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Lesson Plan

8th grade
Content Area: Physical Science,
Unit: Matter, *The Atom, the Periodic Table, and Atomic Bonding*
Time Line: March 10th to April 4th

Georgia Content Standards
S8P1. Students will examine the scientific view of the nature of matter.
a. Distinguish between atoms and molecules.
b. Describe the difference between pure substances (elements and compounds) and mixtures..
e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).
f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

NETS*S Standards (students)
3. Research and information fluency
Students apply digital tools to gather, evaluate, and use information.
a. Plan strategies to guide inquiry
b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media

NETS*S Standards (teachers)
4. Promote and model digital citizenship and responsibility.
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.
a. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.

Purpose & Overview

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Internet Tools In Classroom, ITECH 7430, Dr. Goetzel

Students gain an understanding of science terms and atomic structures by learning the organization of the periodic table and element properties. Students acquire appropriate science content vocabulary skills for speaking, reading and writing.

Students will identify electronic configuration, taomic properties, and substance stability according to element groups and their location on the periodic table. Students will also gain an understanding of compounds and bonding, covalent and ionic bonding. Students gain skills in use of microscopes, Web 2.0 publishing tools, and use advance writing skills for science description reporting during this learning process.

Support appropriate writing skills and the practice of accurate application of punctuation, grammar, and syntax skills such as those targeted in Language Arts.

Unit Overview Description

Teacher lectures are almost daily, but are brief, usually 15 to 20 minutes. This teacher instruction includes whiteboard content notes and diagrams, along with physical demonstrations of substances and material properties. Assignments include daily note taking as student-journal writing entries and four content worksheets. The worksheets, *The Atom, Periodic Table & Pure Elements*, and *Compounds, Mixtures & Bonding (Part A and Part B) . Part B of Compounds, Mixtures & Boding*, is reserved advanced performing students. The worksheets require students to define vocabulary terms, label diagrams, fill-in-the-sentences, and construct written sentences that reflect on reading assignments and class activities. Reading assignments are part of the in-class instruction and are out-loud whole-class shared reading tasks (see Appendix A – C). Students use technology in a number of ways, the Pre/Posttest is provided online using the Georgia Online Assessment System and the schools computer lab. Student use *Blabberize* and *Wordle* to publish a science project to an outside audience. There are two student science projects, The *Periodic Box,* is a handmade paper box model that details the many components of one pure element *(*see Appendix D). Each student selected one element to make their unique paper box model. Once students had produced the element content for the paper box model it was photographed using smart phones. These images and their written content was recorded and uploaded to the student publishing Web 2.0 tools (*Blabberize* and *Wordle*). The second science lab, *Salt Crystals* was an observation report. Students made a mixture of salt & water, and collected remnants from the evaporated mixture for microscope observations. The observation required students to write/report and draw into their student science journals.

Differentiated instruction – sheltered science content instruction provided using content enrichment practices such as: class discussions, out-loud reading assignments and assignment worksheets according to academic ability and assessed student progress, pear lead instruction and group learning, one-on-one teacher to student instruction provided as needed, along with student directed hands-on science projects. All content learning supported by repetitive vocal

instructions, modified reading requirements/limitations, and available online translation applications, such as Google Translate.

Essential Questions

What is matter? What are atoms? What is the periodic table? What are the three states of matter? What are mixtures and compounds? What is the difference between covalent and ionic? To optimized background knowledge Students will gain atomic familiarity with two known substances: salt, for ionic bonding, and water, for covalent bonding.

Formative and Summative Assessments of Student Learning

An online 28-question Pre/Post unit test

Pretest scores reviewed for the purpose of establishing students' background knowledge however, students do not receive a pretest grade (formative)

Pretest scores compared to posttest scores (summative)
Student receive a grade for their score on the posttest

Constructed on Georgia's *Online Assessment System*, selected test questions align to unit standards to address:

Atomic symbols, atomic weight, atomic mass, and pure elements
Atomic physical and chemical properties
Compound and mixtures
Atomic bonding

Worksheets (formative)
Students are required to complete at a minimum 2 pages of the 3 worksheet assignments. Advancing students are encouraged to move ahead and complete the additional pages for higher learning. Students are given 3 days to complete one worksheet (2 pages). Each worksheet assignment is graded as classwork (and each worksheet totals roughly 5 pages). Two pages of a worksheet must be turned in on a three day turn around to receive credit. Worksheets are graded on content accuracy and not spelling or grammar, however sentence structure is corrected for student review. The three scaffold worksheet assignments repeat content and present additional challenges to previous lessons.

