Implementing Mindset Interventions in Hybrid Courses

Organizing a Course to Aid Student Success

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Background on Hybrid Courses

- What is a hybrid class at Tallahassee Community College?

- What is the history of mathematics/statistics hybrid classes at Tallahassee Community College?

- Reimplementing hybrid statistics classes fall 2020

Initial Build for Hybrid Statistics Classes (Fall 2020)

- 3 sections (2 applied statistics and 1 intro to statistics)
- Ideal hybrid class structure
- Video component
- In-class discussion component
- Out-of-class assignment component
- Initial growth mindset implementations
- Qualitative results

Refining Hybrid Statistics Classes (Spring 2021)

- 3 sections (2 applied statistics and 1 honors intro to statistics)

- Similar homework assignments and tests along with the same videos

- Growth mindset interventions deployed:

  - Opening growth mindset assignment

  - Notes submissions

  - Regular reflections on understanding and learning

Assignment Instructions:

I know things are difficult right now - your world may be completely different than it was several months ago (I know my world is drastically different). But it is important that we persist, and that we keep going to continue academically to the best of our abilities.

You probably didn't intend to take an online stats class, but here we are now. You may get frustrated that you don't get things as easily, that we can't meet face-to-face in the classroom or during office hours to get your questions answered right away. I can promise that I will be doing my best to meet your academic needs however I can online. You may find the material in these chapters difficult, but I know you can do it! As long as you use all of the resources available and ask for help when you need it, you can be successful. What these videos and answer the prompts below.

Prompt 1: What is something your learned from these videos? If you didn't feel you've learned anything, what is something that you already knew that was reinforced here?

Prompt 2: What is something you feel you can take from these videos and apply it to our remaining time in this class?

Sample of Student Responses

Applied Statistics Response 1

I have always been one to struggle with math and find it difficult to understand. With watching these videos it shows to keep going and have an open mindset towards your goals because you can go far and get better along the way. I will try to the best of my ability to fully understand what we learn online and keep the information stored so I can get the best grade I can.

Honors Student Response 1

I learned that everyone has to start somewhere. Of course, growing up, I had heard the phrase being said by my teachers and family, but I hadn't given it much thought. I like when the speaker gave the example of Einstein not knowing how to count to ten. It made me feel like everyone is in the same boat when it comes to learning. It's very humbling to think that we all started as babies and have gone through our failures to be where we are now.

Sample of Student Responses

Applied Statistics Response 2

I was never introduced to statistics in my high school, so before this semester started I had worries. That is why watching these videos helped ease my mind. In the first video it was very descriptive of how all of us as individual start at the age zero. This means that people like Einstein or Shakespeare all had to learn the basics to get to where they are. I viewed this as a method of encouragement, it made me learned that I am on the right path even though sometimes I may feel like I am being left behind when it comes to doing something with my career.

Honors Student Response 2

A lesson from these two videos that I feel like I can apply to this class and life, in general, is to learn from my mistakes and the fact that at times I will fail, perhaps a lot of times, but that shouldn't stop me from trying. This lesson spoke to me because naturally, I tend to be a perfectionist, I usually aim to get things right on my first try. I have had trouble letting myself make mistakes and learn from them. I hope to be able to not let my failures and mistakes discourage me, but rather encourage me to learn and try even harder.

Building Upon This Initial Momentum

- Questions at this time?
- Moving into the material
- Shaping class meetings

Considering the Structure of the Class

Pacing:

