Using Colored Candies and Google Spreadsheets to Teach Research Concepts

Mary Gaffney, EdD, MSN, RN
University of South Carolina Aiken
School of Nursing

Please prepare for this presentation!
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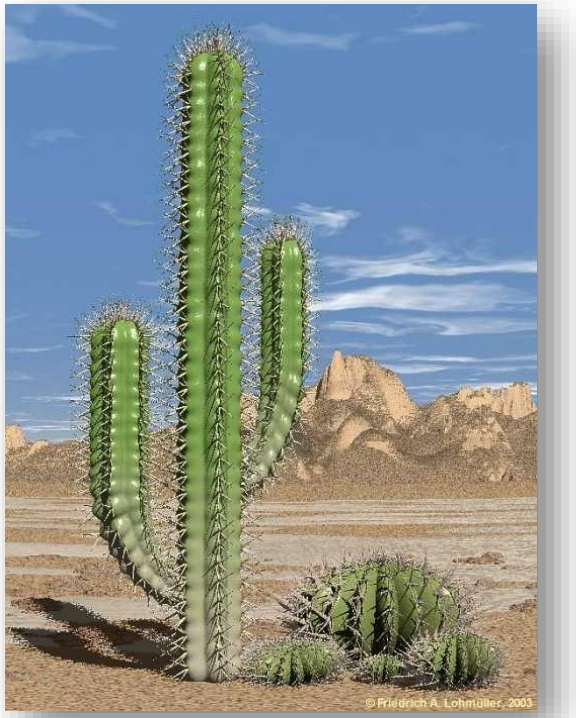
Objectives

- Describe the theoretical basis for the learning activity
- Provide an overview of the activity
- Discuss other research concepts which can be explored using this activity
- Present results of statistical analysis
- Discuss student-based and logistic barriers to the activity
- Describe asynchronous use of the activity

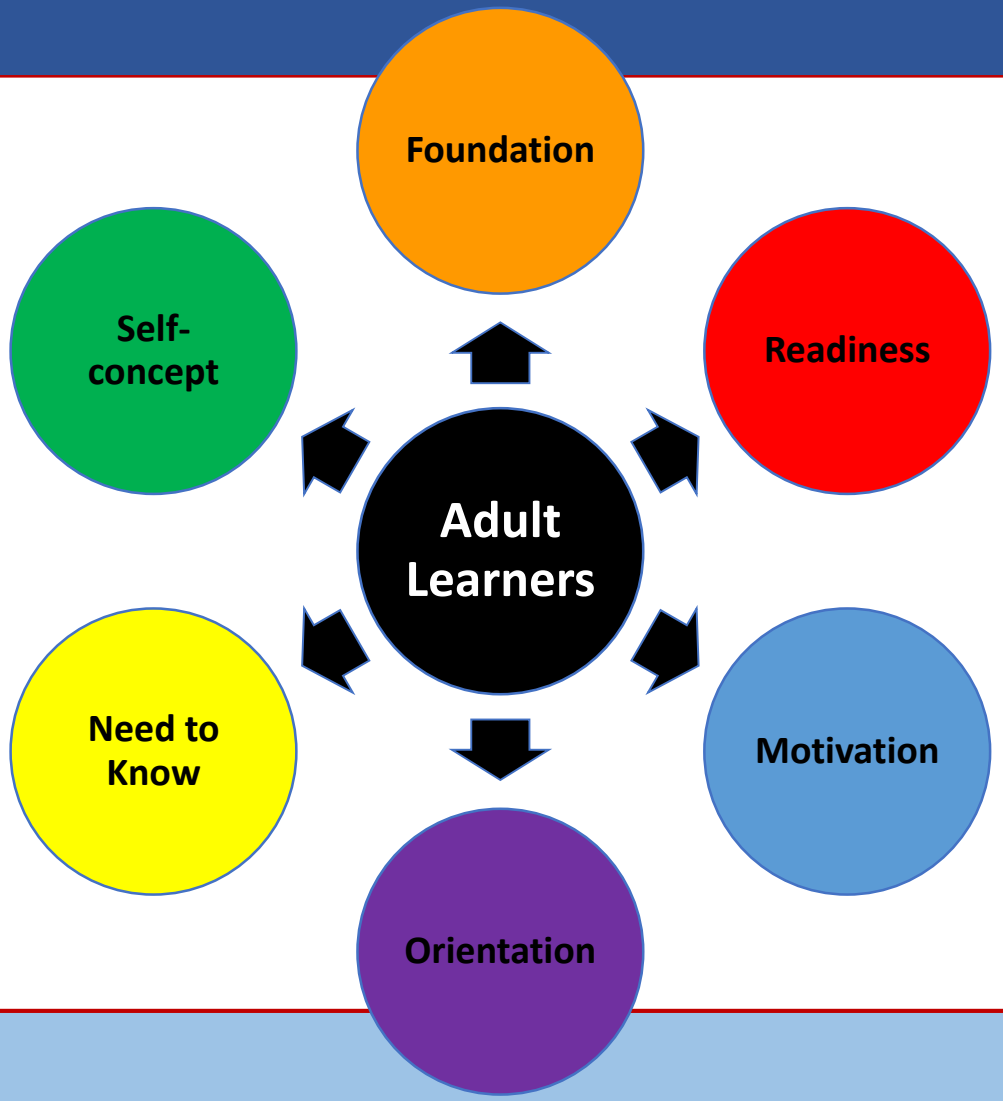
Active Learning in a Research Class?

