

Writing a Short Story about Global Warming in High School Chemistry

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Overview

Writing a short story about global warming in High School Chemistry is a curriculum unit that brings together the discipline of science with the art of writing a short story. It is a unit of study created for students taking an introductory level course of chemistry during tenth grade. The expectation is that students will use two different types of abilities, one the knowledge base of science, and the other proficiency in writing, and will benefit from a mutual synergism while preparing to write a short story. They will collaborate on how to approach, and then write the story after researching theoretical evidence collected by scientists in the field of climatology. A collection of four chemistry related lessons will also be incorporated and presented to students.

The aforementioned framework plays intricately into writing a short story as part of the English standards for the state of Pennsylvania that requires students to become proficient as writers, organizing their writing and ideas, and creating a written product that satisfies the rubrics developed for the Pennsylvania System of School Assessment (PSSA), a combination of skills, both analytical and creative, leads the student toward the goal of creating a scientifically weighted and rewarding piece of writing.

The use of scientific data concerning global warming in this story writing curriculum is a unique approach to foster student writing skills while studying introductory chemistry. It is intended to allow the budding scientist/writer to write a story and focus their attention on details that are analyzed in both the laboratory and current scientific research with special relevance to the study of global warming.

Rationale

Since childhood I have enjoyed reading science fiction stories, or going to the cinema to see sci-fi movies, specially those that introduce a collection of sorted details that not only made me want to understand how science is useful, but that also pertained to unusual occurrences in the natural world. I remember as a boy going to see a movie called, “The Brain Eaters.” After watching this ridiculously fictional sci-fi flick about an alien organism that looked like a crawling brain with an attached spinal cord, sneak up behind a person and stick onto the base of the neck of its human host to take possession of the victim’s brain. I was so scared with worry about the possibility of becoming an alien zombie that I told my older brother to stand by my bedroom door with my toy air-gun to guard me against a possible attack while I slept. The content of the storyline was absurdly fictional, but it did make me feel a need to explore if such creatures might really exist. Should I trust my parents when assured that it was only a made-up story to scare movie watchers, because as they put it, “people like to feel scared”, or was there a grain of truth in the possibility that society was hiding some sort of subversive plot to cover up the truth about an alien presence on earth? For those old enough to identify with growing up during the baby-boomer fifties era, there was a proliferation of stories about aliens and freaks of nature caused by exposure to radiation in the environment. Maybe my need to find out about the real world that I lived in had something to do with my habit of reading every National Geographic magazine that I was able to get my hands on at the library while I attended high school. I liked the fascinating photos of far away places, but beyond interesting pictures, I think the reason for my reading the accompanying articles was to dismiss or give merit to what was real and unreal in this world.

I remember my absorption when reading the mystery stories of the writer, Sir Conan Doyle, where the protagonist of each story, a private detective named Sherlock Holmes, and his loyal assistant Dr. Watson, employed the knowledge of scientific principles and laboratory analysis to sift through the sorted details involved in a criminal mystery case. His vivid descriptions of crimes committed, and also of the inhabitants of Victorian London stimulated my curiosity and desire to understand science. It wasn’t until junior high school that my interest in science became known to fellow classmates when I won a prize for an electronics science fair project that I submitted to the Buhl Regional Science Fair competition. In the race for space decade of the nineteen-sixties there was a tremendous push in the educational community to train up future scientists to compete with the Soviet Union. Science geeks were considered to be in vogue, and many students like me wanted to join the ranks of those making America strong by competing against the Russian threat. Many young people of my generation went on to college and majored

in a science, but like myself still enjoyed reading sci-fi techno-thrillers and mysteries. Although many of the myths about the existence of aliens, or radiation-created mutants have been dismissed by most of us, there is a growing interest in science related issues that threaten the finite resources of planet earth. We can no longer ignore the population expansion that grows ever larger as time passes by, and the need to train students in science so that they can understand and participate in solving the problems associated with earth's limited resources.

