CAESART
Center to Advance Elementary Science
ASSESSMENT • RESEARCH • TECHNOLOGY

ANNENBERG EDEXCHANGE
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Supporting high-quality science learning in PreK-5 through assessment

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Education Development Center

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EdInstruments at the Annenberg Institute

Bill Penuel
UC Boulder

Early Grades Science & Assessment

- Early science & engineering build foundations for later learning
- Better science requires better measurement
- What assessments already exist, and where are the gaps?

Center to Advance Elementary Science through Research, Assessment, and Technology (CAESART)

Build capacity for science education that benefits students and teachers

- Identify and develop assessments
- Generate evidence about effective science teaching and learning
- Share resources that advance the field

EDC.ORG

MIAMI PSYCHOLOGY EARLY SCIENCE INITIATIVE™

UCLA CRESST

The Lawrence Hall of Science UNIVERSITY OF CALIFORNIA, BERKELEY

Funded by:

IES Institute of Education Sciences

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EdInstruments at the Annenberg Institute

*Visit **EdInstruments.org to** browse the free online repository of assessments, questionnaires, etc.!*

- Compile education research instruments across multiple domains
- Find, compare existing measures
- Support consistent measurement across studies
- Identify measurement gaps

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Agenda

- Introduction (Bill Penuel, UC Boulder)
- Elementary Science Assessment Collection (Sania Zaidi, Lukas Winfield, EDC)
- Demonstration of EdInstruments (Curran Mahowald, Annenberg Institute)
- Panel discussion and Debrief (Bill Penuel, UC Boulder)
- Audience Q&A

Introduction – Bill Penuel

Landscape Analysis – Sania Zaidi

Why is this work important?

We need to understand what students know and can do in science and engineering to improve learning

- Assessments can help us understand what is working in early science and engineering education
- Early grades are particularly difficult to assess: not yet readers or writers; limited attention

No comprehensive existing repository for early science assessments

What do we hope to achieve?

- **Developing the nation's first comprehensive database of science and engineering assessments for PreK-5 students.**
  - Provides researchers with a list of available tools to measure learning
  - Identifies gaps in domains and areas of learning

→Allows researchers to make informed decisions about identifying relevant assessments

→Serves as impetus to develop new assessment resources.

Landscape Analysis

Purpose

- Systematic review of existing pre-K–5 science and engineering assessments
- Focused on assessments for researcher use
- Publish database in a public, searchable repository

Landscape Analysis Team

Education Development Center

- Sania Zaidi (Lead)
- Megan Silander (PI)
- Lukas Winfield
- Mingyue Sun

Target Audience

- Researchers conducting science and engineering education research
- Policymakers looking for evaluating programs
- Educators could use this information to inform how they think about designing or selecting classroom assessments.
    - Some resources are designed for classroom use.

Assessment Search

- **Content Focus -** science and/or engineering content (including computational thinking)
- **Grade Level**- PreK-5
- Can provide insight on an **individual** student level
- **Use independent of curriculum**
- Available in **English**
- Developed between **2004-2025**
- Developed or **co-developed by assessment experts, consortia, or researchers**
- Must have **scoring guide** (e.g., rubric, answer key, coding scheme)

Audience Question

Make an (educated) guess about which domains and grade bands were most represented in PreK-5 science and engineering assessments?

