Evaluating Graduate Student Oral Presentations in the Chemistry & Biochemistry Department

DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY

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Missouri State University

Graduate Student Learning Outcomes

- Students will pursue, present, and defend an original scientific project.
- Students will have an in-depth understanding and mastery of the literature in at least one particular chemistry subfield (analytical, biochemical, inorganic, organic, or physical).

Department “Seminar”

CHM 700 & 701 POPULATION

- CHM700: A series of oral presentations on new developments in chemistry. Presentations to be made by faculty members, students, and guest speakers from industry and academe. One of the requirements of this course is an oral presentation. May be repeated, but not more than two hours may be counted toward the 32-hour requirement for the MS in Chemistry degree.
- CHM701: Attendance at oral presentations on new developments in chemistry. Presentations may include those made by departmental faculty members, departmental graduate students, guest speakers from industry and academe and ACS tour speakers. All graduate students not enrolled in CHM 700 must be enrolled in CHM 701.

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CHM 700 STUDENT PRESENTATIONS

- Students enrolled in CHM 700 will create and present a lecture on their thesis research, which should include:
  - Relevant background
  - Foundational methodology
  - Data acquired by the student
  - Appropriate discussion of the data
  - Conclusions to be drawn
  - Future directions for the project
- It is typically a “mid-career” touchpoint for thesis research progress

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CHM 700 EVALUATION OF PRESENTATIONS

- CHM 700 & 701 (all peer MSc students)
- CHM 398 & 498 (speaker evaluation is instructor dependent)
- CHM faculty in attendance
- other

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CHM 700 EVALUATION

- 8 questions posed with Likert scale response

not present	*poor*	*weak*	*fair*	*above average*	*excellent*
❑	❑	❑	❑	❑	❑

- Prompts include:
  - “Organization”
  - “Preparedness”
  - “Quality of Visual Aids”
  - “Oral Communication”
  - “Effectiveness in Explaining Relevant Background”
  - “Effectiveness in Explaining Student’s own Research Plans/Efforts”
  - “Perceived Effort in Student’s Research Plans/Efforts”
  - “Overall Effectiveness in Teaching Class about Topic”

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CHM 700 EVALUATION DATA

- 3 semesters
  - Spring 2018
    - 10 presenters
  - Fall 2019
    - 4 presenters
  - Spring 2020
    - 6 presenters

	Term	Presenter	Evaluator	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
0	Spring 2018	1	1	4.0	5.0	4.0	4.0	4.0	4.0	5.0	4.0
1	Spring 2018	1	2	4.0	4.0	4.0	4.0	4.0	5.0	5.0	3.0
2	Spring 2018	1	3	5.0	5.0	4.0	4.0	4.0	4.0	5.0	NaN
3	Spring 2018	1	4	5.0	5.0	4.0	5.0	5.0	4.0	4.0	3.0
4	Spring 2018	1	5	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
...	...	...	...	...	...	...	...	...	...	...	...
376	Spring 2020	20	13	5.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
377	Spring 2020	20	14	4.0	5.0	4.0	4.0	4.0	5.0	5.0	4.0
378	Spring 2020	20	15	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
379	Spring 2020	20	16	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
380	Spring 2020	20	17	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0

381 rows × 11 columns

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HYPOTHESIS 1: PROMPTS SEEM TO BE DIVIDED INTO THREE SEPARATE CATEGORIES

- Communication Effectiveness
  - “Organization”
  - “Preparedness”
  - “Quality of Visual Aids”
  - “Oral Communication”
- Scientific Content
  - “Effectiveness in Explaining Relevant Background”
  - “Effectiveness in Explaining Student’s own Research Plans/Efforts”
  - “Perceived Effort in Student’s Research Plans/Efforts”
- Overall Evaluation
  - “Overall Effectiveness in Teaching Class about Topic”

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HYPOTHESIS 1: FACTOR ANALYSIS/CHECK FOR DATA SUITABILITY

- Factor Analysis
  - Data reduction technique that presumes there exist one or more latent variables that cannot be directly measured
  - Information on latent variables evident in the relationships caused in a set of variables
- Bartlett's test of sphericity
  - Tests null hypothesis that the correlation matrix is an identity matrix
    - Identity correlation matrix means variables are unrelated and unsuitable for factor analysis
    - Appropriate p-value (usually less than 0.05) calls for rejection of the null hypothesis and indicates data are suitable for factor analysis
- Kaiser-Meyer-Olkin (KMO) Test
  - Examines strength of partial correlation between the variables.
  - Values closer to 1.0 are ideal; Values less than 0.5 are unacceptable. Value of 0.8 is largely taken as sufficient for factor analysis to commence.