Current speculation about what makes nature tick has made its way into popular culture by means of such media events as Al Gore's documentary called, *An Inconvenient Truth*, where science meets pop culture in a study of the causes for global warming. When most of us see a movie like *An Inconvenient Truth*, it makes us want to understand if the natural forces and scientific principles supporting the issue of global warming are fact or speculation. It's the same sort of wonderment that started me to have an interest in studying science when I was a youth. It is with this spirit of extrapolating upon scientific principles to explain the causes of global warming that a group of tenth grade chemistry student will meet the parameters required in the curriculum of the Pittsburgh Public Schools. They will draw from both the discipline of science and also language arts to create a short story about global climate change, and then further craft an explanation for this change from empirical data. The story that students create while participating in this curriculum unit can be either purely fictional or a factual projection, and will address the roll of mankind in the issue of climate change.

As a student I always found it stimulating to do research, and then tried to be objective when drawing my conclusions. I anticipate that my students will enjoy analyzing current information that brings to bear physical evidence collected by the scientific community concerning the issue of global warming, considering the fact that this is a hot button issue that poses a potential threat to future generations because of the cataclysmic events that might ensue across the globe. Is global warming responsible for such events as hurricane Katrina, or Cyclone Nargus? Clues regarded as possible reasons for change in the nature of earth's atmosphere will be regarded by the students, and then used to write a short story that addresses the question of global warming. Does it exist, or is it an abstraction created by an overzealous mass media, as evidenced in current available research? Do we as individuals play a part in this issue? They will employ in their story any scientific principles of chemistry, physics, biological phenomena, and related physical sciences that pertain to the reasons why it's happening.

To write a short story about global climate change that mandates a plot based on scientific principles requires some understanding of multiple disciplines. In this unit the students might choose to apply knowledge from a variety of sources, which may include; meteorology, geology, chemistry, mathematics, physics, and biology, to help them formulate and then write a short story about global warming. In their research they will extract information from multiple sources of expertise in the study of global warming, which might include; biology, chemistry, physics, mathematics, climatology, paleontology, oceanography, geology, and any other subject that addresses the physical makeup of the earth and its atmosphere. I anticipate that they will become familiar with

some of the aforementioned sources, and come to understand the roles that various scientists play in the understanding of global warming.

In the case of a meteorologist the role requires specialization in the physics of the atmosphere. They will better understand that as a profession, meteorology provides for great variety of employment opportunities and requires someone who is not only highly capable as a problem solver, but is also skilled in techniques of mass media and communications.

During their research they might come to see that a general practice geologist is involved in the study of mineral deposits, and that other geologists are involved with engineering construction materials used in civil constructions. Another area of study in geology is called geohydrology, where groundwater and how it influences geological formations is studied. Fossil remains can help our understanding of climate changes. Paleontology uses geology to determine the age of rocks for dating fossils. Geophysicists study how subsurface mechanisms affect above ground changes.

Chemists, physicists, and biologists, specialize in the foundations of scientific thought by studying the relationships between matter, energy, and living organisms. Each profession adds its own dynamic to the underlying processes that influence global climate change. Exposure to applications involving these disciplines will hopefully stimulate their interest in science courses taken in high school, and motivate them to take science courses at the college level.

Some will become familiar with Oceanography (marine science), which is the study of the seas and oceans of the world. This subject deals with a diverse collection of topics with scientists studying cause and affect relationships that influence marine life.

In writing short stories there is often a struggle to determine how current events will affect the future. Just as outcomes aren't always predictable in real life, the student as a story writer has the pleasure of not needing to make the outcome perfectly precise or accurate. Even better, unlike the discipline of science they can create a story that is completely fictional, depending upon the writer's whim. By the end of the story, the cast of characters often reap what they've sown. Future outcomes of life have no guarantees, sometimes events are hidden, others blatantly obvious, but most discerning readers recognize real consequences when following a trail of obvious false direction. Often decisions, like events in our lives, can be interpreted two ways. For example, a bad choice may involve a student who breaks a rule in the chemistry lab that endangers his safety or that of others. Or is it a positive choice pointing to the identification of a chemical reaction using two unrelated substances producing a chemical change. Whether in life, chemistry, or short stories, decisions determine the direction taken.

