Microteach 1 Lesson Plan – Direct Teach Template

Name: Lynne Cohen
Subject: Chemistry
Lesson Title: The Development of the Atomic Model

Grade Level: 9-12
Unit Title: Atomic Structure
Estimated Time: 15 mins (can be extended to up to 45)

Standard/s (Next Generation Sunshine State Standard/s (NGSSS) or Florida Standard/s:

Florida State Standards:

- SC.912.P.8.3 Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
- SC.912.P.8.4 Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
- SC.912.N.3.5 Describe the function of models in science, and identify the wide range of models used in science.

Learning Goal/Target/Objective – Based on standards: [3 pts.] (What should students know and be able to do as a result of this lesson?)

Goals:

- Understand the atomic model and how it has changed over time.
- Understand the basic parts of an atom.
- Be aware of the characteristics of subatomic particles.

Objectives:

By the end of this lesson, learners will:

- Draw and describe several models of the atom.
- Compare and contrast atomic models.
- Link each model to the scientist who described it.
- Locate and label the basic parts of an atom on each model.
- Describe the purpose of scientific models.

Prior Knowledge Required:

- Matter is composed of atoms.
- General understanding of scientific method, theories and laws.

Essential/Guiding Question(s):

1. What does an atom look like?
2. What are atoms made of?
3. How do we know what an atom looks like and what it's made of if it's too small to see?
4. How are models used to help us understand structures we cannot see?

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Content:

- The names of seven important philosophers & scientists who participated in the development of atomic models.
- The descriptions & illustrations of the atomic models attributed to each historical figure.
- The names & charges of each of the three subatomic particles.
- The experimentation and/or thought process used by each figure to create their particular model.

Key Vocabulary:

General Vocabulary	Subject Terminology	Important People
• Indivisible / Indestructible • Matter • Particle • Homogenous • Heterogenous	• Cathode Ray Tube • Gold Foil Experiment • Atomic Structure • Subatomic Particle • Electron • Proton • Neutron • Physical Properties • Chemical Properties • Theory • Law • Orbit • Orbital	• Democritus • Aristotle • John Dalton • J.J. Thompson • Ernest Rutherford • Niels Bohr • Erwin Schrödinger

Procedures: [7 pts.] Insert ESOL accommodations for Edith, Edgar and Tasir in BOLD, CAPITAL LETTERS [3 pts.]

1. **Activate prior knowledge/Anticipatory Set/Hook**
    a. **Mind-Activating Question (2 mins):** "What is a model?" This question is asked before the presentation is started. Students are asked to **GIVE EXAMPLES OF MODELS FROM THEIR LIVES** (embedded content) ex. model planes/ships/cars, stuffed animals/dolls, planetary models made out of foam balls, etc.
        i. **Answer Mind-Activating Question:** Get to the definition of a model being a *representation of something that really exists*. Sometimes it's a model of something you can see, and sometimes it is of something you can't (like the solar system, too big for us to fly out and see from the outside).
    b. **Apply Definition to the Topic (2 mins)**:
        i. Bring up the presentation. Link: https://goo.gl/zo69rw . The first four slides are the "hook". Allow students to look at each one (first three slides), then **REFLECT AS A GROUP** on what they are models of (fourth slide - increased interaction). They should conclude that they are all interpretations of an atom. **Students are then given the blank worksheets** and asked to quickly fill in box 1 with their own idea of what an atom looks like.

