The Relationships of Power

An Integrated Thematic Unit-
Implementing a Bullying Prevention Program as a Service Learning Project

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TABLE OF CONTENTS

I. Introduction

II. Concept Map

III. Engaging Activity:
Parent Letter

IV. Integrated Thematic Unit Content Areas:
English Language Arts
Social Studies
Math
Science
Unified Arts

V. Service Learning Project- Implementing a Bullying Prevention Program

VI. Culminating Activity

Math

The Power in Numbers

Overview: In math, students will look at the power and influence that numbers have when used in data reporting and the power that numbers have over each other in linear and exponential equations. The first part of the ITU will be spent studying data and statistics. This should take about a week. Students will use what they have learned in this week and apply it to their surveys and presentations for the service-learning and culminating activities. This will also serve as a way to review for the data portion of the MCAS. The remainder of the unit will be spent on linear relationships and exponential growth and this will take the remaining weeks.

Classroom Environment: The desks in the classroom are arranged in groups and are easily pulled apart when there are tests and quizzes. This facilitates cooperation and student reliance on each other. Since this unit is taking place at the end of the year, students are used to the class structures and skills necessary to working in groups (active listening, "ask three before me", constructive feedback, acceptance of and respect for all ideas).

Habits of Mind: Simplifying questions and problems, seeing anomalies, designing tests and experiments, searching for patterns, using models and metaphors, cooperating and collaborating, persevering and having self-discipline

Study/Developmental Skills: Listening to others, explaining thought processes, division of work, reliance on others for help, giving constructive feedback, questioning

Essential Questions
How do people control others using numbers and data?
Can numbers have power over other numbers?
How can I use math to give myself power?

Multiple Intelligences: Logical, linguistic and intrapersonal (journal entries), spatial/visual (creating charts and graphs), interpersonal (surveys)

Part One: Data Sampling

Massachusetts State Frameworks

8.D.1 Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample, e.g., convenience sampling, responses to a survey, random sampling.

8.D.2 Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, boxand-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.

8.D.3 Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data.

In this part, students will learn how to analyze data, and understand how data can be skewed based on sampling and outliers. They will learn that sometimes media can influence public opinion by using data pools that aren't representative of everyone's opinion. They will apply what they learned to their own polls of students about bullying and what variables will affect or skew their results.

Lesson 1 (two days)
Objectives: Determine that some polls aren't accurate based on data pool
Review bar graphs and pie charts

- For homework, students will read an article that reports the life of American "tweens" (http://www.pointofview.net/site/News2?page=NewsArticle&id=7801). They will write a short paragraph about whether or not this poll is accurate based on what they know about themselves and their friends.
- In class, they will ask the same questions to each other and create a way of organizing their data.
- For review, students will take their results and put it into a bar graph.
- Students will take their bar graphs and cut them into strips and then turn the strips into a circle to see how a pie chart can be formed.
- To review measurement, ratios and proportions, students will measure the angles formed by each slice of the pie. Then they will set up proportions to compare the ratios of the percentages of respondents to the degrees in circles.
- They will compare what they found in class to what the article said and hypothesize why their results were different.

For homework, students will write a journal entry answering: Did the article give a fair picture on what life is like for tweens in America? How does the article make people believe things that what they are saying is true?

Lesson 2 (1-2 days)
Objectives: Identify whether or not a survey had a random sampling of answers or one from a homogenous group
Identify the variables that affect the outcome of polls

- Student will look at results from presidential polls in the 2008 elections (http://www.usaelectionpolls.com/).
- They will look at the different polls conducted by the different media sources and then the polls conducted in each of the states. Do the results from the national polls match up with all the state polls? What are some things that may influence the way people in different states vote?

- Using the idea that different people in different places have different values, students will think about the different variables that may affect their own polls about bullying they are taking for the service learning project.

Lesson 3 (1 day)
Objectives: Review mean, median and mode of a data set.
Understand that the size of the data pool changes the mean, median and mode and can misrepresent data.

- Students will look at batting averages of a baseball team from the beginning, middle and end of a season. How does the mean, median and mode change throughout the year?
- Is it more impressive to bat .400 when you have only been at bat 10 times or .297 when you have been at bat 160 times? How can you be deceived by a player who has joined the team in the middle of the season (Jason Bay) or does not go to bat many times?

Journal assessment: students will apply this theory to results on standardized tests. How are small schools at an advantage or disadvantage when they report their scores? How are large schools at an advantage or disadvantage? Is it really fair to compare schools that have a large discrepancy in size?

Lesson 4
Objectives: Identify outliers in a data set
Understand how the outlier can affect the mean, median, mode and range

- Students will be given test results and they will find the mean, median and mode before and after an outlier is removed from the data set.
- How did the outlier affect the mean, median, mode and range of the data set? What should you do with the outlier?

Mini-Unit Assessment: Students will try to create a "fair" polling pool for their surveys on bullying. They will decide if they should ask their parents, students from other communities or areas of the state. If they did that, how would their answers vary? Then they must decide if the title of their poll should be bullying in OUR community based on these answers.

Parts 2 and 3: Linear Relationships and Exponential Growth/Decay

In these lessons, students will learn about how different relationships in math are a "function" of one another. They will learn how numbers can have power over each other. For example, in $y = mx + b$, x influences the value of y. They will also see how raising a number to a power is a lot more powerful than multiplying by that same value, as in exponential growth and decay. Finally, they will see that knowing some algebra can actually give them power in everyday situations.

Massachusetts State Frameworks

8.P.5 Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.

8.P.6 Identify the roles of variables within an equation, e.g., y = mx + b, expressing y as a function of x with parameters m and b.

8.P.7 Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.

8.P.8 Explain and analyze—both quantitatively and qualitatively, using pictures, graphs, charts, or equations—how a change in one variable results in a change in another variable in functional relationships, e.g., C = pd, A = pr2 (A as a function of r), Arectangle = lw (Arectangle as a function of l and w).

8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate.

8.P.10 Use tables and graphs to represent and compare linear growth patterns.
In particular, compare rates of change and x- and y-intercepts of different linear patterns.

Linear Equations

Lesson 1 (1-2 days)
Objective: Create tables and equations for linear relationships

- Students will be given two cell phone plans that have a flat rate and then a cost per every text that goes over the limit and a cost for every minute they talk over the limit.
- They will first look at texts and make a chart for how much it would cost for every text they go over the limit for one of the plans.
- They will look for patterns in the chart and (hopefully) see that as y increases, x increases at a steady rate, but y is dependent on x.
- I can see if they can then make an equation that shows the relationship between x and y and how does the flat rate fit into the equation.
- Introduce y = mx + b.

Ticket to Leave: Which variable has more “power” in this equation?

Lesson 2 (1-2 days)
Objectives: Make predictions using linear equations.
Create graphs for linear relationships

- Students will make graphs of their equations using the cell phone plan from the day before.

