Data Exploration in the Classroom

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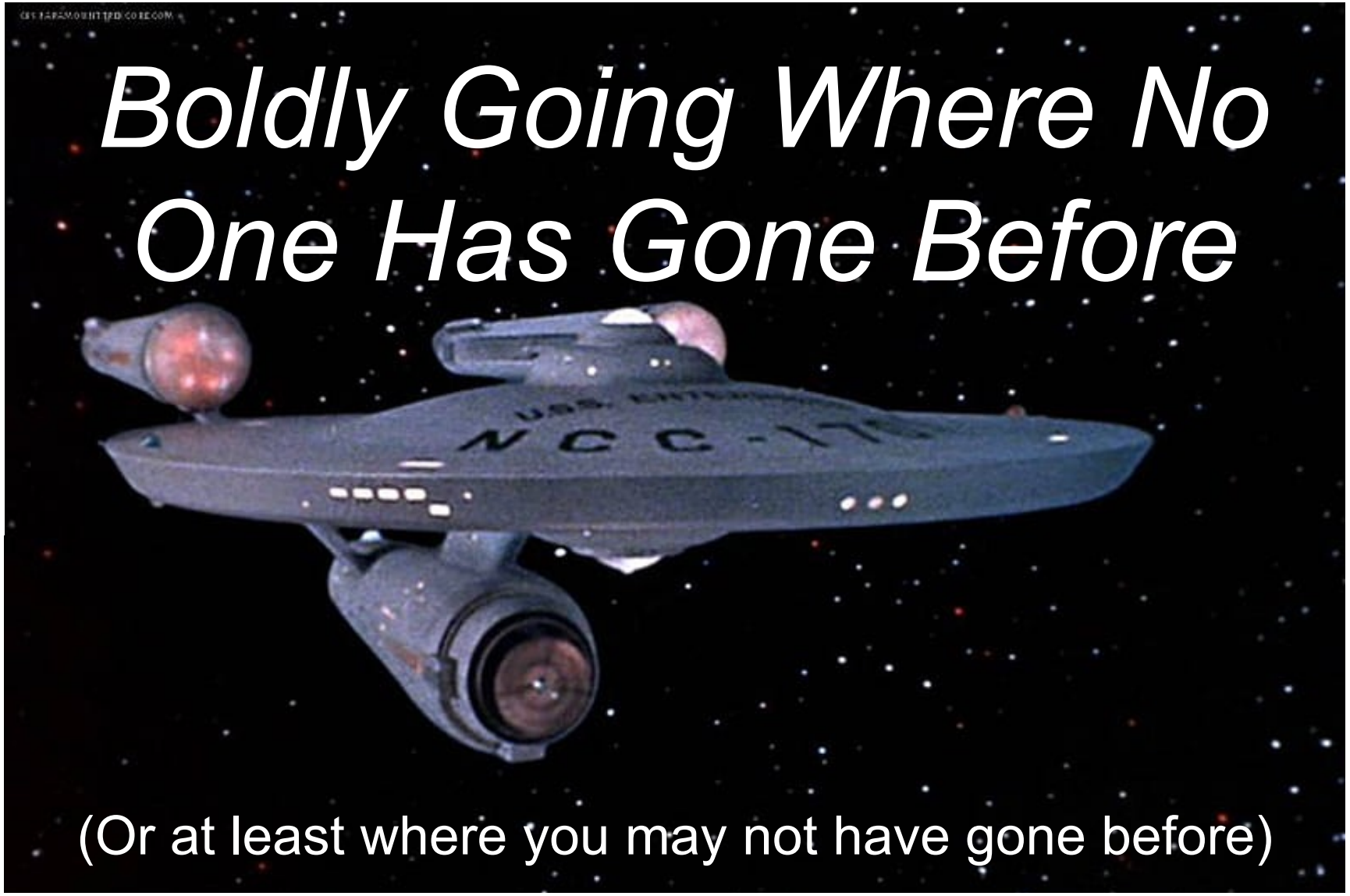


Questions for You

- How many of you teach statistical concepts?
  (graphs, summarizing data, statistical inference)
- How many use statistical concepts for learning in other topics?
  (e.g. science labs)
- How many teach a statistics course?
- How many have a degree in statistics?
- How many have a degree in education?