Grades

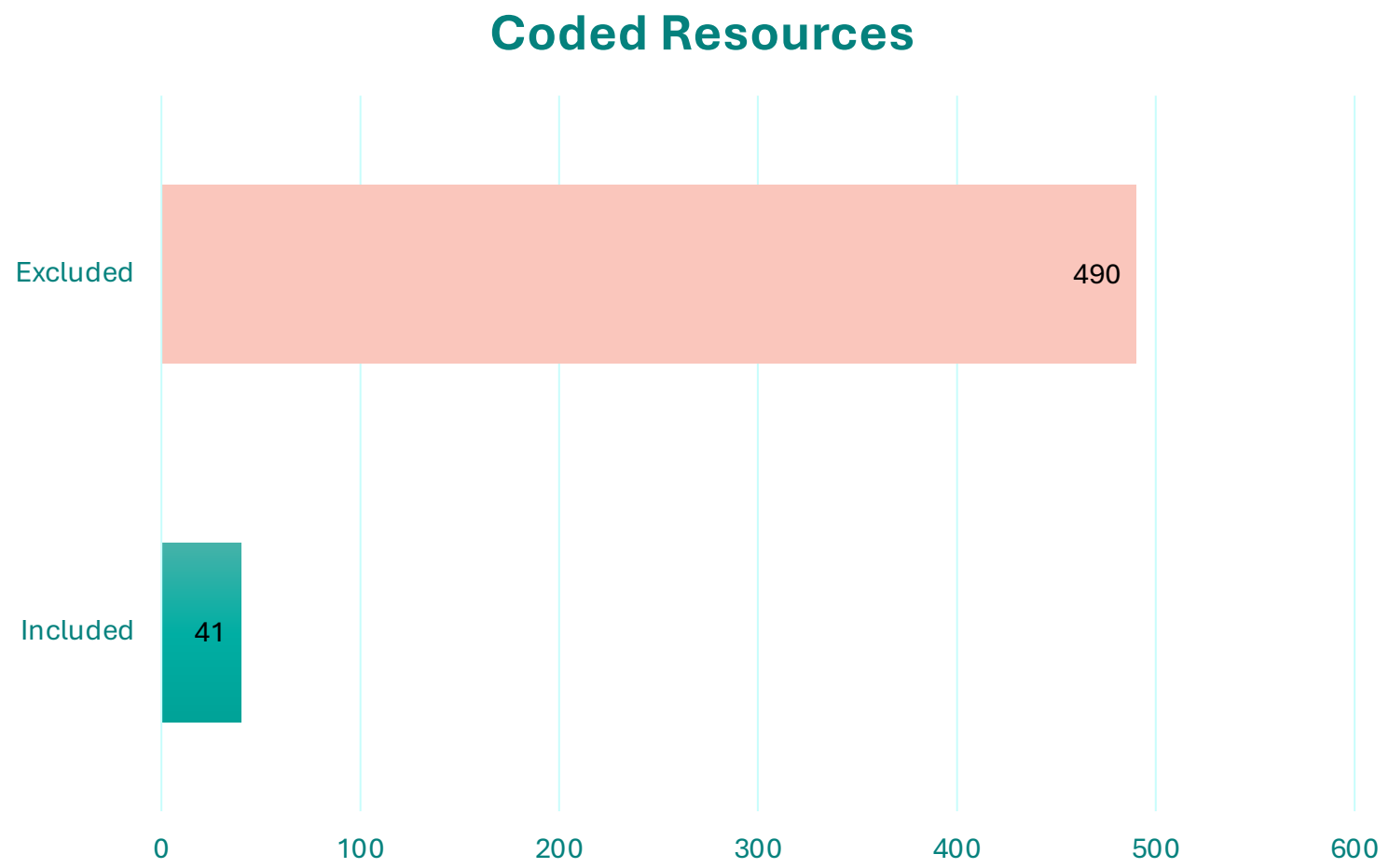
- PreK
- K-2
- 3-5

Domains

- Engineering/Technology
- Physical Science
- Life Science
- Earth and Space Science
- General Science

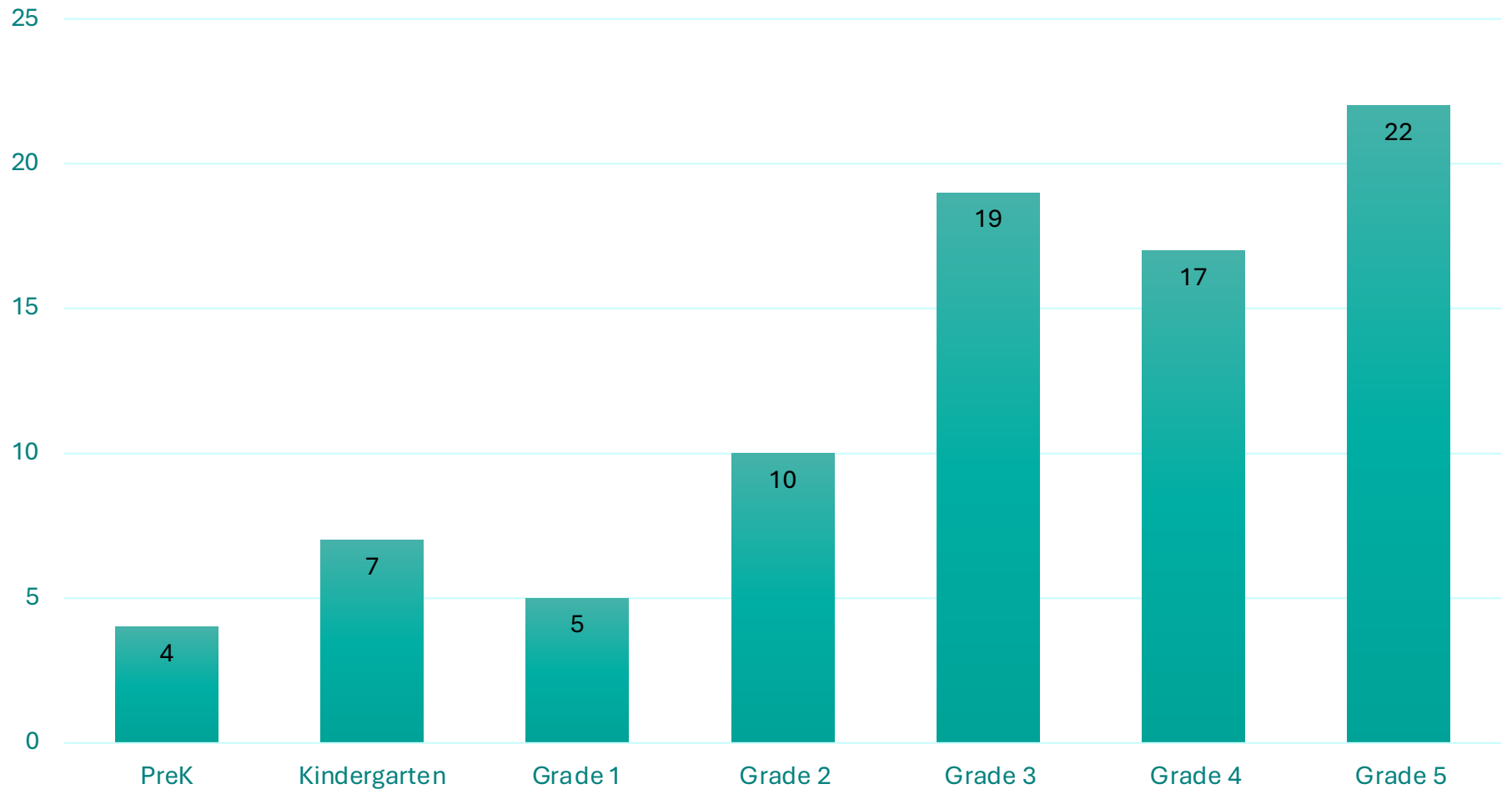
What did we learn from our analysis?
- Lukas Winfield