Week/Dates	Pre-Meeting Assignments	Monday In-Class	Wednesday In-Class	Post-Meeting Assignments
Week 0: Jan 4 – Jan 8 (Class Exploration)	None	None	None	-Read Syllabus -Review Canvas Materials -Growth Mindset -Introduce Yourself
Week 1: Jan 11 – Jan 15 (Class Introduction and Ch. 1 & 3: Beginning Statistics/Graphs)	-Watch Chapters 1 & 3 Videos -Take and Submit Notes for Chapters 1 & 3	-Introduction to Class Materials -Group Discussion of Chapters 1 & 3 -Homework Discussion	-Introduction to Minitab -Minitab Graphing Assignment	-Muddiest Point Reflections for Ch. 1 & 3 -Begin Unit 1 HW 1
Week 2: Jan 18 – Jan 22 (Ch 4: Complex Descriptive Statistics and Empirical Rule)	-Watch Chapter 4 Videos -Take and Submit Notes for Chapter 4	No Class Meeting (Martin Luther King Jr. Day – College Closed)	-Group Discussion of Chapter 4 -Calculator Tips -Homework Discussion	-Muddiest Point Reflection for Ch. 4 -Submit Unit 1 HW 1 -Begin Unit 1 HW 2
Week 3: Jan 25 – Jan 29 (Test Review and Test)	-Complete Unit 1 Study Guide and Watch Videos -Continue Unit 1 HW 2 -Complete Honorlock Quiz	-More Homework Discussion -Minitab Descriptive Assignment	-Discuss Test 1 Content -Homework Discussion -Practice MC and Essay Test Questions	-Submit Unit 1 HW 2 -Unit 1 Quiz -Test 1: Ch. 1, 3, & 4 Open Thursday, Jan 28 Closes Friday, Jan 29 at 5pm

Learning with Purpose

- Revisiting the ideal hybrid class meeting

- Taking steps to continue growth mindset/independent learning

- Constructing the opening class meeting

- Building for the next class meetings

Implementing Notes Submissions

Sample Instructions:

Upload a copy of the notes that you took for chapters 1 & 3 videos. I don't expect notes detailing every single topic in the videos, but I should see some about the main ideas in this material. I would encourage you to write down vocabulary, examples, and summaries of the topics you see detailed in these videos.

- Counting notes submissions as a portion of the overall grade
- Assessing notes submissions
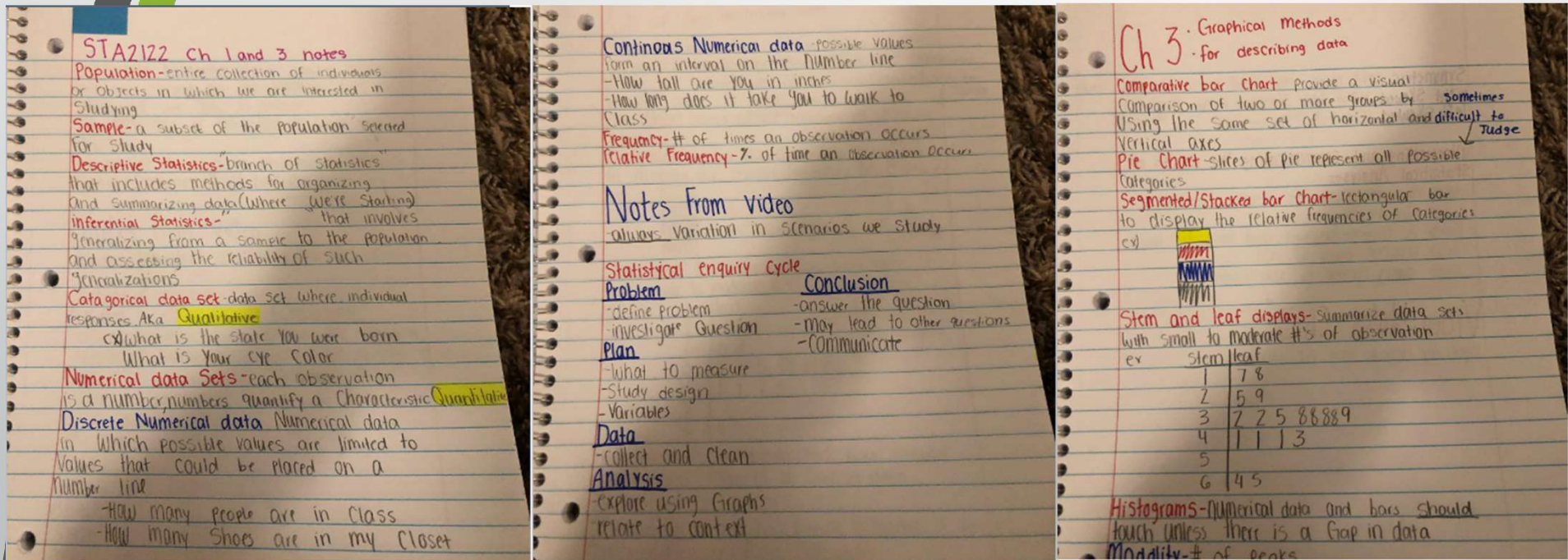- The importance of feedback