Star Trek Mission

To ***explore*** strange new worlds
To ***seek out*** new life
And new civilizations
To boldly go where no one has gone before

Early Exploration

Watching,
Playing,
Touching,
Interacting,
Eating…

All Are Forms of Data Collection!

Exploration and Learning

- We can learn by observing or experimenting, analyzing what we see, then drawing conclusions and/or formulating more questions.

- Students and teachers can explore together in the classroom.

Data Exploration

- A way to **introduce new ideas** OR **clarify aspects** of topics
- Active learning opportunities include
  - Generate data
  - Critique data
  - Analyze data
  - Answer questions/draw conclusions
  - Consider what is still unanswered

Generate Data

- Direct Measurement

Which weighs more?
An M&M OR a Skittle?

- Survey

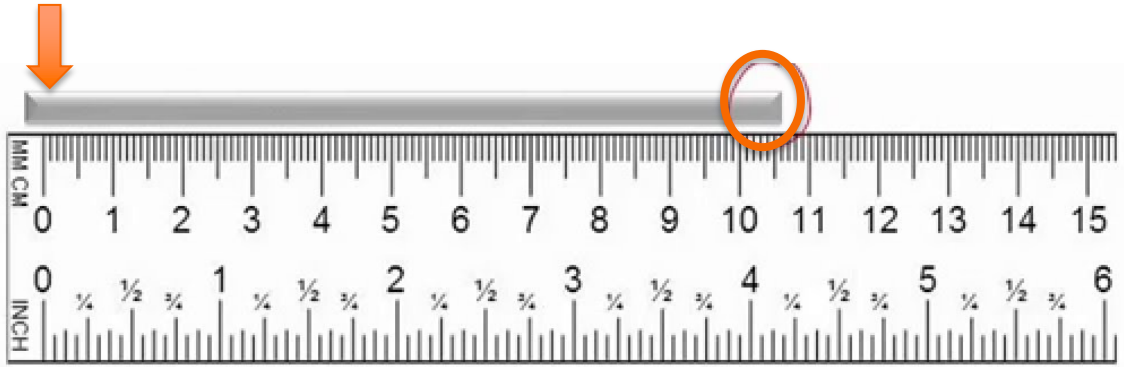
- Observation

Does the number of students who arrive late (or not at all) to the 8 am lecture increase as sunrise becomes later?

- Experimentation

Critique

- What information is the data is providing?
  - Is it a person's feeling about their favorite school lunch? Or it is the person's response to a question about their favorite school lunch?
- How might errors have occurred in measuring or recording the data? Is there a way to identify and/or correct them?