Resources that meet the Inclusion Criteria



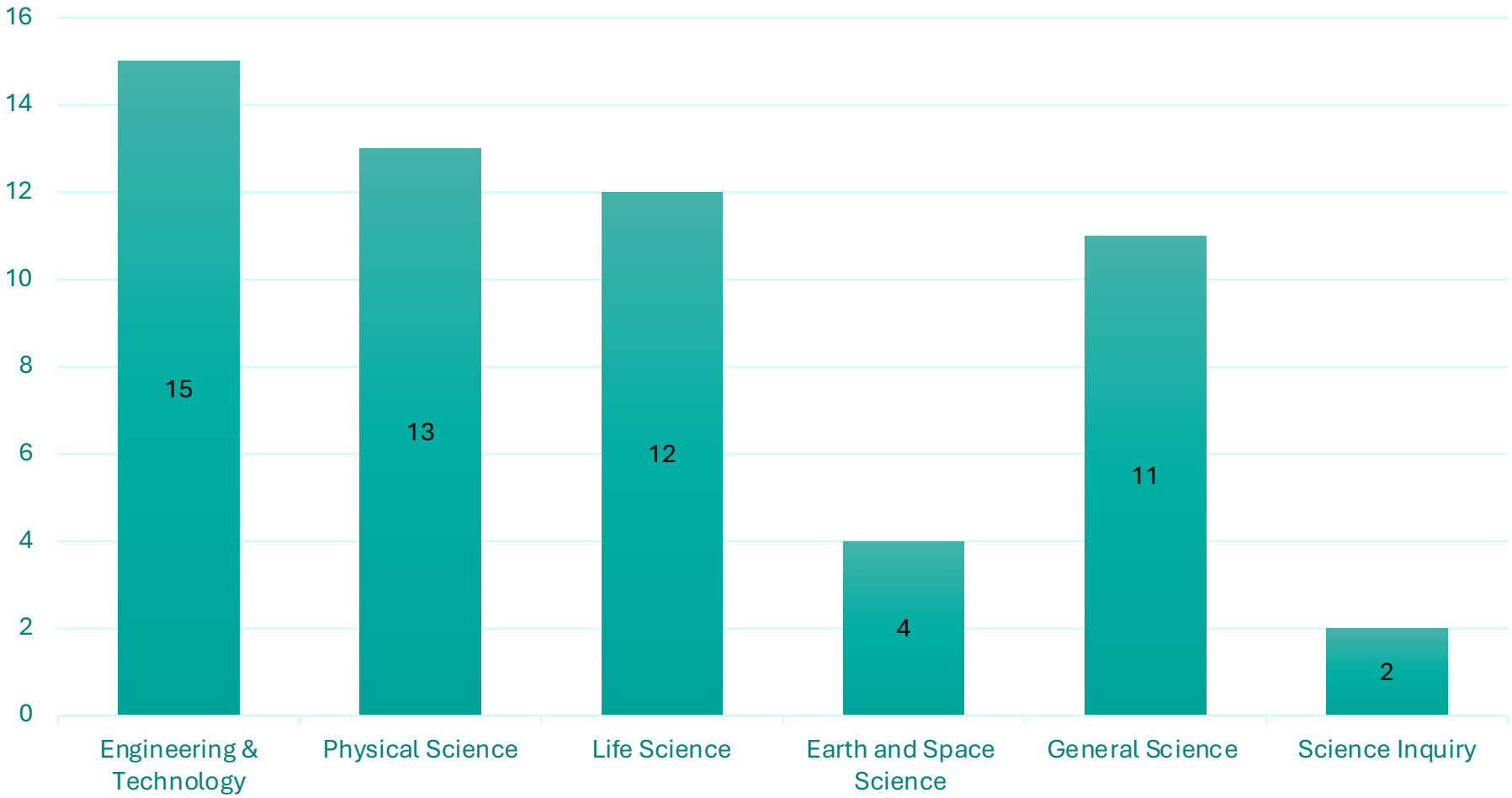
Total Coded Resources = 530 resources

