



CHEMICAL ENGINEERING STUDENT PERCEPTION OF COMMUNICATION DEVELOPMENT FROM PARTICIPATION IN GAME-BASED ACTIVITIES

Ms. Abigail Kulhanek
and Dr. Cheryl Bodnar
June 26th, 2017

WHY IS COMMUNICATION IMPORTANT?



WHAT INDUSTRY EXPECTS



Image obtained from: <http://presentability.com/dilbert-fun-about-powerpoint-presentation/>

- Proficient technical AND communication skills¹
 - Working engineers spend over half of their time communicating²

1. Darling, A. L., and D. P. Dannels. "Practicing Engineers Talk about the Importance of Talk : A Report on the Role of Oral Communication in the Workplace." *Communication Education* 52.1 (2003): 1-16.

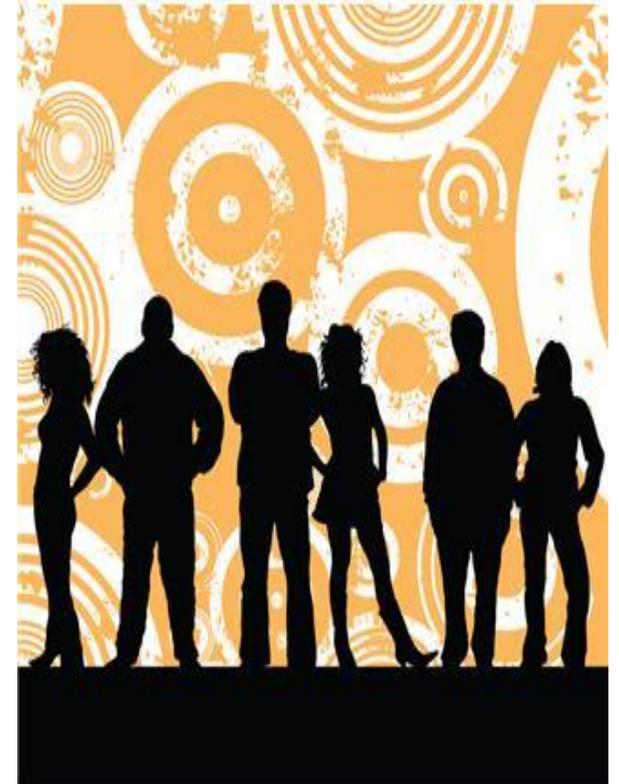
2. Vest, D., M. Long, and T. Anderson. "Electrical Engineers' Perceptions of Communication Training and Their Recommendations for Curricular Change: Results of a National Survey." *IEEE Transactions on Professional Communication* 39.1 (1996): 38-42.

THE PROBLEM

“[Recent engineering graduates’] communication skills are not good, they are less than not good, they’re really bad. In most cases, they’re not strong communicators and that is a problem ...”¹

STUDENT PERCEPTIONS TOWARDS COMMUNICATION SKILL DEVELOPMENT

- May hinder the adoption of communication skills
- Programs developed to aid in communication skill development found:
 - The program didn't have the impact expected¹
 - Late recognition of importance of communication amongst students¹
- Students may think communication skills are not important or misjudge their communication abilities





