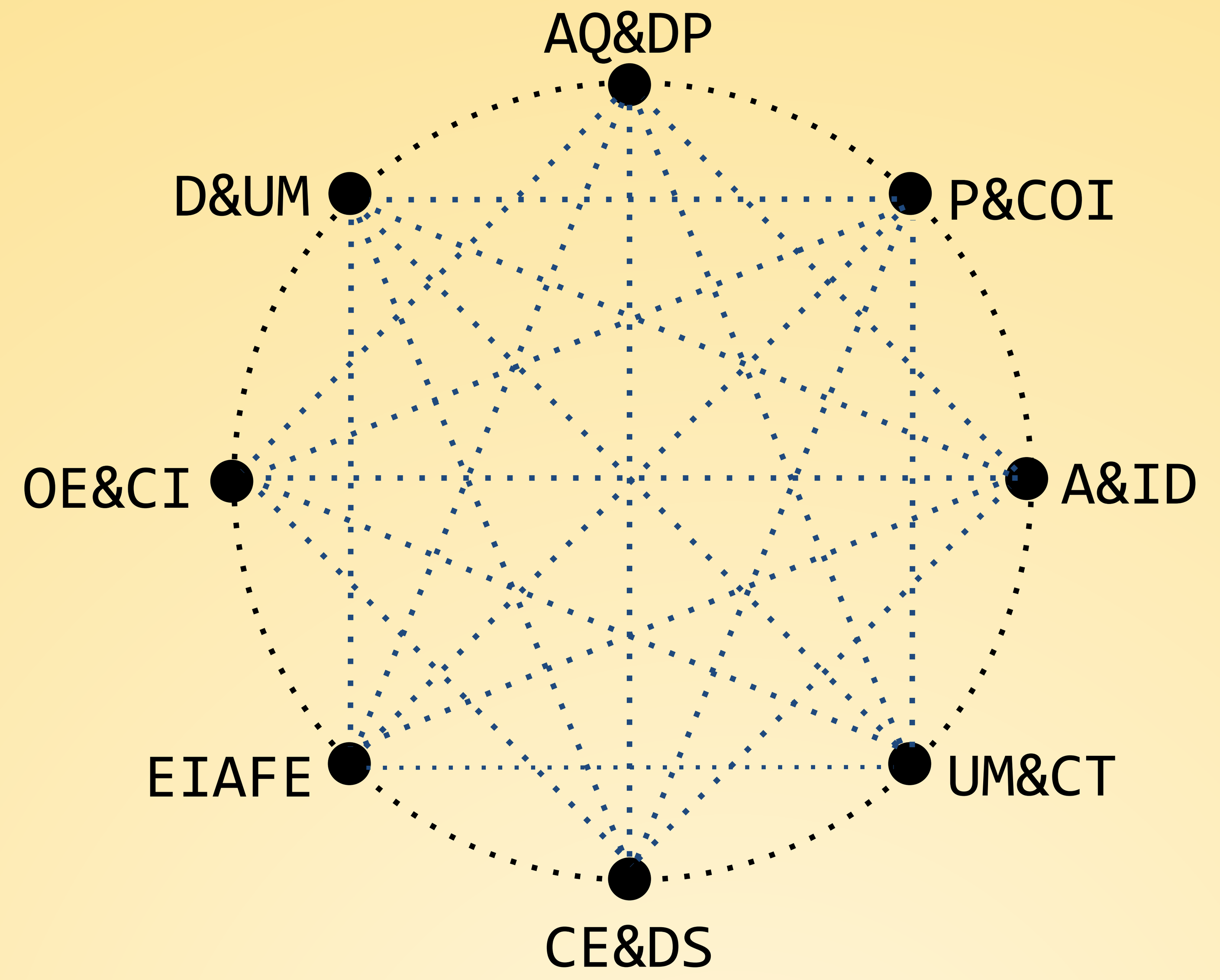
Metacognition and the Next Generation Science Standards