In story writing, the setting must be integrated with the plot, and the mood of the story (Scholastic 2). A well known, familiar setting is the easiest place for students to begin since the actual place is nearby. Alternatively, the setting may include those that have a built-in excitement potential: discovery of novel fossil remains, drowned polar bears

floating in open-ocean, or ice shelves sliding into the ocean. Common settings often include making use of weather conditions (especially during the climax) such as super powerful lightning storms that knock out electricity, floods that wash out entire island communities, or dark clouds blanketing an entire continent. Students should also consider the terrain of the setting (flat, mountainous, caves, ravines), rich or poor neighborhoods, transportation (subways or cabs for survivors to escape the city, tractors or pickups when on the farm), and sensory details including sights, sounds, tastes, and smells typical to the setting (salt on your lips from the surf pounding at the beach, sand scorching your feet, and the smell of rotting fish washed ashore).

As short story writers, the students will make the plot fit the setting, and allow the action involved to include bad guys and heroes. Students will determine if it is possible for a character to be a hero due to age, health, and size, to add believably to the story. Could the senator really be that bad and get away with it?

Throughout the process of combining science with creating an original short story, the student benefits by developing writing skills, inquiry, cooperation, and authentic assessment. The scientific knowledge gained will give students insights about how carbon dioxide gas results from the burning fossil fuels to supply our present and future energy needs. The complete combustion reaction of a fossil fuel with oxygen from the air to produce water vapor and carbon dioxide gas is reinforced by doing this unit study. Students will make a connection between how energy is used and made, and formulate a storyline that incorporates this knowledge into the plot. In the laboratory, students will demonstrate the experimental limitations on observation and accuracy. They will make both qualitative and quantitative observations while performing experiments. Students collaborate when given time to investigate their own ideas as an active participant in the learning process. Use of research tools and techniques used in the chemistry lab will lead students to perform laboratory analyses to pinpoint causes of global warming and create a plausible short story.

Objectives

The intended outcome of this curriculum unit is that students will attain competency in identifying and applying key concepts of content that are stated in the Pittsburgh Public Schools (PPS) Curriculums for Chemistry. It will also provide instruction that allows students to attain competency in applying key concepts stated in the PPS Curriculum for English. They will become skillful with the processes of observation, data collection, analysis, pattern recognition, and then demonstrate how to make inferences and predictions based upon the relationships among science, technology, and society. Similarly, relevant writing standards focus on the ability of the student to use precise language and specific detail, utilize dialogue, apply literary conflict, include cause and effect, include varying characteristics (from whimsical to dramatic), write with a sharp, distinct focus, and revise writing to improve style, sentence variety and subtlety of meaning.

Strategies

As an introduction, the teacher will present students with a series of activities related to story telling. Students will be shown how to identify the elements of an effective short story. Included among these elements are: writing an opening sentence that will capture a reader's attention, creating a cast of characters, including character descriptions that appeal to the senses, using dialogue to tell the reader about the characters, and developing suspense throughout the story making use of the element of surprise.

The teacher will address the basics in writing a short story including some insights about poems, fables, anecdotes, and short novels. The teacher will make the following recommendations relative to the finished product. Make the story less complicated than one finds in a longer novel. Try to focus on one plot in a single setting. Keep the number of characters to a bare minimum with few incidents to cause less difficulty in bringing the story to a quick conclusion. Use fewer elements of staged structure (less detail), and keep the time period of events at a short length when possible.

The teacher will recommend the following ideas relative to the **antagonist** (villain): a character description that includes specifics about physical traits (hair color, clothing style, age, and size), a believable motive and emotion behind their behavior, a personal connection between them and the hero of the story (jealousy over who was the smarter student in school, or greed over profit from being the president of a company that sells coal containing high sulfur concentrations).

