PRESENTER
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# In a physics communication course, reflection and instruction affected neither presentation quality nor retention of concepts.

## Background

- Employer accounts suggest physics graduates are **deficient** in social and communicative skills [Sarkar et al., 2016].
- Despite widespread support for student development of **science communication skills**, implementation of relevant resources has been slow and highly localized.

## Methods

### Senior Seminar
(required course, one credit-hour)

**High enrollment & limited class resources** → Students **present once** per semester, often having received **no instruction**.

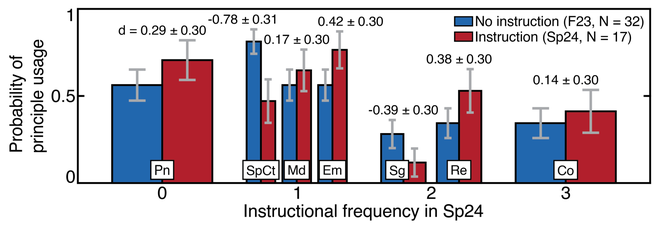
- Randomly assigned peer evaluations per presentation
  - **Treatment:** critical reflection [Girard et al., 2011]
  - **Control:** assess engagement; distract from reflection
- End-of-class quiz on concepts from that day's presentations
- Presentations evaluated independently for research

**N=49** Presentations across two semesters ↔ **N=1033** Peer evaluations; quiz question submissions

## Results

| Multimedia Design Principle | $n_0$ | $n_1$ | Measured effect size | Established effect size [Mayer, 2020] |
|---|---|---|---|---|
| **Coherence (Co):** Omit extraneous, seductive details. | 671 | 362 | 0.14* ± 0.07 | 0.86 |
| **Signaling (Sg):** Visually guide learners through content organization. | 782 | 251 | 0.13 ± 0.07 | 0.70 |
| **Redundancy (Re):** Avoid text that is redundant with narration or images. | 657 | 376 | –0.25*** ± 0.06 | 0.72 |
| **Spatial Contiguity (SpCt):** Place corresponding slide contents near each other. | 222 | 811 | –0.22** ± 0.08 | 0.82 |
| **Modality (Md):** Complement graphics with narration, not blocks of text. | 453 | 580 | 0.030 ± 0.063 | 1.00 |
| **Personalization (Pn):** Use a conversational, informal style. | 415 | 618 | 0.53*** ± 0.06 | 1.00 |
| **Embodiment (Em):** Augment instruction with dynamic, physical expression. | 395 | 638 | 0.014 ± 0.064 | 0.58 |

