Topic: How Atoms Work

http://www.howstuffworks.com/atom

Grade 9-Adult

An integrated lesson plan covering one session of approximately 1.5 - 2 hours.

Lesson-Planning Approach

Some learners perceive their "world" as a whole, where all things are interconnected and dependent upon each other. These "integrated" students face major challenges in coping with our dominant educational, social, and economic systems, which tend to present information in a linear fashion without the necessity of integration into meaningful context. Integrated students are at-risk of failing as they attempt to grasp information in ways that do not match their experience. Among large populations of at-risk students are many from Native American and similar cultures who do not regard their world as a sum of parts but as a blend of all that they experience.

This lesson plan does include some traditional, linear approaches to delivering information (checklists, rules, analysis, problem solving and organization). In addition to the traditional, linear delivery of information, this lesson plan also includes some of the following strategies, designed to appeal to at-risk students as they learn academic/life skills:

- Integration of technology
- Story telling/anecdotal information
- Non-competitive group and team work
- Performance-based assessment and rubrics
- Visual presentations and practice through technology and other means
- Project-based assignments that integrate family and community
- Activities appealing to multiple intelligences (Gardner)
- Application of Scientific Method to formulate and solve a problem.

Lesson Overview

This lesson is designed to familiarize students with the concept of atoms and how they combine to form molecules and compounds. Animations and resources are available on the internet. Students will create a model of an atom using an old CD. From their results, they will write a summary, apply relevant vocabulary, and answer questions about the project using correct punctuation, sentence structure, and experimental method.

Lesson Objectives

Project Objectives: When students complete this session, they will be able to…

- design and create a CD model of an atom.
- label common parts of an atom.
- explain how each major part of an atom operates.
- combine atoms and predict how they will react with other atoms.
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Integration of Other Functional/Academic Skills: (Critical thinking is required throughout the lesson.) Students will be able to…

Math:	locate a specific element on the periodic table and calculate the net charge of the atom
Reading:	apply technical vocabulary; find main points and meaning in written passages.
Writing:	summarize; define; explain
Listening:	Create CD from oral instruction
Science	*a*pply scientific method and correctly format an experiment
Technology:	apply basic features of Microsoft Word and search a site on the Internet

State/National Standards (Complete as Appropriate)

http://www.cde.state.co.us/cdeassess/sci.htm#standards 1,2,5,6

Websites

Required:

http://www.howstuffworks.com/atom

Support:
http://antoine.frostburg.edu/chem/senese/101/index.shtml: General Chemistry Online
http://library.thinkquest.org/10380/introduction.shtml Journey into the atom
http://www.miamisci.org/af/sln/phantom/ The Atoms Family

Pre-requisites: Read at sixth grade level or above.

Required Materials

- 1 molecular model to share with 2-3 students.
- Periodic Table
- Old CD, and beads, sequence, etc. to use for protons and electrons
- 1 Box of Paper Clips

Handouts

- Copy of the Periodic Table (Handout 1) http://www.cs.ubc.ca/cgi-bin/nph-pertab/tab/periodic-table

- Lesson Checklist (Handout 2)
- Experimental Design (Handout 3)
- History of the Atom (Handout 4) http://www.howstuffworks.com/atom
- Lesson Rubric (Handout 5) rubric generator

Required Equipment/Technology

- 1 computer, with Internet connection and a MS Word for every group of 2-3 students
- Projector
- Atomic models of basic atoms and DNA double helix

THE LESSON

Note: Students do not learn from what you do but from what you have them do.

PART I

Preparation

Activity	Instructor Notes
Research the topic. Practice the paperclip activity.	**Read the link** http://www.howstuffworks.com/atom **about early scientists trying to figure out what makes up the world around us.**
Gather old CD's and objects to use as protons and electrons.	**It works best to mention neutrons as something that adds weight in the nucleus but has not charge. Do not attempt to include them in the models at this point**
Examine handouts.	**Be sure you understand the periodic table.**

Presentation

Observe how to find URL's and navigate relevant sites. Have students watch the atom animation on the how atoms work http://www.howstuffworks.com/atom Do the paper clip activity.	**Show students how to use URL addresses. Show students how to look up words and information in http://encarta.msn.com/ , http://dictionary.msn.com/ , Have students practice accessing several different URL's with your help.**

Performance and Practice

Instructions for students	Teacher notes
Assemble the models to create 4 different elements on the periodic table	**Give students the models and explain how to determine the number of protons and electrons from the periodic table.**
Go to the Internet and visit http://www.howstuffworks.com/atom Read and print article explaining how an atom works. In a group or in pairs, look up words at http://dictionary.msn.com/ and write definitions.	**Help pairs or groups refine and make sense of the information.**
Reread the article for meaning, discussing main points. Demonstrate familiarity with terms (list of terms) Paste in your notebook	**Have students underline or note important points from the article**
Explain how the periodic table is arranged. Create atom models with	**Complete the exercise WITH students. Help them arrive at answers. Use the atom sites suggested**

Old CD's	**and help arrive at solutions together.**
Demonstrate understanding by creating a model of 4 different atoms and writing a paragraph about your element (from CD)	**Have students draw 4 more atoms and turn them in with a written explanation of how the periodic table is arranged.**

Lesson Assessment Strategy (Formative – As the lesson progresses)

Preparation, Presentation and Overall Implementation (Instructor)

1. Are the instructions and expectations for the class clear from the beginning?
2. Am I spending sufficient time on modeling the skills I want students to acquire?
3. Is there enough variety in the lesson to appeal to most learning preferences?
4. How many learning intelligences am I addressing?
5. Are students "connecting" to lesson objectives? How?
6. How is this lesson "integrated?"

Performance and Practice (Student)

1. Do all students have the skills to follow instructions? If not, what measures am I taking to address the challenge?
2. Are all students participating in the activities either by active observation or by voicing their thoughts?
3. Am I identifying the strengths of each student and pairing/grouping people accordingly? What results am I getting?
4. How are students performing? Are all of them able meeting 80% of the lesson objectives? If not, what am I doing to help them achieve more?

Technology

1. Is the technology working?
2. How are students reacting to the technology, and what do I need to remember when I teach this lesson again?
3. How are students applying or wanting to apply their technical skills in other areas?

Activity Checklist (Handout 2)

Discuss the topic.	
Handle and examine the atom models.	
Examine and discuss handouts.	
Observe how to find URL's and navigate relevant sites.	
Assemble the models	
Go to the Internet and visit http://www.howstuffworks.com/atom Read the article explaining how atoms work. In a group or in pairs, look up words at http://dictionary.msn.com/ and write definitions.	
Reread the article for meaning, discussing main points.	
Respond in writing to the model building	
Discuss what a summary is.	
In a group, summarize how an atom works. Have someone in the group report the summary and have other students comment on whether anything important was left out.	
Compose a summary paragraph about your element, including all major points and illustrations. Complete the rubric	