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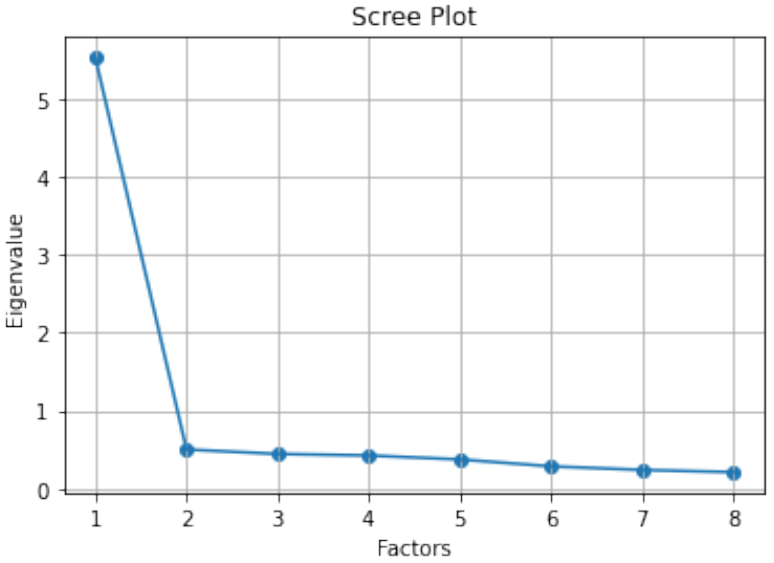
HYPOTHESIS 1: FACTOR ANALYSIS RESULTS

- Data is suitable
  - Bartlett's test of sphericity: 0.00
  - Kaiser-Meyer-Olkin (KMO) Test: 0.93729
- Only a single factor is required to capture overwhelming majority of variation in data.
- **Questions are not clustered into two separate groups**
  - **Issue with the prompts?**



Department “Seminar”

HYPOTHESIS 2: EVALUATORS MAY TEND TOWARDS REPETITION IN THEIR VALUES

not present	*poor*	*weak*	*fair*	*above average*	*excellent*
❑	❑	❑	❑	❑	❑

- Prompts include:
  - “Organization”
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  - “Overall Effectiveness in Teaching Class about Topic”

