Spreadsheets and Databases For Information Literacy

What are students expected to do with data?

- Read & Interpret
- Collect, Analyze
- Make Predictions
- Compare & Contrast
- Describe
- Draw Conclusions
- Make Inferences
- Construct Charts & Graphs

Activity:
Divide into groups of 4 and as a team:
- Circle each verb that would be considered at the higher level of Bloom’s
- Discuss and be ready to have your team spokesman explain what value, if any, do these skills have for students.
- Give your opinion of how you think students at different grade levels are working with data and learning these skills

TEKS Addressed

Grade 1:
- Collects and sorts data (Math)
- Use organized data to construct real object graphs, picture graphs, and bar-type graphs (Math)

Grade 2:
- Read a thermometer in order to gather data (Math)
• Use data to describe events as more likely or less likely such as drawing a certain color crayon from a bag of seven red crayons and three green crayons (Math)
• Constructs reasonable explanations and draws conclusions using data and prior knowledge (Science)

Grade 3:
• Collect, organize, record, and display data in pictographs and bar graphs where each picture or cell might represent more than one piece of data (Math)
• Use data to describe events as more likely, less likely, or equally likely (Math)
• Collects data by observing and measuring in various ways (Science)
• Constructs simple graphs, tables, and charts to examine the accuracy of data (Science)
• Draws inferences based on data related to promotional materials for products and services (Science)
• Collects data using tools including calculators, rulers, balances, magnets, and compasses (Science)
• Obtain information, including historical and geographic data about the community, using a variety of print, oral, visual, and computer sources (Social Studies)

Grade 4:
• Describe the relationship between two sets of related data such as ordered pairs in a table (Math)
• Collects data by observing and measuring in various ways (charts, graphs, tables, metrics, photographs, microscope, journals) (Science)
• Draws inferences based on data related to promotional materials for products and services (Science)
• Conduct tests, compare data, and draw conclusions about physical properties of matter including states of matter, conduction, density, and buoyancy (Science)
• Translate geographic data into a variety of formats such as raw data to graphs and maps (Social Studies)

Grade 5:
• Describe characteristics of data presented in tables and graphs including the shape and spread of the data and the middle number (Math)
• Graph a given set of data using an appropriate graphical representation such as a picture or line (Math)
• Draws conclusions about “what happened before” using data such as tree-growth rings and sedimentary rock sequences (Science)
• Collects data by observing and measuring in various ways (Science)
• Translate geographic data into a variety of formats such as raw data to graphs and maps (Social Studies)
Grade 6:
- Draw and compare different graphical representations of the same data (Math)
- Use median, mode, and range to describe data (Math)
- Sketch circle graphs to display data (Math)
- Solve problems by collecting, organizing, displaying, and interpreting data (Math)
- Generate formulas to represent relationships involving perimeter, area, volume of a rectangular prism, etc., from a table of data (Math)
- Collects data by observing and measuring in various ways (Science)
- Construct graphs, tables, maps and charts using tools including computers to organize, examine and evaluate data (Science)
- Draws inferences based on data related to promotional materials for products and services: (consumer fair) (Science)
- Identifies patterns in data such a percent, average, range, and frequency (Science)
- Compare selected world regions and countries using data from maps, graphs, charts, databases, and models (Social Studies)

Grade 7:
- Select and use an appropriate representation for presenting collected data and justify the selection (Math)
- Make inferences and convincing arguments based on an analysis of given or collected data (Math)
- Describe a set of data using mean, median, mode, and range (Math)
- Choose among mean, median, mode, or range to describe a set of data and justify the choice for a particular situation (Math)
- Graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume and scaling (Math)
- Collects data by observing and measuring in various ways (Science)
- Construct graphs, tables, maps and charts using tools including computers to organize, examine and evaluate data (Science)
- Draws inferences based on data related to promotional materials for products and services (Science)

Grade 8:
- Select the appropriate measure of central tendency to describe a set of data for a particular purpose
- Evaluate methods of sampling to determine validity of an inference made from a set of data (Math)
- Recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis (Math)
- Generate a different representation given one representation of data such as a table, graph, equation, or verbal description (Math)
- Collect data by observing and measuring (Science)
• Construct graphs, tables, maps and charts using tools including computers to organize, examine, and evaluate data (Science)
• Draw inferences based on data related to promotional materials for products and services (Consumer fair) (Science)
• Extrapolates from data to make predictions (Science)

