post responses
4. Curriculum logs were collected from teachers to measure fidelity of implementation
5. Tracking logs were used to monitor survey administration and follow up with teachers as needed
6. Assessed between-group differences in pre-post changes while accounting for teacher nesting using hierarchical linear modeling

Challenges and Solutions

Challenges	Solutions
Equitable Program Access	Waitlisting
Data Tracking	Student Study IDs
Ensuring Survey Administration	Teacher Tracking Logs
Implementation Fidelity	Implementation Logs
Teacher Confounds	HLM Modeling
Internal reliability	Cronbach's alpha
Between-group differences	Attrition rates and demographics as confounds in HLM

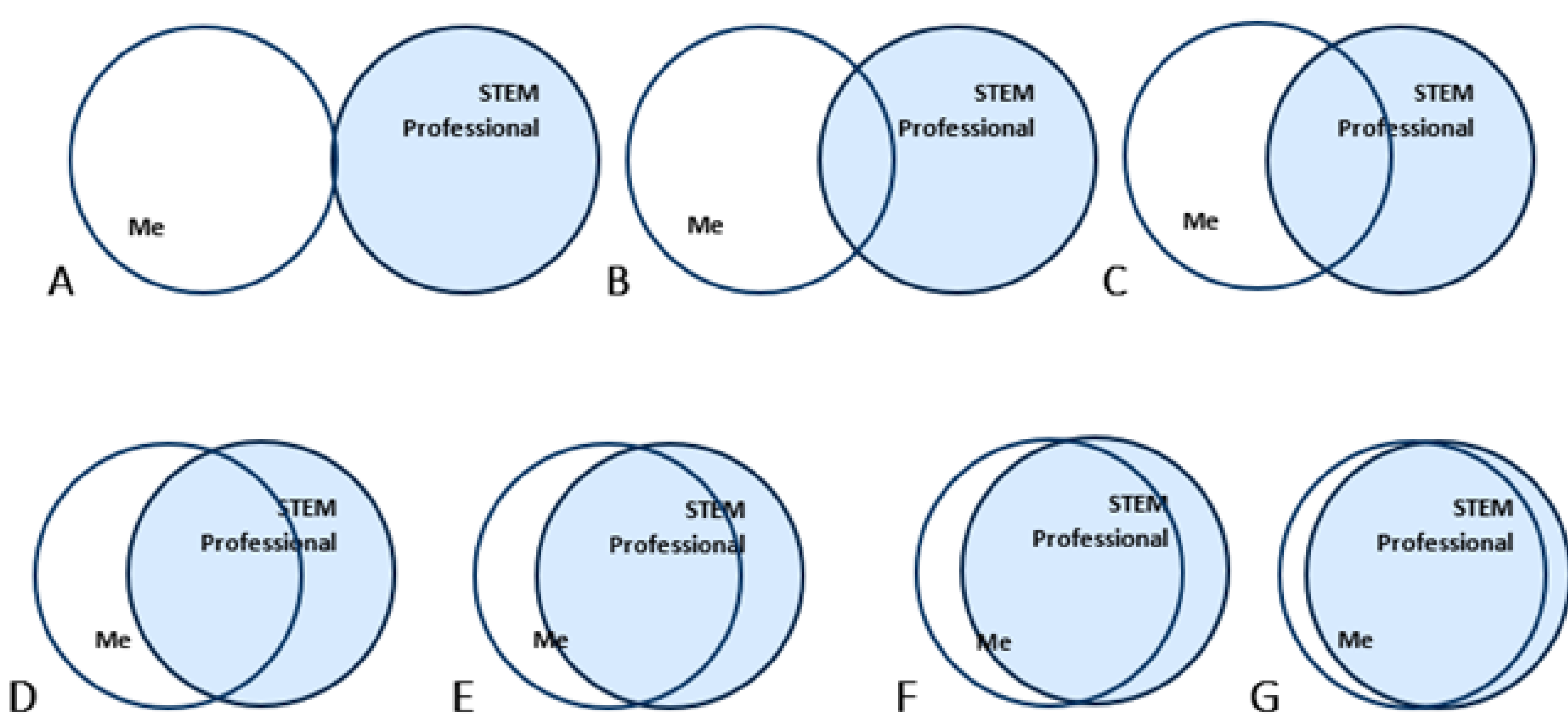
Sample Assessment Item



6. Which statement explains the difference between red light and blue light?

- ☐ A. Red light is warmer than blue light.
- ☐ B. Red light is brighter than blue light.
- ☐ C. Red light moves slower than blue light.
- ☐ D. Red light has less energy than blue light.

STEM Professional Identity Overlap Single Item Measure



Sample In-House Attitude Items

1. I would be comfortable with a job/career that requires using science.
2. I am interested in becoming a scientist.

Sample Test of Science-Related Attitudes Items

1. When I leave school, I would like to work with people who make discoveries in science.
2. I would dislike being a scientist after I leave school.

Study Instruments Over Time

	2017-18	2018 –19	2020 –21	2021 –22	2022 –23	2023 –24	2024 –25
Student Content Assessment	X	X	X	X			
In-house retrospective STEM attitude measures	X	X	X	X	X	X	X
In-house self-reported content gains	X	X	X	X	X	X	
PIO-1 Measure				X	X	X	X
TOSRA				X	X	X	X
Attention Check Items					X	X	X