The teacher will recommend the following relative to the **protagonist** (hero): create someone who is bold and thoughtful. Show that he is a strong story personality who refuses to be victimized. The teacher will recommend making the hero either someone that everybody likes or someone with skills that everyone relies upon.

The teacher will explain that to create logical characters (it is more logical for a young teenager to rely upon the knowledge of a trained scientist than for the scientist to expect a youngster to come up with the explanation for global warming). The teacher will recommend that giving sufficient attention to the serious consequences of global warming provides depth to the story, adds tension, gives the hero a strong motive for acting, and increases the reader's interest.

The teacher will then present the students with a prompt in which an inappropriate behavior leads to a modification of results during a lab experiment. The teacher will ask the students to write about a disaster that may have occurred as a result of the change they have made in the procedures. The teacher will tell students to address how this might relate in a similar manner to man-made changes in composition of the earth's atmosphere. Changes don't happen in a vacuum and the setting must be integrated with

the plot, and the mood of any story. Weaving the setting together using the change convinces the reader that the story could not have taken place anywhere but in this particular setting. A well known, familiar place is the best place to begin. It is easy to duplicate sensory details when the actual place is well known. With the writer being more familiar with the setting, the more interesting his story can actually become (the hero's home or bedroom, a neighborhood mall or park, the local fast food place, or school). Additional considerations for the setting may include those that are more exotic, but that have a built-in excitement potential: previous ice ages, dark caves, deserted parking lots, or an amusement park after destruction from a tornado. Do also include use of many details to describe the setting, choosing those that add to the mood. Common settings often include making use of weather conditions (especially during dramatic short term climax) such as lightning that knocks out electricity, heavy rain that washes out bridges, fog so thick that ships collide in the darkness. Also consider the terrain of the setting (flat, mountainous, caves, ravines), rich or poor neighborhoods (mansions with locked gates), transportation (subways for victims to escape the city, trains washed away by tidal swell), and sensory details including sights, sounds, tastes, and smells typical to the setting (salt on your lips from the surf pounding at the beach, sand scorching your feet, and the smell of rotting fish washed ashore). The use of details and mood will make the reader feel more involved and tense. A good short story makes the reader feel entertained and satisfied to have learned about its outcome.

The teacher will instruct the students to choose a credible story line. Readers know that a natural disaster will threaten the hero. Does regarding the use of an ongoing global disaster include: make the outcome fit the setting, allow the action involved in dealing with the test of survival plausible for the hero. Is it possible for the hero due to age, health, and size to make for a believable outcome to the consequences of a major flood, or tidal surge?

The teacher will provide a list of don'ts that provide for a quick exit while creating an effective short story. Don't begin writing at the beginning of the story without first planning the ending. Don't use dialogue that sounds unnatural or doesn't fit the characters. Don't have loose ends at the end of your story. For example, if a minor character offers to help the main character search for a missing friend, bring him/her back after the friend is found (not allowing him to wander in the night forever). Don't overuse exclamation points. Usage should be limited to when one of the characters, or the writer, is exclaiming. For example, "It was a wild, exciting ride," does not require an exclamation point. However, "What a wild, exciting ride!" does. Don't use the same word two or three times in the same paragraph. Try using a thesaurus to find synonyms. Don't use sentences that are too long or with too many clauses or phrases. It can be confusing. Finally, don't forget to proofread, spell check, or use a dictionary to make sure that words are used and spelled correctly.

Finally, the teacher will then proceed to allow students to do six activities before beginning to write a short story. One lesson will be done in the classroom to familiarize

the students with carbon dioxide gas, and the other five with the issue of global warming and writing skills. Each student will be given a booklet of activity sheets that must be filled out and handed in for credit (see appendix A). They will also be assigned to a team that will work in the lab and examine what sort of evidence can be useful to understanding carbon dioxide and temperature trends. Each team will proceed to the lab to do a test following a full explanation concerning proper lab technique, including a description of how to identify the presence of carbon dioxide gas. They will also be supplied with the laboratory equipment needed to do two quick experiments. Each team will use a data table to record the results for the tests that were done.

