Climate Tweets: Examining Global Climate Change

GRADE LEVEL: 9 - 10

MATERIALS: Internet Access, computer

OBJECTIVE: Critically interpret public opinion of climate change, provide an accurate analysis for review by researchers.

SKILLS: Develop data analysis skills, critically evaluate opinion vs. fact

VOCABULARY: (global) climate change, global warming

OVERVIEW (for students): Television (particularly cable television!) and the internet have brought news media into every home in a much more vivid and descriptive way than in previous history. People now have access to information from around the globe at any time of day, as it happens. People react to the news, and formulate opinions based on their life experiences, moral beliefs, and information available to them. The advent of social media has provided the general populace with the opportunity to voice those opinions in a much more public way than ever before.

One of the most prodigious social media outlets is Twitter. It provides an author the opportunity to state a feeling, "fact", or other piece of information in 140 characters or less. The tweets can be viewed and shared among followers. This platform allows for opinions on "hot button topics", or news items that cause a strong emotional response from people, to be shared from around the world.

Global climate change, or global warming, is a "hot button topic". By analyzing tweets about climate change, we can collect data and develop information about how the public generally feels about climate change.

The UND Computational Research Center is working on collecting tweet data using Citizen Science Grid public volunteers to help classify more than one million tweets. Through the Supercomputing Challenge, you are able to be part of this unique project by helping to classify tweets and provide your personal interpretation of your results.

(for teachers): Document the process during this lesson through photos, short video clips, and collecting the "drafts" of data and analysis along the way. This will be important to review with the students prior to their documentation phase.

PART I: Data Collection

INTRODUCTION (for students): Research is based on the collection of facts, or data, that are used to support various conclusions drawn by the researcher. This part of the project takes the qualitative tweets and transforms them into a quantitative data set that can be reviewed and analyzed. You will be classifying tweets according to attitude, evidence, emotion, impacts, or other qualities.

DIRECTIONS (for teachers): Sign in and access the "Climate Tweets" website according to the instruction page provided with this lesson plan. Discuss the questions below with the class, making sure the students have a clear understanding of what kinds of tweets to assign to each classification category or attitude. Also discuss the "Instructions" link at the top of the "Climate Tweets" website so students are able to refer to it if they are unsure how to classify a tweet. Have each student read at least 50 tweets, marking the appropriate radio button and check boxes. For each tweet classification to be valid, students must select an attitude, and can select only up to **3** category check boxes.

(for students)

1. **Attitudes:** Did the author of the tweet believe that climate change is a major issue or "much ado about nothing"?

   There are 5 levels of attitude for climate change ranging from -2 (Strongly Denies Climate Change) to +2 (Strongly Acknowledges Climate Change). Some people see climate change as a major problem. Even small changes in global temperatures will have cataclysmic and irreversible consequences (strongly acknowledges climate change). Others believe that the Earth's climate naturally goes through cycles of warming and cooling. This process has been going on for ages, and this is just another one of those cycles (strongly denies climate change). Maybe, although climate change is important, the author may feel that there are bigger problems to worry about, such as race or class struggles, than if the temperature of the oceans is going to be an average of 2 degrees warmer in 10 years (neutral/inconclusive or unknown). Use your best judgment for the scale provided to determine how strongly the author feels about climate change.

2. **Evidence and Emotion:** Did the author of this tweet indicate the focus on climate change is an evidence issue or an emotional one?

   These two categories have 5 possible check boxes: Evidence – Drivers of Climate Change, Science of Climate Change, Denial of Climate Change; and Emotion – Politics, or Ethics and Moral Responsibility. Did the author use facts such as greenhouse gas levels (driver), coal burning (driver), CO_2 graphs (science), or climate change models (science) to prove their point? Or maybe, the author claimed that global climate change is a political or ethical issue: a trick to win votes or get funding for a special interest group (political issue), or question what policy makers are doing to save the environment for future generations (moral issue)? Maybe the author combined some of these, such as, "Big oil owns senators (political). The Earth has already been hotter! (scientific) #TimeoftheDinosaurs #MediaPropaganda" (denial).

3. **Impacts:** Did the author indicate that climate change will result in extreme events, unusual weather, threats to the environment, or threats to society and the economy?

   This question really gets at what the author either saw as evidence, or feared will happen. They might have referred to studies of polar bear

habitat shrinking due to melting of polar ice (environment), or claimed melting polar ice will cause X ft of ocean level rise that will threaten island nations such as Fiji, Haiti, or even Japan (society). They feared increases in average sea surface temperatures will lead to increased frequency (weather) and severity (extreme) in storm events such as hurricanes or tornadoes. "Mexico had its first Cat5 hurricane! (extreme) They can't afford to lose tourists to huge storms! (society) #SpringBreakWhere?"

4. **Other:** Did the author truly tweet about climate change or was their tweet about something completely different?

   Maybe the author of the tweet didn't understand the topic, or maybe they were just trying to be funny. "What is the climate changing into?" (unknown). "At least if we warm up a bit, we'll have better tanning weather!" (joke) Regardless of what the author tried to convey, these tweets likely don't include any references to the options in the other categories.

