LEARNING MODULES

GK-12 DISSECT at New Mexico State University

Title: Info Graphics

Author: James Fulton

Discipline or Area: Data Presentation

Teacher: Tammy Miller-Dwake

School: Arrowhead Park Early College High School

Subject of class: Chemistry

Grade: 9th

COVERAGE OF COMPUTATIONAL TOPICS

Students were tasked with creating a semester-end project for their participation in the Desert Data Jam. One of the requirements was the presentation of data analysis in a concise and attractive format. Students were instructed in the importance of abstraction, clarity, and efficiency. These concepts were transmitted through the development of skills creating infographics.

OBJECTIVES

Students will learn the process of data abstraction, or taking specific observations and experiments to represent general concepts, theories, and ideas. They will also acquire knowledge regarding data clarity and its importance in decision-making. Lastly, efficient use of resources (time, attention, energy, and money) will be emphasized. The students will develop a mastery of infographics, their use, and their incorporation into data analysis.

EQUIPMENT AND MATERIALS

Computers with internet access

BACKGROUND AND REFERENCES

The deployment of this module was a result of the requirements of the EcoTrends Data Desert Jam (http://www.asombro.org/desertdatajam.htm) which "challenges high school students to find interesting ways to present scientific data to nonscientist audiences." Information technology offers many exciting resources for achieving this purpose. Possible solutions include dynamic media including (websites, music, interactive models, and videos). In order to facilitate familiarity with this resources, students were instructed on the basics of the internet including HTML coding, website building, and blogging. This activity emphasized data representation through infographics. Charts and graphs are typical to many fields including science, business, and the social sciences. However, the emerging media of infographics offers a format that most audiences find more appealing. There are many free online resources available for interested parties. The following is a short list of some sites offering free templates that students can curtail to their particular interests:

http://piktochart.com/

http://www.easel.ly/

https://venngage.com/

http://prezi.com/

PROCEDURE

Provide detailed instructions on how this module is taught.

During the first class, students are asked about their current research projects. Students are asked to brainstorm ways of presenting their data to a layperson with limited knowledge of the topic and meager interest. Students are encouraged to claim the challenge of grabbing the attention of casual audiences. Following this discussion, several media are shown or heard. This can include various websites (CNN.com, Huffington Post, etc.). Other possibilities include listening to appropriate songs and experiencing the modeling strength of StarLogo. Students are then asked how they could improve mundane charts and graphs. This discussion leads to the comparison of various graphs and charts to infographics describing various themes (peak oil, population growth, or tax dollar expenditure). Initial impressions and thoughts are requested. The class ends with a strong understanding and appreciation for infographics.

During the second class, students are refreshed on data analysis, abstraction, clarity, and efficiency. They are asked to define these terms and how they relate their current project. Following this discussion, various sites that provide free infographic templates are shown and students are encouraged to navigate their use. Tools for editing and curtailing the free templates are shown. This class ends with the students drafting and initiating plans for appealing presentations.

What were the "learning goals?"

The purpose of this module is help students develop their data interpretation. Sound interpretation of data is profound as it provides the answer to the most important question, "What are the consequences of these findings. And what impact will this have?" Supporting students in their comprehension of data, followed by an eloquent presentation, addresses CT skills such as clarity and efficiency.

How did you introduce CT?

This assignment generally builds upon previous modules which focused on the internet and HTML coding. This structure makes sense as info graphics can be used to illustrate webpages and other publications. By building upon these previous topics, the overall focus of CT is reinforced.

How could you assess the understanding of CT in this module?

Computational thinking incorporated analyzing and organizing data; as well as data modeling and data abstraction. Creating intelligent info graphics requires comprehending and interpreting data. These processes are developed into a logical organization and presentation of the ramifications of the findings. By crafting info graphics, students, by the very nature of the task, performing an assignment using CT.

NOTES AND OBSERVATIONS

What were challenges you encountered in the overall development of the module?

Despite the abundance of websites offering free templates, cost can become prohibitive for those wishing to elaborate upon what is currently available. Using free templates is a great beginning into publications; however, some of the templates are not quite appropriate for the topic of interest. This fact holds especially true for scientific presentations.

What was successful?