- Then students will identify the two ways they can predict their monthly bill if they sent 15, 20 and 30 texts over the limit.
- Students will make equations and graphs for the other plan and make predictions for 15, 20 and 30 texts over the limit
- Students will compare the cell phone plans and decide which is the better deal based on their personal usage. Is there a point (the intersections) where it does not matter which plan you choose?

In these two lessons, the power was in the students' hands. They were responsible for creating the t-chart, equations and graphs. They also learned a functional use for algebra and were empowered to make a personal decision (the cell phone plan) by using their math skills.

Linear growth and systems of equations are difficult for some students to catch on to. We will continue doing practice exercises to reinforce these skills.

Students will apply the concept of linear growth to how much it will cost to produce the anti-bullying pamphlets. They will need to research two copying costs and find the base cost plus the cost of each copy and find which the better deal is.

Exponential Growth

Lesson 1 (1 day)
Objectives: Review exponents
Visually see the power of exponents

- Using the idea of Paul Revere's ride, students will chart what it would look like if Paul Revere told two people and they told two people.
- Then they will look at the tree-charts for patterns. How does each level relate to the original number of people told?

Journal question: How does the power of exponents relate to the spread of rumors in school? What kind of power would you have if you chose not to tell other people rumors?

Lesson 2 (1 day)
Objectives: Create tables, equations and graphs for exponential growth problems

- Before the activity students will be asked if they would take a job that 2$ an hour or a job that paid 1$ the first hour and then doubled every hour they worked beyond that.
- Then they will complete the following chart:

x	1	2	3	4
2x	?	?	?	?

2^x	?	?	?	?

- After the students complete the chart, they will be asked again which job they would take and why. I will ask them to prove it to me using a graph.

Homework: Using graphs, show how is $y = 2x + 3$ is different from $y = x^2 + 3$.

Lesson 2 (2 days)
Objectives: Create equations for the exponential growth and decline of population

- Students will take the population of the United States from the beginning of the century to the present.
- Then they will graph the population change from 2000 to the present.
- Then they will average the percent change for each of the nine years.
- After they find the average percent increase, they will form an equation for population growth.
- Then they can make predictions using either the graph or their equations. What will the population be in 10 years? What will the population be when you are 50?

Homework: Book practice on population growth.

Population decline

- Students will read the article "Poison Takes Toll on African Lions" from CBS news. (http://www.cbsnews.com/stories/2009/03/26/60minutes/main4894945.shtml)
- They will take the statistic on the population decline of lions in Kenya and predict when the population of lions in Kenya will be extinct based on an equation of population decline.

Homework: How have humans "bullied" animals? How can you use your math to show the Kenyan government that eventually the lions will disappear? What factors may slow down the population decline?

References:

"Survey Describes the Ups and Downs of Tween Life", Monday, December 8, 2008
http://www.pointofview.net/site/News2?page=NewsArticle&id=7801

"USA Election Polls"
http://www.usaelectionpolls.com

"Poison Takes Toll on African Lions" , March 29, 2009
http://www.cbsnews.com/stories/2009/03/26/60minutes/main4894945.shtml

Life Science, Earth/Space Science & Physical Science (Chemistry)- A Review

Power at the Human Scale, Power at the Macro-Scale and Power at the Micro-Scale

Overview: Following the introduction of the concept of "Power" as it relates to personal interactions, students in Science class will explore "Power" as it relates to the interactions of organisms in nature on the human scale (Life Science), the interaction of objects in space on the macro-scale (Earth and Physical Science) and the interaction of atoms and molecules on the micro-scale (Chemistry). This is offered to students in the 8th grade and supports their review of science content areas for the MCAS tests. The distinction of "Power Over" versus "Power With" will be integrated into the three science investigations thereby drawing direct connections to the application of these concepts in the student community with the topic of "Bullying" in this integrated unit on the Relationships of Power.

The intention of looking at "Power" in the context of different scales is to help students to appreciate the many different relationships and expressions of power that are observed in different "communities"- our ecosystem, our solar system and our Periodic "system" of elements. Some results of these relationships can be viewed as Win-Win, others as Win-Lose, while still others may be seen as Lose-Lose. Students will be able to develop a distinction between potential outcomes of conflict (opposing forces) and recognize that in human encounters there is an element of choice and conscious intention that is not applied in plant/animal, planetary and atomic encounters.

"Power" for people can be understood to mean the ability to personal meet needs. "Power" can also describe the ability to affect change. While in some sense "change" is constant, the durability of some relationships signals a balance or equilibrium of 'powers'. Stable systems are characterized by regular and repeating relations between their components. Disruptions in those systems highlight the tentative balance between those relationships. By exploring both the stable state and the disruptive state of a system, students can examine the effective agents of change and evaluate the consequences for their positive or negative impact. For example, an ecological 'community' may exhibit stability in its animal populations. However, when a shift in food sources occurs due to climate change or an introduction of an invasive species, this stability is disrupted. The result can trigger a chain-reaction that affects all the members of the community food web.

The Science curriculum of this ITU will study the following:

- ***Ecosystem***- Who are the characters? What are their roles? What are their relationships? What is the conflict? What are possible outcomes? What causes the relationships to change or to remain the same?
- Concepts: Interdependence, Food Web, Predator-Prey, Producer-Consumer-Decomposer, Adaptation, Extinction, Invasive Species, Symbiotic Relations: Mutualism, Commensalism, Parasitism, Habitat, Climate, Change

- ***Solar System-*** Who are the characters? What are their roles? What are their relationships? What is the conflict? What is the outcome? What causes the relationships to change or to remain the same?
- Concepts: Gravity, Revolution/Rotation, Orbits (Stable vs. Deteriorating), Formation Theory, Sun, Planets, Moons, 'Other Bodies'

- ***Periodic System-*** Who are the characters? What are their roles? What are their relationships? What is the conflict? What is the outcome? What causes the relationships to change or to remain the same?
- Concepts: Atom, Element, Atomic Structure, Bonding, Molecules, Compounds, Mixtures, Pure Substances, Change of State, Physical Change, Chemical Change

Massachusetts State Frameworks:
The following 'Learning Strands' will be addressed in this unit:

Strand: Life Science (Biology), Grades 6-8
Learning Standards:
Living Things and Their Environment:
13. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.
14. Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.
12. Relate the extinction of species to a mismatch of adaptation and environment.

Strand: Earth and Space Science, Grades 6-8
Learning Standards:
Earth in the Solar System:
8. Recognize that gravity is a force that pulls all things on and near the earth toward the center of the earth. Gravity plays a major role in the formation of the planets, stars, and solar system and in determining their motions.
10. Compare and contrast properties and conditions of objects in the solar system (i.e., sun, planets and moons) to those on Earth (i.e., gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions).