**Algibra I:**
• Gathers and records data, or uses data sets, to determine functional (systematic) relationships between quantities
• Collects and organizes data, makes and interprets scatter plots, and models, predicts, and makes decisions and critical judgments
• Interprets the meaning of slope and intercepts in situations using data, symbolic representations, or graphs
• Analyzes data and represents situations involving inverse variation using concrete models, tables, graphs, or algebraic methods
• Analyzes data and represents situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods
• Collects data and records results, organizes the data, makes scatter plots, fits the curves to the appropriate parent function, interprets the results, and proceeds to model, predict, and make decisions and critical judgments

**English I, II, III, and IV**
• Create, present, test, and revise a project and analyze a response, using data-gathering techniques such as questionnaires, group discussions, and feedback forms

**Math Applications:**
• Analyze numerical data using measures of central tendency, variability, and correlation in order to make inferences

**Things to Consider:**
• When students are truly engaged in hands-on activities, the amount of learning increases
• Students see the relevance of the process when they ask the questions and are engaged in finding the answers
• Working with real data from real resources helps students look at information from different perspectives and ask, “What if”
• It is easier to learn the concrete than the abstract

**Activity:**
Which of the above statements are true and why?
Working with Data:

There are two main tools that are used for working with data in the real world: Spreadsheets and Databases. The difference between the two is based on what type of information is being collected and how the information will be reported, analyzed and used.

It is not uncommon to see people interchange the two applications like you could use a knife as a spatula in cooking. However, we all know a knife is better for cutting. Technology tools each have their strengths and their weaknesses. People can make a tool work for us to do a specific job; however, if they knew and used the more appropriate tool, the job would often be easier and produce a better product.

Database:
- Experience a Database: [http://www2.nexus.edu.au/Teachstud/titanic2/home/menu.htm](http://www2.nexus.edu.au/Teachstud/titanic2/home/menu.htm)
- What is a Database: [http://www.lib.washington.edu/uwill/courses/sis200/02_what_is_a_database.html](http://www.lib.washington.edu/uwill/courses/sis200/02_what_is_a_database.html)
- Database Vocabulary
  - [http://its.guilford.k12.nc.us/act/dbvocab_elem.htm](http://its.guilford.k12.nc.us/act/dbvocab_elem.htm)
  - [http://its.guilford.k12.nc.us/resource/techinstruct/dbvocab.htm](http://its.guilford.k12.nc.us/resource/techinstruct/dbvocab.htm)
- Database Quiz: [http://www.catawba.k12.nc.us/pages/sites/edwebsites/computerskills/quizzes/databasequiz.htm](http://www.catawba.k12.nc.us/pages/sites/edwebsites/computerskills/quizzes/databasequiz.htm)
- Examples:
  - [http://www.wm.edu/education/Faculty/Hannafin/DOE/dbppt/sld006.htm](http://www.wm.edu/education/Faculty/Hannafin/DOE/dbppt/sld006.htm)
  - [http://www.internet4classrooms.com/examples_data.htm](http://www.internet4classrooms.com/examples_data.htm)
  - [http://www.lair.umd.edu/default.htm](http://www.lair.umd.edu/default.htm) (Photo Database)

Spreadsheet:
- What is a Spreadsheet?
- Everything You Need to Know About Using a Spreadsheet – Vocabulary, lesson ideas – A must READ!!!
  - [http://www.ncwiseowl.org/kscope/techknowpark/FreeFall/Resources.html](http://www.ncwiseowl.org/kscope/techknowpark/FreeFall/Resources.html)
- Spreadsheet Examples
  - [http://sunsite.univie.ac.at/Spreadsite/#spreadexed](http://sunsite.univie.ac.at/Spreadsite/#spreadexed)
Data Tasks: Which Tool Do I Use?

There are 3 aspects to working with data: collecting, organizing and manipulating, and reporting and retrieving information. Normally people assume the first thing would be to collect data. However, what you collect depends on what questions you want answered, what information you need to access, and how the information will be accessed and reported. Therefore start with the last task first.

Reporting and Retrieving Information:
The following will help define whether a spreadsheet or a database would be the best tool.

- Write one to three questions that will identify information you need AND questions or problems you need to solve.
- Will the data collected be primarily numerical, text/facts, or a mixture of both?
- Will you need to create a chart or graph?
- Will you need to locate information with similar characteristics?
- Will calculations and formulas be used on numerical data?
- Will numerical data be analyzed, calculated, reported, and/or used for prediction?