Grades



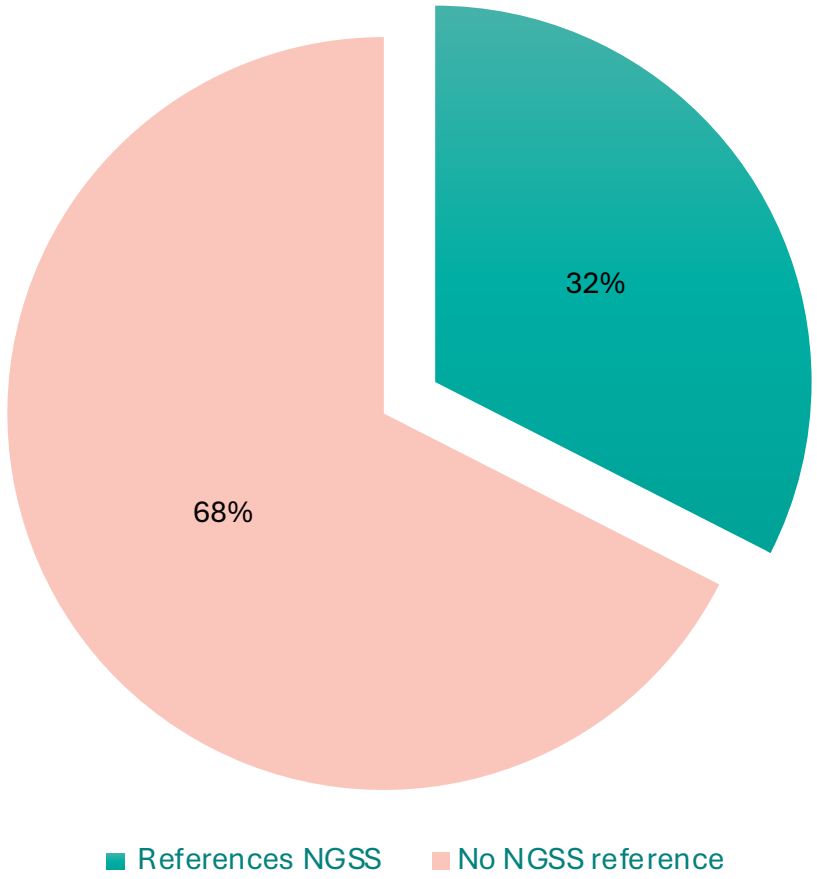
N=41 resources

Domains

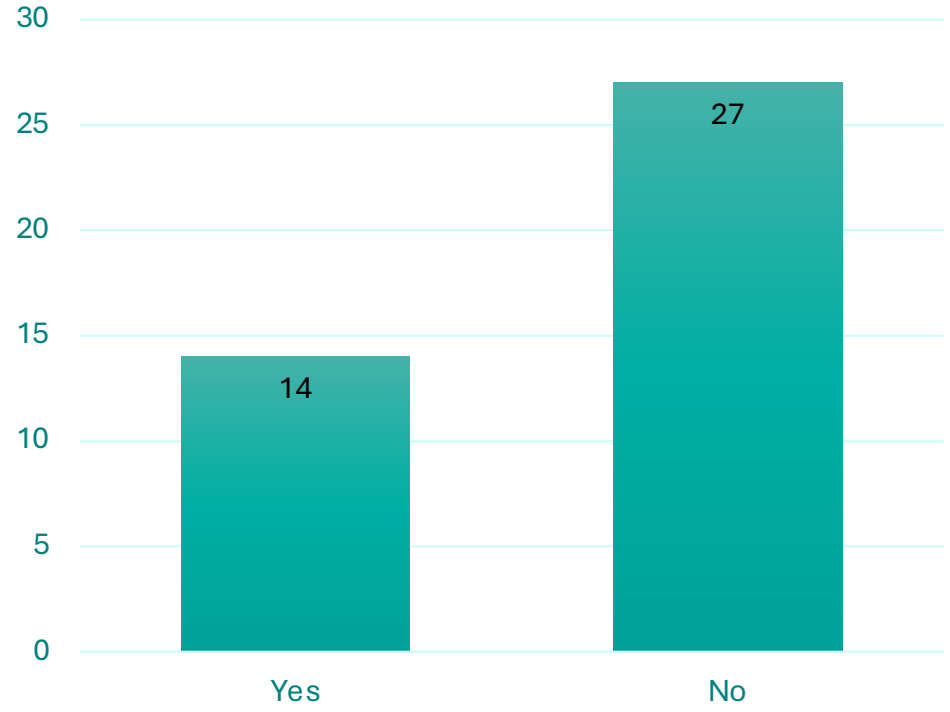