Examples of Students' Notes
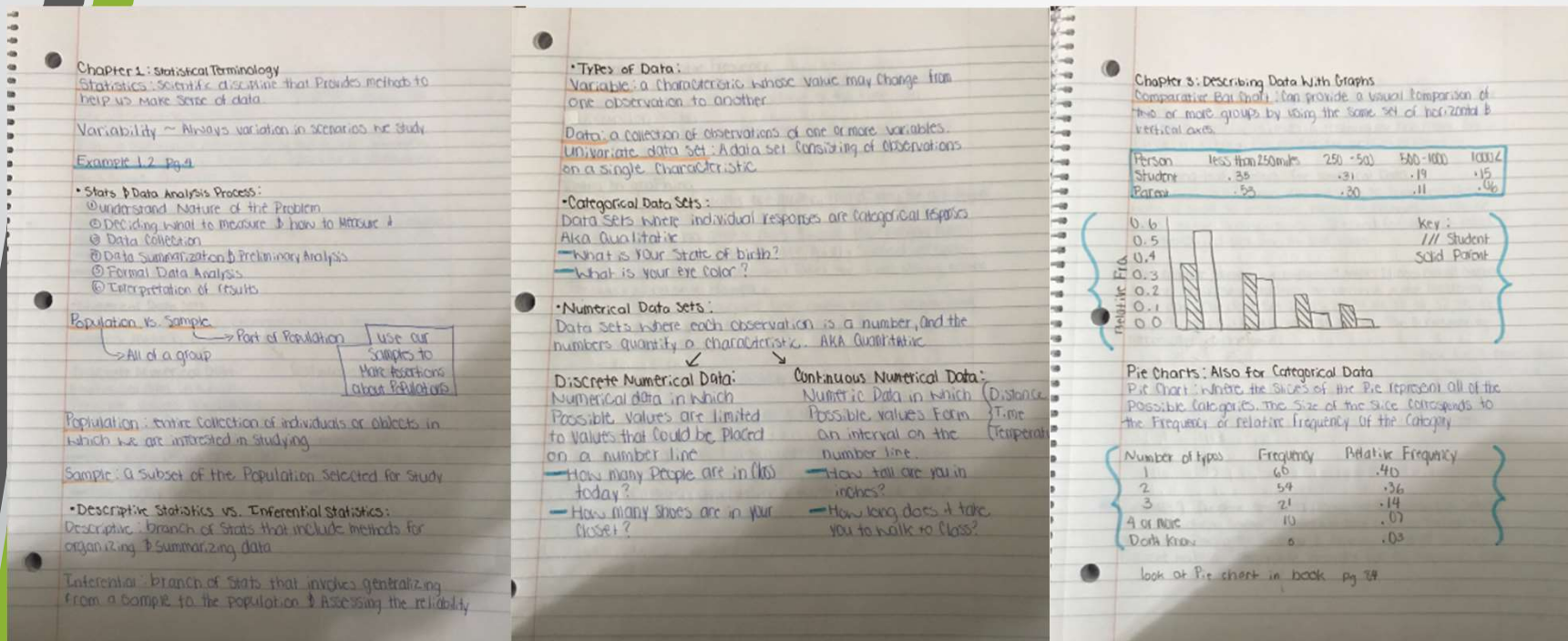
Examples of Students' Notes

Examples of Students' Notes

Chapter 1 Notes

1.1
Statistics- scientific discipline that provides methods to help us make sense of data.

Statistical Literacy- a familiarity with the goals and methods of statistics.

