Student Generated Creative Exercises: An End-of-Semester Project

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Author Biography

Dr. Shainaz Landge joined Georgia Southern University in August of 2010. She completed her Ph.D. at the University of Massachusetts, Boston, and then moved on to a postdoctoral position at Dartmouth College (NH). Dr. Landge's research interests are in the area of synthetic organic chemistry, supramolecular chemistry and chemical education. She likes to engage students with interactive teaching aids to understand the complex concepts in chemistry. Her current education research focuses on student motivation and utilizing time management tools to increase student learning gains.

Goal of Activity

The goal of this creative project is to involve students in teaching each other the course material and to enhance their own basic understanding of content through various creative mediums. This activity targets challenging topics in chemistry courses and is primarily focused on developing critical thinking skills. The courses I teach clearly state that the students should be able to understand, explain, apply and evaluate the material taught in the classroom. These creative exercises particularly focus on these learning goals.

Description of the Activity

Since summer of 2013, I have included creative projects as part of my course (General Chemistry, Organic Chemistry I and II). In my introductory lecture, I give a brief talk about a creative exercise project which is worth 3-4% of the total grade depending upon the course I am teaching. After my second exam in the semester I describe the expectations of the project.

Creative projects can be selected on any topic which the students have learned throughout the semester and approximately four weeks are given to complete this project. Accepted activities may include but are not limited to: a mnemonic, an acronym, a poem, a song, video, art, games etc. The activity should help students understand the material better and make chemistry fun.

Students can work on the project with a partner and each student should participate both in the activity and writing the report. The project report should be one to two pages, and the report should address the following topics with the detailed description addressing six important points (a-f).

Name of all the students presenting (class and section):
Title of the presentation:
Description:

a) Introduction
b) Summary of your project
c) How does your project relate to your learning in this course?
d) Conclusion
e) What is your reactions to this activity?
f) References

The project is due a week before finals and a few examples of past projects are cited in the "Project Report Format" section which is uploaded on the Learning Management System (LMS, Folio). Plagiarism and university standards for student work are clearly defined.

A few examples of "possible topics" such as Nomenclature, Acids and Bases, Stereochemistry, Isomers etc. are shared on folio (our learning management system) so the students have a better idea of topic selection.

After the announcement, I share a google document with the whole class and ask them to submit their project name and the title. The class is able to see the selected topics by other students and have been advised not to select the same topic.

It takes about 2-4 days for the students to come up with a decent topic and select a partner who wants to work on the same project. The partners then discuss their project with the instructor on a *one-to-one* basis and get feedback on what a good project should look like, while also becoming more acquainted with the expectations of the project.

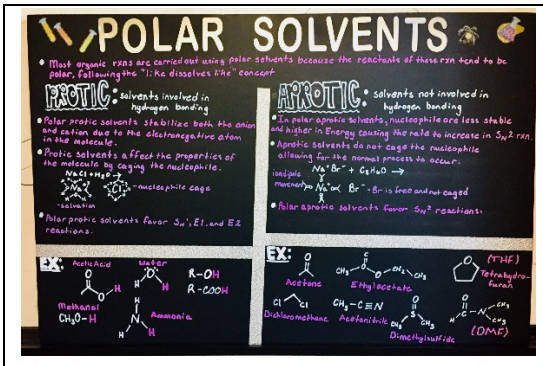
After grading, the projects are first shared with the class before the final exam and a few, unique ideas are shared on public platforms (college and personal websites) along with the college and department social media sites.

This project allows for the enhancement of student learning gains by allowing students' creative expression. This also helps the students to meet, engage, talk, gather ideas and explain their thoughts through diverse platforms. Previous literature focusing on creative activities have suggested that students' higher order thinking skills and student learning are significantly improved when they used various creative mediums (Tomasevic & Trivic, 2014; Ramirez & Ganaden, 2008). For example, in a high school organic chemistry course, students made video vignettes on different concepts. These students showed improved performance on exam questions related to the concepts on which their videos focused (Morsch, 2017).

