Educational Eruption
“An interdisciplinary approach to a classic lesson”

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Student Curriculum Project
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Introduction

The curriculum we developed takes the classic fifth grade volcano project and turns it into a much more productive interdisciplinary unit. In this week of lessons students will learn about volcanoes. They will do this by researching famous volcanoes from all around the world, constructing a model, and finally presenting their research and their volcano model on the final class. The class will get a grasp of how volcanoes work while being challenged by working in a randomly selected group. This lesson plan combines science, history and art into a fun and productive week. An important part of this plan is the final presentation day. In this class students are encouraged, but not required, to bring their parents/guardians/available teacher to help judge all presentations. This is a great way to build family-school connections and gives parents the chance to see what their kids are learning.

Objectives:

To formulate our objectives in this unit we mainly used Connecticut State Standards from several different disciplines that fit our subject. These standards are based around: Geography, English Language Arts, Social Studies, Science, and Arts. These standards and the activities we chose to teach them are areas of study that are lacking in Hartford Public Schools. One of they key reasons we chose this subject is so we could break away from the way our placements in Hartford middle school’s are run. Looking at the strategic school profiles it is clear that these schools aren’t giving enough hours in all subjects. Math and Language arts take up almost all of the school and subjects including art and science are left out. We have also observed that a lot of the curriculum is based
around math worksheets and CMT testing. Our curriculum gives students hands-on activities in multiple disciplines and engages students to work both independently and in a group.

1) **Group Investigation**

   “Group investigation is a general classroom-organizing plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning for projects. Each group presents or displays its findings to the entire class”\(^1\)

   This type of cooperative learning will be used throughout the entire week while students are in their groups. This includes the classroom exercises such as group research and creating a group volcano. Even though the individual research paper is a major part of the final grade, students will not succeed in this part without group investigation in class.

2) **Written work and Presentation**

   “3.2- Students prepare, publish and/or present work appropriate to audience, purpose and task. Students express, develop and substantiate ideas and experiences through their own writing and artistic and technical presentations.” (CTS 3.2) \(^2\)

   This standard perfectly describes the final presentation in our curriculum. This involves writing and artistic presentations that have been developed throughout the unit. In our curriculum students will be evaluated on their research paper and their presentation separately using the grading rubrics supplied.

3) **Synthesis learning\(^3\) (Bloom’s Taxonomy)**

   Dr. Benjamin Bloom, an American academic and educational expert, created taxonomy of learning domains. Bloom placed synthesis as the second best category of

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\(^1\) “Cooperative Learning Methods”, Slavin, p.11

\(^2\) “Connecticut Language Arts Curriculum Framework Grades PK-12”

\(^3\) “Summary of Bloom’s Taxonomy”
learning. This category of learning basically involves actions such as collecting, creating, and reporting.

4) Research

2.1 – Access and gather information from a variety of primary and secondary sources including electronic media (maps, charts, graphs, images, artifacts, recordings and text). (CTS 2.1)4

This is taught and practiced on the second day of our unit. It is important that in this class students are taught to distinguish between primary and secondary resources and analyze their documents for useful information.

5) Hands-on activities

From observing our Hartford placements it is apparent that math worksheets and CMT override the curriculum. It is one of our goals to provide a unit that engages the students to be active rather than forcing them to do passive individual work. Most of the unit is designed to be hands-on group work such as: group research, chemical testing, and clearly the creation of the model volcano.

6) Family-School connection

It is important that the parents of students are invited to the volcano presentations on the first day of class. We do not expect all parents to participate in this but the more interaction between families and the school the better. This is also beneficial for parents. Most students act very differently in school then they do at home.

7) Science Learning

“Students are taught to identify specific geological features created by volcanoes, earthquakes, and uplift.” (Utah Standard 2.2)5

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4 “Connecticut Social Studies Curriculum Framework Grades PK-12”
5 “Utah Science Curriculum Framework Grades PK-12”
We chose this standard from Utah because of its direct relevance to our subject matter in this unit. We would like to involve more science in the school’s curriculum because mathematics and Language Arts dominate take up most of the curriculum. Currently at Burns Academy teachers are required to spend 503 hours on L.A. and 220 hours on Mathematics. However, they are only required to teach 67 hours of Science. Although it is important for a school with almost students from Spanish speaking homes to spend time learning English, other subjects shouldn’t be overtaken.

**Schedule:**

**Day 1:**

The first day of class is going to lay the groundwork for the whole week, giving the kids all the basics of the volcano. The beginning of the class is going to be a teacher lecture on the certain facts about volcanoes. The teacher will cover the difference between lava and magma, the ash cloud that is created, and a list of vocabulary words. The lecture will also cover the formation of volcanoes through earthquakes and give a brief history of some famous volcanic eruptions. Last, a pressure build up demonstration will be given where the teacher will fill a balloon with red powder and blow it to the point where it pops and red powder “erupts” out of the balloon. This is to simulate what an actual volcanic eruption is like.