Strand: Physical Sciences (Chemistry and Physics), Grades 6-8
Learning Standards:
Elements, Compounds, and Mixtures:
5. Recognize that there are more than 100 elements that combine in a multitude of ways to produce compounds that make up all of the living and non-living things that we encounter.
6. Differentiate between an atom (the smallest unit of an element that maintains the characteristics of that element) and a molecule (the smallest unit of a compound that maintains the characteristics of that compound).

7. Give basic examples of elements and compounds.
8. Differentiate between mixtures and pure substances.
10. Differentiate between physical changes and chemical changes.

Classroom Environment:

Habits of Mind*:
Finding and Keeping Focus, Searching for Patterns, Cooperating and Collaborating, Using Models and Metaphors: Thinking by Analogy, Forming Hunches, Being Attentive, Asking Good Questions, Seeing Anomalies
*- Identified by Martinello

Thinking & Process Skills:
Observing, Data Collection and Organization (Research), Using Space/Time Relationships, Inferring, Formulating Hypotheses, Drawing Conclusions, Modeling, Identifying and Controlling Variables

Study Skills and Developmental Skills:
Working with Others, Recognizing Cause and Effect, Comparing, Contrasting, Questioning, Analyzing, Note-Taking, Researching, Taking Perspective, Reversing Perspective, Finding Evidence, Supporting an Argument

Instructional Strategies*:
Use of "inquiry"** through hands-on concrete experiences, questioning, searching for and consulting resources, organizing and interpreting findings and asking new questions,
Use of Representational materials for modeling and simulations, Use of Creative Arts and Expressive Skills in student products to exhibit understanding, Use of Group Work with students discussing and sharing in pairs and fours.
*- Strategies identified in FOSS teacher Guides
**- Inquiry identified by Martinello

Engaging Activity: To initiate this mini-unit review the class views a video, "The Powers of 10" from the website www.powers of 10.com. This is a ten-minute journey beginning at the human scale with a photo of a couple sun-bathing in a park. By increments of 10 power, the camera zooms out from the couple to view the community, then the city, the region, the state, the country, the earth, the solar system, on out into the galaxy and the universe. Reaching the outer limits of our perceptions of space the camera then zooms quickly back to the view of the couple and then begins an inward journey zooming into the hand, the skin, the tissue, the blood vessels, the blood cells, the nucleus, the DNA, the molecules, the atoms, the electrons, the nucleus, the protons, the 'quarks', the interstitial space.

This video provides a brief and effective understanding of scale and the similarity of systems that exist at dramatically different dimensions of space and time. Similarities also are apparent in the relationships that exist within these systems such as moons orbiting planets that orbit

suns that participate in galaxies and molecules composed of atoms composed of orbiting electrons around a nucleus of protons and neutrons. In each system there exist relationships of objects and energy, balance or stability and change or instability. The visual imagery that this video provides will give students a framework with which to explore specific science content contained in this integrated thematic unit.

WEEK ONE & TWO-Life Science: "Ecosystems"

Overview: Students have previously completed a unit on ecosystems in which they created aquariums and terrariums that supported multiple organisms. This nine-day review re-examines the ecosystem with a new emphasis on the relationships of power that operate within an ecosystem. This "power over" can be identified with the predator over the prey or with climatic conditions over species survival. It can also be identified as "power with" by the interdependence that exists between species to sustain the community food web and by the resilience to change that diversity brings to a 'community' in contrast to the vulnerability that a monoculture has to a single threat. Change to an ecosystem can be gradual from human intervention, invasive species and climate change or it may be catastrophic and immediate from volcanic eruptions and storms.

Lesson Objectives:

- Students will be able to recognize that different power relationships exist within a community of organisms and while some relationships between individual organisms may reflect "power over", the survival of the community within the habitat requires the interdependency of "power with" between species populations.
- Students will be able to identify characteristics that define the 6 major terrestrial biomes and recognize habitat as the environment within which an organism lives and interacts interdependently with other species for mutual survival.
- Students will be able to diagram the relationships between organisms that comprise a food web for a habitat and describe the transfer of energy from producers to consumers to decomposers.
- Students will be able to describe the sources of change within an ecosystem both gradual and catastrophic as they impact organisms' essential needs for food, water, shelter and space.
- Students will be able to explain human's role both within a habitat with relationships with other organisms as well as a change agent that impacts habitat.
- Students will be able to understand that the stimulus of change to a habitat can require an organism to adapt in order to continue to meet its needs for survival, and failure to adequately adapt may lead to a species' extinction.

Lessons and Activities:

Day 1-2 : Where in the World?- Identifying Biomes

- **Warm-Up Activity:** Prompt-What four things do all living organisms need to survive? Students respond individually by writing in their Science Journals a response to the prompt. Students share their responses with the class and a list is made of all

responses. Students then vote by a show of hands which four they believe are the most critical to survival. The needs include food, water, shelter, and space.

- Students are introduced to the week-long, mini-unit project to individually design a new exhibit of a chosen live animal species for the local zoo. Details of the project and a rubric will be provided. The format of the presentation is open and flexible to recognize multiple intelligences and learning styles. This project will apply the concepts reviewed this week in class to create a design for a complete and functional animal habitat. To begin the review of ecosystems, students will identify their prior knowledge with a "gallery walk" writing their understandings and examples on the wall chart with the headings "Ecosystems", "Biomes", "Habitat", "Community", "Food Web", "Adaptation/Extinction".

- The class will review the concepts and clarify any misconceptions offering formalized distinctions of scientific definitions i.e.) Biome determined by plant species, temperature range and amounts of precipitation.

- Biome Search- Students meet in groups of four and select one card of six with a given terrestrial biome identified (Rainforest, Tundra, Taiga, Desert, Temperate, and Grasslands). Using textbook, reference text and website reference (www.mbgnet.net) each group researches the description, characteristics, global locations, typical plant life and animal life of their selected biome.

- Students then jigsaw with members from each group presenting their biome and learning from the other group members biome presentations. Students will take notes on each biome in their Science Journals for future use when applying this information to their individual zoo exhibits. Journals will be collected for a formative assessment and check for understanding by the Teacher. For homework, students finalize their biomes notes and select one animal species to research for the zoo exhibit.

Day 3: "Oh Deer!- Checks and Balances in the Habitat

- **Warm-Up Activity:** Prompt-What's the difference between an ecosystem and a habitat? Students respond individually by writing a response in their Science Journals.

- The Teacher facilitates a brief discussion identifying ecosystems as including all the living members (biotic) of a community with all the non-living (abiotic) elements of their environments. Asking students to recall their previous explorations with aquariums and terrariums (and refer to their Science Journals), students list all the organisms that were included. While similar to ecosystems, habitats describe the environment within which a specific organism lives. Many different types of organisms interact with one another within a habitat and depend on each other for survival. All of the members of a single species living within a habitat are referred to as a population. The collections of different populations within a habitat constitute a community.