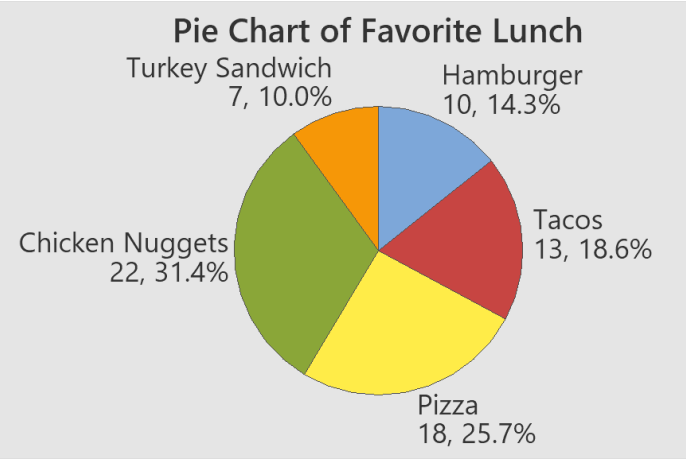


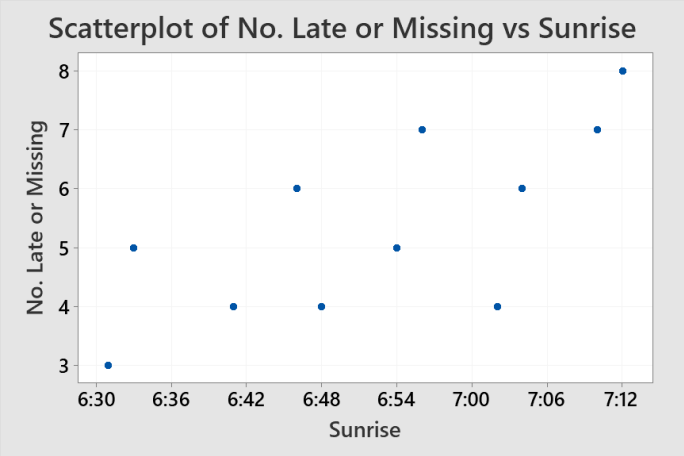
Data Entry: ~~100.5~~ 10.5

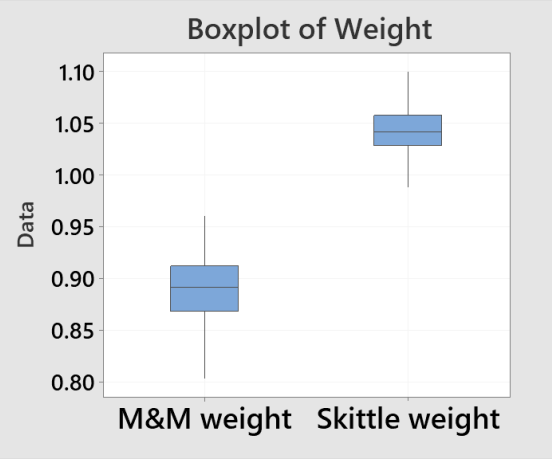
Would a student give the same response as others asked at the same time instead of their true favorite lunch?

Analyze

Summarize, create visuals, look for relationships, make comparisons







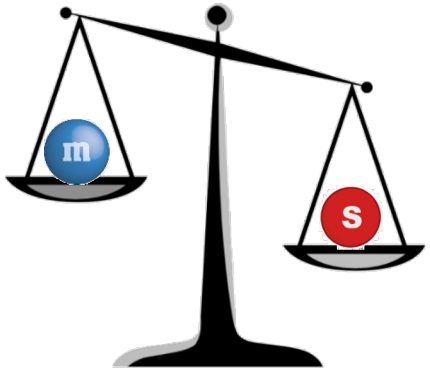
Answer Questions

- What did you learn?

Survey respondents chose chicken nuggets as their favorite more than any other lunch option.

The number of late or missing students tends to increase as sunrise becomes later.

An individual Skittle weighs more than an individual M&M.



Unanswered Questions?

- Did new questions arise during the investigation?

Why do students prefer the chicken nuggets?

Is it just about the Ranch dressing?

- Do students just have more trouble waking up as sunrise becomes later?

- Does the changing morning temperature have an effect?

Teachers can explore, too!

- Teachers can use data to explore teaching methods
- What works for me? For my students?
- What implementation is best?

Flipped Classroom

Inquiry-Based Learning

Project-Based Learning

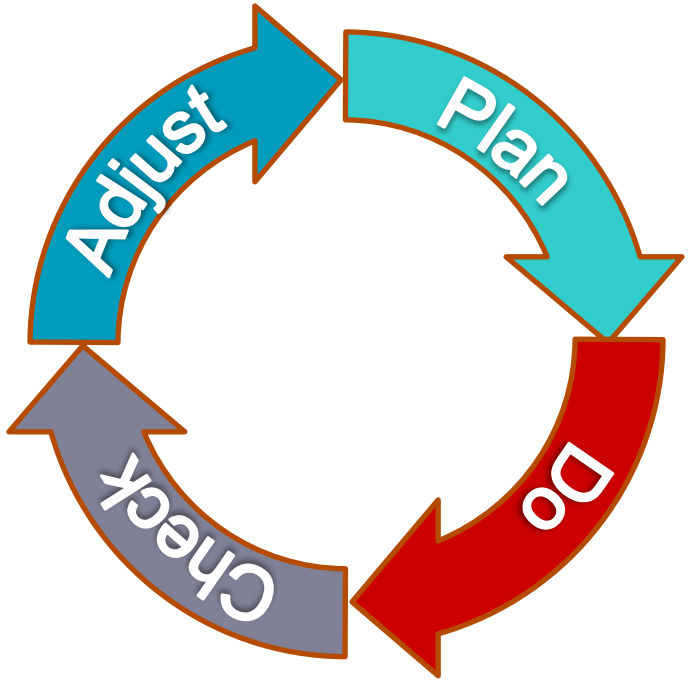
Student-Centered

Small Group Instruction

A Realization

- With students working in assigned teams, sometimes a student would not be participating.
- This happened more often with DHH students, as hearing team members would often talk while looking at their papers and writing.
- I wanted to improve this dynamic.

