Justification Paper

User Assumptions
This unit of instruction is on physical science. The users for this unit will be fifth grade students ranging in age from nine to eleven. Reading abilities for this group range from slightly below a fifth grade level to several years above a fifth grade level. This is a regular-education class with four identified GATE students and three identified RSP students.

Graphic Description

Matter
This section is a graphic interface that will help my learners synthesize the material contained in this unit on matter. It will be used as an introduction into the unit. I tried to keep the design simple as there is much information being conveyed to the learners. This design works because it uses organizations cues to show relationships and provide direction (Lohr, 2007). I connected the atom, molecule and compound icons with small gray boxes rather than a solid line to create a feeling of connectedness without being overdone (Lohr, 2007). The States of Matter section was placed on what appears to be a piece of metal to obtain the feeling of depth (Lohr, 2007).

Reactions
This section is a graphic organizer to illustrate three types of chemical reactions. I focused on the four elements of contrast, alignment, repetition and proximity when I created this design. I used repetition of a straight line and spiral ending six times in this project. “Repetition can create a sense of harmony and unity” (Lohr, 2007, p. 203). I also used the same color for both the heading graphic and the straight lines and spirals. This adds to the sense of unity created through repetition. This project is aligned along both the left side and right side of the project. I also left aligned the text for easier reading (Lohr, 2007). “The images that are aligned form a perceptual chunk that can be used to reduce cognitive load” (Lohr, 2007, p. 201).

Atoms
This section is a graphic representation of a helium atom. This graphic will work because I focused on the three C’s while creating this graphic (Lohr, 2007):

Concentrated: The topic, Atom, is emphasized.
Concise: Specific parts of the atom are emphasized.
Concrete: The color-coding of the parts of the atom and bold text make learning
This graphic uses color to make the elements of the graphic more visual (Lohr, 2007).

**Molecules**

This section is a graphic representation of a molecule. This graphic works because of the use of texture, dimension, color and space. Texture was used in the creation of the nitrogen molecule to add depth and interest (Lohr, 2007). A drop shadow was used in the Nitrogen N(2) title to add dimension (Lohr, 2007). Color was used by integrating it into the text, to help the learner understand the big picture (Lohr, 2007). Space was used between chunks of text to clarify text (Lohr, 2007).

**States of Matter**

This section is a graphic organizer illustrating the differences between a solid, a liquid and a gas. This graphic works because of the use of words and symbols to imply hierarchy. The use of signal words, solid, liquid and gas, are used to “cue the structure of a message” (Lohr, 2007, p. 146). Vertical organization was used to chunk the information and help direct the learner’s attention (Lohr, 2007).

**Mixtures and Solutions**

Both of these sections are graphic organizers. When creating both, I focused on space and balance. Space was used as a tool for clarifying text. I distributed the three important sections of information into separate equal spaces. According to Lohr, this increases the rate of reading and enables readers to see the structure of the document (Lohr, 2007). I also used balance to achieve equilibrium (Lohr, 2007). In the solutions graphic, putting the text on the left side and the pictures on the right side creates a sense of balance (Lohr, 2007).

**Extra**

This section is a combination of typography and shape. For the typography portion I chose four words that students often confuse and ultimately have a difficult time remembering and understanding: arrays; hypothesis; malleability; and mixture. I used primarily Sans Serif typefaces because of its legibility in short bursts of text (Lohr, 2007). I used kerning to enhance the way the words look (Lohr, 2007). Two of my words are following a path and kerning improved the way the words look and increased the readability. The word arrays, I chose to print in the form of an array, which is similar to the layout the textbook uses to show an array of a molecule. Hypothesis is depicted in the form of a question mark to remind the students that a hypothesis is an educated guess. The word malleable means that a substance can bend without breaking. I chose to bend this word along a path to remind students of its definition. The word mixture was written with a mixture of text types to
demonstrate the actual definition. Students often confuse the terms mixture and solution and this graphic will remind them of the difference.

I chose to create the person filled with water to illustrate the fact that we are 70% water. Students have a difficult time remembering this fact. “The form-giving function of shape explains its influence on learning” (Lohr, 2007, p. 250). By seeing a person filled with water that is saying “I am about 70% water” will help students remember the fact that we are approximately 70% water. The use of a cartoon shape is an age appropriate use of instructional materials. “There are times when it helps to use cartoon characters in instructional materials” (Lohr, 2007, pg. 257).

Process Design

My web page format is an easy to follow instructional design. “The term instructional design refers to the systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation” (Smith & Ragan, 2005, p. 4). I created each page using both FireworksCS4 and Adobe Dreamweaver CS4.

I kept the design simple as learners are often overwhelmed by the number of interactive information elements that are needed to be processed simultaneously before meaningful learning can commence (Paas, VanGog & Sweller, 2010). The web pages are arranged in logical order from left to right. The pages are designed for both student and teacher use. A complete Unit of Instruction as well as individual lesson plans can be found on the Teacher Link tab of the project. An additional lesson plan link can also be found on the first tab associated with a given lesson.

• Lesson One incorporates Matter and Reactions.
• Lesson Two incorporates Atoms, Molecules and States of Matter.
• Lesson Three incorporates Mixtures and Solutions.

The Extra tab is used throughout the unit and is designed to extend student learning. This activity uses a cognitive approach to learning. Cognitive learning theories are currently the dominant theoretical influence on instructional design (Smith & Ragan, 2005). Cognitive theorists explain learning in terms of cognitive processes (Levine, 2010). The activities represented on this page allow students to process what they have learned through hands-on learning activities.
References