Class participation (formative): whole-class, small groups, and appropriate technology uses as demonstrated by appointed group leaders and teacher instruction.

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Science Projects (summative, lab grade)

Periodic Paper Box Model

Construction of a paper box to model one table element, the multiple faces of the paper box designed by the student to show:

- Atomic symbol, atomic weight, atomic mass, and element name
- Atomic dot diagram (shells, electrons, and nucleus)
- Atomic physical and chemical properties
- Reason student made their element selection

Web publishing for an outside audience and an online student academic artifact

Science Project:

Mixture of hot water and salt, students observe salt dissolves. The mixture of dissolved salt and water is left out for the evaporation process to occur. The remaining ice crystals are viewed under the microscope, and observed for the purpose of witnessing the formation of crystals and providing a written description and drawing of that which can be observed under the microscope for entries in student science journals.

Worksheets (formative, classwork grade)

The Atom
PDF, pages 30, 50, 53, and 59 available at:
http://www.glencoe.com/sites/common_assets/science/workbooks/georgia/ga8sn2.pdf)

Pure elements and the Periodic T able
PDF, pages 31, 32, 45, 58, 74, and 63 available at:
http://www.glencoe.com/sites/common_assets/science/workbooks/georgia/ga8sn2.pdf

Compounds and Mixtures & Bonding (Part 1 and 2)
PDF, pages 35 – 37, and 66 -70 and 79, available at:
http://www.glencoe.com/sites/common_assets/science/workbooks/georgia/ga8sn2.pdf

Resources

Textbook, Physical Science, (2008). Glenoe/McGraw-Hill
Worksheets (modified) Science Notebook, (2008). Glenoe/McGraw-Hill

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Google Translate

Online site, user friendly for translating English to students' first languages, provides text and audio language translations.
http://translate.google.com/

Instructional Strategies Online

Site provides examples of *Interactive Instruction,* such as *Role Playing* and *Cooperative Learning Groups.*
http://olc.spsd.sk.ca/De/PD/instr/categ.html

Center for Research on Learning and Teaching

Site's resources reflect on the challenges of engaging students' prior knowledge and bridging cultures in the classroom.
http://www.crlt.umich.edu/internationalstudents

WIDA (World Class Instructional Design and Assessment)

This instruction resource dictates the framework of my district ESOL program, wealth of information on instruction strategies, objectives, and assessments (assessments, such as ACCESS: reading, writing, and speaking).
http://www.wida.us/assessment/access/

Students' Smartphone and school Laptops, uses: translation of English terms to students' first languages, examples and definitions of content terms, and digital imaging. Laptops: uses for student publishing activity

Web tool/technology use: advancing students lead small groups for exploratory and discovery levels in academic publishing using *Blabberize* and *Wordle*.

Music videos available online

The Elements, by Tom Lehrer with animation by Mike Stanfill
www.privatehand.com/flash/elements.html
Meet the Elements, by They Might be Giants
www.youtube.com/watch?v=d0zION8xjbM

Chemical reaction examples on video, online

www.middleschoolchemistry.com/multimedia/chapter4/lesson3#sodium_in_water

Instructional Plan Preparations, and Classroom Management

Class rules posted on the classroom wall, and students are reminded of science class participation rules and behavior expectations for their safety and for common courtesy, as part of class

participation. Students not fully participating will be removed temporarily moved to *time-out* in another class. Examples of posted rules:

> *When the teacher is speaking students are to listen*
> *Follow instruction provided by the teacher*
> *Every item has a place, make sure you return it*
> *Unfinished work due to playing is graded zero*

Visual and physical objects used in teacher lead demonstrations, brief content lectures and board notes are key components used to address students' content and cultural familiarity needs, along with their language recognition needs, such as skills for speaking and writing content and language translations. Students are prepared to communicate what they understand and what they do not understand with the use of visuals, and physical objects. Images and objects are large parts of in-class learning teaching techniques for language and content acquisition learning and supported by WIDA objectives. English Learners with an academic history in their first language tire quickly from vocabulary drills, such as flash cards and repetitive word-repeat exercises, and it is necessary to implement vocabulary reminders in many forms, such as models, activity demonstrations, and role playing. Students without extensive academic histories are learning how to learn and their frustrations form from slowly acquired skills. Keep all student engaged required learning that has them physically and mentally involved.

