Lesson Title	Thermoclines: A reference of descriptive statistics
Length of Lesson	2 days
Created By	Shane A. Irvin
Subject	Statistics
Grade Level	10^{th}-12th
State Standards	5d. Compare and contrast sampling methods, including simple random sampling, stratified random sampling, and cluster sampling with regard to benefits and trade-offs.
DOK Level	DOK 2
DOK Application	Calculate, Make Predictions, Recognize, Compare
National Standards	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
Graduate Research Element	In my research descriptive statistics are used to make sure the samples taken in a specific area are random. To prove that I have not cheated, I have to present these statistics to a committee

Student Learning Goal:

Statistical analysis including mean, median, mode, histograms, and quartiles are used in most research to prove the success of data collection. This proof allows scientist to essentially trust the research they are citing as valid and trustworthy.

The students will demonstrate the ability to use statistics in a real world application by allowing them to conduct an experiment without any regard to what the data collection will be used for. The goal of the lesson is to teach the students about randomized sampling and potential bias placed in a study by accident. The lesson will also provide examples where bias is unpreventable and must be taken into consideration when specifying the collected data.

Once the students have a grasp of the subject the students will be asked question for assessment, like what would happen if certain situations were changed.

Materials Needed (supplies, hand-outs, resources):
Excel, Laptops, access to data set

Lesson Performance Task/Assessment:
The MathSL students need more statistics to prepare for next year's test. It is important that the students get real life examples since most of the questions discussed are word problem based and can be tough to decipher through. The students will be asked to work with a data set learning how to operate histogram commands as well as simple regressions including R2 values. It is also important for the students to understand what these values mean.

The students will be assessed by simple question answer profile in class. The students will be asked:

What does a high R2 value mean?

Why do we do histograms?

What does a regression tell us?

Lesson Relevance to Performance Task and Students:
The MathSL students need more statistics to prepare for next year's test. It is important that the students get real life examples since most of the questions discussed are word problem based and can be tough to decipher through. The students will be asked to work with a data set learning how to operate histogram commands as well as simple regressions including R2 values. It is also important for the students to understand what these values mean.

The more practice that the students get, the better they will respond to future testing. The data set that is being used is real and has good and bad stats to it, showing the students what they may not see in a textbook environment.

Anticipatory Set/Capture Interest:
The students will be told how I utilize stats in my research. Since they are always asking about my research, this will give them an in-depth review of what I do.

Guided Practice:
The students will go through with the teacher the statistics that they have learned so far. This refresher will get the students motivated and paying attention. Once the students feel comfortable, the data set will be introduced. The students will be told what to do with the data set, including formulating a histogram, and a regression with an R2 value. The value on one data set is good and one is bad. This will give them the opportunity to search for mistakes that they may have thought they did. This will allow them to think through the process and come up with assumptions.

Independent Practice:
The students will interpret the data set using the methods discussed. Once the students have gone through the data set, the students will be asked specific questions about the data set, including why they feel the data produced results as it did.

Remediation and/or Enrichment:
Remediation:
In situations that remediation is needed the student can see the instructor for one on one tutoring. The student can also be paired with a high performing student with full understanding of the lesson.

Enrichment/Extension:
All of these extensions depend on the students' ability and knowledge of the subject matter. The student will have the opportunity to explain specifics about their boat, in particular area.

Check(s) for Understanding:
The students will be assessed after the lesson by asking them questions:

The students will be assessed by simple question answer profile in class. The students will be asked:

What does a high R2 value mean?

Why do we do histograms?

What does a regression tell us?

Closure:
The teacher can close the lesson by explaining why some statistics come out the way they do and also plot a comparison for the students to see.

The graduate student will do the above as well as talk about how this is directly linked to his research by providing examples and answering questions.

Possible Alternate Subject Integrations:
Physics, Statistics,

Teacher Notes:
The data set used is not published so cannot be provided but data sets for this are sometimes public and can be found with little or no cost.