Research is More than Googling:

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Using Technology to Conduct Authentic Research

UConn

http://researchbasics.education.uconn.edu
Develop the talents you were given.
Pass on what you have learned.
Leave the world better than you found it.
What technology does for gifted kids....

1. Removes “information resource” barriers
2. Creates opportunities for students to explore disciplines through authentic methodologies and products
3. Provides opportunities for “What if” scenarios
Technology use in the classroom has progressed through 3 distinct stages.
Automated Print Production Tool
Automated Print Production Tool
Data Driven Decision Making
WHAT IS REAL RESEARCH?

- Investigates a question that does not have a predetermined answer
- Gathers, records, and interprets raw data
- Presents conclusions to an appropriate audience
The Research Process Creates an Opportunity for an Open-Ended, Inquiry-Based Approach to Learning
...our goal is to allow students to construct knowledge by providing them with opportunities to gather information, organize it in meaningful ways, and present it to others. In this way, the student is actively engaged with the technology and uses it as a productive learning tool.
Identify Problems
Discover Trends and Patterns
Critically Evaluate Research Findings
140,000 – 190,000
1.5 million
• What day of the week are people most and least depressed?
  Depression is highest on Monday and lowest on Saturday

• On what day of the year are people most and least depressed?
  Depression is highest on February 27 and lowest on December 25 with depression highest in April

• Does temperature influence depression?
  Lower temperatures are associated with higher levels of depression

• How does education affect depression?
  Having more college-educated people in an area is associated with lower depression (Stephens-Davidowitz, 2013)
A little stats never hurt anyone

\[ \Sigma_0 \]

1_{st}
“There are three kinds of lies: lies, damned lies, and statistics.”

- Mark Twain
“It’s easier to fool people than to convince them that they have been fooled.”

- Mark Twain
Toasters Don’t Kill People…Bread Does

I’ve done a little research, and what I’ve discovered should make anyone think twice….

• More than 98% of convicted felons are bread users.
• Fully HALF of all children who grow up in bread-consuming households score below average on standardized tests.
• More than 90 percent of violent crimes are committed within 24 hours of eating bread.
• Bread is made from a substance called “dough.” It has been proven that as little as one pound of dough can be used to suffocate a mouse. The average American eats more bread than that in one month!
• Bread has been proven to be addictive. Subjects deprived of bread and given only water to eat begged for bread after as little as two days.
• Bread is often a “gateway” food item, leading the user to “harder” items such as butter, jelly, peanut butter, and even cold cuts.
• Bread has been proven to absorb water. Since the human body is more than 90 percent water, it follows that eating bread could lead to your body being taken over by this absorptive food product, turning you into a soggy, gooey bread-pudding person.

• Bread is baked at temperatures as high as 400 degrees Fahrenheit! That kind of heat can kill an adult in less than one minute.

• Most American bread eaters are utterly unable to distinguish between significant scientific fact and meaningless statistical babbling.
Pie Charts and Bar Graphs aren’t the only game in town.
Not all data are numbers.
Collecting and finding patterns in data is important, interesting, and easier with technology.
A little stats never hurt anyone

1st correlations
Suppose we wished to graph the relationship between foot length and height of 20 subjects.

In order to create the graph, which is called a scatterplot or scattergram, we need the foot length and height for each of our subjects.
Assume our first subject had a 12 inch foot and was 70 inches tall.

1. Find 12 inches on the x-axis.
2. Find 70 inches on the y-axis.
3. Locate the intersection of 12 and 70.
4. Place a dot at the intersection of 12 and 70.
Assume that our second subject had an 8 inch foot and was 62 inches tall.

5. Find 8 inches on the x-axis.
6. Find 62 inches on the y-axis.
7. Locate the intersection of 8 and 62.
8. Place a dot at the intersection of 8 and 62.
Assume that our second subject had an 8 inch foot and was 62 inches tall.