As advised by Carter (1986), executed sheltered content instruction, meaning the instruction is scaffold and student interaction involves real world science learning experiences. Use of physical objects and visual images for demonstrations and the manipulation of objects to show changes, characteristics, and functions is fundamental. Available objects, such as balloons, ice, apples, salt, vinegar and even soured milk, students feel, touch, smell and see science properties. Hands-on experiences added in understanding in the meaning of what is *matter*, what are atomic changes, and how the periodic table is organized. Students were required and prepared to mimic demonstrations and give examples when called upon. Student required to act-out understanding in small groups, participate in whole-class discussions, and content reviews for higher learning gains.

Students were permitted and encouraged to use their smartphones, however school laptops are provided for the unit lesson. Three students to one school laptop, a total of ten laptop computers were made available for the class and provided access to the Internet. This technology is used to obtain content information from provided science Web sites. Peer learners and advancing students were selected as peer learning leaders for small groups for the use of computer/technology, and completion of project tasks and worksheet tasks.

Physical Objects for visual recognition are key in providing science learning experiences such as:

> Water and Ice, salt, vinegar, baking soda, plastic bag (containing air), rocks, car oil (density), coconut oil, candles (burning), matches, talc powder, magazines, color pencils, construction paper

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Instructional Strategies

Writing practices: student were provided content worksheets and instructional notes projected on the white board, encouraged to translate content, first language input increased application clarity, and supported homework task completed after school. Homework review tasks were frequently accomplished in social circles before and after classes at school, with the use of students' smart phones.

Pre-teaching of vocabulary terms: using flash cards and physical objects, this practice was implemented for speaking and writing, a language acquisition strategy provided daily

Re-looping of previous content understanding: this is a type of sheltered instruction that scaffolds learning and then revisits content by several methods, such as reading assignments, class discussion and worksheets, to gain depth of understanding.

Content read-a-louds, writing practices, and student lead content in-class discussion for the purpose of hearing and speaking the science content English language, and language translations efforts.

Hands-on leaning - Science Projects provided students with opportunities to direct an individual project, content was researched on classroom computers, laptop computers and student smart phones. Two Web 2.0 student publishing tools integrated the hands-on learning experiences

Learning Activities

Day 1 Pretest, online unit assessment, interface provides immediate feedback to students
A student performance report goes to the teacher, and useful as a formative tool
The whole class is scheduled in the computer lab for the pre/post assessments
Teacher instruction on computer hardware use targets abuses and appropriate use

Day 2

Sponge activity - teacher demonstration: tearing of a piece of paper, repeat, repeat, repeat. Emphasis to students: the smallest possible part of the paper or any object are atoms. Manipulatives provide recall prompts for content recall

Content Instruction - projected atom/images, the dot diagram, use of pen and white board, request inquire of which images are familiar to students, student input: where they have seen the image before, initiate student discussion to demonstrate background knowledge. Build on what students understand, further support understanding with out-loud reading assignment – a language listening task for reading and hearing comprehension,

Elaborate again on what students understand about atoms, provide vocabulary terms.

Student learning activity - have students copy the Atom Dot Diagram, and vocabulary terms from board notes, include examples/elements, hydrogen, gold, and aluminum,

Close- encourage students to elaborate speaking on the meaning of pure, allow student to contribute first language examples, and permit one home-shout-out, where one student is allowed to phone/text a relative and ask for help to answer for teacher lead questions, such as for interpretations of words or the meaning of a terms.
Out-Loud reading assignments repeated in small groups, for advancing students: textbook, second reading assignment, sections in chapter 4, if time permits
Assignments not completed, during small/peer groups, assigned as homework and content review.