Next we will show a video called “The Volcano Song”. Although it is silly, it is very informative in covering the basics and some key vocabulary words. Hopefully such a catchy song will give the students a better understanding of volcanoes and help the vocabulary stick in their heads. There will then be a handout that has spaces for the kids

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6 “Burns Academy Strategic School Profile, 2009”
to label the parts of the volcano that they just saw in “The Volcano Song”. See handout attached. They can work with the other people at their table if they are unsure about any of the new vocabulary.

Last, the teacher will talk about the final presentation on Friday. This way, the kids will know what they are working towards. A handout for parents will also be given to let them know about the presentation and that they and any other family members are welcome to come for the presentations on Friday to give their input on the projects. Hopefully by giving this handout on Monday, there will be the highest parent turn out possible because there was a lot of notice given. Finally, the students will be broken into groups of 2. These will be their research groups for the rest of the week.

Day 2:

The purpose of day 2 is that is to have the kids break into their small groups of 2-4 and begin their research of the volcano of their choice. The majority of the class will be held in the school library, using both books and computers for research. There will be a list of popular volcanoes from the regions that the students are from, if they are interested in researching those. Before any research is done, the kids will be taught what is and is not a valid resource. The teacher will give an example of inaccurate information on the internet (Wikipedia mistakes), and what the best kinds of sites are to find valid information on. The kids will be researching simple facts such as the height of the volcano, whether it is live or dormant, and its approximate year of formation. They will also be researching things like the basic culture of the surrounding area and how the volcano affects daily life there. That way, they will get to not only learn about
volcanoes, but also the culture of a region that they have interest in. Some kids will research using books in the library, while other kids will use the computers. To avoid any problems over who gets to use the computers, the teacher will have the kid’s switch who is doing what type of research half way through the research portion of class.

Once the research is finished, the kids will begin each of their own first drafts. The writing portion is one page long and will be done in drafts. Before the kids can begin their writing portion, they have to present the research to the teacher and have the teacher make sure that they have sufficient information to write the full page. The teacher should also check that none of the information seems incorrect just at a glance to make sure the students are on the right track. Whatever the kids do not finish during class they must take home and finish for homework. This will be a hand written paper to avoid any problems if children do not have computers at home.

**Day 3:**

Day three begins with the students getting into groups of two. The partner groups should be two kids researching two different volcanoes so that the kids can see the research on multiple volcanoes. The students will then peer edit each other’s papers. They will be looking for simple spelling and grammatical errors mostly, but they can also give structural input as well. Once the students are done marking up each other’s papers, they will go over the changes they made with their partner and the student who wrote the paper can decide which of the changes to accept. This makes it a bit of a joint correcting of the draft.
Then, as preparation for their presentations on Friday, the students will each draw a picture of a volcano, similar to the one in their handout from day one. The students will then label each of the parts of the volcano and explain what each part of the volcano is responsible for. They will have to do the same thing for their presentations on Friday, accept using an actual volcano model that they will build. This will not only help the student become more comfortable speaking about volcanoes out loud, but also help them recognize anything they are not completely sure about.

Following this, the kids will get back in their research groups and they will come up with a design for the volcano they will create later in class. They are going to be given large pieces of paper and markers. They should draw out the volcano as well as anything they want to have in the surrounding landscape so that they have something to base their actual model on. The actual model will then be made according to this design using the tinfoil and balls of newspaper method. The kids create their volcano around a water bottle with newspaper balls, and then cover it with tinfoil. This has much less mess than the paper mache technique and the kids can still decorate on top of the tinfoil.

The teacher edits the paper for structure and substance overnight.

**Day 4:**

This day is mostly a science day, based around what happens when you mix baking soda and vinegar, which is what we are using in the volcanic eruption presentation the next day. The day will begin with the testing of pH for every day liquids. We will test things like vinegar and milk so the kids get an idea what makes
something more acidic or basic. They are also going to go over the scientific method. They will learn how to make hypothesis, tests, and conclusions and then they will apply them and test more everyday objects like soda and juice. They will be given a list of these every day liquids and will first hypothesize whether they think it is acidic or basic. They will then run the tests, and give conclusions on whether they were right or wrong, and why they hypothesized as they did. The teacher will then show, in smaller proportions, so that the kids still don’t know what to expect for Friday, what happens when you mix baking soda and vinegar. The kids are then going to be asked to hypothesize how much of a reaction we will see from the actual presentation. Will it just bubble out? Or will it shoot up to the ceiling? The class will end with the teacher returning the edited drafts and addressing the most common issues in the essays, as well as addressing any specific questions the kids may have about the teacher’s comments.