What advantages does a database have over a spreadsheet

<table>
<thead>
<tr>
<th>Spreadsheet</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked data</td>
<td>Flexibility due to data independence</td>
</tr>
<tr>
<td>Possible data redundancy</td>
<td>Centralized data storage</td>
</tr>
<tr>
<td>Possible inconsistency of data</td>
<td>Consistency of data</td>
</tr>
<tr>
<td>Limited data sharing</td>
<td>Unlimited data sharing</td>
</tr>
<tr>
<td>Limited input control</td>
<td>Input formatting controls</td>
</tr>
<tr>
<td>Reporting more limited</td>
<td>Flexible reporting</td>
</tr>
</tbody>
</table>

Collecting Authentic Data:

There are two sources for data. First, students can collect their own data by creating surveys, performing experiments, and/or gathering observational data. Teachers may wish to consider finding another teacher/class in a different country, state, or city who would be interested in doing a collaborative research project. This could be an opportunity to compare and contrast data from a totally different area.

- Surveys
  - Use QuizStar to create a survey - [http://quizstar.4teachers.org/](http://quizstar.4teachers.org/)
  - Create free online survey - [http://freeonlinesurveys.com/](http://freeonlinesurveys.com/)
  - More Tools [http://www.indiana.edu/~tickit/resourcecenter/resource1.htm#survey](http://www.indiana.edu/~tickit/resourcecenter/resource1.htm#survey)
- Global Grocery List Project [http://landmark-project.com/ggl/]
- Examples of Project Based Learning from George Lucus [http://www.edutopia.org/php/keyword.php?id=037]
- ATT – (select project to search) [http://www.kn.pacbell.com/wired/bluewebn/search.cfm]
- A Day in the Life of an Ice Cube [http://www.windsorct.org/icecube/]
- Online Appliances in the Home Project [http://web.utk.edu/%7Eawatkin3/appliances/default.html]

For more complex problems, students can access national and international data posted online.
- Data resources: [http://www.ikeepbookmarks.com/browse.asp?folder=477902]

**Organizing and Manipulating Data:**

The type of information collected and the projected use of that information determines the tool most appropriate for the job. Spreadsheet? Database?

Unfortunately the decision is made more difficult because now both spreadsheets and databases often have very similar features. Many times one can use a spreadsheet for a database. However, picking the least appropriate tool may limit the access and manipulation of the data.

**Excel Spreadsheets:**

Best used for managing, analyzing, and reporting statistical data.
- Evaluate Tools: GraphClub [http://www.tomsnyder.com]
- Lessons / Activity
  - M & M [http://www.forsyth.k12.ga.us/kadkins/M&Ms.html]
    - Create A Graph: [http://nces.ed.gov/nceskids/Survey.asp]
- Weather WebQuest
- Dream Vacation
  - Lesson
  - Create a Survey:
    - QuizStar [http://quizstar.4teachers.org/]
  - Alternative lesson plan for upper grades - [http://students.ed.uiuc.edu/garley/unit/calendar.htm]
- Tutorial
  - [http://www.usd.edu/trio/tut/excel/]
  - [http://www.sabine.k12.la.us/training/Excel%202000.htm]
- Hanout/How To
• Other uses for Excel
  o http://www.forsyth.k12.ga.us/kadkins/abc.htm
• Other Lesson Plans Using Spreadsheets
  o North Carolina Schools
    http://www.learnnc.org/lessons/search?phrase=spreadsheet

Access Database:
Best used for managing, sorting, finding, and identifying specific information and/or related information.
• Sample Database http://www.dawcl.com/
• Unit Plan
  o Template
• Timeline For Unit With Spreadsheet
  o Example: http://www.fi.edu/fellows/fellow4/may99/spreadsheet.html
  o Instructions
    ■ http://www.education-world.com/a_tech/techtorial/techtorial021.shtml
    ■ http://www.bedfordk12tn.com/timelinesexcel.htm
    ■ http://www.usd.edu/~dverst/tie2001/timeline.htm
• Practice Using Access Database
• Create a Database of Travel
  o Identify Fields
  o Identify Types of Information
  o Create
• Tutorial
  o Camille Thomason’s Handout
    o http://www.cs.unc.edu/Courses/wwwps98/members/barman/databaseLesson/accessTutorial.html
• Other Lesson Plans using Databases