- Research concepts are dry!



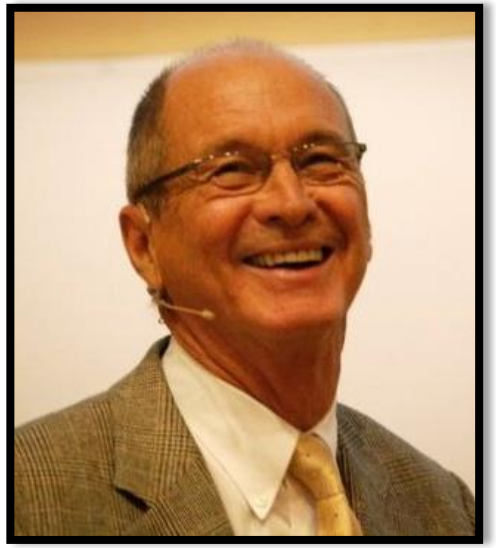
Theoretical Basis

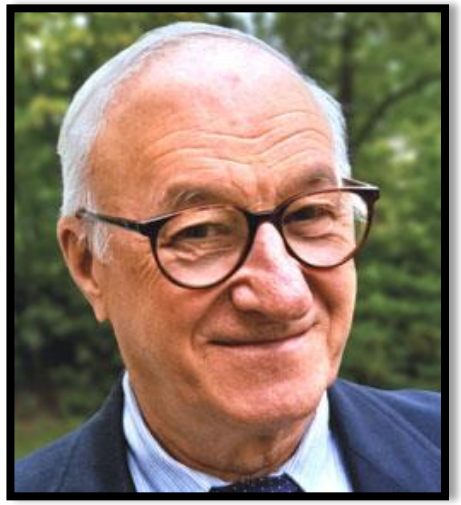
- Adult Learning Theory
  - Active learning
  - Intrinsic and extrinsic motivators