Day 3

Sponge Activity – assist students in making a human model of hydrogen, two students to stand and represent the nucleus and one student to run around the nucleus acting as the electron (out-of-seat learning activity, and application of science concept)
Teacher Instruction - elaborate on the number of electrons for different elements, 3 or 4 examples, Whiteboard and pen, teacher provides drawing, images, brief specific notes and terms to explain the charges of each atomic particle, have students copy board notes and use color pencils to color code charges
Student activity - students attempt to make a human model of lithium (an infer application activity and requires higher level thinking)
Allow students time to copy smart board notes, work in pairs to complete unfinished work sections. Out-loud reading for language recognition, and hearing content for comprehension, textbook, chapter 5.
Close - question students on meaning of key vocabulary terms used in class discussion, assess clarity of content and verbal language skills.

Day 4

Sponge activity: Periodic song and YouTube video
Instruction - ask students questions for clarity and depth of content understanding thus far on Atoms. Introduce *periods* and *groups*, and *Periodic Table* content worksheet.
Student Activity - students collaborate in small groups or by peer requested assistance. Students work in small groups to complete a worksheet that addresses content and reading sections: Energy Levels, students are allowed to use textbook and Google Translate App.
Close - one-on-one teacher to student instruction for selected students in need of additional learning assistance. Feedback on completed worksheets, collect additional completed worksheets

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Day 5 Teacher instruction – Vocabulary, out-loud spelling and definitions and object examples

Student activity - students advancing assigned as student leaders and lead class discussions for content clarity, students mimic teacher in-class demonstrations (role acting) that reference meaning and examples of object states, elements and element characteristics, in English and when possible/appropriate first languages, Worksheet assignment and reading assignment,

Close - watch BrainPop Video on Periodic Table. One-on-one teacher to student instruction for selected students in need of additional learning assistance.

Day 6

Sponge activity - demonstration, burn a piece of paper and show the burned black remnants, next tear up a paper cup. Question students on their understanding of each substance change.
Class instruction and student activity - Out-Loud reading, textbook, chapter 5. Teacher elaborates on the clues, writing brief board notes, providing visual images and physical objects examples, students can see, hear and smell: chemical change examples, discuss familiar chemical changes, and demonstrate examples, such as baking soda and vinegar for fizzing and foaming. Allow students to infer processes, such as burning, and rusting, and to encourage contributions to class discussion in their first languages to support application of science, Advancing students - reading assignment and worksheet on *Compounds*

Close - review the 3 states of water and the properties of water's physical changes, Allow students time to copy smart board notes, and complete or correct pervious worksheet, provide feedback on sections for scaffolding and understanding new content

Day 7

Sponge activity - observe the mixtures, a transparent plastic bag full of air, density of oils, and sugar and salt.
Teacher instruction - elaborate on homogeneous mixtures and how this differs from that of a compound, provide student brief and specific board notes, images, and draw diagramed examples and Periodic table symbols needed for compounds and mixtures.
Student activity - students work in small groups and use computers to navigate through several provided sites to obtain the chemical formulas for water, salt, vinegar and sugar and any additional compounds of interest – to provide student directed interest application of understanding, complete pervious worksheet sections and advancing students address *bonding*.

Close - provide students with instructions for Lab Activity using salt and water. Advancing students move on to reading assignment, textbook, chapter 6, on compounds and mixtures, and complete Part 2 of worksheet on bonding

Day 8

Students watch *BrainPop* Video on *Compounds*,
Teacher elaborates on ionic and covalent bonding, using water and salt as examples,
Student copy notes from the smart board
Additional journal entries, provide students with microscopes and salt crystals evaporated from water, while large groups are observing the crystals, have advancing students begin the Science Project, the element box, provide Science Project board instructions and laptop computers. Students work in groups depending completed tasks.

Day 9

Large group observe salt crystals evaporated from water, using microscopes
All students continue working on Science Project, the element box. Advancing students instructed in Web publishing, and one-on-one teacher to student instruction for selected students in need of additional learning assistance.

