

Armstrong believes that there is a major problem with the way we are educating students to read. Students learn in different ways and teachers need be flexible in their methods in order to teach to the different ways that students learn. One way to help teachers teach to the different ways students learn is by using Gardner’s multiple intelligences theory. Armstrong believes teachers can use multiple intelligences to help make literacy come to life for all students. Educators need to use a wide range of strategies to help every student learn.

Gardener’s multiple intelligence theory includes seven intelligences. According to Ryan, these intelligences are interpersonal, intrapersonal, bodily-kinesthetic, visual-spatial, musical, naturalist, logical-mathematical, and verbal-linguistic intelligences. Interpersonal learners gain knowledge best by working with others (Ryan, 1998). Intrapersonal learners have an attentiveness of their own personal thoughts (Ryan, 1998). Bodily-Kinesthetic learners have the aptitude to work proficiently with objects involving both fine and gross motor skills (Ryan, 1998). Students who possess visual-spatial intelligence can examine the world and recreate characteristics of it (Ryan, 1998). Musical intelligent students possess good skills in musical or rhythmic patterns (Ryan, 1998). The naturalist intelligent student has an appreciation for nature. They can easily classify plants and other nature related items (Ryan, 1998). Students who display the logical-mathematical intelligence can easily solve problems (Ryan, 1998). They tend to
think abstractly. The student with the verbal-linguistic intelligence is good at listening, speaking, and writing (Ryan, 1998).

The concept of learning styles should influence the curriculum development and delivery by ensuring all teachers are using multiple methods of teaching. The teacher should not use one instructional strategy to teach all his or her students with. A teacher should not cater to one learning style because most of the class seems to learn best this way. It is important for students to become familiar with different strategies of learning, therefore, the teacher should make sure they are using multiple teaching strategies to accommodate the learner.

I have included a unit plan that has incorporated Gardner’s multiple intelligences. I tried to use as many of Gardner’s multiple intelligences as possible and as often as possible. The unit plan is a work in progress and will continue to change as I gain more knowledge and ideas on the topic.
Unit Plan Title: Matter

Grade: 4  Name of Class: Science/ Health  Unit # 1

Number of Weeks for this Unit: 7 weeks

Performance Indicators

III A 3  Identify physical properties of objects that are made from the same type of material (plastic, paper, glass, powder, etc.); classify the objects by their use; explain the basis for the sort, and identify how the different products enrich our lives.

III A 14  Develop a list of physical properties to describe each of the 3 states of matter from the examination of various samples/pictures of each; select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature, and area in metric and English units.

III A 15  Distinguish between physical (e.g., crumbling paper, cutting hair, slicing or melting butter, etc.) and chemical (e.g., rust, burning something, pennies in copper acetate, etc.) change, citing evidence to explain the type of change; cite and explain real-life examples of both physical and chemical changes (different from examples done in class).

III C 10  Compare/contrast different types of heat transfer in terms of effectiveness (e.g., conduction, convection, radiation); cite real-life examples of each.

Gardener’s Multiple Intelligences

<table>
<thead>
<tr>
<th>Interpersonal Intelligence</th>
<th>Intrapersonal Intelligence</th>
<th>Bodily-Kinesthetic Intelligence</th>
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<tbody>
<tr>
<td>Visual-Spatial Intelligence</td>
<td>Musical Intelligence</td>
<td>Naturalist Intelligence</td>
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<tr>
<td>Logical-Mathematical Intelligence</td>
<td>Verbal-Linguistic Intelligence</td>
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MOTIVATION

1. Introduce unit vocabulary and have students brainstorm meanings of the words. (Science, Instructional Resources, pg 39) (Verbal/Linguistic)

P.I. III A 3

2. The class will play “I Spy”, using physical properties to describe objects around the room (Verbal/Linguistic, interpersonal, logical/mathematical)
3. I will sort students into various groups and have class determine how I sorted them (classification). *(Verbal/Linguistic, interpersonal, logical/mathematical)*

4. Pre-assessment: Give students six small objects and ask them to describe the physical properties of each object. Ask students to separate the objects into a minimum of two groups and record how they were separated. *(ODE Website)* *(Visual/Spatial, Logical Mathematical)*

**P.I. III A 14**

5. The class will watch Bill Nye: Phases of Matter as an introduction to the properties of the 3 states. *(Visual/Spatial, musical/rhythmic)*

6. We will read aloud, What’s Smaller Than a Pigmy Shrew, by Robert E. Wells to introduce molecules and atoms. *(Verbal/Linguistic)*

7. Students will learn “The Molecule Dance” in order to see molecular properties in the three states of matter. *(Body/Kinesthetic, Musical/Rhythmic)*

**P.I. III A 15**

7. The class will watch Bill Nye: Chemical Reactions as an introduction to chemical changes. *(Visual/Spatial, musical/Rhythmic)*

8. Have students use a piece of clay to make one shape and then another shape. *(physical change) (Body/Kinesthetic, Visual/Spatial,)*

9. Pre-assessment: Ask students to write a list of words that give clear description of the physical characteristics of paper. During this brainstorming session, walk around and observe students. Identify those students who are experiencing difficulty in expressing their thoughts in writing. Provide those students the opportunity to provide oral expression *(ODE website)* *(Intrapersonal)*

