

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.

Course details

PHYS 4602: Senior Seminar
required for Physics majors,
1 credit hour, 107/135 consent

Few uncapped sections per year & limited class resources

Students **present once** per semester, often having received **little to no instruction** and **highly varied feedback**.

Observed 3 semesters (F23, Sp24, F24)
Developed & co-instructed Sp25

107 oral presentations
39 semi-structured interviews

CHEM 4601: Chemistry Seminar
required for Biochemistry majors,
2 credit hours, 28/33 consent

Multiple capped sections every semester & longer class periods

Students **present four times** per semester after **three hours of instruction** and receive regular, **detailed feedback**.

Observed 2 semesters (Sp24, F24)

82 oral presentations
11 semi-structured interviews

New curriculum & reception

W1: Intro to Science Presentations <ul style="list-style-type: none">– Expectations, assignments, & outcomes– Slide titles & composition basics [Doumont, 2012]	W2: Slide Design <ul style="list-style-type: none">– Backward design [Wiggins & McTighe, 2005]– Multimedia learning [Mayer, 2020]– Adapting premade graphics
W3: Presentation Workshop <ul style="list-style-type: none">– Flipped classroom day– Iterate slides in groups– Focus on key takeaway(s)	W4: Slide Critique <ul style="list-style-type: none">– “Key slides” only– Brief public feedback– Detailed writeup
W5: Public Speaking <ul style="list-style-type: none">– (Non)verbal communication– Staying conversational under pressure	

23 students fully attended the interventional curriculum.

“What was your experience with the lessons at the start of the course?”	Intro	Slide Design	Workshop	Slide Critique	Public Speaking	Ambiguous
Feedback tally, 19 interviews						
Positive	1	9	4	1	5	5
Mixed	0	1	1	1	1	4
Negative	0	0	1	4	0	1

- Students **appreciated learning** slide design **guidelines** (e.g., animations, text and graphic usage) and **practicing implementation**.
- Students found the workshop **useful for building** their slides and **getting feedback**, though some felt it was too soon to focus on slide specifics.
- Students were **frustrated by** critiquing one **key slide** because it led to **irrelevant feedback** built on **incorrect assumptions** about the presentation.
- Students embraced the speaking challenge as **initially scary but very helpful**. Some requested more feedback and exposure to further build confidence.

Limitations & future work

- **Small sample size** and **restricted class continuity** hinder generalization and detailed examination of confounders.
- Updating the curriculum’s focus on key slides to instead emphasize **presentation narratives** may further improve presentation quality and student reception to a revised slide critique lesson.
- Qualitative analyses may improve understanding of how various **feedback styles and sources** contribute to presentation quality.

Research-based instruction improved students’ science presentations and beliefs comparably to multiple rounds of practice and feedback.