Day 10

Post Test, online assessment

Review answers/responses of the 28 questions
Lead class instruction on student publishing, *Blabberize* and *Wordle*. Students work in small groups and use laptop computers to upload projects and complete worksheet sections. One-on-one content instruction and student project presentations as time permits.

Evaluation

Objective	Assessment	Was the objective met? Evidence of student learning.
(Content) The student will investigate the characteristics of Matter, The student will gain an understanding of what an atom and *what is* matter, and that matter has three states (solid, liquid, and gas)	(Formative). I will observe and ask questions on the description of an atom Observe how well students are able to duplicate the drawn atom, and if students can identify the three particles of an atom without looking at notes Using lab and classroom objects for various state of matter examples, and	Yes. Students were able to respond to questions on the characteristics of matter with appropriate answers, such as identification of melting, evaporation… Students were able to model the Hydrogen Atom, and elaborate on differences of other atoms, such as gold, oxygen, beryllium…

	a class worksheet, observe students' written responses and journal entries	
(Content) The student will investigate the properties of physical and chemical changes	(Formative). I will observe and ask questions that prompt student to demonstrate physical matter changes and chemical matter changes matter	Yes, Students recognized written examples of physical changes and chemical changes and where able to provide their own examples, students were able to identify diagrams and written examples of physical changes of matter
(Content) The student will investigate the properties of pure elements	(Formative). I will observe and ask questions on the description of pure elements Observe how students written response reflect their use of the periodic table	Students were able to use read the periodic table and responded to written questions on the properties of pure elements, such as outer shell, placement of electrons, and stability
Unit Content	Pre/Posttest (summative)	40% increase in average student performance sores

Reflection:

Earlier this year my department lost one full-time instructor and we are consequently experiencing an unexpected long-term teacher shortage. Several sub-instructors became part of our instructional staff. Within a five–period-student-population there is a selected group of 8th graders. These ELs attend two traditional classes for engineering in a STEM program off site. These students came to my attention after several students in the group had requested to be transferred to my 5th period class for science. Outside of the language barrier these 19 students are high achievers, and the majority of these students are reading and writing English on 5th and 6th grade levels. My 5th period class is a student body of my lower achieving students and probably my most traumatized students. Based on an ACCESS assessment, the reading levels of my 5th period students are mostly at 3rd grade. The bond I have with this group of students would not let me trade them off to the substitute teacher. Both classes are demographical about the same, roughly 30% Nepali, 20%, Burmese, with the remainder of students from mid-eastern countries, Central American counties, and African countries. Ages range from 14 to 19 years old.

To help our situation, I offered the 19 students a two week review on the unit for *Matter and the Periodic Table*. The review project, termed *Extra Study* turned into four weeks of student engaged learning. In addition to basic components of the periodic table, we investigated atomic

bonding, ionic and covalent. With roughly 40 students present most days, the learning environment seemed chaotic at times. Staff and faculty passing by my door reinforced a notion that this was *different.* We didn't have a sufficient number of desks and some of my visiting students adjusted to sitting on top of shelves and even sat on the floor. Students in both classes willingly accepted the situation and joined together in what was a unique peer learning experience.

As advised by Carter (1986), my practice executes sheltered content instruction, meaning the instruction is scaffold and builds real would science learning experiences. I use lots of physical objects and visual images for demonstrations and the manipulation of object to show changes, characteristics and functions. Using available objects, such as balloons, ice, apples, salt, vinegar and even soured milk, students were able to feel, touch, smell and see science properties. Hands-on experiences added in understanding what *is matter*, what are atomic changes, and how the periodic table is organized. Students were required and prepared to mimic demonstrations and give examples when called upon. Students were required to act-out understanding in small groups, selected for peers learning and worksheet tasks. Other teachers shared with me that several of these instruction demonstrations were acted-out enthusiastically by my students in their class. Students were singing the periodic song, making jokes about the *attraction* and *repel* of one another, and even shared their *Wordle* skills with others outside my class. Students aided each other with written translations of my notes, they asked quality questions, authentic – and not just the higher achievers. My own 5th period students were more attentive in the learning process, and I assume this was due to *positive* peer pressure. Pedagogical strategies and learning via engaging students included independent writing practices, pre-teaching of vocabulary terms, re-looping of previous content understanding, content read-a-louds, writing practices, and lots of content in class discussion for understanding.