Background

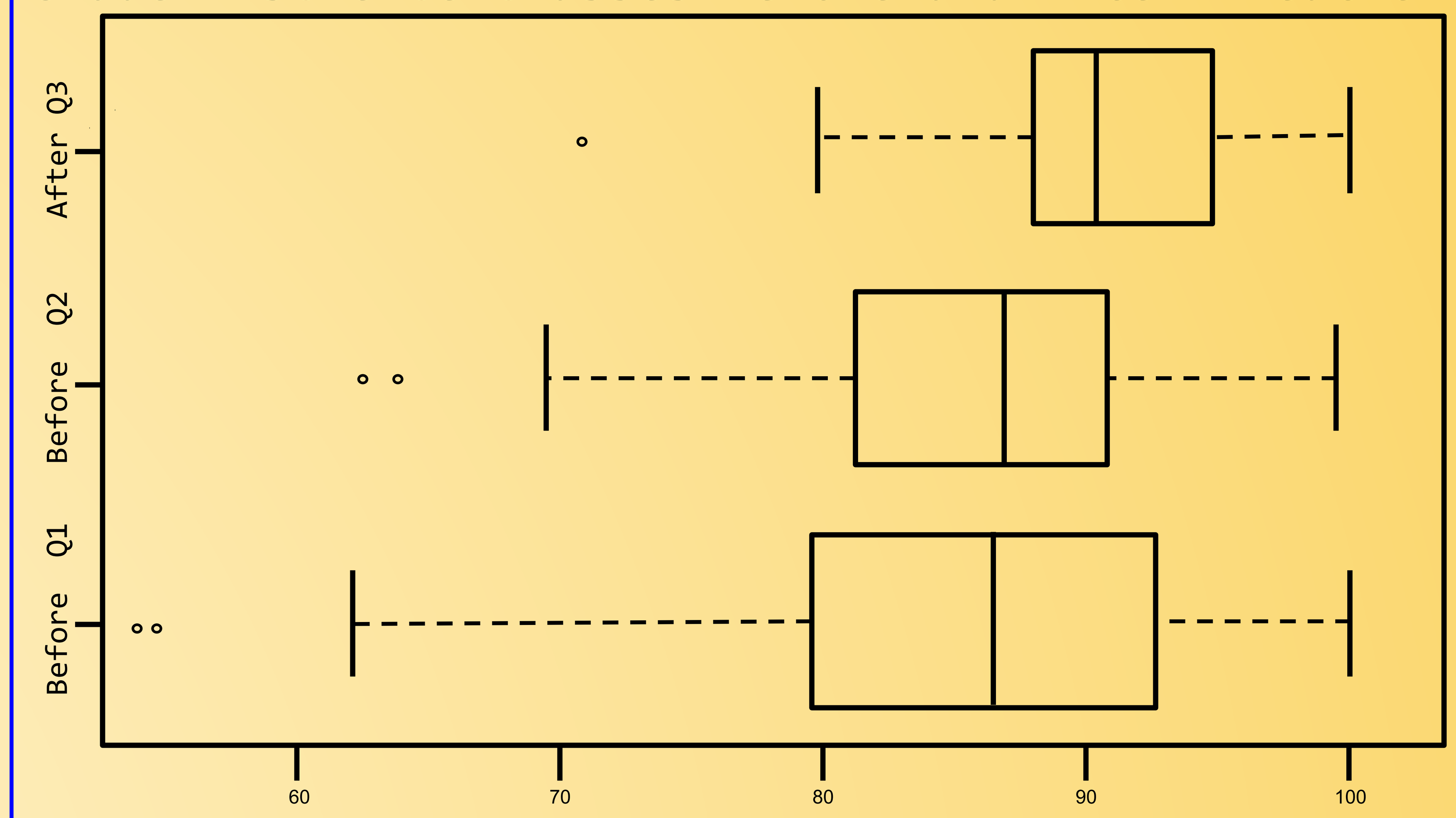
My research project was inspired after I noticed my middle school science students showed a lack of consistent retention, understanding, and transfer of the science and engineering practices within the NGSS. I implemented metacognitive strategies using a science practice model to trace the practice paths used each lesson. My hope was that this strategy would allow students to comprehend the practices more deeply and allow them to start predicting which practice to use to achieve mastery.