RESEARCH QUESTION

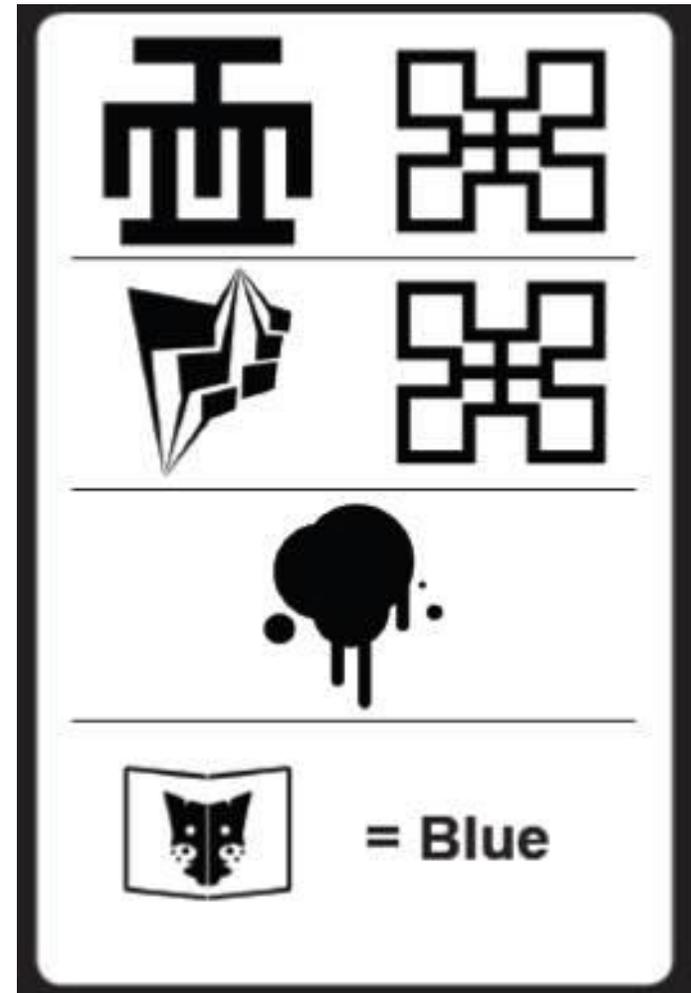
How do games influence students' perceptions of skillsets that are important within written and oral communication?

STUDY DESIGN

- 86 undergraduate students enrolled in Spring 2015 Introduction to Chemical Product Design course
- Implemented specific game-based activities focused on building communication skills
 - ROYGBIV
 - Mystery Liquid
 - Professional Slide
- Students completed optional activity reflections after their participation in the game-based activities

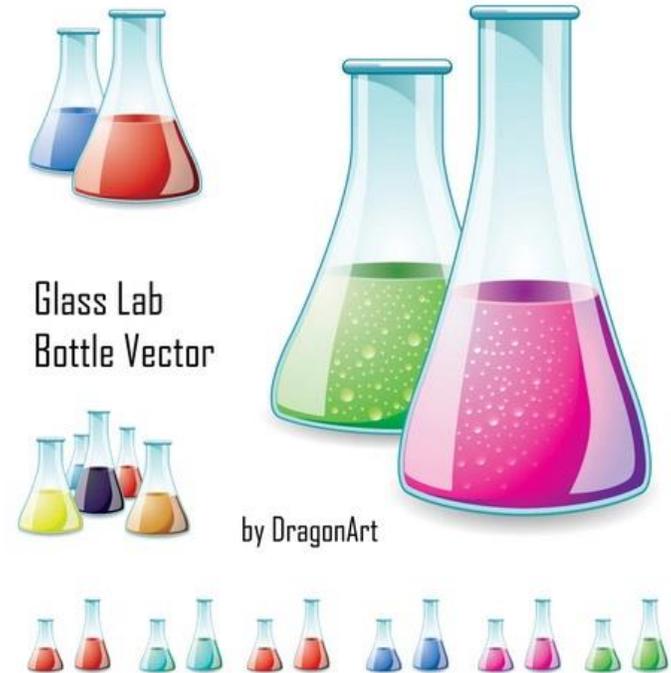
ROYGBIV

- Each student received a card with information (similar to that shown on right)
- Could only use oral communication to decode card
 - No writing or drawing
- Once their card was decoded, students had to change the color of a tile on the instructors computer to reveal a message



MYSTERY LIQUID

- Students placed in teams
- Each team member inspected different unknown liquid
 - Can use touch, sight, and smell
- Prepare written description about the liquid and give this information to their group members
 - Once students returned to group they couldn't speak about mystery liquid
- Remainder of group members must correctly identify mystery liquid without ever seeing it