References

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Natheson-Mejia, S. (1994). Bridges between home and school: Literacy building activities for non native English speaking homes. The Journal of Educational Issues of Language Minority Students.

Schunk, D. (2008) Learning Theories: An Educational Perspective, Fifth Edition, The University of North Carolina.

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Worksheet: Atom

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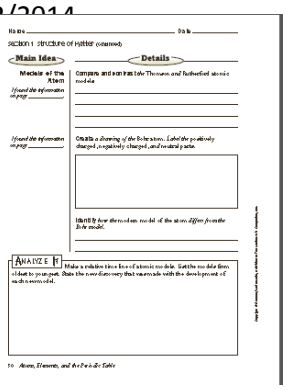
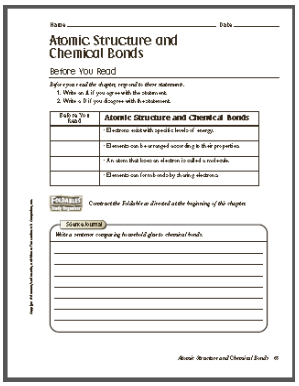


Page 30 (1 of 4 pages)

Worksheet: Periodic Table

Page 32 (1 of 6pages)

Worksheet: Compounds, Mixtures, and Bonding



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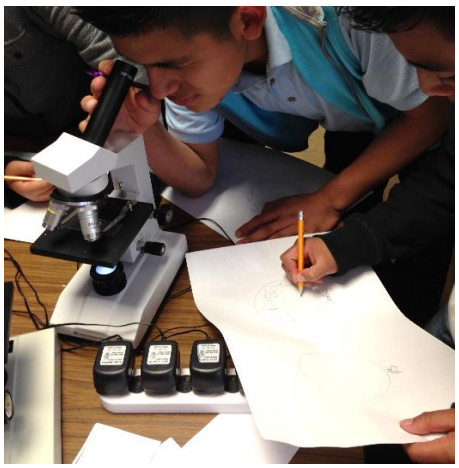
Student Artifacts

Science Project:
Pure Element Box, a paper model

Four paper box models constructed by students

Graded as a *Lab Activity*, the Pure Element Box paper model, required students to select and element, design a minimum of three faces on the box, one for the atom-dot diagram, Paper box, another side for the element symbol and atomic weight, and on one with a written description of element properties.

Science Project:
Salt Crystals



Students using lab microscopes

After dissolving salt in warm water, allowing the water to evaporate from the mixture, students observe the reformed salt crystals. Observations were recorded in students' science journals.

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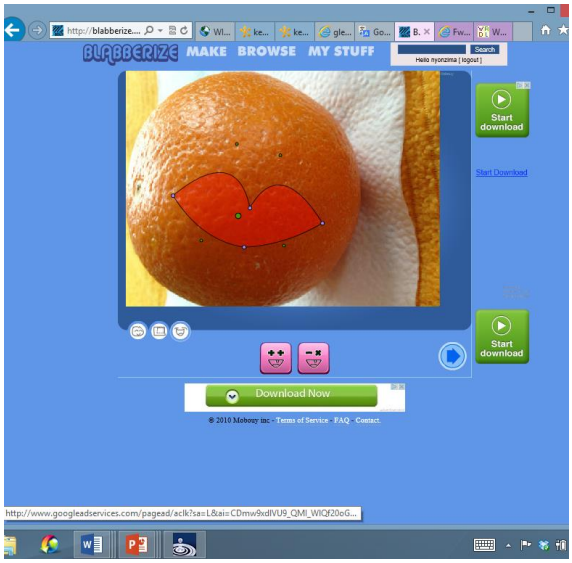
Wordlle Matter Poster  Student Poster, composed using unit vocabulary terms and the *Wordle* online publishing tool Posted at http://www.wordle.net/show/wrdl/7761661/2nd_period_science_class_2014_	Blabberize Animated and audio data on matter  Students uploaded images of matter and recorded statements on the properties of selected matter.

http://www.wordle.net/show/wrdl/7761661/2nd_period_science_class_2014_