Theoretical Basis

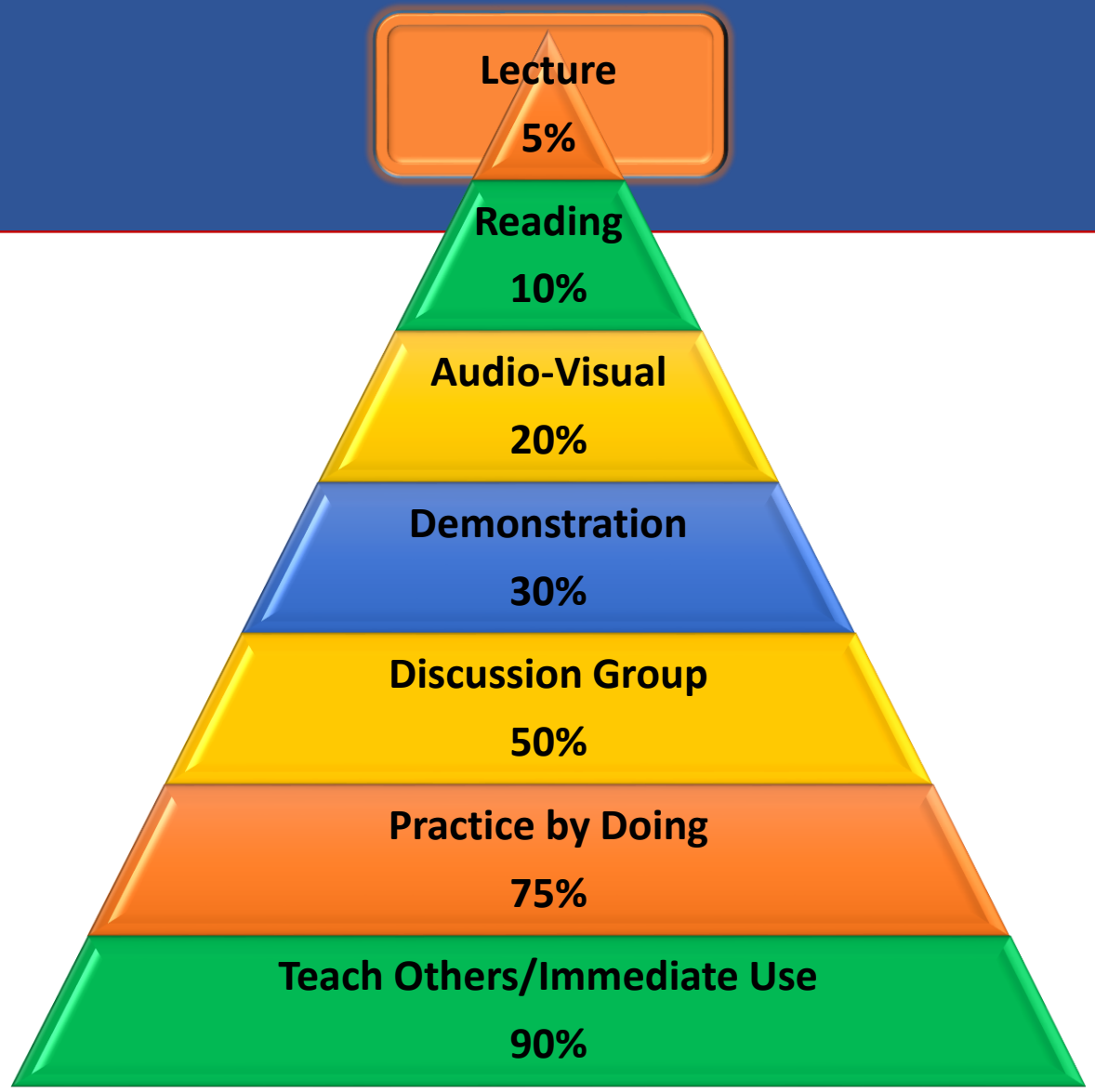
- Collaborative learning
- Experiential Learning





Theoretical Basis

- Learning styles v. retention/ working knowledge



The Scenario

The Skittles company is suspected of packaging unequal quantities of the 5 colors in each bag.

The Activity

- Supplies
  - Skittles or other colored candy (100 for each small container)
  - Aluminum pan or other workspace able to contain the candies
  - Smart phones for data entry

Activity Instructions

- Divide into groups of 2
- Obtain supplies and written instructions
- Use smart phones to enter sampling data on Google spreadsheet

NURSING RESEARCH AND EVIDENCE-BASED PRACTICE: SKITTLES SAMPLING ACTIVITY

Sampling technique #1

* Without looking, remove 25 Skittles (participants) from the box of 100.
* Sample = 25 Skittles
* Count the number of red, orange, yellow, green, and brown Skittles
* Enter this information into the spreadsheet
* What kind of sampling technique is this?