N=41 resources

Reference to NGSS

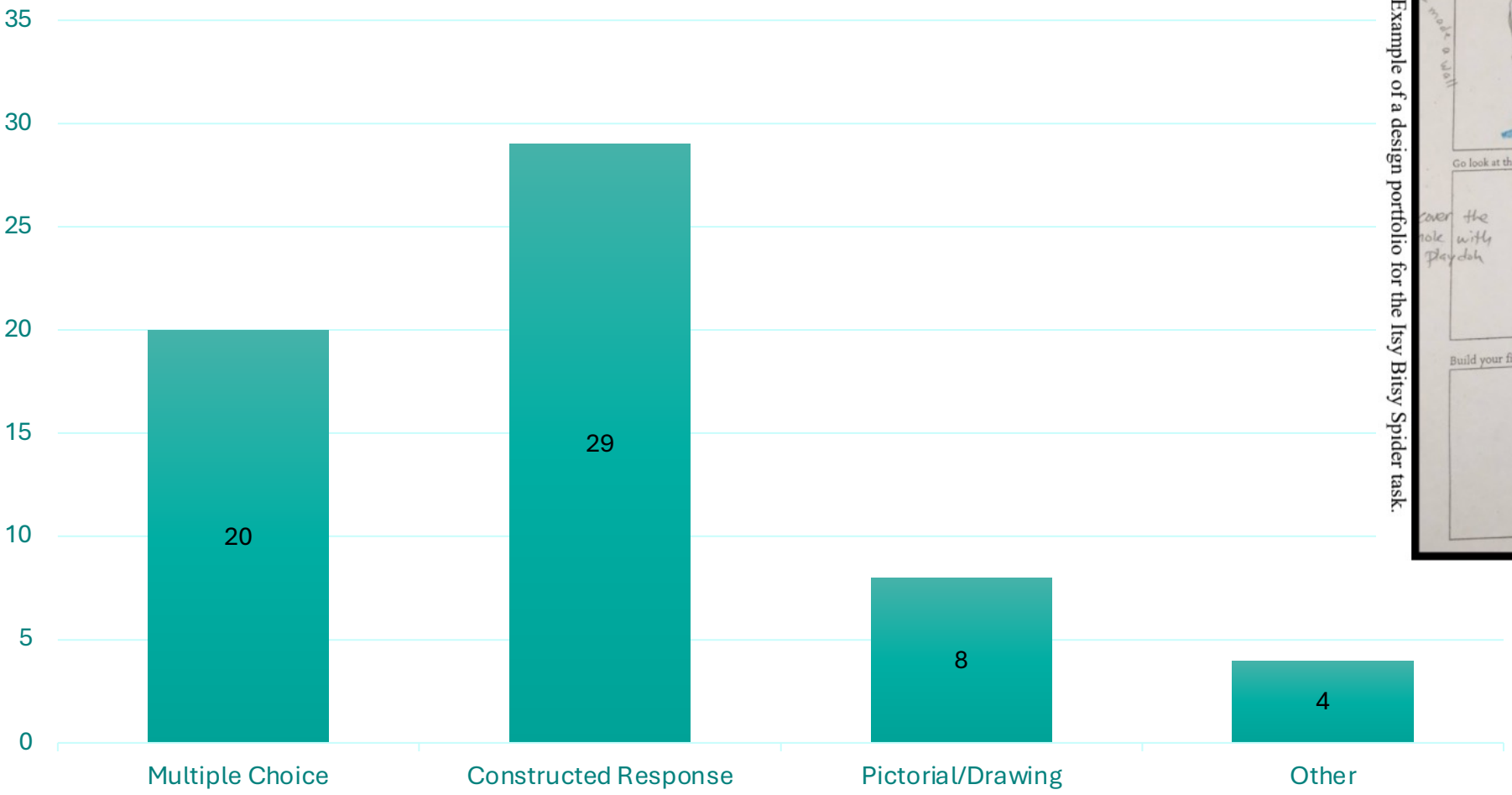


N=41 resources



Measures multi-dimensional learning