Classroom Activities

Day 1: Introduction to the Curriculum Unit

The objective of this lesson is to introduce students to the genre of short stories. Provide each student with a copy of the same short story to be read silently. Following their reading, a classroom discussion follows to identify the following elements: background information including characters, setting, mood, plot (including basic facts and sequence of information), rising action, climax, and resolution. Students relate portions of the story just read silently with each of the basics listed. An overview of the upcoming activities, laboratory analysis, and writing exercise is provided to students in preparation for the upcoming series of lessons.

Days 2, 3: Investigations of Climate Change

Investigation 1

The first investigation will require inquiry and critical thinking skills concerning the topic of how lifestyles affect global warming. It is centered on the idea that each of us has a carbon footprint that can be measured. Students will consider how lifestyle changes might affect carbon emissions. They will go online to acquire data at the website (<http://www.epa.gov/climatechange/index.html>.) and calculate carbon emissions that result from home energy use. It begins with a brainstorming activity where each student is asked to list several uses of energy needed in their homes. They must try to relate this use of energy to the issue of global warming by identifying the source of the energy being used and how this power was supplied. The question that they will be asked after doing this list is, "Were these sources from fossil fuels, or from renewable sources?" The students will work on this research in a computer lab and be split up into teams of four students per team. Each team will submit a completed questionnaire that summarizes data about the average carbon footprint for a typical small neighborhood (Appendix A).

Investigation 2

The second investigation is a simulation that compares the choices of affluent sectors of society with those of the less fortunate concerning materials resource consumption. How do wealthy neighborhoods stack up against poorer neighborhoods with choices that reduce the unwanted impact from over consumption? They will be asked to consider possible alternatives to the destructive practices of excessive consumption, and identify how factors of an individual's socioeconomic position add to limiting the level of consumption. They will take into consideration the environmental impact from consumption patterns, and how personal choices can help. By brainstorming the essentials of daily needs (food, housing, fuel, clean water, clothing, etc.), students will make decisions on what to buy during a trip to a Mall (department, pharmacy, convenience, Gap, etc.). Choices on what to buy will depend on resources of the individual with some students having more money than others, thereby being able to purchase nonessential items as well as those that are basic. The computer lab will assist students by allowing them to go online and downloading a lesson called, "Shop Till You Drop" at the website, (<http://www.facingthefuture.org>). They can download a table from this site called, The Global Mall, to use as a guide. This will give them further insights on things that they might not have considered while making their choices. Students will be assigned a credit line with different levels of purchasing power. Sixty percent of the class members will be given one hundred dollars of credit. Thirty percent will have one thousand dollars of credit, and ten percent percentage will get four thousand dollars of credit. Students will then have one period (thirty-five minutes) to shop for items they will purchase.

After the students finish shopping they will be placed into groups of four per group. Each group will write a list of all items purchased onto the chalkboard. On a separate sheet of paper each class member will evaluate the findings by making a split-page report, where on one side of the paper they write "Environmental Impacts", and on the other "Social Impacts". Students will go to the website, (<http://www.facingthefuture.org>), to find a table called "Global Mall Impact" which is available for use with this activity. They will then be asked to write a paragraph explaining how the choices made will effect the environment, including any connection this has with global warming. They will be then be assign to do some homework-research on how to reduce greenhouse gas emissions by using cost-effective methods (weather-stripping homes, using small fluorescent light bulbs, driving hybrid cars, etc.). This information will be reported to the class the next day with an explanation of how such methods can improve their lives, and the lives of others.

Investigation 3

The third investigation is a simulation to mirror the effect of the limits caused by government regulation. They will explore how industry is controlled by laws that address carbon emissions. By doing this activity students will learn about the cap and trade system for maximum allowable levels carbon dioxide gas release. The outcome expected from this lesson is that students will reflect upon ways that they can help to alleviate the emission of carbon into the environment. Students will form into groups of four per group, and be given Monopoly money in the amount of five hundred dollars per group.

