

# Teachers as Learners: Understanding Teachers' Perception of Representations

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# Designing Professional Development



Limited research in leveraging **Blended Learning** to support teachers as learners (Young & Lewis, 2008).



# Designing Professional Development for in-service elementary science teachers

**Representations** play an important role in scientific practice and, thus, science instruction (Danish et al., 2007; Ainsworth, 1999; Coleman et al., 2011).

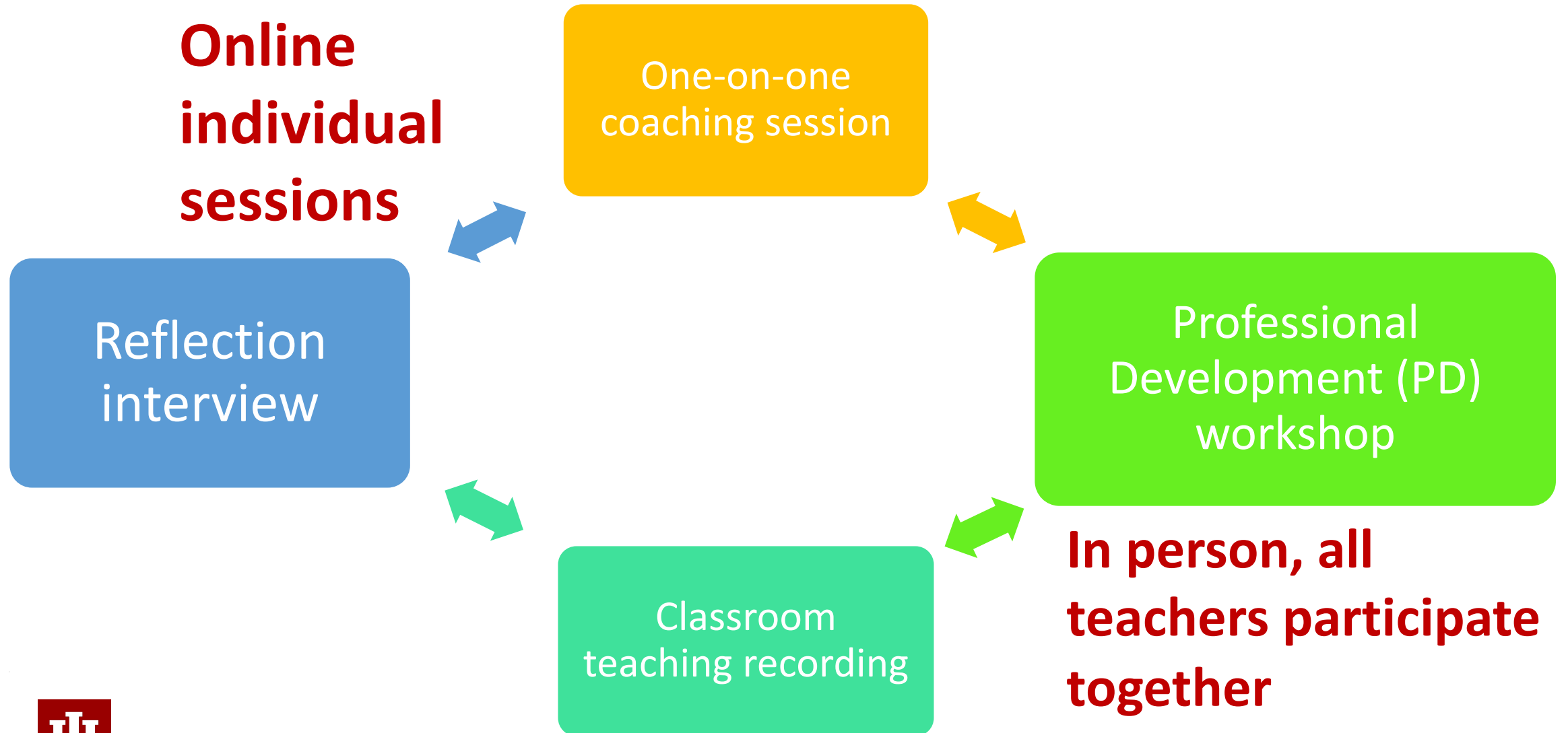
- Representation is **anything** that stands for something else (Palmer, 1977)

# Research Questions

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- RQ1: How do teachers change their perception of representations?
- RQ2: How do teachers' perception of representations influence their in-classroom teaching?

# The Blended Professional Development



# Method

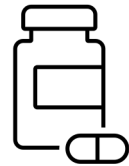
Participants: 8 elementary teachers from Indiana.

