

DESIGNING INSTRUCTION: FROM CANDY TO COMPUTERS

Susan Kelly Archer
Mitchell College, USA
archer_s@mitchell.edu

INTRODUCTION

Teaching introductory statistics classes at the college level requires a pedagogy of concrete to abstract concept creation. Often some of the best concrete lessons involve M&M® candies (or something similar) for concept introduction before shifting to interpretation of more abstract symbols and equations. In today's technology-driven global community, we are also compelled to integrate manipulation of statistical software so that our students are ready for the workforce. What does this composite instruction look like – especially at a school with a very tight instructional budget?

CLASSROOM COMPONENTS

Students learn best when they can manipulate and *do*. So, let's flip the classroom and make that possible. Start new concept instruction with concrete experiments. These can include using easily purchased food items such as candy or cookies, or any other items that are available in quantities appropriate for organizing, displaying, and/or describing during a typical class period. Use the resulting graphics to discuss important concepts. Then shift from the concrete to abstract representations with statistical symbols, equations, and values. Knowing some of our students cannot afford a graphing calculator with statistical applications – especially if they only take one statistics class during their college years – introduce a variety of online calculators and use them in the classroom. Model the work you want your students to be able to do. Let them use these tools to work problems during a class period (flip the class) so that you can hear their thinking, help with understanding, and create an environment in which they see that you value their learning.

But what about technology? Students can download RStudio® for free. There are numerous videos available online for instruction in how to download the software and how to write basic programming code. There are also a wide variety of online resources for instructors to use to create the code you want to use to teach students a particular process. An added benefit is that there are datasets embedded in the program, so you just have to write the line of code to 'call them up.' Again, flip the classroom. Provide the code, explain the commands, and let students practice with your help. They learn more about the work of a statistician and you get to see students working together to solve problems (the ones you assign and the program debugging kind).

Concrete Modeling

- Using candy to introduce X^2 hypothesis testing (activity provided in AP Statistics teacher training; handout available on multiple websites).
- Using candy to explain the difference between a confidence interval and confidence level – and how they are related (my own activity, developed with a pre-intern in 2010 and presented at 2012 FCTM conference).

Shifting to the Abstract

- Teaching the language of statistics.

Technology Integration

- Using online calculators.
- Free software for calculations and analysis.

This poster presents just one set of processes that offer student-centered practice. Giving them the power to learn enhances the classroom and can make statistics a class they don't want to miss.

REFERENCE

RStudio Team. (2020). RStudio: Integrated development for R. PBC. <http://www.rstudio.com>