Sampling technique #2

* Without looking, remove 5 Skittles (participants) from the box and place these in a small pile in the pan.
* Repeat until there are 20 piles of Skittles in the pan.
* Without looking, pick 5 piles from the pan and return them to the box.
* Sample = 25 Skittles
* Count the number of red, orange, yellow, green, and brown Skittles
* Enter this information in the spreadsheet
* What kind of sampling technique is this?

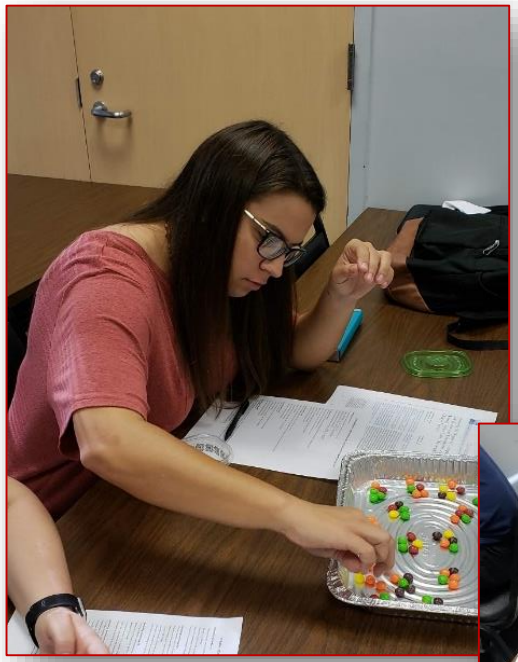
Activity Instructions

Sampling technique #3
* Line up all Skittles (participants) in a line around the edge of the pan.
* Beginning in 1 corner of the pan and moving in a clockwise direction, select every 4th candy and place it in the container.
* Sample = 25 Skittles
* Count the number of red, orange, yellow, green, and brown Skittles
* Enter this information in the spreadsheet
* What kind of sampling technique is this?
Sampling technique #4
* Sort all Skittles by color
* Without looking, pick any 5 Skittles (participants) from each color group
* Sample = 25 Skittles
* Count the number of red, orange, yellow, green, and brown Skittles
* Enter this information in the spreadsheet
* What kind of sampling technique is this?
Sampling technique #5
* Sort all Skittles by color
* Assume that all red Skittles are not perfectly round, but that all other colored Skittles are. Return all red Skittles (participants) to the plastic container. Assume that red Skittles (members of the population) are not important because you do not like Skittles unless they are perfectly round.
* Without looking, choose 5 Skittles (participants) from each remaining color for your final sample.
* Sample = 20 Skittles
* Enter the information on the spreadsheet. Consider how this sampling technique affects measures of central tendency.
* How well does the final sample represent the population of Skittles?
* Consider if there are any ethical concerns related to this sampling technique.

Complete the five sampling technique exercises. Enter the results in the table below. After considering the questions below, access the Skittles Measures of Central Tendency using this link: link here. Enter data from the table below into the Google Sheet. Results will be displayed to the entire classroom.

Sampling Technique	Red	Orange	Yellow	Green	Purple
#1					
#2					
#3					
#4					
#5					
Calculate the mean value for each color for all sampling techniques.					
Calculate the mean value for each color for all sampling techniques, excluding sampling technique #5.					
Which sampling methods produced similar results?					
Consider the mean values obtained for sampling technique #5. Do you feel that this technique produced a sample that represents the entire population of Skittles? Was there evidence of bias?					
Do the sampling techniques #1-4 result in similar samples? Do you feel that these techniques produced samples that represent the entire population of Skittles? Was there evidence of bias?					