The denominations of the money issued are; two - one-hundred dollar bills, four - fifty dollar bills, and ten - ten dollar bills.

Each group represents an industry and will use the worksheet to write down what happens during the simulation. The activity starts with students being asked how they would feel if they are allowed to send now more than four text messages. They can make less than four, but not more than four messages a year and unused messages will be able to be traded to others for money. This mimics how the government sets limits that regulate power companies generating carbon dioxide gas.

Each group will then be given a short deck of four cards, with numbers of two through five, from a deck of playing cards. The teacher informs them that they must draw two cards from the deck and multiply the sum by five. This value will represent the tons of carbon dioxide gas generated by their company per year. Next, they pick a card from the deck and multiply by ten, and this represents how much it costs them to reduce the company emissions by one ton per year. These numbers will be recorded onto the chalkboard for each group. Depending how different the cost verses amounts of gas generated will determine if a company has extra governmental allowances in their manufacturing processes, or if they need to reduce emissions. Companies with low emissions have an advantage over other companies and can sell their extra allowances to less competitive companies with need of emission reductions. Everyone in the game will keep track of the money that they gain or lose during twenty-five minute session of play. Each student should have had at least three transactions during the session. Extra time can be allowed if someone lacks three transactions.

A discussion will follow the game with questions being posed about the outcome. Students will be asked if they think businesses follow such governmental system of regulations, and how they feel about the procedure. They will also be asked if they think such a system can work across national borders and around the globe. A third question will ask if they can come up with a better system for controlling carbon dioxide emissions than by government regulations. One last question will be a judgment comparison between how governments regulate verses development of cleaner technologies. Would it be better if the government provided tax incentives to industries that used technology to fix the emissions problem?

Laboratory Investigation

A simple test for the presence of CO₂ gas can be preformed in the laboratory. Because this is the one of the gases responsible for global warming, it is appropriate to show students how to test for the presence of carbon dioxide. This gas can be easily generated by a variety of methods, such as: burning a wooden splint inside a test tube, or using a burner to heat a test tube partially filled with copper (II) carbonate to generate carbon dioxide. I have chosen the second method for this investigation because it does not generate the byproducts of soot and smoke, and is a cleaner gas generation system.

The students will place two heaping spoonfuls of this chemical into a large test tube and heat it for about three minutes. They will remove the burner when the green colored powder turns black, and then place a burning wooden splint into the test tube to test for the presence of CO₂ gas. If this gas is present the flaming splint will be extinguished immediately.

Another quick exercise that students can do to test for CO₂ gas involves using a straw to blow exhaled air into a test tube filled with limewater. A clear solution will turn milky white if carbon dioxide gas is present. This result is the precipitate calcium carbonate that causes the milky white color change of the clear limewater. After seeing this color change the students can modify the generation system by changing the straw and mouth system to a more efficient method where copper (II) carbonate is decompose in a test tube that is fitted with a one-hole stopper and glass delivery tube that is bent in a u-shape, with the open end of the glass tube submerged in a test tube filled with limewater. The gas generated will bubble through the limewater and cause the clear liquid to change milky white. Care need be taken after the white precipitate has appeared, in that students must be warned to pull the opened end of the glass delivery tube out from the limewater before they remove the heat source (burner flame) from the bottom of the test tube. The danger of taking away the burner before removing the glass delivery tube is that negative pressure will build up in the test tube, which will cause the limewater to be drawn into the heated test tube. The sudden contrast of cool limewater hitting the heated walls of the copper (II) carbonate containing test tube will shatter the glass, which is a dangerous situation for those who are nearby for they could be hit by flying glass.

Day 4: Presentation of the Rough Drafts

Each team presents their short story rough drafts orally to the class for feedback. Peer feedback and review is very valuable. Allow time for classmates to volunteer feedback to the group orally. Students are also required to write down their ideas for each team to be collected and reviewed by the story writing team. While some students will have no difficulty volunteering their ideas and suggestions orally, many will be more comfortable writing their feedback and ideas for the team.