<u>PART II:</u> Data Analysis

INTRODUCTION (for students): Data is only the first step in developing understanding. A researcher needs to consider their data and decide what, if any, patterns can be shown by the data. Some information may be obvious, like kids drink less coffee than adults. Other information may be inferred by combining pieces of data. For example, maybe we knew that professional adults consume more coffee than college students, but college students spend more money on coffee than professionals. Then, we can infer that professionals likely have access to a free source of coffee, such as the coffee pot at work, which the college students do not have.

The tweets you read were collected between 12/25/2011 and 01/17/2014. Research the major local, regional, national, and world events that were occurring during that time period. Use a valid information source (NOT WIKIPEDIA!). Compare those to the events happening in your world today.

When you finished classifying your tweets, your data was used to create an individual bar graph of the categories you assigned and pie chart of the tweet attitudes. Your data was compiled with the rest of the class to show how your class classified tweet categories and attitudes as a group. Using your individual and class results, you will evaluate your classification methods, and your classification results in small groups.

DIRECTIONS (for teachers): Break the students into groups of 4 to 5 students. Have students discuss the information shown by the data sets. Students should determine what patterns they see and what data can be combined to infer other patterns. Each small student group should create a clear description of the information they inferred from their data sets. The students can use the questions below to guide their discussion. One student will record the major points of the discussion for each group.

1. How easy/difficult was it to classify the tweets? What made a tweet easy/difficult to classify?
2. How well do you think your personal feedback pie chart and bar graph compares to the rest of the class? Can your personal outlook/attitude affect how well your results compared to the rest of the class? Explain.
3. During the period the tweets were collected, what types of major events were in the news? (i.e., political - it was an election year, environmental - there was a major oil spill, financial – the stock market had major fluctuations, weather – unusual extreme heat or cold reports, health – epidemics and outbreaks, etc.) Using your individual pie chart, and the class compiled data pie chart, what was the prevalent attitude toward climate change shown by the tweets? Are there any patterns that suggest tweet attitude corresponds with the major news events you found? (i.e., mostly major negative world news on a single topic : many strongly view the climate is changing, or assorted/mixed news items of varying importance : mostly neutral tweets)
4. How do you feel public opinion on climate change is influenced by media focus on news events? Compare the major 2012 presidential candidate platforms to the 2016 candidate platforms. Compare your answers to questions 3 and 4 to your answer for this question. Can campaign themes be used as a barometer for public opinion? If so, how has the public interest become more or less focused on environmental issues?

The students will then meet as a class to discuss their patterns and relationships to world events. When the class has reached a consensus regarding what patterns they see, the adjustments to the data that needed to be made, and what (if any) world events may have influenced public opinion, the students will form groups to write the report to be submitted to UND.

PART III: Information Distribution

INTRODUCTION (for students): The ultimate goal of a researcher is to disseminate the information they got from the research they conducted. The final product is a journal article that has peer review and is published for other researchers interested in similar topics to refer to and cite when conducting their research. Journal articles typically have several authors that work together to produce the final report, which has a very specific format. You will write up your research similar to a journal article.

DIRECTIONS (for teachers): Students will complete this portion of the project as individuals and in groups. Review with students the documentation you have been collecting (i.e., photos, video clips, etc.) to refresh their memories prior to the writing process. Break the students into groups based on the portion of the report they will

cover: Introduction, Methods, Data, Analysis, Conclusions. You have the option to ask the students to write up an Abstract as well. Each student in each group will write up their own version of the section they are assigned to. The group will evaluate each write up, and edit together a version they want to submit as a final product. The Introduction

should include a quick statement about what the research was about, and why they felt it was important. The Methods should describe how they extracted their data, and the discussion/analysis process. Students should be specific and provide at least 3 clear details regarding the process. The Data should include a graphical and/or tabular reproduction of the pie charts and bar graphs results the class received. Students have the option of including one or two individual data result sets for comparison. The Results should describe the patterns they agreed they observed as a class. Statements should try to refer to graphs for emphasis, where possible. The Conclusions should include statements why they feel their analysis is correct, areas where the analysis could have been improved, and suggest further potential for research. The Conclusion section may be the hardest section to write. Therefore, if the students groups do not divide evenly, add students to the Conclusions group first. The final product will be a single report submitted to UND for review. Include the photo/video documentation with the submittal.

ADDITIONAL RESOURCES:

EPA: Climate Change. This site has fact sheets and links to the most frequently asked questions about climate change, such as Why is it happening? and What can I do about it? http://www3.epa.gov/climatechange/

NASA Global Climate Change, Vital Signs of the Planet. This site has animated displays of satellite imagery showing evidence of global warming and links to news articles describing the satellite imagery animations http://climate.nasa.gov/

NOVA "Warnings from the Ice" This video explains how ice core studies record global climate change http://www.pbslearningmedia.org/asset/ess05_vid_climatechange/

Penn State Public Broadcasting Geospatial Revolution Episode 4, Chapter 1: Monitoring a Changing Climate. This video explains how satellite and other remotely sensed data is collected to track climate change.
http://geospatialrevolution.psu.edu/episode4/chapter1