Sampling in Action

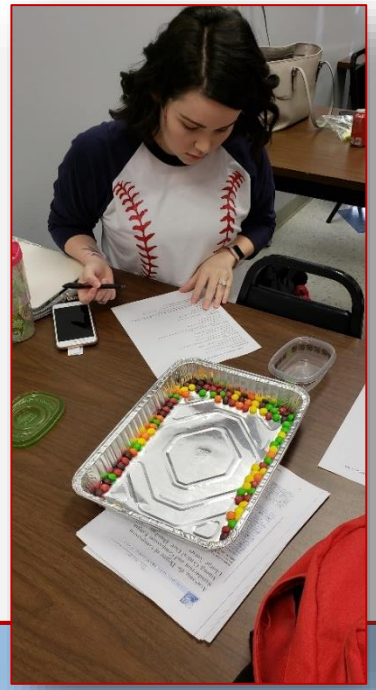


Cluster

Stratified

Sampling in Action

Systematic



Debriefing

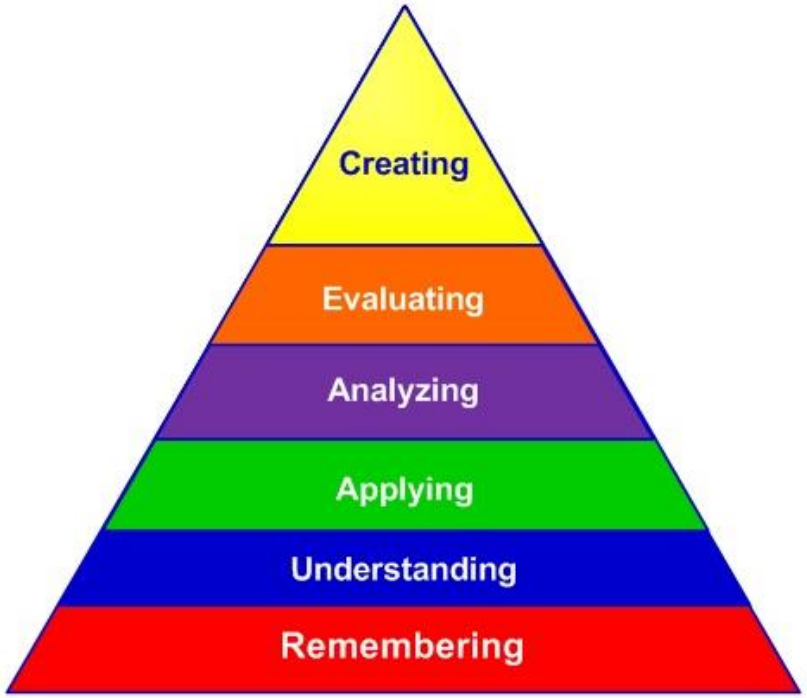
- Sampling techniques
- Several others may be introduced or reinforced during this activity

Assessment of Learning

- Before-and-after testing with identical questions
- Google Forms used to design and administer the test

Assessment of Learning

- Bloom's Revised Taxonomy levels



Bloom & Anderson, 2001

A nurse researcher is performing a study of adults over age 70 with a history of heart failure. Patients representing all four classes of heart failure are included in the study. The participants will be followed over a 5-year period to assess quality of life. The researcher obtained a sample using the stratified sampling method. After 22 months, 75% of Class III and IV patients had died. The researcher decided to stop the study based on which rationale?

- ○ The studied intervention may have caused the deaths of the Class III and IV patients.
- ○ The sample may no longer be representative of the entire population of heart failure patients.
- ○ Fewer Class III and IV patients are available in the general population.
- ○ The intervention cannot be evaluated for effectiveness in heart failure patients.

