

**POEs Through Rigorous Measurement**

A4LE: Great Lakes  
March 17, 2023

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**Introduction**

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University of Kansas

Podcast Showrunner & Co-host  
Two Pint PLC

Co-author  
*UDL: Check of Spaces* (K-12, 2nd Edition)




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**Agenda**

- Why standardize a POE?
- Threats to validity.
- Coherence through application.



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“ [A] new expanded definition of 'performance' in terms of three interrelated domains: **building, people and organization** ”

Boissonneault, A., & Peters, T. (2022). Concepts of performance in post-occupancy evaluation post-probe a literature review. *Building Research & Information*, 50(1), 1-25. <https://doi.org/10.1080/09613223.2022.2102108>

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**Measuring Buildings**

Observable Variables

- Temperature
- Lighting
- Air Quality
  - CO<sub>2</sub>
  - PM<sub>2.5</sub>
  - VOCs



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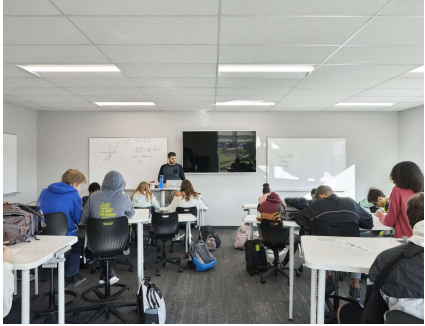
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**Measuring People**

Latent Variables

- Comfort
- Learning
- Creativity

[https://en.wikipedia.org/wiki/Latent\\_and\\_observable\\_variables](https://en.wikipedia.org/wiki/Latent_and_observable_variables)



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### Measuring People

#### Latent Variables

- Comfort
- Learning
- Creativity

With NO DISCUSSION, write as complete a definition of that as you can.

Remember, it's got to be measurable.

[https://en.wikipedia.org/wiki/Latent\\_and\\_observable\\_variables](https://en.wikipedia.org/wiki/Latent_and_observable_variables)

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### Idiosyncrasy Matters

1. Idiosyncrasy limits access
2. Limits to access present along lines of power
3. A) Exclusion is morally wrong.  
B) Exclusion undermines validity

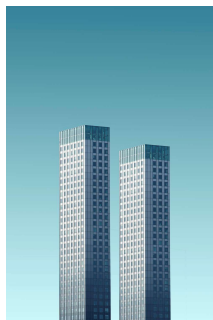


Image Credit: Source: Shutterstock

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**Idiosyncrasy Matters**

- 1. Idiosyncrasy limits access
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Hadjri, K., & Crozier, C. (2009). Post-occupancy evaluation: purpose, benefits and **barriers**. *Facilities*, 27(1/2), 21-33. <https://doi.org/10.1108/02632770910923063>

Matsick, J. L., Oswald, F., & Kruk, M. (2022). **Missing perspective**: Marginalized groups in the social psychological study of social disparities. *Behavioral and Brain Sciences*, 45(e82). <https://doi.org/10.1017/S0140525X21000601>

Tauke, B., & Smith, K. (2020). **Marginalized by Design**. *Journal of Interior Design*, 45(1), 5-12. <https://doi.org/10.1111/joid.12168>

Zalio, M., & Clarkson, P. J. (2022). The **Inclusion, Diversity, Equity and Accessibility audit**: A post-occupancy evaluation method to help design the buildings of tomorrow. *Building and Environment*, 217, 109058. <https://doi.org/10.1016/j.buildenv.2022.109058>

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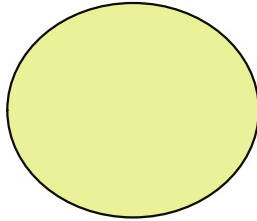
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**Standards for Insights**

Connections between and across studies require comparability.

- 1. Consistency: Same measures



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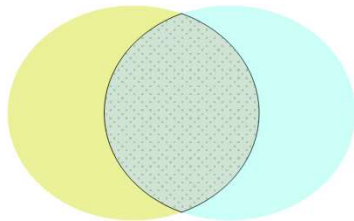
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**Standards for Insights**

Connections between and across studies require comparability.