Science Practice Model
(Nyman & St. Clair, 2016)

Results

Grade 7 Science Classes Before and After Treatment

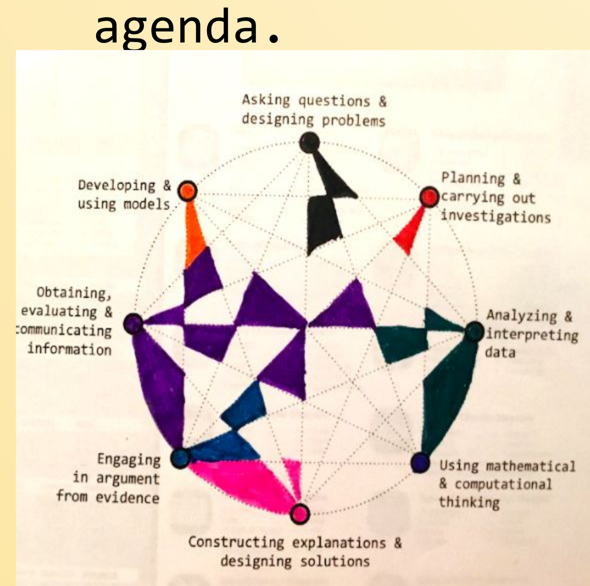
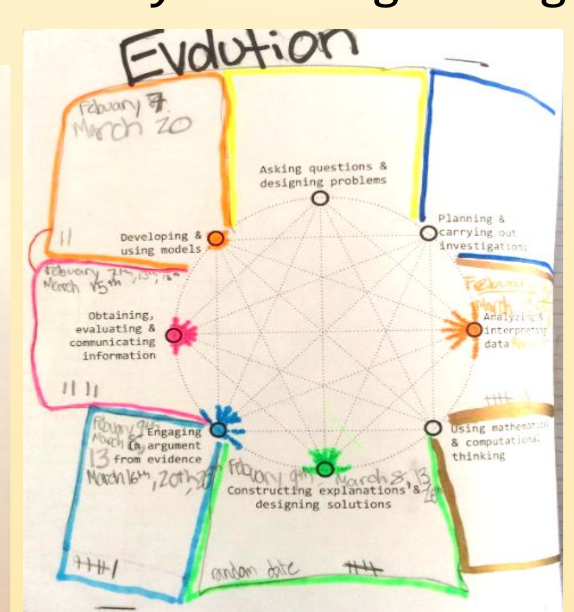


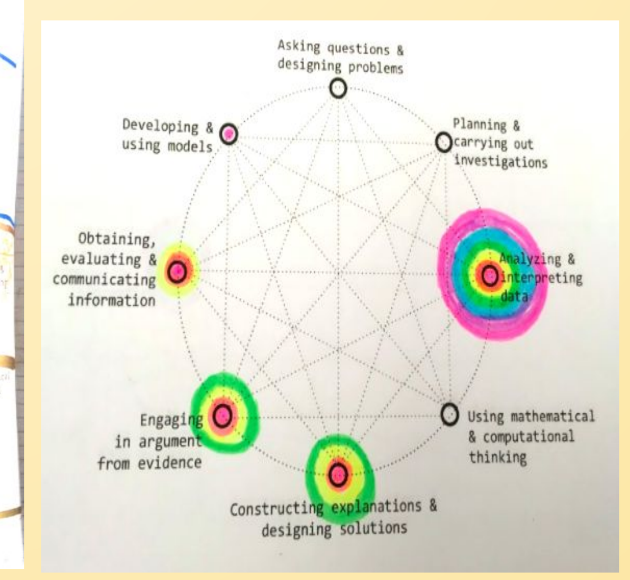
Research Questions

- How does the integration of metacognitive strategies impact student understanding and transfer of the NGSS Science and Engineering Practices?
  - What is the impact of metacognitive strategies on student understanding of the science and engineering practices?
  - How do students perceive the usefulness of the metacognitive strategies in relationship to understanding the science and engineering practices?

