Using Improvisational Acting Techniques to Improve the Oral Communication Skills of STEM Graduate Students

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Introduction & Motivation

- Members of the STEM workforce are notorious for lacking the ability to describe their work to people outside of their field.
- Yet it is crucial for our society to understand the importance of science so that citizens are scientifically engaged and policies are influenced by empirical results rather than mis-information or by mis-trust of the STEM community.
- This project aims to improve the communication skills of STEM graduate students using improvisational acting techniques.
- It is hypothesized that this type of novel training will reduce the use of jargon when communicating to a non-STEM audience and result in higher scores on a previously validated public speaking rubric.

Program Description

- STEM MS & Ph.D. students are eligible for the program.
- Students can receive independent study credits if desired.
- The student's Ph.D. advisor must sign a consent form indicating they are aware of the participation in the program.
- Students meet weekly for 1.5 hours through the academic year (2 semesters).
- In semester 1, students participate in training by improvisational actors on:
  - stage presence & confidence
  - story telling
  - adapting a story to the audience in real-time.
  - playing off of other actors
- In semester 2, students get training on creating podcasts and practice giving scientific talks to a non-technical audience.
- The program culminates with a presentation at an off-campus public venue & posting of their podcasts.

Fig. 1. Advertisement for Year 2 Cohort

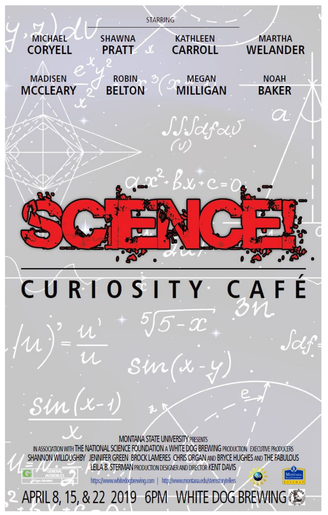

Fig. 2. Advertisement for Public Presentations

Figure 2: Application website

Presentation Assessment

- A public communications rubric was adopted to evaluate the students' presentations (Schreiber, Paul & Shibley, 2012).
- Faculty evaluators were calibrated by watching 12 YouTube videos of 3 minute thesis (3MT) presentations.
- After each faculty rated the 3MT videos, the group discussed any different ratings.
- Interrater reliability was evaluated, achieving Cohen's K = 0.95 in last 5 rounds.
- At least 3 trained evaluators scored students' public talks.

		Performance Standards				
		Advanced 4	Proficient 3	Basic 2	Minimal 1	Deficient 0
		The Student…				
Topic & Intro	1	Selects a topic appropriate to the audience and occasion				
	2	Formulates an introduction that orients audience to topic and speaker				
Main points & support	3	Uses an effective organizational pattern				
	4	Locates, synthesizes and employs compelling supporting materials				
Conclusion	5	Develops a conclusion that reinforces the thesis and provides psychological closure				
Language, Adaptation	6	Successfully adapts the presentation to the audience				
	7	Demonstrates a careful choice of words				
Vocalics	8	Uses a rate/tempo that is appropriate				
	9	Speaks at an appropriate volume and with appropriate inflection				
	10	Enunciates clearly and avoids dysfluencies				
Kinesics	11	Uses appropriate facial expressions				
	12	Maintains strategic eye contact				
	13	Keeps appropriate posture and uses appropriate hand gestures				
	14	Maintains appropriate appearance				
Delivery & artifacts	15	Effectively uses space through movement and room set up				
	16	Skillfully makes use of visual aids				
Persuasion	17	Constructs an effectual persuasive message with credible evidence and sound reasoning				

Fig. 3. Public Communications Rubric

Fig. 4. Public Presentations

Podcast Assessment

- An algorithm was used to calculate the scientific jargon of students' podcasts (Sharon, Baram-Tsubari, 2013).
- To calculate the jargon score, these steps were taken:
  1. Choose a set of texts to create a scientific corpus.
  2. Choose a set of texts to create a contemporary American English corpus.
  3. Create both corpora, with word stops, punctuation, numbers, and hyphens removed.
  4. Prepare transcript text by removing punctuation, numbers, and hyphens.
  5. Determine how many times each word in the corrected transcript file occurs in each corpus.
  6. Calculate jargonness value for each word.

$$j_i = \begin{cases} \log\left(\frac{f_{i,\text{sci}}}{f_{i,\text{eng}}}\right), & 0 < f_{i,\text{sci}} < f_{i,\text{eng}} \\ 3, & f_{i,\text{eng}} = 0 \text{ and } f_{i,\text{sci}} > 0 \end{cases}$$

  7. Calculate the jargonness for the whole transcript.

$$J = \frac{1}{N}\sum_i j_i \times f_i$$

Current Project Status

- Public speaking rubric adopted. ☑
- Faculty training on rubric. ☑
- Jargonness algorithm development. ☑
- Cohort 1 storytelling program ☑
  - Improv experience ☑
  - Storytelling training ☑
  - Public speaking experience ☑
  - Podcast creation experience ☑
- Program refinement ☐
- Cohort 2 recruiting ☐

Fig. 5. Cohort 1 During Improv Training

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