- 1. Consistency: Same measures
- 2. Clarity: Different measures, known relationship



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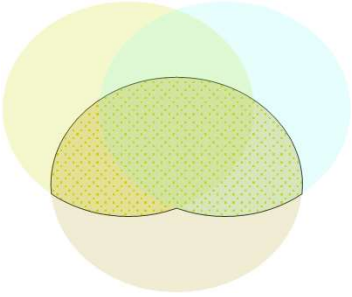
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**Standards for Insights**

Connections between and across studies require comparability.

1. **Consistency:** Same measures
2. **Clarity:** Different measures, known relationship
3. **Convergence:** Different lenses on bigger problem



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**THREATS TO VALIDITY**



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“ Validity refers to the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests. ”

STANDARDS for Educational and Psychological Testing (2014)

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**Validity Evidence**

Step 1: What is this for?

Step 2: Does this work for that?

- Content Evidence
- Internal Evidence
- Convergent Evidence
- Consequential Evidence



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“ [Reliability is] the consistency of scores across replications of a testing procedure, regardless of how this consistency is estimated or reported ”

STANDARDS for Educational and Psychological Testing (2014)

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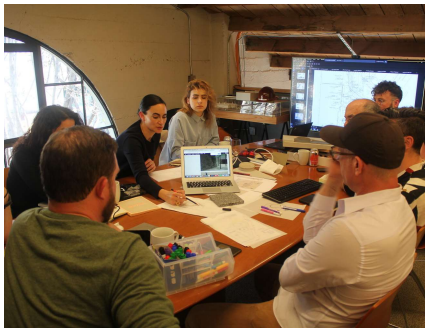
**Reliability Evidence**

How will we compare these scores?

- Between participants?
- Over time?

Reliability is a comparison of signal to noise.

Consistently getting good signal (reliability) is not a guarantee it is the signal you think it is (validity).



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**BRIEF #1: How often do students use the makerspace, broken down by age?**

Work individually, for now.

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**BRIEF #1: How often do students use the makerspace, broken down by age?**

Small groups - discuss

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**Interval of Measurement**

Common mistakes:

- Assume the bins (pre-binning)
- Ask a precise question in a vague way
- Ignore variation in the answer

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**Interval of Measurement**

Common mistakes:

- Assume the bins (pre-binning)
- Ask a precise question in a vague way
- Ignore variation in the answer

-  What is your annual income?
- \$25,000-50,000
  - \$50,000-70,000
  - \$70,000+

-  How old are you?
- 10-15 years old
  - 15-20 years old
  - 20-25 years old

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**Interval of Measurement**

Common mistakes:

- Assume the bins (pre-binning)
- Ask a precise question in a vague way
- Ignore variation in the answer

-  When did you last ride a bus?
- Very recently
  - Somewhat recently
  - Not recently

-  How often do you eat fast food?
- Once a day
  - Once a week
  - Once a month

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### Interval of Measurement

Common mistakes:

- Assume the bins (pre-binning)
- Ask a precise question in a vague way
- Ignore variation in the answer

⊘ What is your gender?

- Man
- Woman

⊘ What is your role in the school?

- Teacher
- Paraprofessional
- Other

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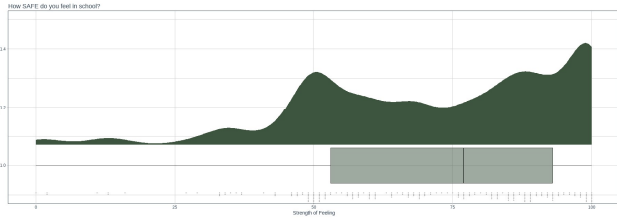
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### Interval of Measurement

When possible, measure your variable at the unit it exists!

Your tool needs to allow for variation in the data it generates, because that is where you derive insight.



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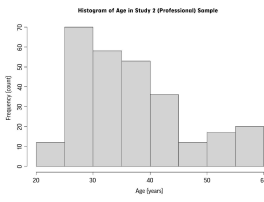
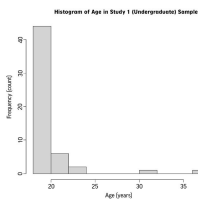
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### Interval of Measurement

Ask the question at the most precise level of measurement.

Don't assume you know the relevant clusters. You can create bins *after* you generate the data.



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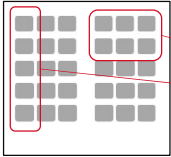
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**Interval of Measurement**

Opportunity to create bins for secondary/subgroup analysis.



With precise knowledge of things like location, you can test a subgroup that may have a different experience than others.

For example, perhaps one part of the room has a significantly different thermal comfort than most others.