Item Format



N=41 resources

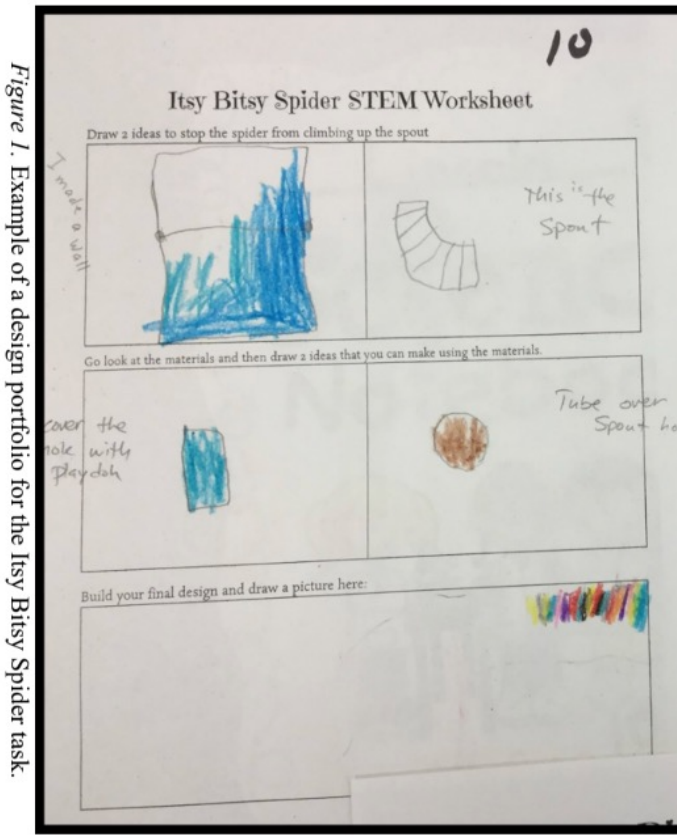
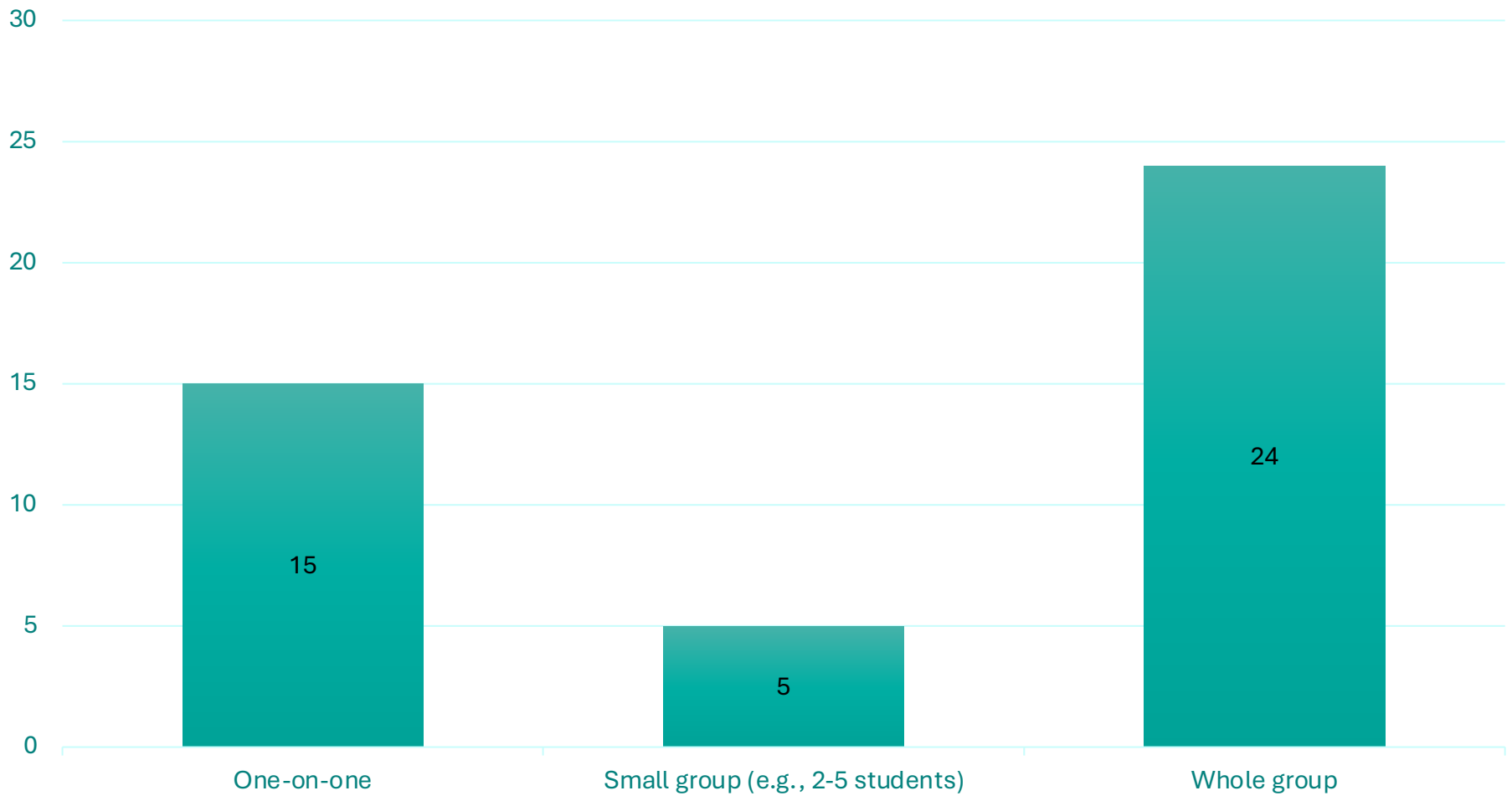