Evaluation of Activity

- All students taking this course for the 1st time (semester 3 of 5)
- 14% male/86% female

Ethnic Backgrounds	
67%	Non-Hispanic White
23%	Non-Hispanic Black
7%	Hispanic
3%	Asian

Evaluation of Activity

Paired Wilcoxon Test Analysis[a]

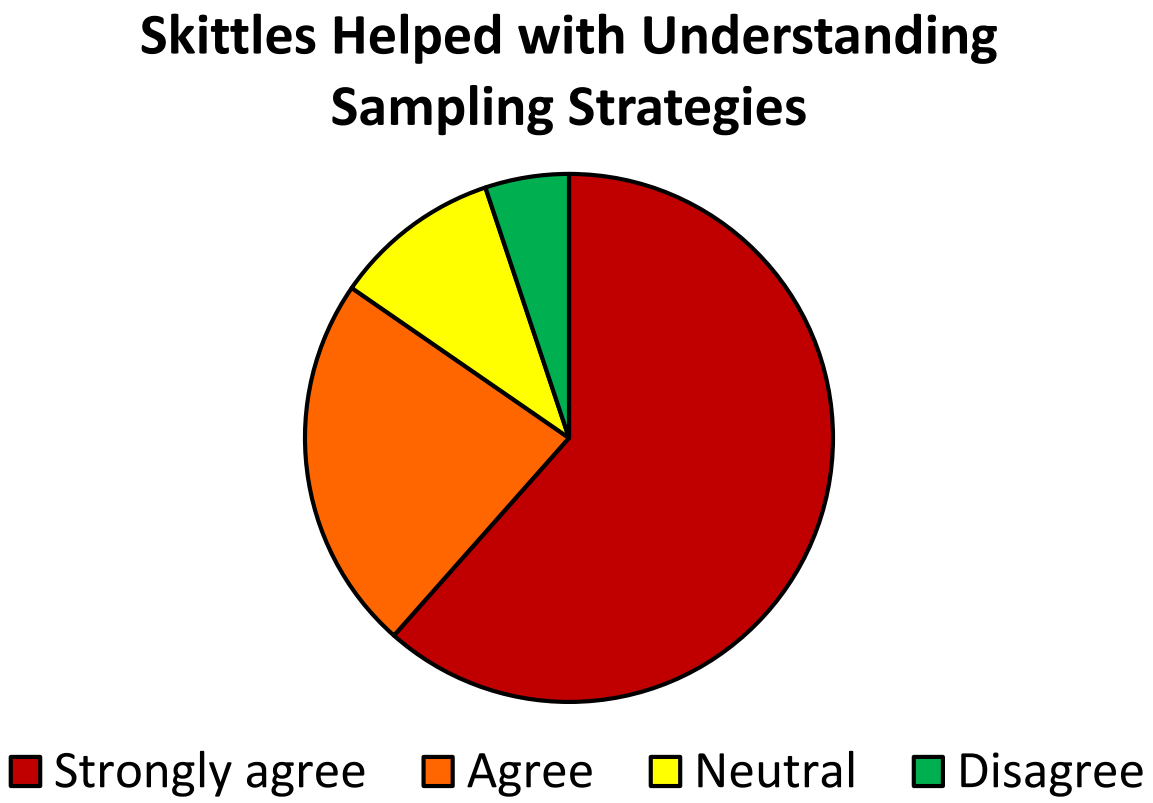
	Sample v. Population	Sample Types	Bias	Reliability	Attrition	Represent Population	Generaliz-ability	Total Test Score
Z	-2.498[b]	-3.357[b]	-2.858[b]	-2.069[b]	-2.586[b]	-1.487[b]	-2.417[b]	-2.991[b]
Asymp Sig* (2-tailed)	.012	.001	.004	.039	.010	.137	.016	.003