- To explore the interactions between species and their habitat and to apply the four needs for survival that are provided by a habitat, the class plays a game simulation called Oh Deer! (refer to website: www.col-ed.org/cur/sci/sci35.txt) In the gym or schoolyard, students count off by fours. All the ones line up 20 yards away and face the twos, threes, and fours. The ones will be deer who need a good habitat to survive. A good habitat provides food, water, shelter, and space. Assuming that the deer have adequate space the twos, threes and fours individually decide in each round whether they will individually represent food or water or shelter. They will signal this identity by grabbing their stomachs with both hands to indicate they are food, covering their mouths with both hands to indicate they are water, and holding their hands over their heads to indicate shelter. The round begins with the deer turned away from the three needs. The deer each decide what need they require and make that sign. At the same time the needs make a sign for the need that they represent. When all students are ready, the teacher shouts "Habitat" and the deer turn and run toward the needs to pair up with their corresponding need. Any deer remaining unpaired at the end of the round are told that they 'die' and become habitat and join the other needs. Any deer finding its needs survives and the need becomes a new offspring of deer and both return to be deer for the next round. Each round represents one year in the life of a deer and the number of deer are counted at the beginning of each round. Students representing habitat needs can change their need with each round but not once the round has started. Deer can change the need they represent with each round but not once the round has started. After performing and recording 10 rounds, the teacher can represent a human hunter who can tag deer to contribute to the die rate of additional rounds.

- Students return to classroom and to their groups of four. Given the deer count from each round, each group creates a graph of the change in deer population with each round. The teacher prompts the students to respond to the following questions:
  - What did you observe about the deer population over time?
  - When the population was increasing, what caused it to stop increasing?
  - What limits the growth of a population in a community?
  - What other factors beside the four we explored may also limit the deer population increase?

- Student responses are shared with class and the concepts of limiting factors, carrying capacity and interdependence are discussed and recorded in students' Science journals.

- For homework, students are asked to list examples from the Oh Deer game that represent exchanges of power or control, and respond to: What elements influenced or controlled other elements within the habitat? Did this control happen once or repetitive times, gradually over time or immediately? How are the interactions between individual organisms similar and different from interactions between one species population and another. Students are also continuing to research their animal species for their zoo exhibits.

Day 4: Food Webs and Energy Transfer- Who eats Whom and is Eaten by Whom?

- **Warm-Up Activity:** Students identify the animal species that they are designing a zoo exhibit for and list three components of their habitat. This is handed- in to confirm progress and to check for student understanding.

- Using a K-W-L chart as a graphic organizer, students provide their background knowledge about Food Webs by identifying the relationships represented in a food web, examples of familiar Food Webs, and terminology associated with the various roles. Students also identify what information they want to learn more about.

- Referring to textbooks and webquests, students individually diagram the Food Web for their selected species habitat identifying Predator and Prey relationships and also identifying each organism's role in the habitat as Producer (Autotroph), Consumer (Heterotroph), Decomposer (Saprotroph).

- Students are asked to think of food as "Energy". What is the source of energy in the Food Web? Looking at the relationships between Producer, Consumer and Decomposer, who does everyone rely on and how do they bring energy into the Food Web? Students view two website illustrations, Illuminating Photosynthesis (www.pbs.org/wgbh/methusalah/photosynthesis.html and www.mi.mun.ca/mi-net/enviro/photo.htm). These show the process within plants that use energy from the sun to convert water and Carbon dioxide to sugar (carbohydrate) and Oxygen (O2). This cycle is then reversed by animal respiration which converts sugar and Oxygen to Carbon dioxide and water.

- Class then meets to openly discuss their homework and review examples of 'power over' and 'power with' in the Food Web relations. While predator is easily seen as exhibiting power over their prey, students are asked why then don't all the prey die from being overwhelmed by the predators? Referring back to the Oh Deer! simulation the fluctuations in deer population are examined to reveal periods of increase and decrease in the population over a long cycle revealing the limiting factors and carrying capacities that function maintain an equilibrium in the habitat populations. The interdependency of the predator and prey is discussed confirming that while the predator needs to kill the prey in order to survive, the predator also needs the population of the prey to survive in order to sustain its food source. The power of the individual predator is limited with respect to the entire population of the prey.

- Students are asked to write a One-Minute Paper distinguishing the difference between power the predator has in an individual interaction and power the predator has in a large population interaction. For example, What power does a lion have over a single gazelle and what power does that same lion have over an entire herd of gazelles. Students discuss their papers in the groups to share their different interpretations of power-over and power-with in their habitats.

- For homework, students continue their species research and begin the design their zoo exhibit presentation.

Day 5: Symbiosis- Other Relationships between Living Organisms

- **Warm-Up Activity:** Students complete a cross-word puzzle with a word bank of terms and definitions as clues. Puzzle serves as a pre-assessment of student knowledge of symbiotic relationships. Students then pair-up to review and grade their responses.

- Students meet in their groups of four. Explain to students that they are going to be investigators who are going to go on a search for organisms in symbiotic relationships. Using textbook, class references and internet webquest, each group is to research one of the following: Symbiosis, Predator/Prey Mutualism, Commensalism, or Parasitism. Ask each team to create a checklist that will help them to record exactly what kinds of relationship characteristics they are investigating. For example:

  Mutualism-
  ____ Symbiotic Relationship
  _____ Living organisms
  _____ One organism benefits
  _____ One organism is harmed
  _____ One organism is unaffected

