



## UTeach Maker - Showcase Lesson Overview Paige Arneson (Spring 2017)



Lesson Title	Egg-olution
UTeach Maker	Paige Arneson
Name of collaborator/s	Oren Connell
Subject and grade level	10th grade Pre-AP Biology
<b>Link to lesson plan and materials</b>	<a href="http://arnesonpaige.wixsite.com/website/egg-olution">http://arnesonpaige.wixsite.com/website/egg-olution</a>

### **Lesson Description:**

This Maker lesson has students play a game, Egg-olution, that models natural selection as a mechanism of evolution. Students see how different adaptations affect their organism's fitness during different natural disasters. Students use a plastic egg to make an organism, representing their adaptations however they choose. The organism's ability to survive and reproduce varied as they acquired more adaptations and underwent different natural selection events.

### **Lesson Development:**

This project was developed through collaboration with my Maker mentor, Oren Connell. I looked at the calendar and saw we were going to be wrapping up our evolution unit. I looked over the TEKS and decided which objectives would need to be covered by the game. After determining the content that needed to be addressed, we brainstormed many different evolution related ideas. Together, we thought up different ways to play and practiced playing. Oren and I collaborated to design the game, then I used what we discussed to create student handouts.

### **Lesson Implementation:**

This lesson was taught to two Pre-AP biology classes at the Ann Richards School, a public charter school in Austin ISD. The classes are both single-sex (all female) and are composed of primarily minority students. Many of the students are from low-income families. The students have had exposure to Making in previous classes, but not previously in their biology class. My cooperating teacher did not have her other classes play the game, composed of similar demographics, so we were able to see how playing this game impacted student understanding.

## **Connection to important concepts and skills within the discipline and/or across subject areas:**

This lesson was a summary lesson at the end of our evolution unit and was designed to address misconceptions and reinforce the content. The Texas TEKS were used to design the lesson, which are the state standards for important concepts and skills. The lesson addressed both process (3E) and content (7C, 7D, 7E, 12D) TEKS in the biology curriculum. Additionally, this lesson hit on TEKS from other subject areas, including algebra, art, english, and world history.

## **Reflection:**

This Maker lesson was fun to design and even more fun to teach. My students were smiling and laughing throughout the class and many “tweeted” exceptionally positive things. One student in particular, previously told me she disliked biology class and then said “biology is so fun” during Egg-olution, which was a win in my book. Additionally, one of my professors came and observed the lesson and only had praise.

However this lesson could be improved in a few small ways. For starters, group roles could be strengthened. Students often forgot what role they had, so I have updated the booklets to include a place for them to record their role on the cover. Additionally, students were not able to answer all the questions during class, which became homework. These questions were discussed the next class, so this lesson could easily be extended into a second day, where students could further reflect and change their ideas. Assigning the questions as homework worked well, but more time could be devoted to discussing the questions in class. Ideally, there would be more choice and self-expression in this lesson. Instead of starting with the same base, a plastic egg, students could make their own base or choose from a list of bases for their organism (such as Play-Doh, a plastic water bottle, or a cardboard tube). If this lesson was extended to two or more days, students could use more tools like drills, saws, and laser cutters, to construct their organisms. This lesson could also be taught with more digital tools, such as Scratch to code or 3D printers to print the adaptations. This would give students a chance to use multiple technologies that are both high-tech and low-tech. You could even do the entire project with just computer programming, if you wanted to have students using only digital tools. There are many ways this lesson could be adapted to meet the needs of different students with varying levels of technology.

Overall, implementation of this lesson was successful for both of my classes. We addressed several misconceptions about natural selection through true/false questions and students scored higher on their tests than classes that did not play egg-olution (by 2 points!). We achieved each of our learning goals, as seen by students answers to the questions at the end of the lesson. Every student accurately answered that evolution acts on populations not individuals when responding with the Plickers, students explained that evolution is a slow and gradual process, and they all created a unique organism, based off the adaptations they were assigned. Students reviewed content previously covered (binomial nomenclature, fitness, etc.) while reinforcing natural selection.

This activity ensured equity in my classroom. Students from different backgrounds and with different interests could express their understanding in whatever way they saw fit. The design of the adaptations varied widely, even within the same groups, due to the self-expression and individuality of each group member. Additionally, the materials for this project are easy to obtain, cheap, and simple. This lesson could be replicated in any classroom, not just ones with access to technology. This lesson accommodates for diverse groups of learners and showcases how Making can be implemented in any classroom, even biology.

Through designing and implementing this lesson, I realized that preparing to Make in a biology classroom is a lot of work. However, the time and energy invested is worth it because of student excitement and the value of what they learn through Making. My students have asked for more lessons where they can make or create. Students are not just learning content, but are also learning how to create, problem-solve, and express themselves. These skills extend beyond my classroom, into their other classes and their everyday lives. Making is a valuable endeavor for students and teachers alike.