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**BRIEF #1: How often do students use the makerspace, broken down by age?**

Full group - how would we measure that?

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**BRIEF #2: Do students like to use a breakout area in the school?**

Work individually, for now.

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## BRIEF #2: Do students like to use a breakout area in the school?

Small groups - discuss

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### Operationalize Constructs

Common mistakes:

- Proceeding without definitions
- Single-item measures

"Operationalizing" your variables is an essential planning step.

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- "Perceptions of Autonomy-Support" is measured by the Learning Climate Questionnaire (LCQ) as the degree to which students see their teacher as encouraging, tolerating, or preventing the responding student to make their own choices about how they engage in learning during class time. Autonomy-supportive instruction looks like teachers making space for student intellectual risk-taking and creativity. It also includes the teacher engaging with the students about their decision-making processes and making them feel seen as actors with agency in their own learning.
  - Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science education*, 84(6), 740-756. [https://doi.org/10.1002/1098-237X\(20001\)84:6<740::AID-SCE4>3.0.CO;2-3](https://doi.org/10.1002/1098-237X(20001)84:6<740::AID-SCE4>3.0.CO;2-3)
  - Simon, P. D., & Salanga, M. G. C. (2021). Validation of the Five-item Learning Climate Questionnaire as a measure of teacher autonomy support in the classroom. *Psychology in the Schools*, 58(10), 1919-1931. <https://doi.org/10.1002/pits.22546>

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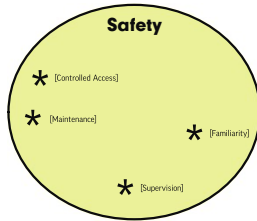
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**Operationalize Constructs**

Common mistakes:

- Proceeding without definitions
- Single-item measures



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**BRIEF #3: Which of these THREE (3) options is most comfortable and interesting?**

Work individually, for now.

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**BRIEF #3: Which of these THREE (3) options is most comfortable and interesting?**

Small groups - discuss

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**Design for Analysis**

Common mistakes:

- Asking compound questions
- Generating difficult-to-interpret data

If you chase two rabbits, you will catch neither.



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**Design for Analysis**

Common mistakes:

- Asking compound questions
- Generating difficult-to-interpret data

**How to calculate Ranked Choice Voting:**

**How long will this take me to calculate?**

It depends on three main factors: the number of voters, the number of candidates, and whether tiebreakers are needed.

The above example was on the very simple end of the spectrum. Only 5 candidates, 18 total votes, and no tiebreakers. Following this guide, you'd likely spend between [20-30 minutes](#) on it.

But what if you had 10 candidates? 100 votes? Encountered tiebreakers? Now you're talking about multiple hours of tedium.

<https://www.civilrights.org/public-legal/ranked-choice-voting/how-to-calculate-ranked-choice-voting-with-google-forms-and-google-sheets>

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**Design for Analysis**

Common mistakes:

- Asking compound questions
- Generating difficult-to-interpret data

**Step 1:** Generate precise estimates for each option.

**Step 2:** Compare options.

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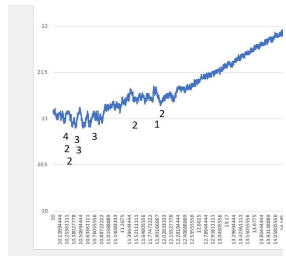
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### Design for Analysis

Precise measures allow more freedom to compare/combine measures.

For example, plotting reports of comfort against temperature, over time.



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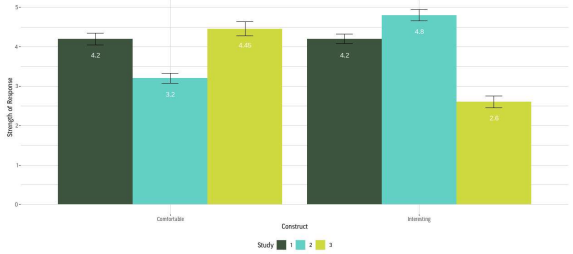
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### BRIEF #3: Which of these THREE (3) options is most comfortable and interesting?

User Perceptions of Comfort and Interest



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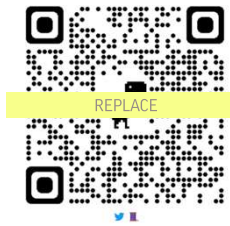
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### DISCUSSION



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@MichaelCRalph

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