**Day 5:**

This is the final presentation day. The kids will come with any family member that is available to come for the presentations. The family members will all be given a comment sheet to give feedback on each kid’s presentation. Each student will read their paper aloud and the parents/family members will make comments on the paper itself, and how it was presented. They will also be given comments on how they could improve on presentations in the future for simple things like posture, tone, volume or hand movements.
To conclude the project, each volcano group will introduce their volcano and the landscape they built. They can say how anything in the landscape represents something from the region the volcano is from. They will identify each part of the volcano on the model and also describe the different functions of each part. Then the teacher will put the correct amount of baking soda and vinegar and the volcanoes will erupt. This will end the whole project with a fun presentation that is a culmination of all the kids’ hard work earlier that week.

**Evaluation:**

In this unit students will be graded in three areas: teacher evaluations of research paper, parent/student evaluation of presentation, and teacher evaluation of presentation. For the research paper, students will have been given support from both their peers and their teacher before the final paper is due. That being said, students are expected to make changes on their papers according to what the teacher comments on. In the end, the grade would be broken down 50% research paper, 10% parent/student evaluation, and 40% teacher evaluation. The teacher will take the family evaluation comments into consideration when grading the presentations, but the parent grading forms will not have any impact on the actual grade. The teacher seeing the feedback can also show what he or she can work on to improves this project. Both the research paper and presentation rubrics are attached.
Resources
“Inside A Volcano” Clip Art Gallery, 
http://school.discoveryeducation.com/clipart/clip/volcano2.html
“The Volcano Song” http://www.youtube.com/watch?v=BcFtpWjZwI4
“Volcanoes Around the world”

Computer Lab
Ph test kit
Volcano materials
   Cardboard boxes (students bring if they can)
   Aluminum foil
   Empty water bottles (students bring)
   Dishwashing detergent, baking soda, vinegar, water, red food coloring.

References

Burns Academy Strategic School Profile


“Summary of Bloom’s Taxonomy”, Trinity College Educational Studies Resources.
http://www.trincoll.edu/depts/educ/resources/bloom.htm

“Science Content Standard 2.2” The Utah Curriculum Framework K-12 Core Standards,
http://www.uen.org/cc/uen/core/pub/displayCoreCourse.action?ccId=3050

“Volcanoes Around the world”
# Research Paper Rubric

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<tr>
<td><strong>Research-Quality:</strong></td>
<td>Included facts, quotes, and paraphrasing from reliable sources.</td>
<td>Included facts, conclusions, and opinions from reliable sources.</td>
<td>Included a mixture of facts from reputable sources and opinions from unreliable sources.</td>
<td>Included more opinion than fact. Information was taken from unreliable sources.</td>
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<tr>
<td>Information from reputable sources</td>
<td>Included research from subject-matter experts.</td>
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<td><strong>Writing-Ideas:</strong></td>
<td>All details were unique, interesting, and related to and supported the profile idea. Writing included information based on fact.</td>
<td>Writing had many interesting details which supported the profile idea. Writing included interesting information.</td>
<td>Writing had three or more details that supported the main idea.</td>
<td>Writing had few details.</td>
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<td>Interesting, informative details</td>
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<td><strong>Content-Creativity:</strong></td>
<td>Project demonstrated student's own interpretation and expression of research material. Used pictures, images, or other visual aids to display information in multiple ways.</td>
<td>Used student-created materials as well as existing material from other sources. Student devised a creative way to design or deliver the project.</td>
<td>Information was factual but showed little student interpretation. Project based primarily on sample work. Student added one or more original ideas.</td>
<td>Project was built from a template, designed only as prescribed, or was based entirely on sample work.</td>
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<td>Unique delivery</td>
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<td><strong>Organization-Time Management:</strong></td>
<td>Used time well. Work was turned in early or on time.</td>
<td>Most work was done on time.</td>
<td>Some work was not done on time. Monitored progress occasionally. Did not change work habits or schedule accordingly. Worked frantically to finish project on time.</td>
<td>Did not use time well. Little or no work was done on time. Did not monitor progress adequately. Project was not completed on time.</td>
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<td>Uses time wisely</td>
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<td><strong>Design-Layout and Organization:</strong></td>
<td>Content was well organized with headings and subheadings. Text and graphics were neatly organized and made the project easy to read.</td>
<td>Project was organized with headings and subheadings. Text and graphics were placed to make the project easy to read.</td>
<td>Most of the project was organized. The placement of text and graphics sometimes made the project hard to read.</td>
<td>Project was hard to read. There is no clear structure. Text and graphics were randomly placed.</td>
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<td>Organized and easy to read</td>
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<td>Grade (1-10)</td>
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<td>Teamwork - cooperation</td>
<td>9/10</td>
<td>Student took initiative in presentation to set up volcano for explosion</td>
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<td>Enunciation</td>
<td>9/10</td>
<td>Entertaining and clearly understood</td>
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<td>Historical Accuracy</td>
<td>9/10</td>
<td>Student used primary sources to adequately describe the volcano and surrounding area.</td>
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<td>Artistic creativity of</td>
<td>3/10</td>
<td>Volcano model was messy and did not represent volcano that the group researched</td>
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<td>Volcano</td>
<td>3/10</td>
<td>Student showed little engagement to the project and presentation</td>
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