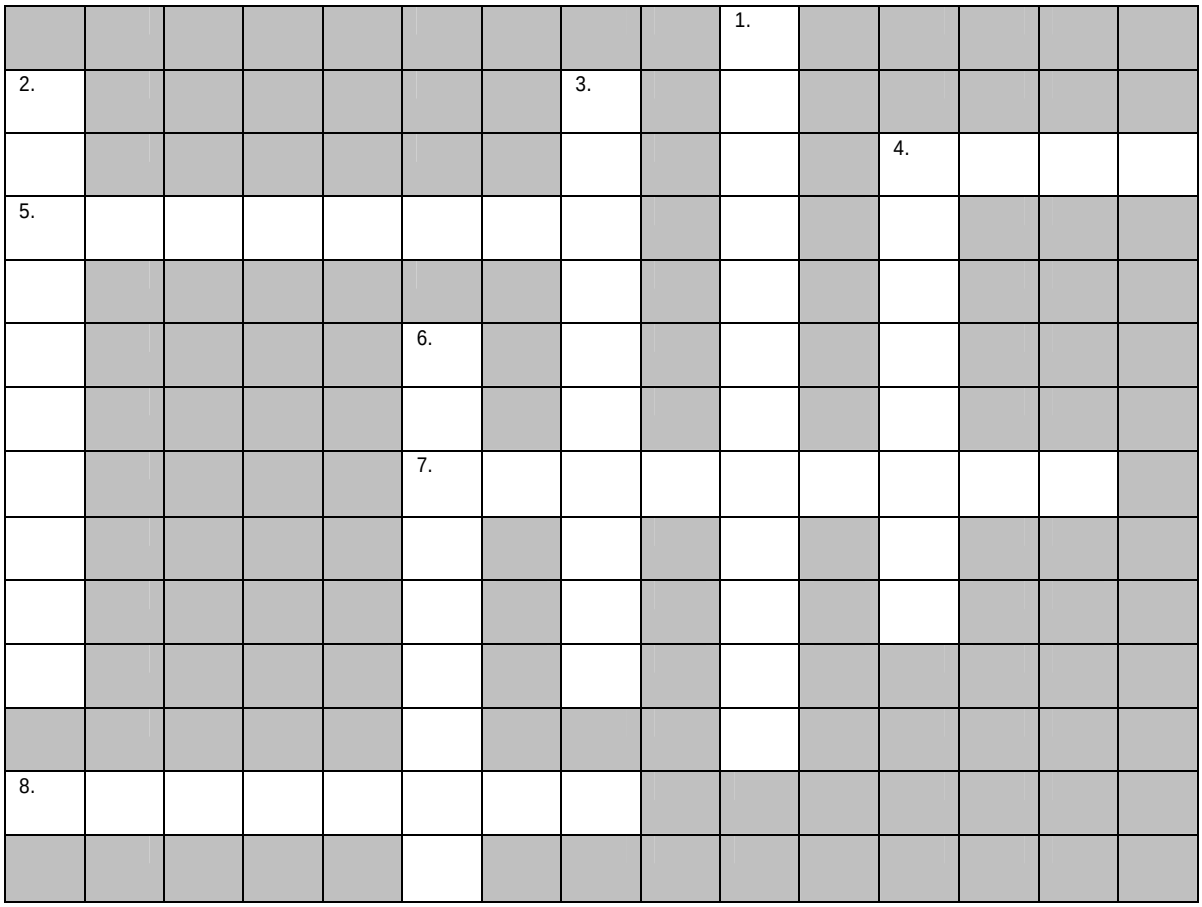
  Students should record their research in their Science Journals, listing the data / information that they found, the source of the information, the authors of the source and the pages. Each student should record examples of species pairs that interact in the specific way that their group is researching.

- Have teams that share the same investigation meet to review each other's research and accuracy of information. Confirm the examples that each similar group is collecting to eliminate any repeat examples. Students gather pictures from old nature magazines, down-load images or draw pictures to show how the organisms are living together in the symbiotic relationship.

- When the groups have completed their research, have each group share their findings with the whole class. Again the investigative teams should help each other by listening for errors. If any team does not have something new to add to the case, they should be sent out for more “digging.” Challenge the students to identify any relationships in which neither organism could survive without the other.

- Have students complete the post-assessment which includes several pairs of species which the students must correctly associate with the appropriate type of symbiotic relationship with a correct identification of either a positive, a negative, or a no harm or benefit next to the name of the species. Note: Many of the pairs are drawn from the groups' research efforts.
- Resource: This lesson was posted on the Ohio Department of Education website: http://dnet01.ode.state.oh.us/IMS.ItemDetails/LessonDetail.aspx?id=0907f84c80532540

Symbiotic Relationships



Across

4. An animal that a predator kills and eats
5. An animal that eats another animal
7. A close relationship between two organisms in which both organisms benefit
8. A living thing

Down

1. A relationship in which two organisms live together; one benefits while the other is unaffected
2. A group of organisms, all of the same species, that live in the same area
3. A relationship between two organisms in which one is harmed and the other benefits
4. An organism that derives nutrition from a host causing harm to the host
6. Living together

Word	commensalism, prey, parasitism, population, organism
Bank	symbiosis, predator, mutualism, parasite

Post-Assessment

Symbiotic Relationships

Directions for completing the assessment: Read the relationships on each card. Paste it on the sheet under one of the symbiotic relationships: Predator-Prey, Parasitism, Mutualism or Commensalism. On each card put a plus sign next to the name of the species if it is positively affected by the relationship, put a negative sign if the species is negatively affected by the relationship. If the species is neither harmed nor benefited by the relationship, put a 0 next to the name.

Bacteria **Human Intestines**	**Spanish Moss** **Trees**	**Dogs** **Fleas**	**Squirrels** **Trees**
Whales **Barnacles**	**Butterfly** **Flower**	**Figs** **Fig Wasps**	**Remora** **Sharks**
Tawny Owl **Mice**	**Field Digger Wasp** **Fly**	**Clown Fish** **Sea anemone**	**Venus flytrap** **Insects**
Rafflesia plant **Vine**	**Ants** **Acacia Trees**	**Tapeworm** **Mammal**	**Trees** **Orchids**
Human head **Lice**	**Trees** **Mistletoe**	**Yucca moth** **Yucca plant**	**Eagle** **Rabbit**

Post-Assessment

Commensalism	Mutualism	Parasitism	Predator/Prey

Day 6: Impacts of Change on Ecosystems: Gradual, Catastrophic, Human

- **Warm-Up Activity:** Students write in Science Journals how the role of humans in the habitat is similar to and different from the role of other species.

- In a whole class discussion, students describe the differences that see humans bring to the habitat. Two major distinctions are consciousness and intentionality. Most species kill to eat what they need immediately to survive. These acts are instinctual responses. Humans have awareness of themselves and the ability to think about their actions. They also have the ability to significantly manipulate their physical environment to create change. Students are asked to Brainstorm many of the unique ways that humans introduce change to their environment and identify this as an example of "Power Over"

.

- Remembering the Oh Deer! simulation, have students identify possible limiting factors and carrying capacities that may restrict the "Power Over" that humans impose. These limiting factors can exercise a Power Over humans as the ecosystem pushes back against the changes introduced by humans. Have students identify some examples that are currently being experienced of Nature pushing back, i.e.) global warming, swine flu pandemic virus, food shortages in geographical areas, over-population, HIV/AIDS, water/air pollution, impacts on forests by acid rain, desertification from deforestation and over-farming, nuclear radioactive threat/pollution, banana blight. Many of these changes are a result of gradual and accumulated change to the ecosystem.

- Have students also identify possible catastrophic changes to the ecosystem, such as acts of nature i.e) volcanic eruptions, impact of meteors or asteroids, floods, wildfires, ice storms.

- To examine these causes and their subsequent effects on a habitat, students will review their habitats and related food webs for their exhibit. Each student will select a type of external change imposed on their habitat and write an essay or draw a diagram that represents a potential chain of consequences. Students will propose several possible end results to their animal species and to their population. Possibilities range from partial deaths, adaptation to new conditions, and extinction when species is unable to adapt to the available sources of food, water, shelter or space. Essays will be included as a part of their final exhibit design presentations.