Treatment

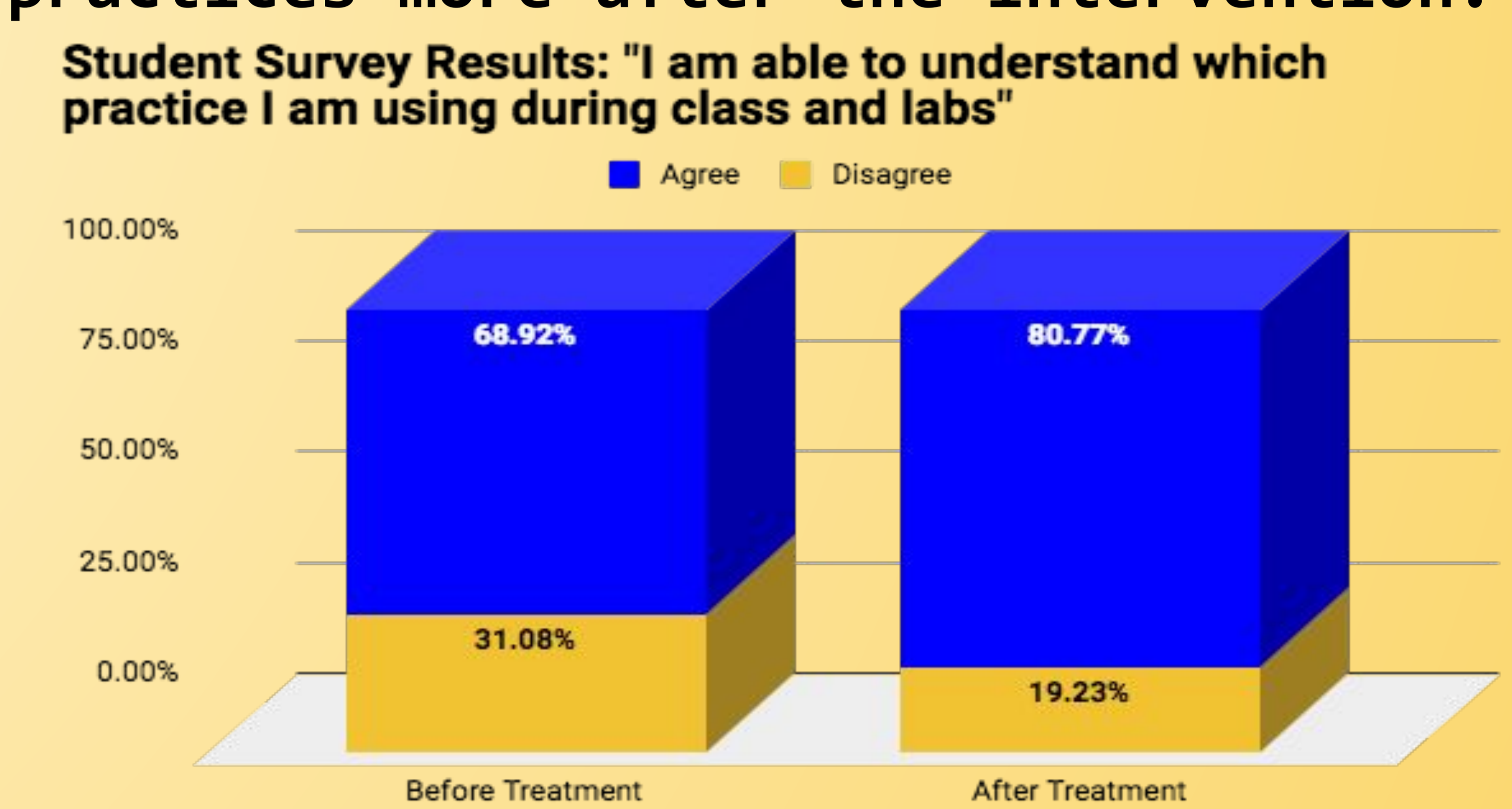
- Students practiced metacognitive skills by using the science practice tracker, each lesson throughout the unit.
- The first unit of the treatment, students marked which practice was going to be used in the beginning of every lesson.
- The following unit, they marked which practice they used after the lesson.
- The final unit, the students predicted which practice they would use that lesson by reading the guiding question and agenda.



Conclusions

- **The results of the assessment scores showed significant growth after treatment.**
- **Students reported that they understood the practices more after the intervention.**



Science and Engineering Practices

- *Asking questions and defining problems*
- *Developing and using models*
- *Planning and carrying out investigations*
- *Analyzing and interpreting data*
- *Using mathematics and computational thinking*
- *Constructing explanations and designing solutions*
- *Engaging in argument from evidence*
- *Obtaining, evaluating, and communicating information*

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