5. Find 8 inches on the x-axis.
6. Find 62 inches on the y-axis.
7. Locate the intersection of 8 and 62.
8. Place a dot at the intersection of 8 and 62.
9. Continue to plot points for each pair of scores.
If the points on the scatterplot have an upward movement from left to right, we say the relationship between the variables is positive.

If the points on the scatterplot have a downward movement from left to right, we say the relationship between the variables is negative.
Not only do relationships have direction (positive and negative), they also have strength (from 0.00 to 1.00 and from 0.00 to –1.00).

The more closely the points cluster toward a straight line, the stronger the relationship is.

\[ r = 0.00 \]  \hspace{2cm}  \[ r = 1.00 \]
Correlation is a necessary, but not sufficient, condition for determining causality.
http://www.gapminder.org

Refresh your world

Pour the sparkling fresh numbers into your eyes and upgrade your worldview.

EXAMPLES:

- Wealth & Health of Nations
- CO₂ emissions since 1820
- Africa is not a country!
- Is child mortality falling?
- Where is HIV decreasing?

BUBBLE CHART
The following table is adapted from Doll and shows per-capita consumption of cigarettes in various countries in 1930, and the death rates from lung cancer for men in 1950.

<table>
<thead>
<tr>
<th>Country</th>
<th>Cigarette Consumption</th>
<th>Death per million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>480</td>
<td>180</td>
</tr>
<tr>
<td>Canada</td>
<td>500</td>
<td>150</td>
</tr>
<tr>
<td>Denmark</td>
<td>380</td>
<td>170</td>
</tr>
<tr>
<td>Finland</td>
<td>1100</td>
<td>350</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1100</td>
<td>460</td>
</tr>
<tr>
<td>Holland</td>
<td>490</td>
<td>240</td>
</tr>
<tr>
<td>Iceland</td>
<td>230</td>
<td>60</td>
</tr>
<tr>
<td>Norway</td>
<td>250</td>
<td>90</td>
</tr>
<tr>
<td>Sweden</td>
<td>300</td>
<td>110</td>
</tr>
<tr>
<td>Switzerland</td>
<td>510</td>
<td>250</td>
</tr>
<tr>
<td>USA</td>
<td>1300</td>
<td>200</td>
</tr>
</tbody>
</table>

https://docs.google.com/a/uconn.edu/spreadsheets/d/1OFAkWh7hSjShrLsD8uUY87vblPCo83GT-x6BxRIVRNw/edit?usp=sharing
Pie Charts and Bar Graphs aren’t the only game in town

2nd

- Blue: 35.6%
- Red: 27.7%
- Grey: 17.8%
- Yellow: 7.2%
- Pink: 10%
Growing up in some places — especially liberal ones — makes people less likely to marry, new data shows.
The Thanksgiving Recipes Googled in Every State

By THE UPSHOT STAFF  NOV. 25, 2014

Which foods are unusually popular in each state on Thanksgiving.
Not all data are numbers

3rd
Collecting and finding patterns in data is important, interesting, and easier with technology.
Decibel 10th - Professional Noise Meter
SkyPaw Co. Ltd
Offers In-App Purchases
Rating: ★★★ (167)
myLightMeter Free
David Quiles

4.0 stars (36)
Plickers is a powerfully simple tool that lets teachers collect real-time formative assessment data without the need for student devices.

Tailor instruction with instant feedback

Use Plickers for quick checks for understanding to know whether your students are understanding big concepts and mastering key skills.

*Seeing responses like these on @plickers quizzes let(s) me know I can...*
https://create.kahoot.it
TEACHING WITH DIGITAL DATA AND ARCHIVES

UNDER CONSTRUCTION

Advances in information technology have opened up new opportunities for students to use data and archives to answer real-world questions in their disciplines. On-line databases and web-based tools now allow undergraduates and even younger students to access and manipulate authentic data and artifacts without having to master sophisticated or time-consuming methods of data collection.
Honors students demonstrating different sampling techniques with M and Ms
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