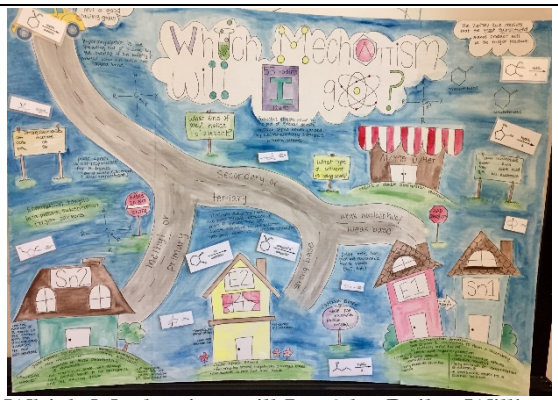
I have received an overwhelmingly positive response since I started this classroom practice in 2013. Every semester, I personally learn so many new teaching techniques from the students. I gather, use and share the well-designed projects with my incoming class on few specific topics focusing on difficult content. The student feedback and the student rating of instruction at the end of the semester have consistently reflected that students' understanding has been improved and allowed them to think about the material in depth.

Sample Student Work

A few examples (photos and links) with student's names are listed below:

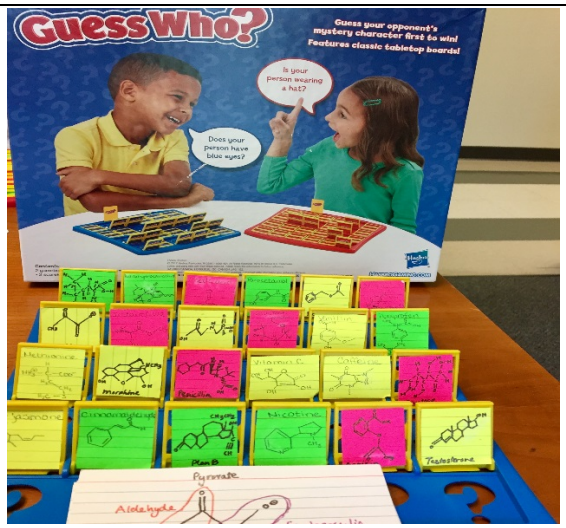


Polar Solvents by Ms. Lexi Lord & Ms. Taylor Lee



Which Mechanism will I go? by Bailee Williams

Monopoly by Ms. Hartley Causey and Ms. Kameran Land



Guess Who by Ms. Arianna Skyes and Ms. Yvonne David

Organic UNO by Ms. Kamari Jordan and Ms. Constance Moorer.

Claymation of SN2 reaction by Ms. Leann Smith and Mr. Robert Greene.

Links: For more student examples of creative exercises, visit:
Student presentations:
https://sites.google.com/a/georgiasouthern.edu/slandge/teaching/student-presentation
Student poems:
https://sites.google.com/a/georgiasouthern.edu/slandge/teaching/poems

Student Feedback

The project report surveys students with the question: What are your reactions to this activity?" Most of the students mentioned that it was a great, fun way to learn and understand the material. A few selected, distinct responses from the organic chemistry course are shared below.

> Being able to create this project gave us a better understanding of elimination mechanisms because we were able to organize the concepts in a way that is easier to follow. This project gave us an opportunity to gain more exposure to the concepts for the purpose of comprehension, memorization, and practice because we were actively creating our own examples. This project is a great study tool. (Project: You've just been Eliminated!!!)

> I was a little confused on hyperconjugation and inductive effect in class, but after further studying the material to create this project, I understand it now and can refer back to the videos in my head during the test if I get confused. (Project: Carbocation Stability)

> Working on a project like this turned a somewhat challenging or stressful topic, like organic chemistry, into a fun and entertaining project. (Project: Claymation of S_N2 Reaction: Night of the Nucleophile)

> Creative projects require the amount of thinking and understanding that we feel we strive to have toward every topic in organic chemistry. We plan to use this idea and apply it to other courses because of the usefulness. (Project: Polar Solvents)

> There are a lot of functional groups and remembering all was tricky but this game has made it easier to remember them. After doing this activity, I believe that I'm going to have an easier time during my finals. (Project: Functional Groups – Guess WHO!)

References

Morsch, L. A. (2017). Student Authored Video Vignettes in Chemistry. e-mentor, 70(3), 25-32.

Ramirez, R. P. B., & Ganaden, M. S. (2008). Creative activities and students' higher order thinking skills. Education quarterly, 66(1), 22-33.

Tomasevic, B., & Trivic, D. (2014). Creativity in teaching chemistry: how much support does the curriculum provide?. Chemistry Education Research and Practice, 15(2), 239-252.