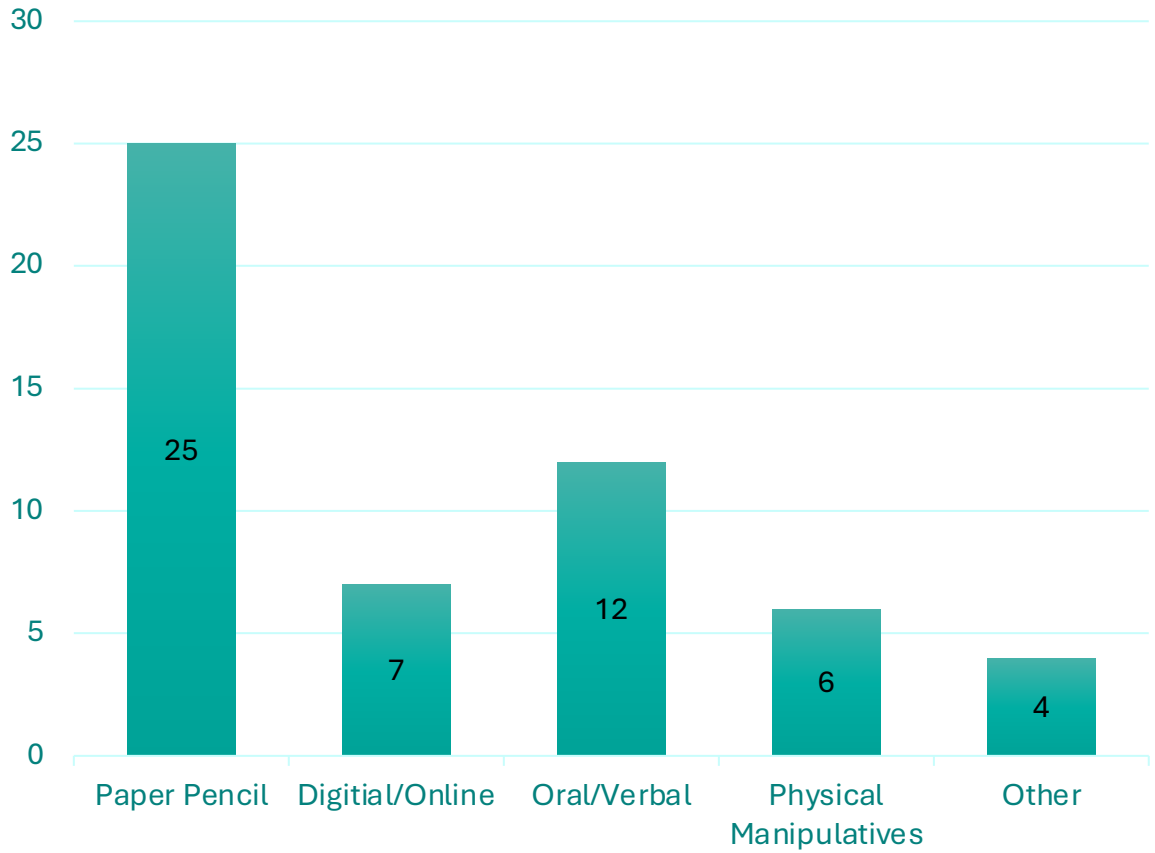
Figure 1. Example of a design portfolio for the Itsy Bitsy Spider task.