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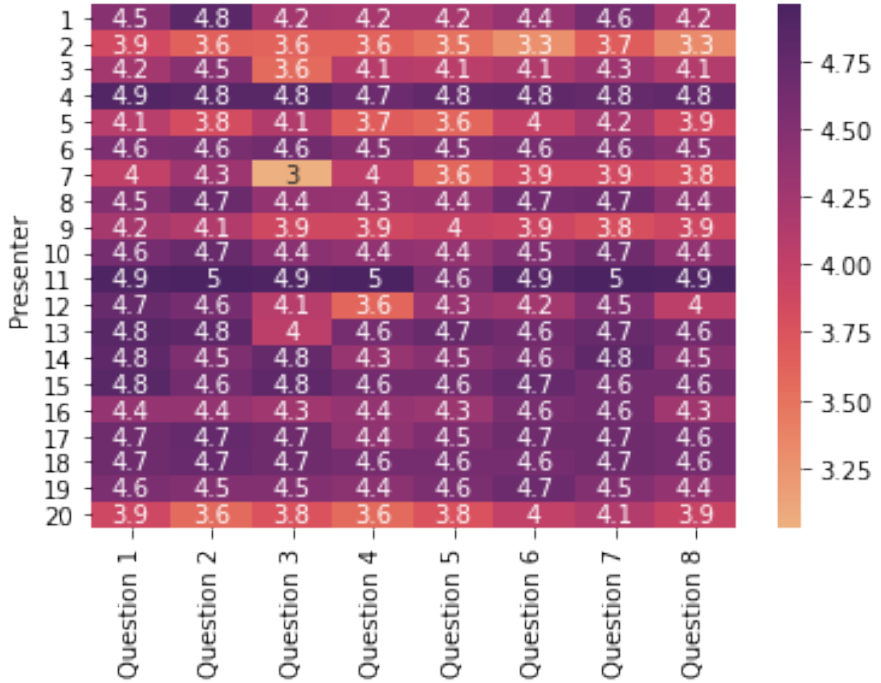
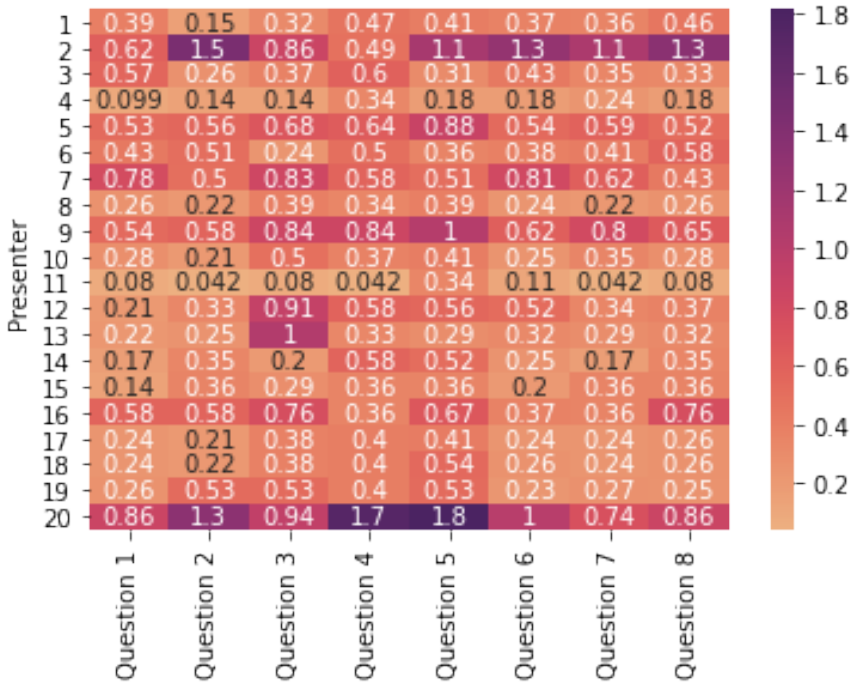
HYPOTHESIS 2: EVALUATORS MAY TEND TOWARDS REPETITION IN THEIR VALUES

Mean Scores



Variance in Scores



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HYPOTHESIS 3: PROMPTS ARE REPETITIVE/REALLY ASSESS PRESENTATION "QUALITY"

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- Prompts include:
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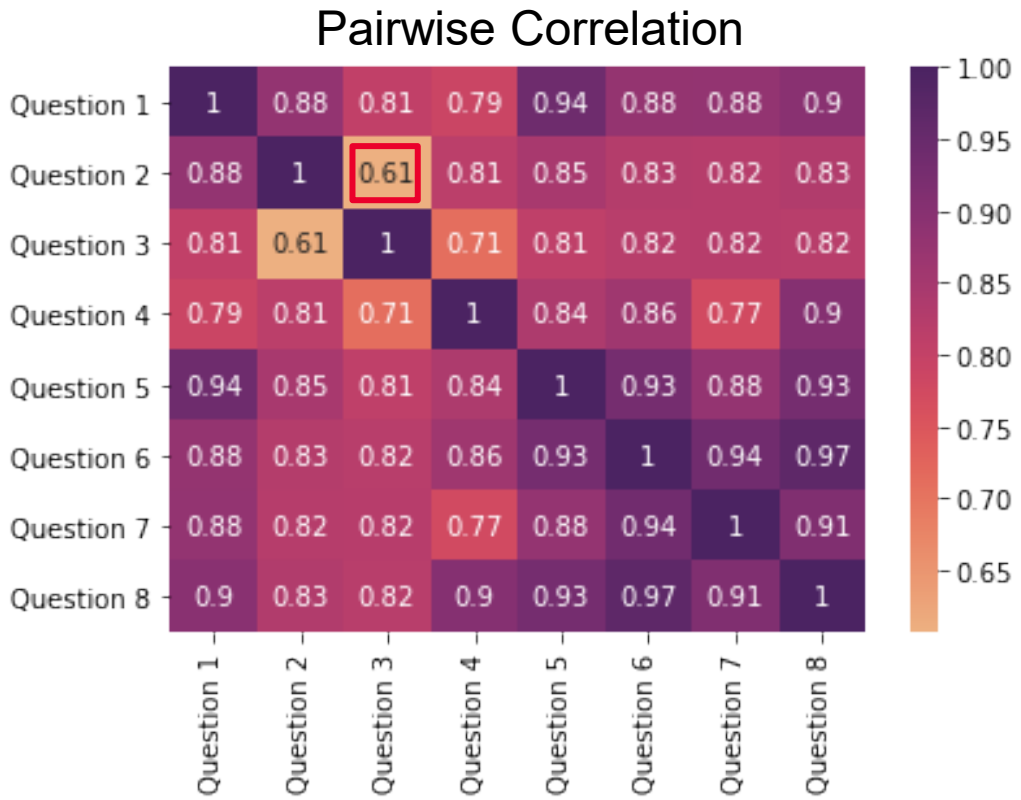
  - "Perceived Effort in Student's Research Plans/Efforts"
  - "Overall Effectiveness in Teaching Class about Topic"