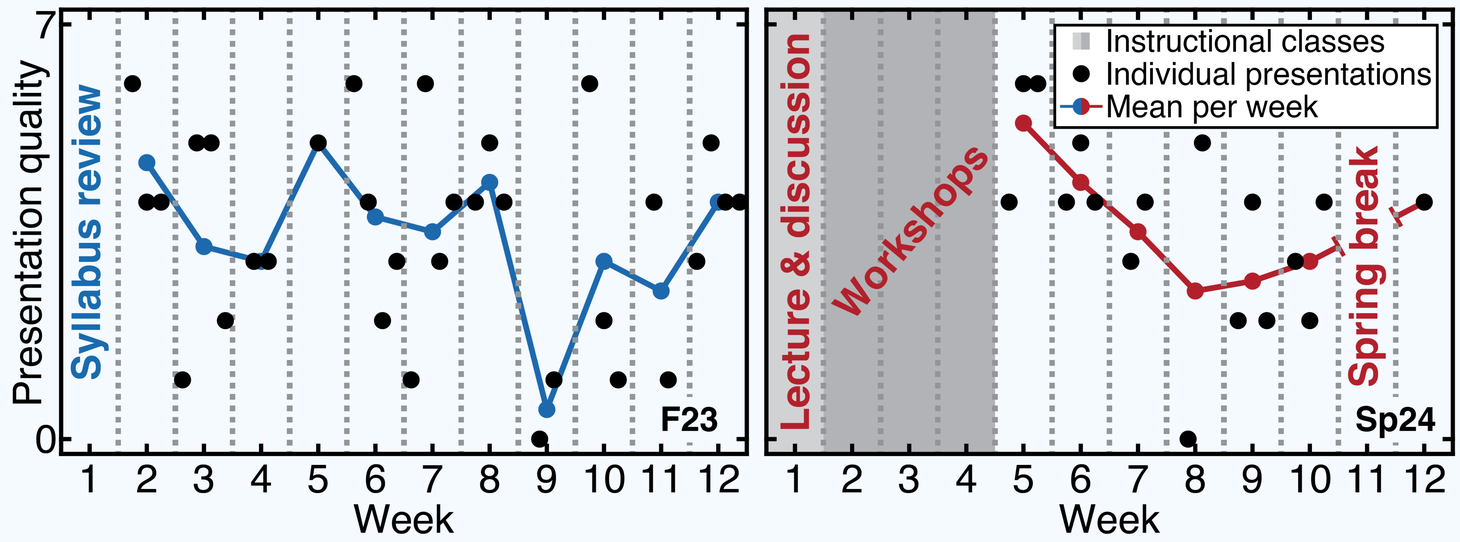
*p < 0.05; **p < 0.01; ***p < 0.001

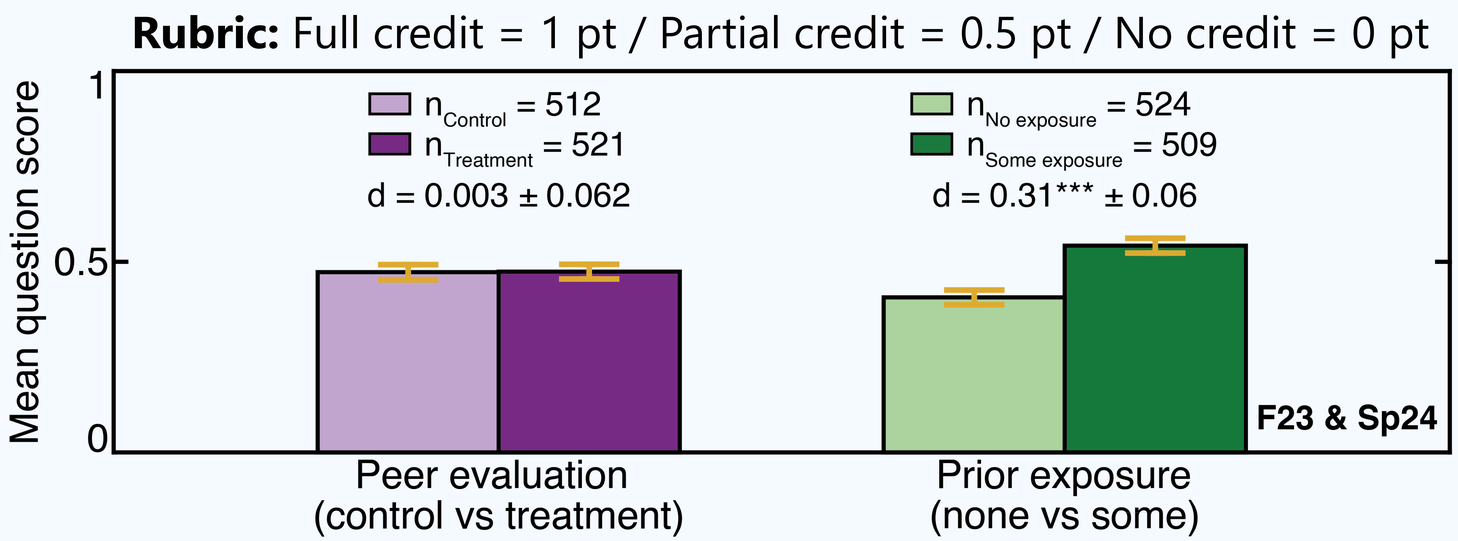



Sp24 students received four weeks of instruction while F23 students received none. Still, a one-sided Mann-Whitney *U* test **did not suggest improvement** in usage of CTML principles.

## Limitations & future work

- **Small sample size** and **restricted class continuity** hinder generalization and detailed examination of confounders.
- Ongoing study of analogous two-credit-hour chemistry course may improve understanding of **rigorous instruction** and **multiple presentation opportunities**.




REFLECTING TO LEARN IN A PHYSICS MULTIMEDIA COMMUNICATION COURSE

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