N = 26

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

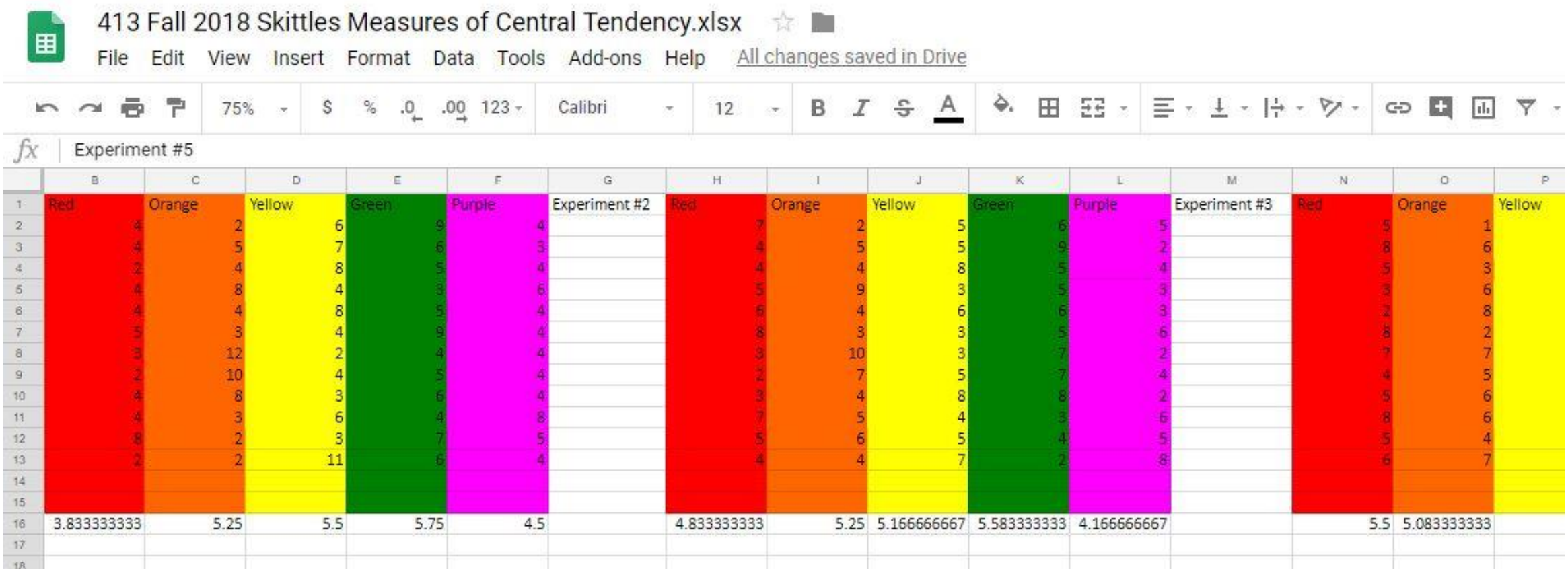
End-of-Semester Student Evaluation of Activity



Barriers to Sampling Activity

- Student resistance to change from traditional pedagogy to flipped classroom
- Variability in students' preparation for class
- Time (45 minutes)
- Technology failures

Asynchronous Version



413 Fall 2018 Skittles Measures of Central Tendency.xlsx

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fx Experiment #5

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Red	Orange	Yellow	Green	Purple	Experiment #2	Red	Orange	Yellow	Green	Purple	Experiment #3	Red	Orange	Yellow
2	4	2	6	9	4		7	2	5	6	5		5	1	
3	4	5	7	6	3		4	5	5	9	2		8	6	
4	2	4	8	5	4		4	4	8	5	4		5	3	
5	4	8	4	3	6		5	9	3	5	3		3	6	
6	4	4	8	5	4		6	4	6	6	3		2	8	
7	5	3	4	9	4		8	3	3	5	6		8	2	
8	3	12	2	4	4		3	10	3	7	2		7	7	
9	2	10	4	5	4		2	7	5	7	4		4	5	
10	4	8	3	6	4		3	4	8	8	2		5	6	
11	4	3	6	4	8		7	5	4	3	6		8	6	
12	8	2	3	7	5		5	6	5	4	5		5	4	
13	2	2	11	6	4		4	4	7	2	8		6	7	
14															
15															
16	3.833333333	5.25	5.5	5.75	4.5		4.833333333	5.25	5.166666667	5.583333333	4.166666667		5.5	5.083333333	
17															

Summary

- Experiential, collaborative learning activities
  - Appeal to multiple learning styles
  - Serve as a springboard for linking multiple concepts related to a single topic
  - Improve students' attitudes toward learning about research
  - Are effective in asynchronous environments