Day 7: Biodiversity vs. Mono-cultures

- **Warm-Up Activity:** Given what you know about habitats and the relationships between organisms, how do habitats benefit from having a wide range of plant and animal species?

- The class divides into two groups representing large scale farming practices and local organic farming practices. News articles describing both approaches are distributed for

student to read. Both groups prepare a brief presentation to the class about the benefits of their practices and the shortcomings of the other's practices.

- Presentations include the high-productivity that monoculture farming can yield given the human population's demand for food. However, monoculture agriculture is highly vulnerable to a single, disease causing germ threatening the entire crop. Students are given several historical examples of such failure and the consequences i.e.) Irish potato famine mid 1840's, European vineyards devastation in late 1800's, the current banana blight. The current environmental movement advocates for polyculture encouraging diverse crop farming to help protect against the impact from a species killing germ.

- A speaker from the local Conservation Commission comes to class to speak about the problem of invasive species. Examples include loosetrife in wetland areas, milfoil in fresh water bodies, honey suckle and kudzu. Background information is provided about the means of introduction, the spread and negative impacts of invasive species- the reduction of biodiversity in the native community.

- Students individually research one invasive plant species and report the impacts and the possible eradication techniques to the class.
- Resource: Wildlife Habitat Council: "The Power of Invasion", www.wildlifehc.org/documents/native_plants/less.pdf

Day 8-9: Habitat Designs for a Zoo Exhibit

- Students spend a class period completing the presentations of their proposed designs for a local zoo exhibit. The presentations incorporate the learning from this mini-unit about the elements and relationships that contribute to a healthy habitat.

- On the final day of the unit, students display and present their proposals to the administration of the local zoo and to the other classes at the school.

- Presentations are assessed on their accuracy and completeness based on the rubric provided.

- Resources: National Geographic website: www.nationalgeographic,com/xpeditions/lessons/08/gk2/ecosystem.html

Exhibit Display Scoring Rubric:

Design Content	**Novice**	**Apprentice**	**Practitioner**	**Expert**	**Comments**
Display is complete	**1**	**2**	**3**	**4**	
Background info about animal	**4**	**6**	**8**	**10**	
Ecosystem/Habitat	**4**	**6**	**8**	**10**	
Animal Adaptations	**4**	**6**	**8**	**10**	
Presentation					
Clear voices/good eye contact	**1**	**2**	**3**	**4**	
Strong knowledge of topic demonstrated	**4**	**6**	**8**	**10**	
Presentation is engaging	**4**	**6**	**8**	**10**	
Creativity					
Display is interactive	**4**	**6**	**8**	**10**	
Display is easy to implement	**1**	**2**	**3**	**4**	
Display design is resourceful and creative	**1**	**2**	**3**	**4**	
Showed “outside of box” like thinking	**1**	**2**	**3**	**4**	

Score:_____

WEEK THREE- Space Science: Solar Systems

Overview: Recalling the video "The Powers of 10", students can visualize that our solar system represents another organization of objects that respond to relationships of "Power Over" and "Power With". Power in this context is represented by a physical force of attraction that exists between two or more "bodies" of mass. The initial class identifies the different objects in our solar system and the characteristics that distinguish them. The subsequent classes explore the actions and interactions of these objects to understand the source of energy in the solar system and apply this to a theory explaining the origin and formation of the solar system. Student understanding of the objects will be applied in a week-long design project in which the students individually or in teams design a space vehicle that is able to distribute packages from one planet or moon to another. The design of the vehicle must take into account the various conditions that are experienced on the surface of each planet or moon.

Lesson Objectives:

- Students will be able to understand that gravity is a force of attraction between two objects, each exerting a force upon the other that varies based on their relative mass.
- Students will be able to interpret that some events involving individual bodies may exhibit "power over" another body (i.e. the impact of an asteroid). However, within the community of the solar system, the forces of all the objects exhibit a "power with" that contributes to a stable system with regular, repetitive patterns of orbits.
- Students will be able to compare and contrast physical characteristics of the different objects in our solar system.
- Students will be able to understand how the attractive force of gravity can provide a theoretical explanation for the formation of the sun and planets and for the motions within our solar system.

Lessons and Activities:

Day 1 - Terrestrials and Gas Giants

- **Warm-Up Activity:** Student write a brief response to the prompt: How is a planet different from a comet or asteroid? What defines a planet?

- Students share their responses to develop a definition of a planet.

- The class will divide into eight groups of equal number and each group will be responsible for researching and documenting the design conditions of a given planet. Half of the class period will be used to research the planet information and the second half will be used to record these conditions. Each group's entries will then be assembled to create design requirements for the package delivery vehicle, listing the performance specifications for the vehicle. Research includes the physical characteristics, the distance from the sun, the speed it travels, the length of a year (one full revolution around the sun),the duration of a day (rotation of the planet), the

temperature and atmospheric conditions on the planet surface. This information will be used as performance specifications for the design of the space delivery vehicles.

- Groups will jigsaw with other groups to share their planet's information. Each student will compile individual records of each planet over the course of the jigsaw. Whole class will meet to review similarities and differences between the planets and other objects in our solar system, to review the distinction between rotation and revolution as it relates to planetary motion, and to review the completion of the design requirements.

Day 2 - The Actions and Interactions in our Space Community

- **Warm-Up Activity:** One Minute Write Up- Student respond to the question: If gravity is an attractive force between two objects, then why doesn't the moon collide with Earth, and the planets collide with the Sun?

- Students view animations and simulations from the weblink (http://highered.mcgraw-hill.com/sites/0072482621/student_view0/animations.html#) and "The Life Cycle of Stars" from NASA's Imagine the Universe! at http://imagine.gsfc.nasa.gov/docs/teachers/lifecycles/SC_title2.html and view photo images of Star Nebula to view the forces of motion in star systems.

- In a whole class discussion, students provide examples of evidence for gravity- an invisible force. Discussion identifies our examples as seen from within the context of Earth's gravity. Everything within our experience indicates that objects fall to Earth. Discussion is extended to examples of things 'falling away' from Earth and an examination of Earth's tides representing a pull force on the Earth from the Moon and the Sun. Our understanding of gravity identifies that both objects exert a force of attraction on each other, a mutual attraction that is modeled by the pull of two magnets with opposite poles facing each other. Gravity is the primary force that drives the motions of the planets and contributes to the theory of their formation. The attractive force between objects is a function of their relative masses and their distance. Larger more massive objects exert more attraction on smaller less massive objects. These attractive forces cause the objects to move. Their attractive forces cause them to collide thus increasing the mass of the larger surviving object.

- Students continue their planet research and determine whether they will work individually of in groups for the design project.