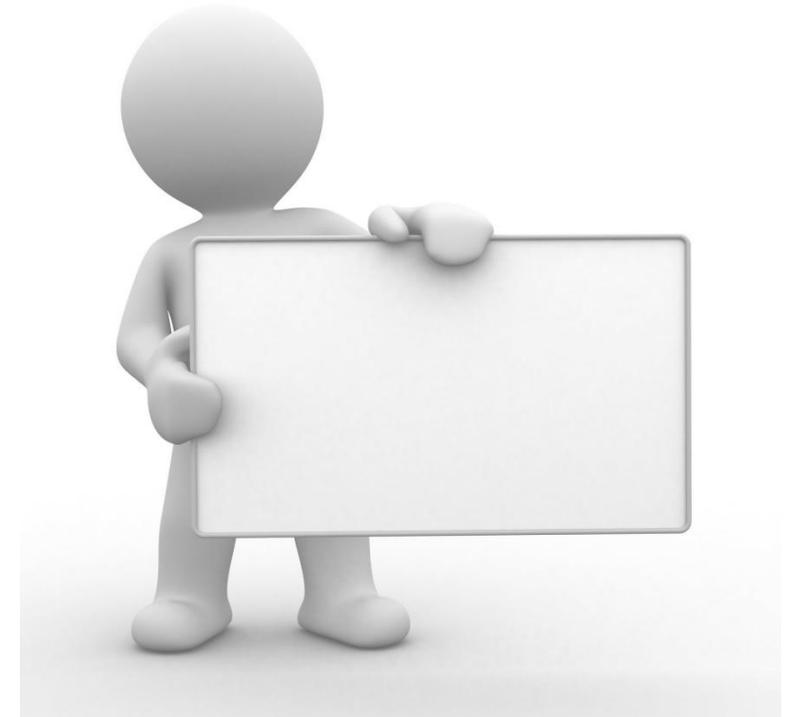
Obtained from:

<https://dragonartz.files.wordpress.com/2009/07/vector-glass-lab-bottle-prev-by-dragonart.jpg?w=495&h=495>.

Accessed May 24th, 2017.

PROFESSIONAL SLIDE

- Groups of students act as a company in distress
- Create a single slide to explain a provided issue:
 - Environmental
 - Medical side effect(s)
 - Instability in a key component
 - Dangerous manufacturing conditions
- Students told professional engineers from industry were also submitting slides
- Students voted on which slide was the most professional looking



Obtained from: <http://1.bp.blogspot.com/-lrKXHCcyy6U/TknoFa90asl/AAAAAAAAAHGI/rRHkJJDOTS4/s1600/carrying+empty+board+3d+human+character.jpg>. Accessed May 24th, 2017.

THEMATIC ANALYSIS¹

- Grounded emergent analysis approach
- Reflection responses collected, read and re-read to identify patterns
- Patterns linked to themes as the analysts understood the reflection responses to represent
- Created a coding framework that could be applied to review all student reflections