Cohort	2018 (C1)	2019 (C2)	2021 (C3)
Participants	2	3	3



- Year 0
- Recruit teachers

- Year 1
- Professional Development (PD)
- One on one coaching



- Year 3
- PD
- Coaching

- Year 4
- PD
- Coaching
- Pre/Post interview

- Class recording
- Reflection interview
- End of project interview

# Data analysis: Teachers' perception

- Thematic analysis
  - RepTaL framework (Danish et al., 2020).
  - How do teachers perceive representation in science classrooms?
  - **What:** forms of representation
  - **Why:** the uses of representations

# Data analysis: How RepTaL helped?

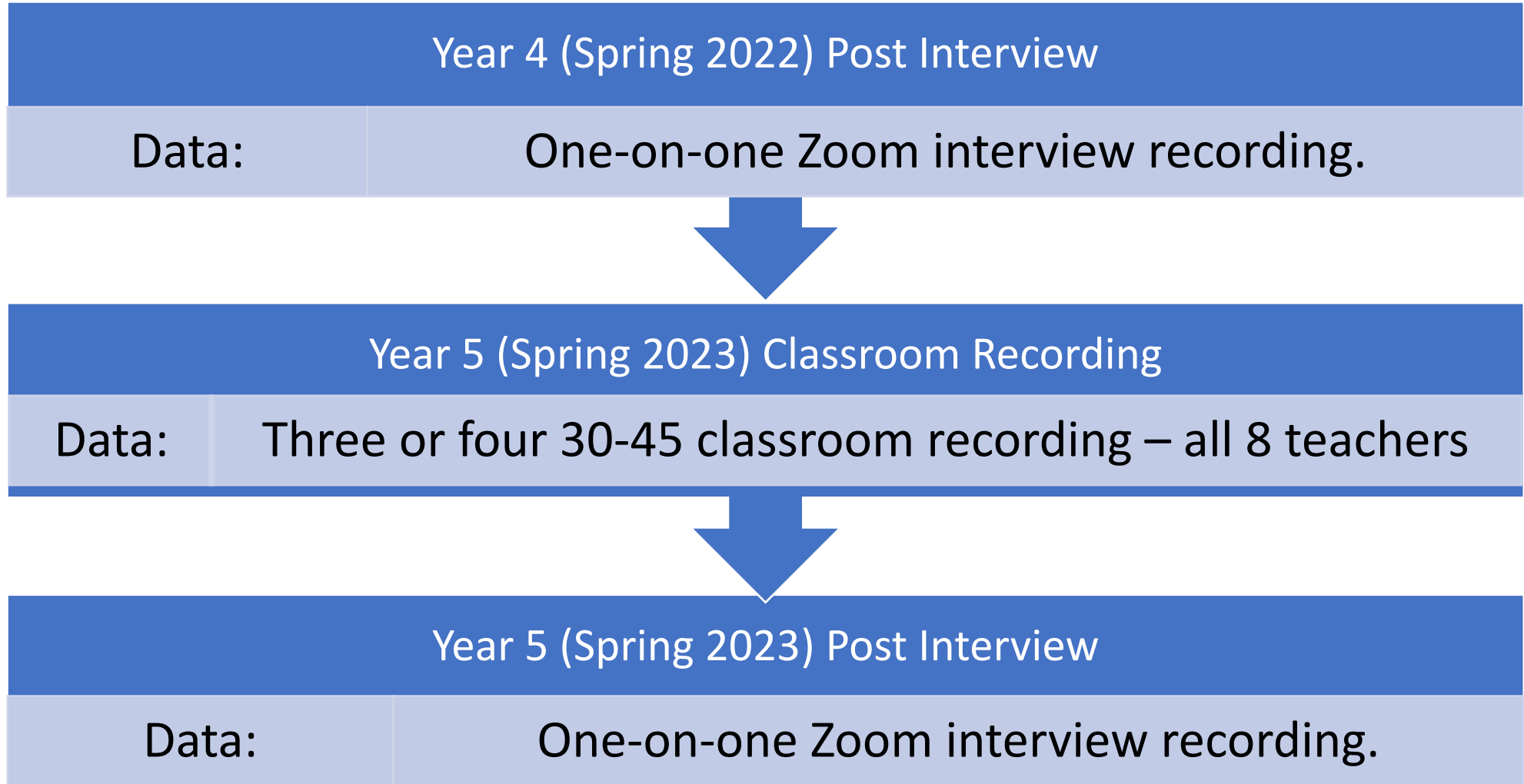
## Case study approach (Yin, 2013)

- Heather: Started in 2018, and participated for 5 years
- Amy: Started in 2021, and participated for 2 years

Teachers were selected to represent a range of experiences in the project at different points in time



# Data Sources



How do teachers change their perception of representations?