Day 3 - Hit or Miss Orbits

- **Warm-Up Activity:** A canon shoots a ball and it returns to Earth. A rocket blasts off and its capsule orbits the Earth for eternity. What is different between these two results?

- Students view an web animation that simulates Newton's Cannon thought experiment explaining that an object shot with enough force to "fall off the edge of Earth's surface" can achieve orbit circling the Earth.(http://highered.mcgraw-hill.com/sites/007299181x/student_view0/animations.html)

  - Objects that orbit avoid collision by counterbalancing the force of gravitation attraction with the inertia that the objects have from their motion. When the gravitational force is greater or the speed of the object reduces, then the orbit deteriorates and eventually causes the object to fall or collide with the second object. Similarly, if the speed increases or the gravitational force is reduced, then the orbit is disrupted and the object is no longer restrained by the gravitational attraction and the object leaves orbit. The planets and the moon exhibit repetitive orbits around the Sun and Earth respectively. This can be seen as an example of gravitational 'power-with' where the forces from both objects have reached a balance between the pull-in attraction of the larger object and the push-out force of the smaller object's motion. "Power-over" is observed when a foreign object from outside the solar system like a comet passes close enough to the Sun to be affected by its gravitation field. The comet's path of travel is redirected possibly becoming 'captured' into an orbit of the sun.

Day 4 - A Star is Born

- **Warm-Up Activity:** Given what students have learned about the different planets and understood about gravity's attractive force between two objects, students are asked to consider how the solar system may have been formed if in the beginning there was only cosmic dust?

- Students share their different 'theories' with the class and then using textbook, reference books and Internet search, review existing theories for the formation of the solar system. Students list what evidence is cited in the research in support of the theories and present the theories to the class for discussion.

- Astronomers cannot experience the life of a star so they use their observations of stars in different conditions to hypothesize how a star is born and what different stages are included in the life of a star. Given photos of stars indifferent stages and reference texts, students individually diagram the possible stages of the life of a star.

- Referring to the different compositions of the planets and their position relative to the sun, students consider why the planets closer are composed of solid materials and the planets farther from the sun are composed of gases. How does this disposition of the planets help to inform the theory of their formation?

- Students meet in their design groups to continue work on their vehicle designs.

Day 5 - "You Are Now Free to Move About the Solar System"

- Students present their space vehicle designs to the class. Each design is reviewed for meeting the conditions met on each planet's surface. Each student is a specialist in one planet's conditions and they review each design for it's success in responding to the planet's temperature, atmosphere, surface condition, light/visibility, wind speeds, and solar radiation.

WEEK FOUR- Physical Science: 'Atomic Systems'- Elements of Change

Lesson Objectives:

- Students will be able to recognize that elements are the building blocks of matter. They combine to form the compounds that compose all living and non-living things.
- Students will be able to describe and model the structure of an atom, identifying its separate parts and functions.
- Students will be able to differentiate between physical changes and chemical changes.

Lessons and Activities:

Day 1-2 - What's the MATTER? A Look at the Elements

- **Warm-Up Activity:** Select a common object and describe all the simple parts of it. Now, describe what makes up one of the parts. What material is that made of? What makes up that material? What makes up the ingredients of that material? Can you identify any smaller parts?

- Students explore what the smallest piece of stuff is- the atom and what makes it unique and unable to be divided any smaller. Student work in pairs to research a single element. Using textbook, reference books and internet websearch, the pairs identify the following information for their element:

Name of the element	Symbol	Atomic Number
Atomic Mass	History of the element	
Discovery date	Name of know Discoverer	
Three facts about the element		

- Based on their research, each pair constructs or draws a schematic physical representation of the element's atom showing the overall structure, the individual parts, and labeling the functions of each part.

- Each pair then presents there element to the class describing its structure and telling some fact about the element.

Day 3 - Families of Elements- The Periodic Table

- Each pair of students is assigned five elements to create a "trading" card that lists the specific information for each element. 60 elements of the approximately 94 common elements are detailed by the class. See example of "Trading Card" format.
  Resource: http://sciencespot.net/Media/elemtradcds.pdf

Element Trading Cards :
Each card must include:
- Periodic Table information
- Number of protons, neutrons, and electrons
- Discovery information (Person and date)
- Important Uses
- Pictures that illustrate one or more uses for your element

My elements are:
_____
8
O
Oxygen
15.98
P = _____ N = _____ E = _____
Discovered in _____ by
_____
Important Uses:

- Students use the website http://www.chemicalelements.com/ and http://www.webelements.com/index.html to identify the categories that their elements are members of and their characteristics :

  Alkali Metals
  Alkaline Earth Metals
  Transition Metals
  Other Metals
  Metalloids
  Non-Metals
  Halogens

Noble Gases
Rare Earth Elements

- Students layout their cards bi increasing atomic number, then try to sort the deck in terms of similar properties. Comparing their "table' to the current Periodic Table, students identify gaps in their elements and their atomic numbers. A whole class introduction to the Periodic Table, invented by Dmitri Mendeleev in 1869, explains the organization of the elements in Groups and Periods based on their atomic structure and their common properties. Given the configuration of the electron shells of each element can predict whether an element is highly "reactive"- bonds easily with other elements to form compounds or is low "reactive" - more stable and less easily bonding with other elements, typical of the Noble Gases.

Day 4-5 - Elements of Change- Combining Elements

- **Warm-Up Activity:** Have students observe a demonstration and then write what they believed caused the action observed. Demonstration: Place one half of an alkaseltzer tablet in a plastic film container. Add a small amount of water and put he lid on. Take precautions by having students stand at a safe distance and be clear of any overhead light fixtures. Students record their observations and hypothesize about the cause and effect.
- Set-up four stations for groups of students to rotate through. Each station has more than one task for students to complete. Students are to record the description, their observations, and their determination of the type of change observed at each station on the sheets provided.
- Students use the following to help identify evidence of a chemical change:

1. Unexpected color change
2. Change in odor
3. Unexpected temperature change
a. Endothermic – heat is absorbed. (feels cooler)
b. Exothermic – heat is released. (feels hotter)
4. Gas bubbles appear
5. Electricity is generated
6. Light is produced
7. Fire is produced
8. A solid forms when two liquids are mixed

- Student group rotate through the following five stations:

Station 1:
o Eat a marshmallow. Place a few marshmallows in a cupcake foil. Heat and stir on hotplate until melting is complete. Write observations. When cooled, taste the marshmallow and note any other observations or comparisons.
o Continue to heat the marshmallow over the hotplate until it gets good and crusty. Write observations. When cooled, taste and note any other observations and

comparisons.

- Rip a marshmallow in half. Put it back together. Write observations.

Station 2:
o Lick the ice cube and taste the water. Write observations.
o Melt the ice cube until it begins to boil and evaporate. Write observations.