Steps to being an informed consumer of reports:
1. Extract information from tables, charts, and graphs.
2. Follow numerical arguments.
3. Understand the basics of how data should be gathered, summarized, and analyzed to draw statistical conclusions.

Steps in the data analysis process:
1. Decide whether the existing data is adequate or whether additional information is required.
2. If necessary, collect more information in a reasonable and thoughtful way.
3. Summarize the available data in a useful and informative manner.
4. Analyze the available data.
5. Draw conclusions, make decisions, and assess the risk of an incorrect decision.

1.2
Variability- differences in factors or frequency in data.
-Variability is present in all things, universal.
-Understand data presented in graphs to determine the significance in changes in variability.

1.3
Data Analysis Process:
1. Understanding the nature of the problem; Effective data analysis requires an understanding of the research problem.
2. Deciding what to measure and how to measure it.
3. Data collection.
4. Data summarization and preliminary analysis.
5. Formal data analysis.
6. Interpretation of results.

Population- The entire collection of individuals or objects about which information is desired.

Descriptive Statistics- The branch of statistics that includes methods for organizing and summarizing data.

Inferential Statistics- The branch of statistics that involves generalizing from a sample to the population from which the sample was selected and assessing the reliability of such generalizations.

1.3
Example 1.3- Clearly defined research question (Can stimulating mental activities lead to an improved memory and psychological wellness in older adults?), appropriate choice of how to measure the variables of interest (tests used to measure problem solving, memory span, self-esteem, psychological well-being) preceded data collection.

1.4
Variable- A characteristic whose value may change from one observation to another.

Univariate data set- A data set consisting of observations on a single characteristic.

Categorial Data Set- A univariate data set is categorical (or qualitative) if the individual observations are categorical responses

Numerical Data Set- A univariate data set is numerical (or quantitative) if each observation is a number.

Discrete Numerical Variable- A numerical variable results in discrete data if the possible values of the variable correspond to isolated points in the number line.

Continuous Numerical Variable- A numerical variable results in continuous data if the set of possible values forms an entire interval on the number line.

Frequency Distribution for Categorical Data- A table that displays the possible categories along with the associated frequencies and/or relative frequencies.

Frequency- number of times the category appears in the data set.

Relative Frequency- frequency divided by number of observations in the data set.

Chapter 3 Notes
Monday, January 11, 2021
3:54 PM

Bar Charts- Used to summarize distribution of categorical data.

Comparative Bar Chart- Visual comparison of 2 or more groups by using the same set of horizontal and vertical axis.

Pie Charts- Categorical, slices represent all possible categories. Size corresponds to frequency and relative frequency. (Typically don't use)

Segmented Bar Charts- Displays relative frequency of categories. Divided into pieces based on relative frequencies of the categories.

Stem-and-Leaf Displays- Used to summarize data sets with a small to moderate number of observations. One or more of the leading digits is selected for the "Stem" value. Leaf values can be on left or ride side, or both.

Frequency Distributions and Histograms: Numerical Data- Used for large data sets.

Modality of the Histogram- Refers to the number of peaks seen in the histogram if the bars are roughly traced.
   Symmetric- Left tail and right tail are roughly the same.
   Right-Skewed- Right tail is stretched much farther than the left tail.
   Left-Skewed- Left tail is stretched much farther than the right tail.

Sampling Variability- Taking a small sample (50 TCC students) and getting an average of courses being taken in a semester (3.2). No guarantee to get same results when another 50 students are sampled. Must be taken into account when we move ahead in the course.

Assignment Comments

Nice notes! ✕

Ross Brooks, Jan 12 at 10:36am

Thanks Professor ✕

, Jan 12 at 10:37am

Qualitative Results During In-Class Meetings

- Discussing the material
- Reinforcing difficult ideas
- Focusing on technology
- Moving into extensions
- Questions at this time?

Implementing Reflections

Sample Instructions:

Take some time to reflect on the material from chapters 1 & 3. Answer <u>one or more</u> of the prompts below:

- What was the muddiest point for you (hardest to understand)?

- What was the clearest point for you (easiest to understand)?

- What is something that you need a little more help understanding?