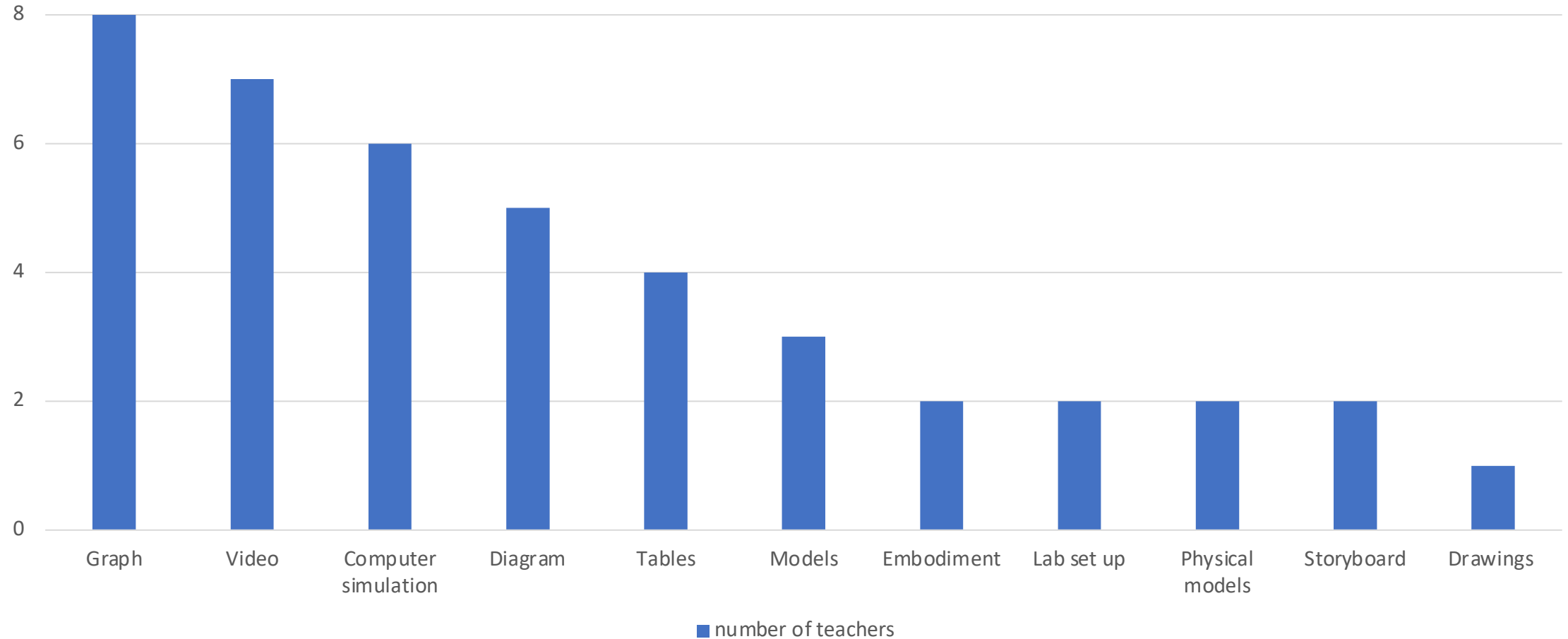
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What: Forms

Why: Purpose to use Representations

# Findings: **What**

Forms of representation



# Why



- 1) Tools to show students' understanding (8 teachers)
- 2) Tools to shape students' understanding (5 teachers)
- 3) Students can use representation to understand the target topics (3 teachers).

# Why

- Conceptualize target science concepts
- Catch students' attention
- Create concrete science experiences for students
- Connect things to the real world
- Introduce topics in the science classroom