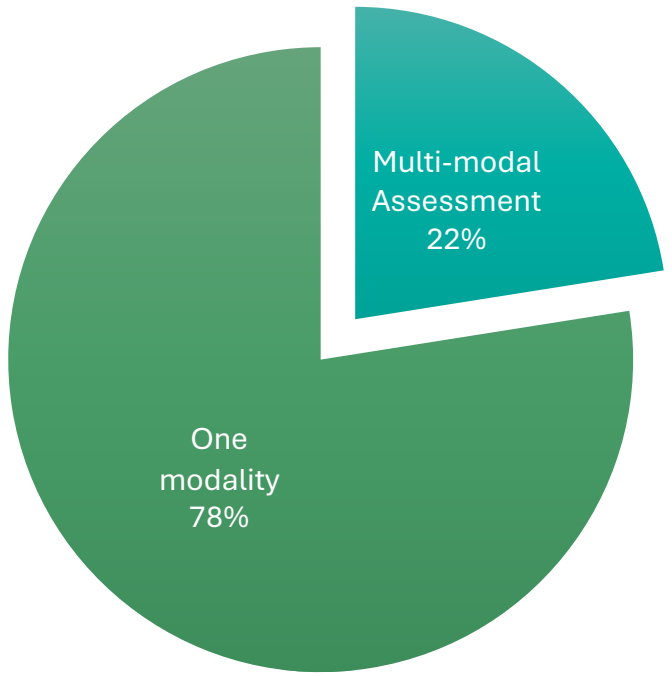
Administration Format



N=41 resources

Assessment Modality





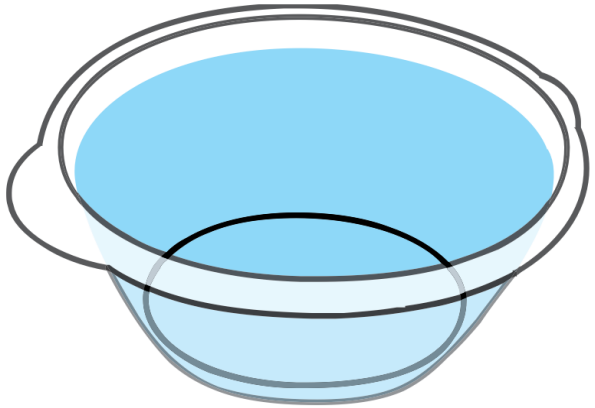
N=41 resources

Physical manipulative tasks

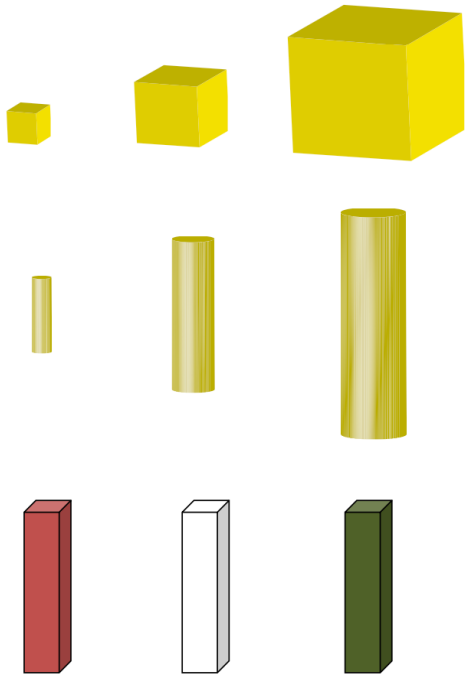
Example #1

Trial 1:
FLOATING & SINKING PREDICTION

SET-UP



(Bowl of tap water filled to about ¾" from top)



(Sets of blocks, cylinders and long blocks)

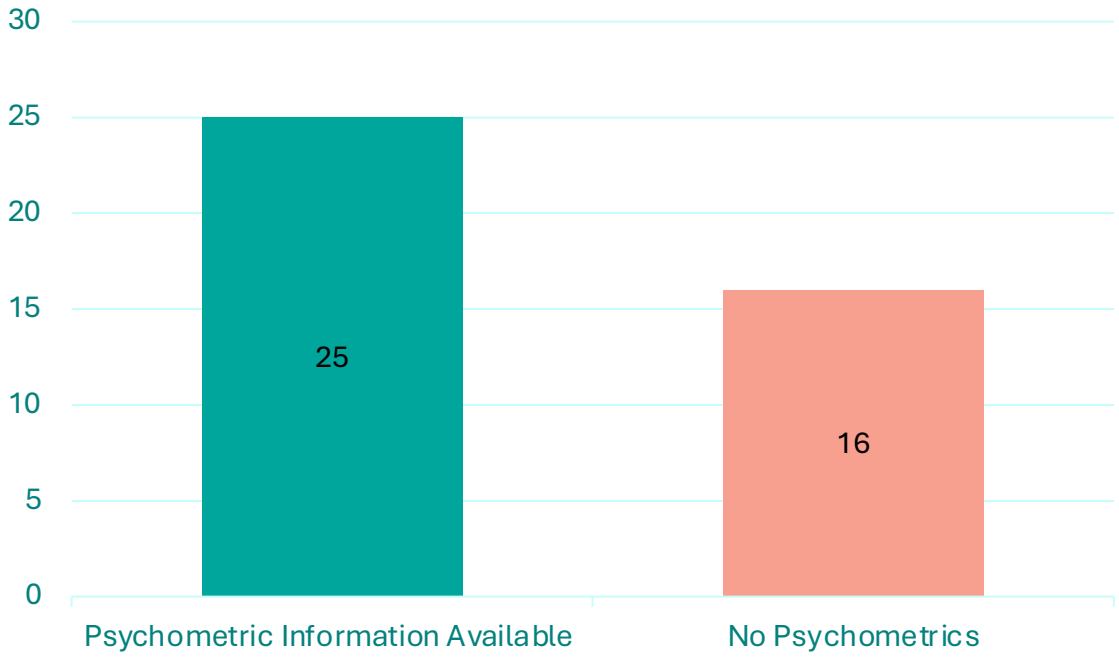
Measure: Preschool Assessment of Science (PAS)

Example #2

Measure: Exploratory Behavior Scale (EBS)

Availability of Psychometric Information

Psychometric information is about making sure that measurement tools such as surveys, tests measure what they are designed to measure and do so consistently.
It strengthens evidence-based decision-making, reproducibility, and the credibility of findings



N=41 resources

Type	Yes	No
Reliability	25	16
Validity	25	16

Walkthrough of the Collection – Curran Mahowald

*Navigate to **EdInstruments.org** to follow along!*

<u>Use case:</u>

- New 4th grade science unit focused on energy
- Did it improve student learning?
  - Beyond vocab memorization
  - Application of scientific ideas, construction of explanations, and 3D learning

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Panel Discussion

Audience Q&A

Debrief – Bill Penuel

THANK YOU

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For more information check out ceasart.edc.org

Sign up for email updates from EdInstruments by scanning this QR code:

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*Browse the free online repository of assessments at **EdInstruments.org***

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