CODING FRAMEWORK

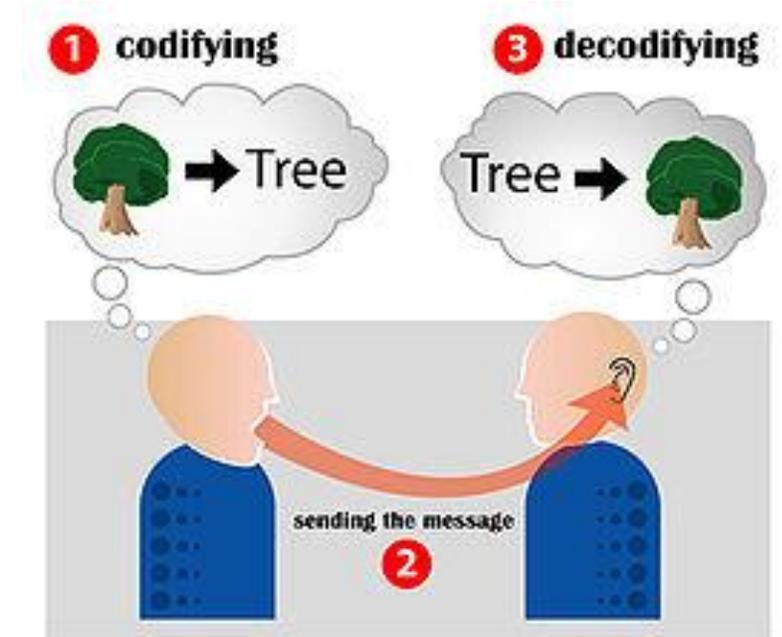
Category	Sub-category	Description
Difficulties	Misleading	Information provided in communication may steer audience to a specific thought that doesn't match the desired goal of communication
	Biases	Audience may have past experiences that influence how they perceive information; importance in identifying biases when preparing communication
	Stepping Out of the Comfort Zone	Specific to oral communication the need to speak to individuals that aren't known by the individual, getting feedback on ideas, doing more than expected
Audience Perception	Wording	Types of descriptions that are used in communication influencing the perception of the final product
	Understanding/ Listening	Person's perspective is not always that of the audience; need to reflect on target audience and their background to help encourage more effective communication
	Misinterpretation	Thoughts conveyed by speaker or writer are not interpreted as intended
Approach	Framing	How to set up the piece of communication and determine what should be included and what may not be necessary, use comparisons, starting from shared experiences
	Organization	The method used to prepare the piece of communication, how many sections or bullet points, any common themes grouped together
	Detail	Amount of detail that is included within communication piece, length of piece and its impact on the ability to convey correct information
	Presentation	Clarity of the final piece of communication, level of professionalism

RESULTS: TOP THREE THEMES

Communication Activity		Theme
ROYGBIV	First	Understanding/ Listening [33]
	Second	Wording [26]
	Third	Stepping Out of Comfort Zone [26]
Mystery Liquid	First	Detail [44]
	Second	Wording [30]
	Third	Biases [28]
Professional Slide	First	Framing [39]
	Second	Understanding/ Listening [29]
	Third	Presentation [16]

ROYGBIV

- Understanding/listening
 - Speaker needs to reflect on target audience to ensure effective communication
- Wording
 - Watch descriptions used to ensure audience understands final product
- Stepping out of the comfort zone
 - Doing more than expected to get feedback or gain new information
 - Talking to individuals that the student does not know



Obtained from:

https://upload.wikimedia.org/wikipedia/commons/thumb/7/79/Encoding_communication.jpg/270px-Encoding_communication.jpg. Accessed on October 13, 2016.

MYSTERY LIQUID

- Detail
 - Need to include specifics
 - Acknowledges length of the piece
- Wording
 - Ensure audience understands final product
- Biases
 - Importance of conveying only information that was given
 - Don't introduce perceptions of their own

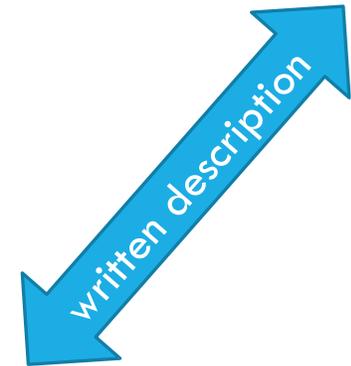


Obtained from: <http://clipart-library.com>.
Accessed on May 29th, 2017.

Obtained from:
<http://courageousscientists.blogspot.com/2013/08/unit-1-scientific-method-day-6-making.html>. Accessed on May 29th, 2017.



Obtained from: <https://thecliparts.com>.
Accessed on May 29th, 2017.