Topics from this chapter include: variation, numerical vs categorical data, populations vs samples, bar graphs, pareto charts, pie charts, stacked bar graphs, frequency vs relative frequency, stemplots, dotplots, histogram, shape, center, spread, misleading graphs, etc.

- Continuing to think about the material

- Counting reflections as a portion of the overall grade

- Assessing reflections

- The importance of continuing feedback

Examples of Student Reflections

Feedback

Initial Reflection

For me, the easiest point for me to understand were what types of data are used in each graph. I have had many math classes online and the first chapter normally always has reviewing graphs so they are previous knowledge. The hardest point for me to understand were the stem-and-leaf display because in the homework it asks you to make one and I am just having trouble trying to put it in a display. I would need more help with the stem-and-leaf displays and just using the data to put it into different graphs. I need some practice with this.

Assignment Comments

Hi ▮
We will look at stemplots and we can create them tomorrow in class. Is there a particular HW question you want to look at?

Ross Brooks, Jan 12 at 10:24am

Questions 3.16, 3.20, and 3.23 I am having trouble with solving:) thank you!

▮ Jan 12 at 5:09pm

Thank you! We can start class with these tomorrow.

Ross Brooks, Jan 12 at 7:46pm

Last Reflection

Chapter 15 looks like the other chapters we have worked on so the easiest point for me to understand was the steps that are used to figure out of we reject Ho or not. I think the only point I need to work on is describing why we reject Ho.

Assignment Comments

With the ANOVA test, the calculator software is analyzing the means of all of the samples at once. If that p-value is low, it is saying that there's a big difference in at least one of the groups that leads us to believe that the means are not all the same for all of the populations.

Ross Brooks, Apr 7 at 9:56am

Thank you!!

▮ Apr 7 at 10:03am

Examples of Student Reflections

Feedback

Initial Reflection

Due to the chapter being more so terminology then calculation or problem solving. I found no trouble understanding the materials. I'm just a little worried in regards to remembering the meaning of the terms after a while or under stress (like testing).

The whole chapter was clear. I loved the video that coronated with the lesson.

Last Reflection

The muddiest point for me was learning how to input the information for the calculator. The clearest point for me was test statistic and p-value for this tests and making a conclusion with this test. So far I just a little more help with the calculator.

Assignment Comments

Glad to read the class is going well so far! ✕

Ross Brooks, Jan 14 at 8:17pm

Assignment Comments

Hi ██████ can you meet during office hours ✕
next week to go over the calculator functions?

Ross Brooks, Apr 15 at 9:46am

Examples of Student Reflections

Feedback

Initial Reflection

The hardest point for me is knowing when to state if it's a numerical variable or just a variable in a problem. The clearest point for me is the difference between a sample and a population. I also thought observational studies and confounding variables were easier to remember because they are more realistic to the real world. I think doing more examples of simply identifying vocabulary will help me. It's like I recognize the words but don't know how to pick them out in a problem.

Last Reflection

The easiest thing for me to understand is the different type of graphs and whether they are positive, negative, or linear. Something I might need more help understanding is the line of best fit.

Assignment Comments

We can definitely talk more about variable terminology tomorrow!

Ross Brooks, Jan 12 at 10:33am

Results of Implementing Interventions

Fall 2020 Breakdown

- Applied Statistics: 77.6% success (ABC) 13.8% failure (DF) and 8.6% W. (n=58)

- Intro to Statistics (Non Honors): 91.2% success (ABC) 5.9% failure (DF) and 2.9% W. (n=35)

*Online Intro to Statistics 82.5% success rate (n=103)

Spring 2021 Breakdown

- Applied Statistics: 83.3% success (ABC) 10.0% failure (DF) and 6.7% W. (n=60)

- Intro to Statistics (Honors): 95% success (ABC) 5% failure (DF) and 0% W. (n=20)

*Online Intro to Statistics 90.1% success rate (n=71)

Refining Interventions Moving Forward

- Similar course load for fall 2021

- Continuing the initial GM assignment, notes submissions, and reflections

- Possibly adding in test-focused GM boosters and a final reflection

Questions?

Thank you!