Station 3:
o Dissolve some salt into a cup of water. Taste the saltwater. Make observations.
o Place an Alka-Seltzer® tablet in a cup of water and observe the release of carbon dioxide gas. **Do not taste.** Write observations.

Station 4:
o Eat a rectangle of chocolate. What happens when you eat the chocolate? Make observations.
o Place another piece of chocolate in a cupcake foil and melt the chocolate. Let the chocolate cool and taste. Write observations.
o Proceed to heat the piece of chocolate until it is good and crusty. Let chocolate cool and taste. Write observations.

Station 5:
o Place a teaspoon of popcorn kernels in a clear plastic bag and cook in microwave on high for 2 minutes. What happens to the kernel? Make observations.
o What has caused the kernel to "Explode"? How is this explosion similar to or different from the explosion observed at the beginning of class?

- Students compare their findings to confirm which changes were physical changes and which represented chemical changes and write a statement describing what determines a physical change and what determines a chemical change.

Resource:http://apps.caes.uga.edu/sbof/main/lessonPlan/ChemPhysChangesKitchen.pdf

Electives/Unified Arts

Photography- students will create a photo-journal that shows an abstract representation of power.

Art- in art class students will create posters for the Celebration of Power Night that will be held at the school.

Health- students will analyze the difference between foods that provide people with "brain power" and foods that provide people with "physical power"

Culinary Arts- students will prepare foods that require ingredients to cooperate as a means of creating a reaction leading to food being created

Theatre/Drama- students will act out performances centered around the idea of power. Students will also write the scripts they will perform on the Celebration of Power Night as well as create the sets and costumes they need to make the Celebration of Power Night a success

V. Service Learning Project: Implementing a "Bully Prevention Program"

We wish to establish a tradition in our middle school of anti-bullying. Each year the eighth grade will work on developing an anti-bullying campaign that they will share with incoming fifth graders. The goal of the presentation is to show the fifth graders that their school does not tolerate bullying and to give the incoming students tips on how to deal with bullying. They can choose to collaborate with another school in the neighborhood to show that bullying is happening in other schools, to share all their data and to demonstrate that there is "power in numbers". This is their project so it is up to them how they want to proceed. The teachers will be on hand to provide suggestions and give them guidance. Some ideas for presentations can be surveys, skits or pamphlets. They could take surveys of students in their school and even their parents to show that bullying can exist in the adult world. The surveys can ask questions like: What is your grade level? What defines bullying for you? How often are you bullied in school? How many times have you bullied someone else? Have you ever been bullied by someone older than you? Why do you think some people bully other people? Have you felt too intimidated to come to school because of bullies? They can also look into the topic of gangs and their affect on the community outside of school.

After they take their initial surveys, they will create write-ups in their ELA class and graphs in their math class to display their findings and posters in their art class. Then, they can go to the fifth graders to present information about bullying. They will convey the message that bullying can have a detrimental affect on the school environment and affects everyone. They will also show the different way that bullying manifests itself from rumors to physical violence. During the presentations, they can do some exercises with the students about conflict

resolution that they have done in their classes such as conflict escalators, making "I" statements, understanding culture and understanding clout. They can also put on short skits or role-plays that model how to deal if you're being bullied and how to intervene as bystanders. If students wish, they can create a website or a pamphlet that outlines their tips. Other students can add on to this as the years go on.

During the service-learning process, they will write journal reflections on what they are doing. The questions will help them to reflect on what they have learned from the data and help them explore the essential questions of the unit. For example, questions can be:

- What does the data collected tell you about the negative effects of bullying?
- How do you think other students are going to respond to this data?
- How does this project change how you view your personal power and the ability to change things?
- Do you feel like you have had some impact on the students you presented to (after service-learning)?
- Are there other things that go on in the school or community that you would like to try to change?
- Did you feel like you could do more when you worked with other people?
- If you had been bullied before, do you feel like you have the power to stand up to a bully?
- If you had been a bully before, how have you used power and influence negatively and will you try to use it more positively?

On the surface, we hope that this project shows students that they have the power to make changes in their community. We also hope to empower students as they create something that will continue to contribute to and change the school community. The deeper understanding we want students to achieve is that there are positive ways they can use their power and that when they team up, they have more power than working alone.

VI. Culminating Activity:

In an effort to celebrate student achievement throughout the unit we will have a celebration of student EmPOWERment! This culminating activity will be a chance for students to display the transfer of power from teacher run activities at the beginning of the unit to student run activities at the end. Students will end this unit with a Celebration of Power Night. At the Celebration of Power Night there will be a list of activities including a photo journalism display, a play which was designed with the drama class, recipes that show the cooperation of ingredients to create a meal. Upon entering the Celebration of Power Night the students will receive a tri-fold pamphlet version of the handbook the students created that describes how to deal with bullies, what bullying consists of, and the ways in which a student can prevent bullying from occurring inside and outside the classroom.

This culminating activity is a chance for students to show their clout inside and outside the classroom and the power they hold within their community. Additionally, this culminating activity will be centered on "Power Night!" Students will invite faculty, community members, and family members to a showcase of their achievements. The main focus of this "Power Night" is the use of power to create positive change within a community. Attendants will observe various skits and a play created by students in their drama elective. These skits will be the same skits used in the service-learning piece where students will teach the younger grades how to use their power to help others rather than tease and bully their peers as a means of feeling more secure about themselves. Also, these skits will involve positive messages about ending bullying and teasing and using one's power and clout to help rather than hurt others. Attendants will also be treated to photo journalistic display of abstract representations of power. These photo-journals will be created in the student's photography elective.

Next, honored guests will be invited to a meal in which students will serve courses highlighting foods that require a reaction among the ingredients in order to be created. For example, pizza requires warm water as a means of activating the yeast. The water within pizza dough is powerful in that if it is too cold or too hot the yeast will not activate and the dough will not exist leading to there being no pizza. The menus that will be created for the Celebration of Power Night will highlight cooperation among the ingredients like that within pizza and will be prepared within the culinary arts classes of the students. Additionally students will educate their guests on "power foods" (foods that will help guests get more health bang for their buck). The students will educate their guests on all the foods that give a person the power to go further physically and academically. Such power foods are foods that stimulate the brain leading to increased awareness and alertness of the students. An example of this can be seen in eating protein before a test. Students will also educate their guests on the foods that allow a person to be physically active for longer. This can be seen in runners loading up on carbohydrates before a big race.

Ideally students will display and identify the transfer of power from teacher run activities at the beginning of the unit to student run activities at the end of this unit, thus creating student "EmPOWERment."

Photo journalism
Play
Drama class with show
Inviting community members
Students can breakdown the responsibilities of this Celebration of Power Night and choose which part they want to complete as a result of which multiple intelligences they best relate to.

End of Integrated Thematic Unit
Relationships of Power