# How it differs among cohorts?

## **Amy, 2021 cohort:**

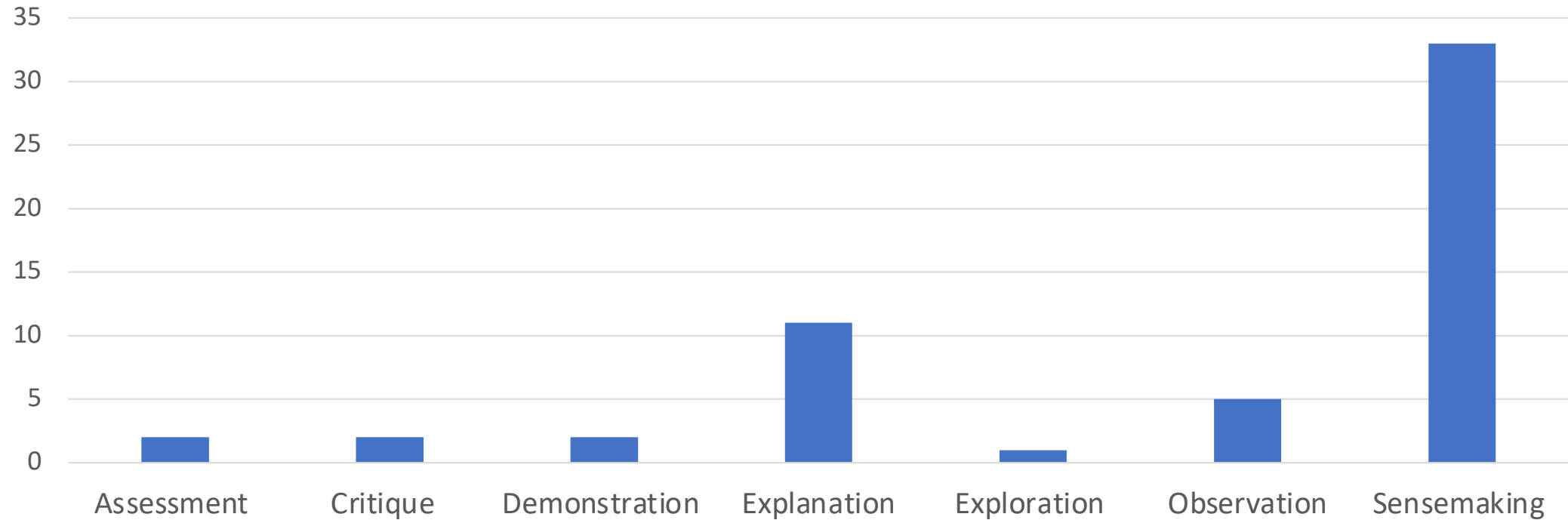
representations were used to **help students understand** abstract topics or show the process of a target phenomenon.

**Heather, 2018 cohort:** more about how **representation** could **be dynamic and led by students.**

# What representations have been used in classroom?

	Text related	Chart/Diagrams	Embodiment	Multimedia	Model
	Text (29) Virtual words (2) Table (1)	Chart (1) Color (1) Diagram (31) Drawing (8) Graph (2)	Embodiment (5) Gesture (13)	Image (2) Music (3) Video (9) Photograph (6)	Physical model (22) Simple machine model (4)
<b>Total count</b>	32	43	18	20	26

# How do teachers use the representations in classroom?








# How do you use representation in the classroom?

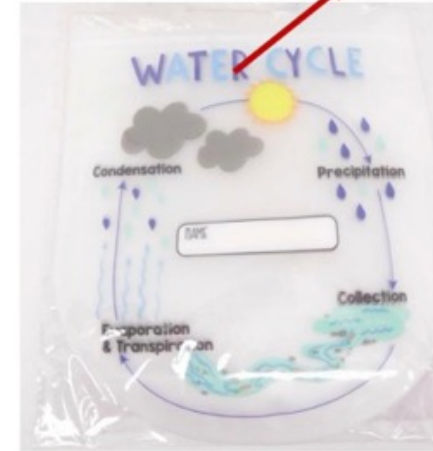
Heather (2018 cohort): I just really gone and say that, you know, our thoughts can change, and what we learned can change. So we just get better ideas. As we revise, we make different, we change. We may just want to add something, or we may just want to get rid of something. ... I think it just shows growth in their (students) learning, and growth in their understanding.

Heather talked about students led creating representation in science classroom

1) Monthly weather chart\*

Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
						

2) Zip loc bag- frozen water



3) Cotton and note cards

Amy (Kindergarten) used a variety forms of representations in her weather unit.

# How do you use representation in the classroom?

- **Interviewer:** Can you talk a little bit about how you decided to use this representation?
- **Harper:** [...] We (Harper and Luna) had **originally planned to have already pre-printed pictures** of types of weather, and then the kids would have to get a picture and then put it on the pocket chart to match, like the words to describe the type of weather. But then we were thinking about that more, and although, like that, is a good representation of what that weather looks like. It's **kind of us doing the, kind of like the learning**, but like the understanding for the kids like, **we're not giving them the opportunity to create their own**. We're just giving them a picture that they have probably already seen before, and already recognize what a sun looks like. And then they're just kind of putting it on the pocket chart. **So there's really not any like deeper connection there**. It's pretty like clear cut. This is your picture put it under sunny. So we thought like, how could we change this lesson to where the kids are creating the representation? And they're able to create their own understanding of it, and to show differences, too, because we talk about like going back, and as an original rep that they could go back and then change, and with the pocket chart they couldn't really do any differences, because the pictures were already created for them. **So it was really more like student directed. It's why we chose this activity.**

# Conclusion

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- In this paper, we explored how teachers' perceptions of representations and representational activities influence their science classroom teaching.
- The results revealed that with the RepTaL, teachers' perception of 1) forms of representation to use and 2) students' role in using representation in science classrooms has been changed.
- Teachers used representation in their classrooms and felt this was productive for their learners.
- Teachers reflected on these moments, they indicated that they valued students' ownership of the representations and their engagement with them.