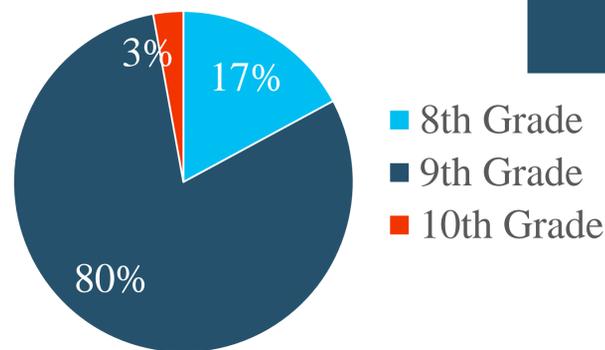


## BACKGROUND

In Vermont, science proficiency is based on the Next Generation Science Standards. Students develop their science skills, demonstrate understanding in the disciplinary core ideas and crosscutting concepts (CCC).

### SAMPLE

Earth science course at U-32 public high school. A total of 53 students across 3 sections.



### TREATMENT

CCC explicitly taught through activities based on the proficiency scale

- Defining each CCC
- Writing arguments to support why a given CCC applies to a given scenario
- Make a claim about the CCC in given scenario and support with evidence
- CCC Proficiency scale referenced by teacher and students throughout treatment period

## PROFICIENCY SCALE

Indicator	Beginning	Developing	Proficient	Advanced
Identify CCC in science	I can define the CCC.	Beginning + I can explain why the CCC the teacher gives me applies to a given scenario.	Developing + I can •Identify which CCC match the scenario. •I can explain why they match the scenario.	Proficient + I can compare examples in different domains of science for the same CCC.

## RESEARCH QUESTIONS

Does explicit instruction around crosscutting concepts paired with proficiency grading have impact on

- student mastery of content and crosscutting concepts?
- student confidence?

Does the use of proficiency scales help with student mastery of the crosscutting concepts?

## METHODOLOGY

Mastery of CCC

- CCC Pre scores based on CCC pre mastery test
- CCC Post scores based on CCC post mastery test
- If score = 0, than score based on the two formative assessments that assessed skill level at *Beginning* and *Developing* on the proficiency scale.

Mastery of Content

- Unit summative assessments at the end of each unit

Student Confidence

- Likert style questions in a pre and post survey determined student confidence with CCC

## CONCLUSIONS

The data suggests that

- There was no significant difference between the CCC pre and post scores.
- There was no significant difference between the unit summative assessments before treatment and post treatment.
- No conclusion can be made that the proficiency scale contributes to student mastery
- There was an association between direct teaching of the CCC and student understanding of the DCI. Magnitude and direction of the association was not determined.
- Students confidence with the CCC improved over the treatment period.

## RESULTS

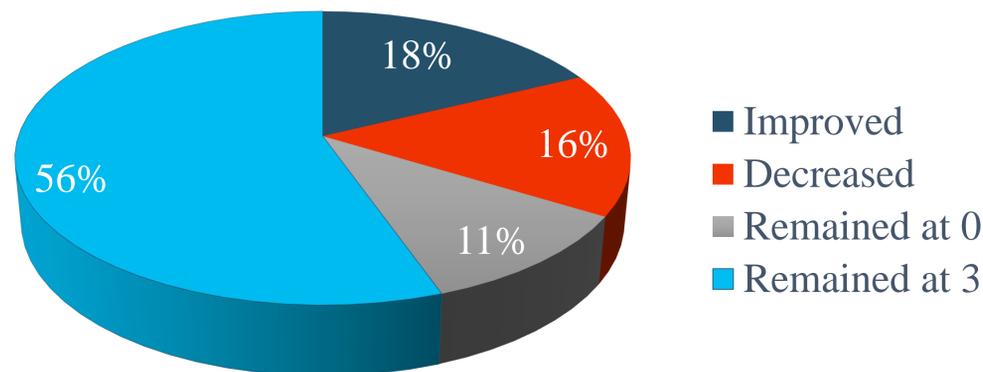


Figure 1. Difference in Pre and Post CCC Scores, (Post Scores – Pre Scores), (N=45).

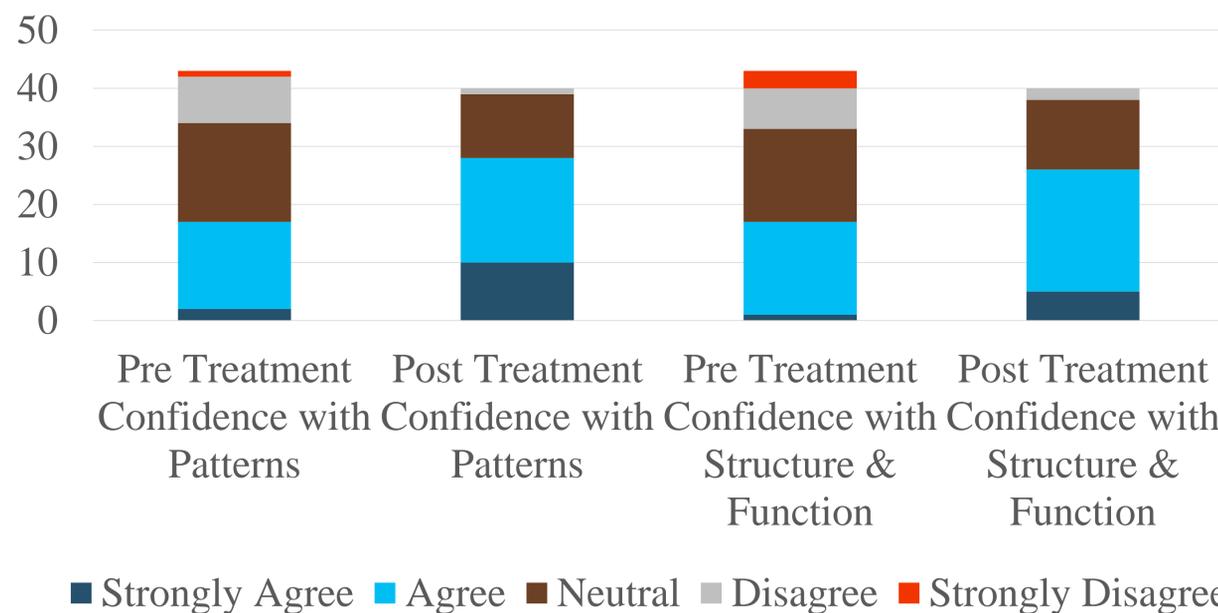


Figure 2. CCC Confidence in Patterns and Structure & Function Pre and Post Treatment Comparison, (N=40).