PROFESSIONAL SLIDE

- Framing
 - How to set up and what should be included in piece of communication
- Understanding/listening
 - Speakers perspective not always that of audience
 - Need to reflect on target audience to ensure effective communication
- Presentation
 - Need for clarity and professionalism in final piece of communication



Obtained from:

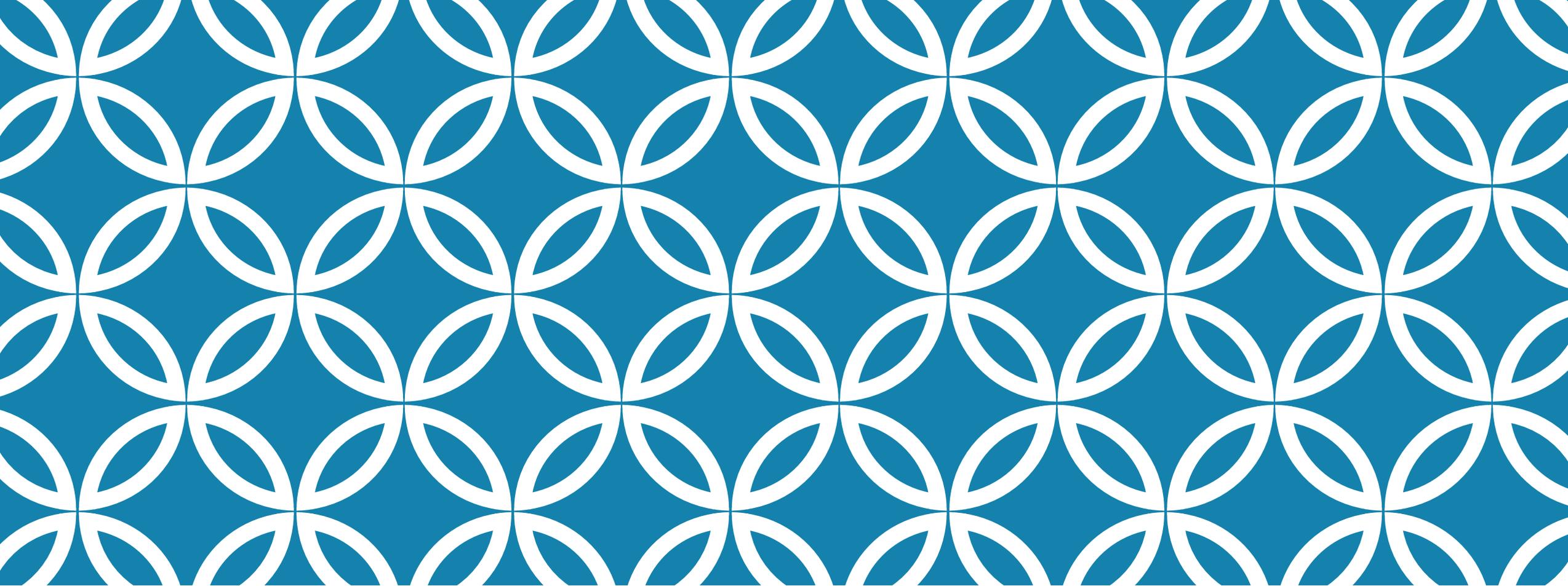
<https://www.slideshare.net/mohammadnadeem30/presentation-business-communication>. Accessed on May 29th, 2017.

CONCLUSIONS

- Effective communication is important in any field
- Many engineering graduates currently do not meet industry expectations for communication skills
- Games followed by self-reflection exercises may help contribute to ability to translate skills from the classroom to the workforce
- Themes identified within student reflections aligned with the desired key takeaways of the games

ACKNOWLEDGEMENTS

- Funding from the Engineering Information Foundation (EIF)
- Pete Vigeant, Completely Surrounded



**THANK YOU
QUESTIONS?**