**P.I. III C 10**

9. Students will rub hands together for 30 seconds, touch feet for 30 seconds, and jog in place for 30 seconds (introduction to heat). *(Body/Kinesthetic)*

10. Have students imagine they have a round blob of “heat” in their hands that they need to get to a friend across the room. Describe 15 ways they could get the heat blob to their friend. *(Body/Kinesthetic, Visual/Spatial)*

**INFORMATION**


   A. Students think of an object and write 5 properties to describe it. Students exchange list with another student and attempt to determine the object by sketching it. *(Visual/Spatial, Logical/Mathematical)*

   B. Students complete TRILOGY assignment. They draw 3 items that have a common property on a piece of paper. Write property on back. (e.g. picture 1: baseball field; picture 2: deck of cards; picture 3: woman getting engaged; property: all have diamonds) *(Logical/Mathematical, Visual/Spatial)*

   C. Complete lab on pages 14-15 in *Properties of Matter* on fingerprint identification. Students will review properties by listing characteristics of
different prints. It will also introduce classification. *(Body/Kinesthetic, Interpersonal)*  

**D.** Divide class into 5-6 groups. Each group is given a box with various items in it (gems, bottle caps, buttons, nuts/bolts, coins, etc.) and told to classify items into as many groups as possible by properties. Each group then picks one way to classify their box of items. Other groups then determine the property that each group used to classify. Instruct students to work with a partner to sort objects based on their characteristics. One student should sort the objects into two groups and the other should guess how they were sorted. Listen closely while they work to be sure they are using the “characteristic and not characteristic” wording. Encourage students to use creative ways to sort. Explain that they may have only one object in a group, but there must be two groups, with all objects sorted. *(Logical/Mathematical, Verbal/Linguistic, Interpersonal)*  

**E.** Ask six to seven students to volunteer a shoe, temporarily, to be used in a class shoe key. Have students write their name on a sticky note and place it in their shoe. Ask for a suggestion to divide the shoes into two groups. It is acceptable if the groups are not even, but helpful at the beginning to have more than one in both groups. Be sure students use the terminology that allows all shoes to be included. Record the grouping on the chalkboard using a branch key. Continue dividing each group of shoes into two or more groups based on a property. A property may be used more than once, but encourage variety. The key is complete when each shoe is in its own box in the key (ODE Website). *(Visual/Spatial, Logical/Mathematical)*  

**F.** An interesting summary to this activity is to ask an adult who was not in the room while the key was being made to join the class. Ask the person to choose a shoe from the original group, and use the key to determine whose shoe it is (ODE website) *(Interpersonal)*.  

**G.** Introduce students to another type of dichotomous key used most frequently by scientists in the field. This type of key uses numbers and letters to sort and group properties. Show students an example of this type of key by reproducing the key from a field guide. Ask students to identify all properties used in the key to identify a specific object. Help students learn how to use the key backwards. Allow time for students to practice using these keys to identify objects. Students can create one of these keys for items or materials they draw. Classmates can follow the key to find the name of this newly detected species (ODE website). *(Logical/Mathematical, Visual/Spatial, Interpersonal)*  

**2. (III A 14)** Determine the 3 states of matter and their properties by reading pgs B8-B10 in *Science*, Scott Foresman. Students will also observe water in its 3 states (ice, liquid water, water vapor) in a classroom demonstration. *(Visual/Spatial, Intrapersonal, Verbal/Linguistic)*  

**A.** Students complete a graphic organizer (chart) filling in each state of matter, it’s properties, and examples. A column for molecular properties could also be available for use at a later time. *(Logical/Mathematical)*

C. Students learn about the molecular properties of each state through “The Molecule Dance.” SOLID – 1. Molecules are packed tightly together. (Stand in a very close group.) 2. Molecules have strong bonds. (Grab neighbors’ hands and hold tightly.) 3. Molecules move very little. (Move slowly back and forth.) LIQUID -- 1. Molecules have space in between. (Stand about arm’s length apart.) 2. Molecules have weak bonds. (Link pinkies with your neighbors.” 3. Molecules move somewhat. (Move at a moderate pace.) GAS -- 1. Molecules are far apart. (Stand all around the room.) 2. Molecules have very weak bonds. (Do not touch.) 3. Molecules move very quickly. (Move around the floor quickly.) The properties of molecules can be added to graphic organizer (2A). (*Body, kinesthetic, Musical/Rhythmic, Visual/Spatial, Interpersonal*)

D. Students learn about the changing states of matter – freezing point, melting point, condensation, boiling point -- reading pgs B23-B25 (*Science*). A graphic organizer is completed showing the changing of states and differences in energy (heat). Transitions for the molecule dance are taught and danced. (*Body, kinesthetic, Musical/Rhythmic, Visual/Spatial, Interpersonal, Intrapersonal*)

3. (III A 15) Students will define *physical and chemical changes* by reading pgs. B22-B29. Students will define *mixture and solution* by reading pgs B10-B11. (*Intrapersonal, Verbal/Linguistic*)

A. Students will complete lab in which they observe physical changes in salt crystals. Students will measure 50 mL of water and 3 teaspoons of salt, stirring until it is dissolved as much as possible. They will pour some of the *solution* into an uncovered petri dish and leave it undisturbed in a sunny location. Once water has evaporated, students will compare original salt and the salt crystals formed in the petri dish (*Properties of Matter*) (*Logical/Mathematical*)

B. Students will observe the effects of chemical changes by taking a piece of steel wool and placing it in a paper cup, covering it with vinegar.