Day 5: Second Rough Draft Writing

Each team reads peer feedback sheets, considers ideas, suggestions, and additional thoughts. Students summarize and reflect on what has been heard and rewrite the first rough draft making changes to the dialogue, characterization, plot, setting, word choice, and sentence length as needed to synthesize various aspects of their writing.

Day 6: Final Copy

Each teammate receives a photocopy of the second rough draft. Each student individually edits and revises the draft for clarity, word usage, plot, and conventions of language (spelling, punctuation, grammar). Students then collaborate with their revised drafts to create a single final copy of their story. Students may word process their mysteries using stylistic mechanics of their choice.

Day 7: Oral Presentation of the Short Story

Each team will orally present the final version of their group's story to the class. Either one person in the group will read the story aloud, or the members can take turns reading different sections of the story. Following each oral presentation, classmates are encouraged to provide feedback to the authors. They will make comments about what interested them the most about the story, and how it might be improved. If there are no improvements needed then all stories are collected and compiled by the teacher into a Short Story Collection to be provided to the school newspaper for possible publication. This could be done using one story in each monthly issue, or as an anthology of short stories. This collection of stories may also be shared with other chemistry classes or English classes for their reading enjoyment.

Works Cited

Bauman, Amy and Peterson, Art. Breakthroughs: Classroom Discoveries about Teaching Writing. Washington, DC: National Writing Project (NWP), 2002.

This book discusses successful writing techniques available for the classroom. It is a handy reference manual that will allow someone that does not teach the subject of English to navigate through the waters of the proper applied structure and techniques needed to create effective prose's in writing.

Climate Change. 9 April 2008

<http://www.epa.gov/climatechange/index.html>.

This website is useful in calculating carbon emissions from fuel uses. It has useful reference data that can be gained if the instructor has access to a computer lab for students to do online research. Most of the information is up to date and pertinent to the issue of global climate change.

Cost of Environmental Regulations. 11 April 2008

<http://www.facingthefuture.org>

This website allows a method to determine the costs associated with carbon dioxide emissions.

Emanuel, Kerry. What We Know About Climate Change. Cambridge, Massachusetts: The MIT Press. 2007.

This book discusses what the vast majority of scientists agree upon concerning the nature of global climate change. It is a short book and a quick read with information that is very up to date.

Intergovernmental Panel on Climate Change: ICC Reports.

<http://www.ipcc.ch/ipccreports/index.htm>

This site gives up to date links of information concerning climate change with assessment reports on scientific, technical, and socio-economic information from around the globe. Most of the information is arranged by a year by year description of recommendations made by a study panel of participating scientists.

Scholastic. Writing with Writers. 13 April 2007
<http://www.scholastic.com/write/wit/mystery/index.htm>.

This website provides a great volume of valuable specific information regarding the process of writing for students. What makes it nice is that it can be used by students who have access the internet.

Wagner, Maxine. Laboratory Manual: Chemistry, Second Edit. Newton, Massachusetts: Allyn and Bacon. 1987.

This lab manual has helpful exercises for qualitative and quantitative analysis techniques. It is a standard manual used by many introductory chemistry classes throughout the United States, but it is a bit dated. Still it is useful for helping to give students basic instruction and techniques that are useful in the laboratory.

Reading List for Students

Bauman, Amy and Peterson, Art. Breakthroughs: Classroom Discoveries about Teaching Writing. Washington, DC: National Writing Project (NWP), 2002.

Students will become familiar with writing techniques.

Emanuel, Kerry. What We Know About Climate Change. Cambridge, Massachusetts: The MIT Press. 2007.

This book discusses the nature of global climate change on a level that students can easily understand.

Scholastic. Writing with Writers. 13 April 2007
<http://www.scholastic.com/write/wit/mystery/index.htm>.

This website will help students to become better writers.

Wagner, Maxine. Laboratory Manual: Chemistry, Second Edit. Newton, Massachusetts: Allyn and Bacon. 1987.

This manual provides students with useful techniques for working in a chemistry laboratory.