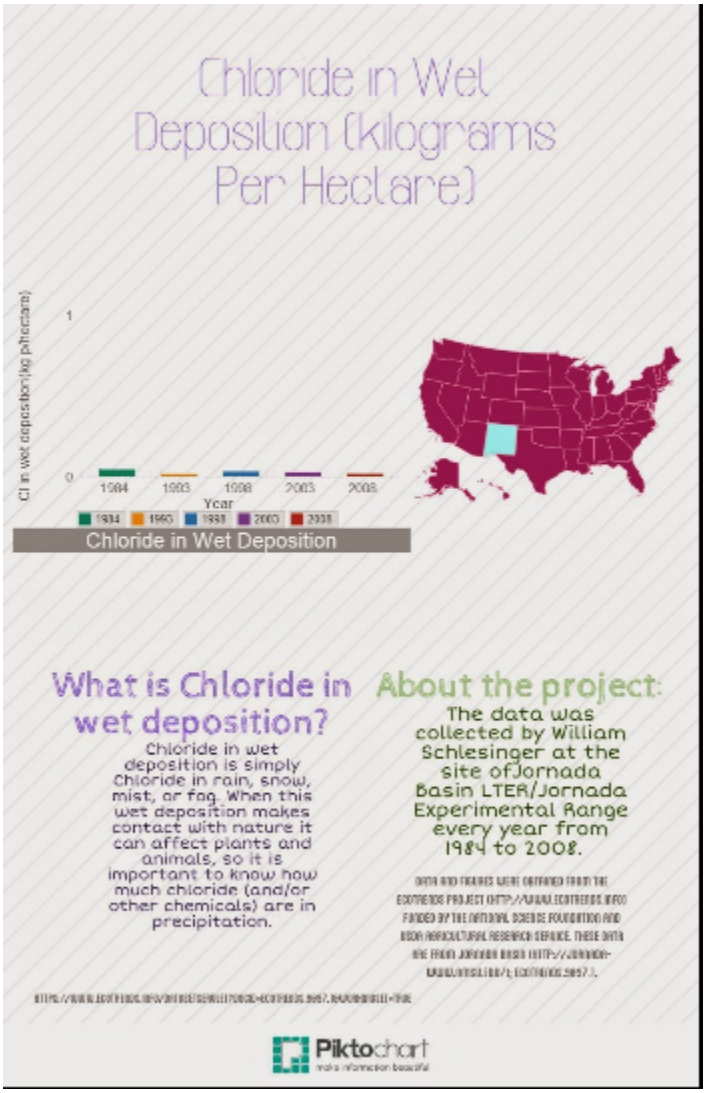
The importance of creating charismatic presentations is obvious. The students understand the short-attention spans of modern audiences. When investing effort into projects, generally, the creator appreciates recognition for their investment. The students enjoyed the appeal of infographics for this purpose. There are many websites that offer templates for students to peruse. The basics concepts can be relayed using these preset templates.

How was the students' reception to the content of the module?

The students saw the importance of presenting data in a reader-friendly format. They immediately saw the appeal of using Info graphics instead of mundane line graphs and pie charts. The students enjoyed and preferred using technology to create reader-friendly presentations.

For example,
https://docs.google.com/presentation/d/14cXs1pGxnkhSEDXUBouTNSdtf2cqxfotUlXARgdYjZI/edit#slide=id.p

Also, an example of two student's infographs follow:



CALCIUM, RAIN, AND PLANTS

Relationship between precipitation, calcium in wet deposition, and plant species richness

Precipitation in Las Cruces varies

Calcium in wet deposition is very low

Plant Species Richness increases and has sharp decreases

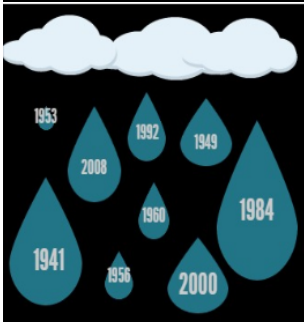
Precipitation

vs

Plant Species Richness

vs

Calcium in Wet Deposition

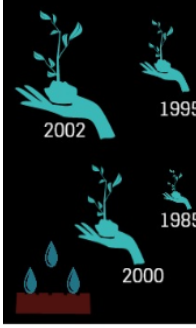


Precipitation

Data for precipitation shows that the precipitation is highly random and has no correlation. In the year that the experiment began which was about 1916, precipitation was about 22.5 centimeters. From there, the data takes a random pattern of sharp decreases and increases. In the year 1984, the data reaches its highest point which is about 50 centimeters of precipitation. In the final year of collection which was 2008, the precipitation was about 41 centimeters.

Plant Species Richness

The data of plant species richness was collected in the year 1989, and the plant species richness was at 3.50 per meter squared. In the following year the value increases, but then takes a random pattern of increases and decreases after the year of 1990. Ten years after the first year of data collection the plant species richness is at 4.50 per meter squared. The data reaches its highest point in the final year of collection which was 2008, with a value of about 7.1 per meter squared.



Calcium in Wet Deposition

The data of calcium in wet deposition shows that when the experiment began in 1984, the calcium found in wet deposition was fairly high, which was about 0.112 kilograms per hectare. After that however, the value decreases severely from the years 1985 to 1991. Then, in the year 1994 the calcium in wet deposition reaches 0.135 kilograms per hectare. Once again, the data takes a huge decrease for the following years but not as severely as the past decrease. In the year 2002, the data reaches its highest point which is about 0.147 kilograms per hectare and finally in the year 2008 the data has decreased to 0.057 kilograms per hectare.