C. Students will place thermometer in a plastic jar and then wring the vinegar from the steel wool, placing the wool over the thermometer’s bulb. They will cover the jar tightly and record the temperature. Temperature will be taken every 5 minutes for 1/2 hour. They will also observe changes in color of the steel wool. (*Logical/Mathematical*)
D. Students will make ice cream as a team. They will be given sugar, milk, and vanilla, mixing it into solution form in a bag. They will then place that bag inside a larger re-sealable bag containing ice and kosher salt. They will gently shake the bag until the solution has turned solid into ice cream. Throughout the process they will observe physical changes (milk solution changing shape, ice melting, etc.) and chemical changes (the solution turning into ice cream.) (Visual/Spatial, Body/Kinesthetic, Interpersonal, Intrapersonal)

4. (III C 10) Students will define conduction, convection, and radiation by reading pgs. 38-45 in Forms and Uses of Energy.

A. Conduction:
   Example: handing a blob of heat to the closest person then to the next closest person. (direct touching) (Body/Kinesthetic, Visual/Spatial)

B. Convection: Fill a cup with hot water. Hold your hand about 2-3 inches above the top of the cup, but do not touch the water. Record observations. Hold hand above radiator. Record observations (Forms and Uses of Energy).
   Example: Carrying a blob of heat across the room to a friend. (liquid or gas moves through its particles’ motions) (Body/Kinesthetic, Visual/Spatial)

C. Radiation: Fill a cup with hot water. Put equal amounts of margarine into the spoons and hold the bowls near, but do not touch the outside of the cup. Discard the margarine into the empty cup. Hold your hand near the outside of the cup with water in it, but do not touch it. (Forms and Uses of Energy)
   Example: Throwing a blob of heat to a friend. (energy traveling through empty space) (Body/Kinesthetic, Visual/Spatial)

D. Give students some items to make a cooler for a picnic. Have students create a cooler for a picnic and test the cooler by using ice to see how long it takes for the ice to melt. (Interpersonal, Visual/Spatial, Logical/Mathematical, Verbal/Linguistic)

Extensions

P.I. IIIA3 Collect items for recycling and learn how waste materials are sorted by their properties. (Naturalist, Logical/Mathematical)

Have students write riddles about objects in the classroom for their classmates to solve. (Logical/Mathematical, Interpersonal)

Play “20 questions” about objects in the classroom. Instruct students to only ask questions that are about properties. (Logical/Mathematical, Verbal/Linguistic)

Prepare bottles containing several different liquids, some thick, some colored and some thin: Have students practice sorting or develop a key. (Logical/Mathematical)

While teaching each unit in Science, look for ways students can practice sorting objects, words, ideas, or numbers. (Logical/Mathematical)

Use dichotomous keys from field guides to identify insects, animals, flowers, leaves, or trees. (Naturalist, Logical/Mathematical)
Play the game “20 questions” using a map of the United States. Students eventually learn to ask questions that eliminate large numbers of states and allow them to identify a particular state. *(Logical/Mathematical, Visual/Spatial)*

**ASSESSMENT**

1. Paper/pencil quiz on properties and classification.
2. Students will be given items to classify into different groups. They will also have to look at groups I sorted and explain the way that I classified. *(Logical/Mathematical)*
3. Venn diagram concerning properties of the three states of matter. *(Logical/Mathematical)*
4. Children will demonstrate understanding of measuring mass, volume, length, and density using the appropriate tools. *(Logical/Mathematical)*
6. Paper/pencil quiz on molecules and their properties.
7. Unit test (teacher created) on matter.
8. Students will complete a Venn Diagram comparing/contrasting the effectiveness of heat transfer (conduction, convection, radiation). They will also cite real life examples. *(PI: III C 10) (Logical/Mathematical)*

**CULMINATION**

1. Students will create a dichotomous key using Inspiration. The students will have on partner to work with. They must create a dichotomous key using different animals to sort. *(PI: III A 3) (Logical/Mathematical, Naturalist, Visual/Spatial, Interpersonal)*
2. Post Assessment (IIIA3): Give students a variety of items to sort according to physical properties. Have students list the items in the appropriate groups. Next, have students select two objects from the list and describe the properties of the materials that could be used to separate or sort. *(Logical/Mathematical, Bodily/Kinesthetic)*
3. Students create a comic book about physical and chemical changes, showing real life examples of each and citing evidence to prove that examples are either physical or chemical. Students will evaluate their own performance using a teacher created rubric. *(PI III A 15) (Intrapersonal, Visual/Spatial, Logical/Mathematical, Verbal/Linguistic)*