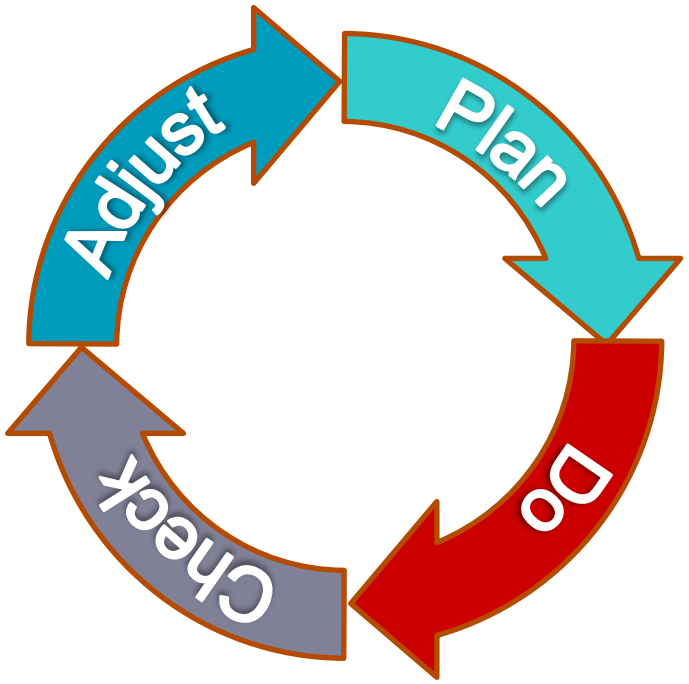
Framework: Continuous Improvement



PDCA

- Plan
- Do
- Check
- Adjust

PDCA Cycle



- Plan – Prepare what you need to use the new method. Determine how will you assess success.
- Do – Use the method and conduct the assessment(s).
- Check – What did the assessment(s) show?
- Adjust – What would you do differently?

What do you want to know?

- Does a new teaching approach work better than the old?
- What do students think about the new approach?

Data to evaluate success

Types of Data

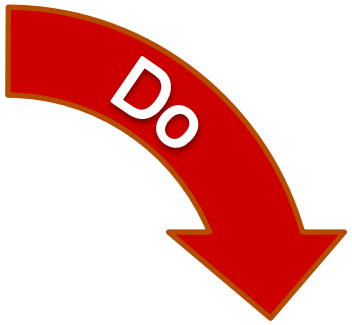
- Quantitative (numbers)
- Qualitative (yes/no)
- Narrative (story)

Collecting Data

- Plan and document
- Be consistent with questions, procedures, etc.

Example - How does using the white board for in-class teamwork impact students?

- I want to add whiteboards as a tool to support student teamwork for a semester
- Data I can examine
  - Test scores without (before) and with (now)
  - Student survey by email at end of semester
  - Classroom observations by a colleague



Conduct in-class teamwork with whiteboards

- Obtain extra whiteboards, markers, erasers, magnets, etc…
- Provide instructions for students
- Agree on observation protocol
- Create student survey

Evaluate impact

- Test scores did not show differences
- Survey revealed students felt the whiteboards made teamwork more “equal”, increased communication, and kept them engaged (notice, no sitting!)
- Observations indicated DHH and hearing students were working together more actively in some teams

What would I do differently?

- Build in support for team dynamics
  - Add team ground rules and learning cycles
- Provide motivation for using white board
  - Show team activity scores for those using/not using whiteboard
  - Add “deaf experience” activity & debrief early in term

Be your own captain! Use data to explore in your classroom.

Live long and prosper.

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