Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Mathematics	Course:	Statistics and Probability	Unit 6 Title:	Analyzing Bivariate Data	Grade Level(s):	10-11
Assessed Trimester:	Trimester A	Pacing:	6-7 Days	Date Created:	1/29/2014	Last Revision Date:	1/29/2014

Course Understandings: *Student will understand that:*

D. Graphs and data displays allow them to see trends, center, and spread of large amounts of data as well as compare multiple sets of data to make real-world conclusions.
E. Outliers and lurking variables can have a significant impact on data and how we collect and analyze it.
F. A linear relationship between two quantitative variables can be described in terms of correlation and a least squares regression equation that can be used to make predictions.
G. A strong linear relationship between two variables does not always mean that there exists a cause and effect relationship.
H. Technology can be used to assist with calculations, simulations, and data analysis.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Minnesota State/Local/Technology Standard(s) addressed (2007):

- **Standard (9.4.1.#):** Display and analyze data; use various measures associated with data to draw conclusions, identify trends and describe relationships.
  Benchmark:
  9.4.1.3 Use scatterplots to analyze patterns and describe relationships between two variables. Using technology, determine regression lines (line of best fit) and correlation coefficients; use regression lines to make predictions and correlation coefficients to assess the reliability of those predictions.

- **Standard (9.4.2.#):** Explain the uses of data and statistical thinking to draw inferences, make predictions and justify conclusions.
  Benchmark:
  9.4.2.2 Identify and explain misleading uses of data; recognize when arguments based on data confuse correlation and causation.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

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Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: • In order to interpret the relationship between two variables it is important to take into consideration potential lurking variables (common response, confounding, coincidence). • A least-squares regression line can be calculated to approximate the linear pattern in a scatterplot and how to use this to make predictions. • The correlation value is valuable for interpreting strength and direction for a linear relationship. • To accurately interpret a scatterplot you need to describe the overall form, direction, and strength of the relationship along with any potential outliers.	**Students will keep considering:** • When is prediction for a least squares regression line no longer useful? • Are there any situations where there are no lurking variables influencing relationships?

Acquisition

Knowledge - Students will:
- Describe relationships between 2 quantitative variables
- Know and understand terminology of scatterplots and least squares regression line
- Know correlations, interpolation, extrapolation
- Know how to read various graphs
- Identify the source of data
- Ways of collecting data
- Understand the meaning of correlation and causation
- Examine graphs, numerical summaries and statistical reports

Reasoning - Students will:
- Analyze patterns
- Use correlation coefficients to assess the reliability of those predictions
- Distinguish which graph is appropriate when
- Analyze if an appropriate data collection method was used
- Analyze distortions
- Analyze whether statistics have been displayed or represented in a misleading way
- Distinguish between correlation and causation

Skills - Students will:
- Use technology to determine regression lines and correlation coefficients
- Use scatterplots and regression lines to make predictions
- Use spreadsheets and graphing technology to make data displays

Common Misunderstandings
- Students incorrectly believe that the value of r must between -1 and +1 and the meaning of the value of r.
- Students think that correlation is the same as causation.
- Students incorrectly believe that correlation only measures straight line relationships and not all relationships.
- Students misunderstand the concept of slope and y-intercept in the context of the problem.

Essential new vocabulary
- Causation
- Common response
- Confounding
- Correlation
- Explanatory and response variables
- Extrapolation
- Interpolation
- Linear/Non-Linear
- Lurking variables
- Outlier
- Scatterplots
- Regression line/ Least-Squares Regression Equation