Department "Seminar"

HYPOTHESIS 3: PROMPTS ARE REPETITIVE/REALLY ASSESS PRESENTATION "QUALITY"

- Prompts include:
  - Q1: "Organization"
  - Q2: "Preparedness"
  - Q3: "Quality of Visual Aids"
  - Q4: "Oral Communication"
  - Q5: "Effectiveness in Explaining Relevant Background"
  - Q6: "Effectiveness in Explaining Student's own Research Plans/Efforts"
  - Q7: "Perceived Effort in Student's Research Plans/Efforts"
  - Q8: "Overall Effectiveness in Teaching Class about Topic"



Conclusions Reached

HOLISTICALLY, THINGS LOOK GOOD!

not present	*poor*	*weak*	*fair*	*above average*	*excellent*
❑	❑	❑	❑	❑	❑

- Goals:
  - Students will pursue, present, and defend an original scientific project.
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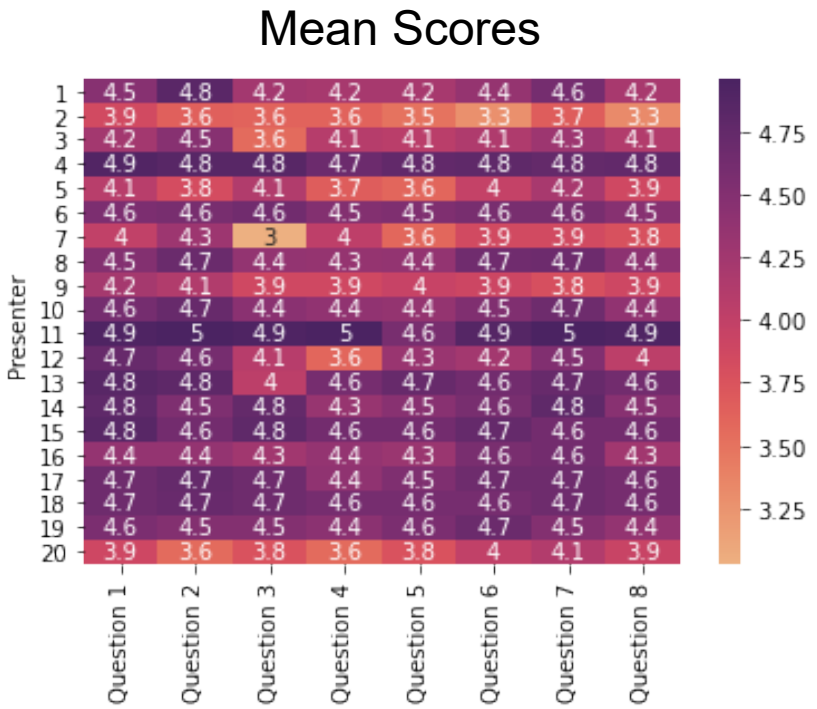

Conclusions and Associated Action Items

1. Faculty and Students may differ in what they value
   a) Initial assignments to reflect on attributes of better and worse presentations?
2. Prompts are largely appropriate, but need improvement
   a) Provide description for each prompt to help “alignment” in definition
   b) Categorize prompts to help “alignment” in definition

Follow-up Plans & Next Steps

- Implement new assessment item and assignments into seminar
- Collect data on an ongoing basis to test effectiveness of new assessment item and assignments