High School

Modeling

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

Some examples of such situations might include:

- *Estimating how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed.*
- *Planning a table tennis tournament for 7 players at a club with 4 tables, where each player plays against each other player.*
- *Designing the layout of the stalls in a school fair so as to raise as much money as possible.*
- *Analyzing stopping distance for a car.*
- *Modeling savings account balance, bacterial colony growth, or investment growth.*
- *Engaging in critical path analysis, e.g., applied to turnaround of an aircraft at an airport.*
- *Analyzing risk in situations such as extreme sports, pandemics, and terrorism.*
- *Relating population statistics to individual predictions.[1]*

Statistics and Probability

Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.[2]

All of these examples have some excellent geospatial ties.

I recommend these maps as beginning places for students to explore how we use modeling and statistics:

- http://storymaps.esri.com/stories/doctors/
- http://storymaps.esri.com/stories/feedingtheworld/
- http://storymaps.esri.com/unemploymentpopulation/

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[1] Common Core Math Standards http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf
[2] Common Core Math Standards http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf

Let's examine a specific example from the Geometry CC standards: Geometry G-MG (2) Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). This map, The Great American Commute (http://storymaps.esri.com/stories/2014/commuting/) displays this concept very well.

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