2. **Input:** Teaching Phase
    a. **Key vocabulary instruction** -
        i. Students would have been prepared the day before by being given a reading assignment.
        ii. Students with special language/comprehension needs would have been **GIVEN A VOCABULARY LIST** as well, with **DEFINITIONS AS APPROPRIATE** (comprehensible instruction) (see "Adaptations for Unique Student Needs" section).
    b. **Teaching of the concept** -
        i. The remainder of the presentation will guide the class discussion. The presentation guides students through the history of atomic models, and the names of several important historical chemists. The slides have **PLENTY OF IMAGES TO ASSIST COMPREHENSION**.
        ii. The content is within the presentation, but the text on the slides is only to guide; the teacher is meant to **TALK THROUGH THE SLIDES CONVERSATIONALLY** (focused content) and using **APPROPRIATE WORDING TO ENSURE UNDERSTANDING** (comprehensible instruction) .
        iii. There are seven scientists/philosophers covered in the presentation. After each one, students are asked to draw the model belonging to that scientist in one of the boxes on their worksheet. **PEER DISCUSSION IS ALLOWED** (increased interaction).
        iv.
3. **Modeling:**
    a. Within the presentation slides, plentiful examples are given for what atomic models may look like. It is made clear when students are meant to draw from their imagination vs. when they are to copy and/or interpret exactly what is on the slide. While students are drawing, I will check on a few, and **GIVE POSITIVE FEEDBACK** when deserved (supportive environment). **IF I NOTICE FURTHER MODELING IS NEEDED, I WILL MYSELF DRAW THE MODEL ON THE BOARD.**
4. **Check for understanding:**
    a. The worksheet is itself a **GRAPHIC ORGANIZER** that will be used simultaneously as an in-class exercise, a formative assessment, and after receiving comments, will be returned to the student to use as a study guide.
5. **Guided practice:**
    a. Students will be guided as a group through the drawing of the seven philosopher/scientist-based atomic models, and **CAN HELP EACH OTHER** as needed.
6. **Independent practice:**
    a. Students will independently draw their initial & final concepts of the atomic model.
    b. Students will independently answer the reflection questions on the back of the worksheet & turn in before the end of class.
    c. Students will be **SENT THE SLIDES DIGITALLY AFTER CLASS**. Links to **VIDEOS** with further information have been incorporated into the slides for students to view on their own to increase comprehension.
7. **Closure:** How will you assist your students in organizing the knowledge gained in the lesson?
    a. Students will have organized their learning as they go by filling in the worksheet. The worksheet involves **BOTH WRITTEN AND DRAWN WORK** to encourage participation & comprehension for all students, even if written work is a challenge for them.

b. Students will turn in their worksheets (with drawings & reflections); they will get it back the next day with comments.
c. If there are common misconceptions, the next day the instructor can use a document camera to **SHOW AN EXAMPLE** of a worksheet they completed, or a worksheet of a student who did very well. Students will be allowed to revise & correct their worksheets to use as a study guide.

Assessment and Monitoring:

- Formative Assessment:
  - Learners will begin the lesson by drawing their initial idea what an atom looks like, and conclude the lesson by drawing their final idea of what an atom looks like. These are creative step, the only criteria is that they draw something and can rationalize in their reflection why they connected those images to the concept of an atom.
  - Throughout the lesson, learners will draw the different models of the atom on a worksheet as they are presented and label the components of each model. (This stage is cooperative; students perform their own work but can discuss and help each other.) The criteria for this step is for these drawn models to be reasonably accurate & well-labeled.
  - Learning will be assessed when students reflect upon the difference between their initial and final drawing. This writing portion is meant to be independent but can, if needed, also be done supported by peer discussion. The criteria for this step is a logical train of thought that connects what they've drawn to the concepts in the lesson.

Materials/Resources:

- Web-enabled presentation setup (an internet-enabled computer with a projected screen).
- Presentation: https://goo.gl/zo69rw
- One "Atomic Model" Worksheet per student: https://goo.gl/5d7ZQf
- One pencil per student.

References and Resources Used:

American Association of Chemistry Teachers. (2017, May 23). *Element Project*. Retrieved July 13, 2017, from https://teachchemistry.org/classroom-resources/element-project

American Association of Chemistry Teachers. (2017, July 13). *The Scientists Behind the Atom*. Retrieved July 14, 2017, from https://teachchemistry.org/classroom-resources/the-scientists-behind-the-atom

Aristotle. *On the Generation and Corruption*. Translated by H. H. Joachim. South Australia: University of Adelaide, 2015. Retrieved July 14, 2017 from https://ebooks.adelaide.edu.au/a/aristotle/corruption/complete.html

Druyan, A., Sagan, C. & Soter, S. (Writers), & Druyan, A., Pope, B. & Braga, B. (Directors). (2014, June 10). Hiding in the Light [Television series episode]. In Druxman, A. & Butler, A. (Producers), *Cosmos: A Spacetime Odyssey*. USA: 20th Century Fox.

Guillaume, A. M. (2016). K-12 Classroom Teaching: A Primer for New Professionals. Boston, MA: Pearson.

Western Oregon University. (1997). *A Brief History of the Development of the Periodic Table.* Retrieved July 16, 2017, from https://www.wou.edu/las/physci/ch412/perhist.htm

Wikiquotes. (n.d.). *Main Page.* Retrieved July 16, 2017, from https://en.wikiquote.org/wiki/Main_Page

[Also see Images & Links included within presentation.]

Adaptations for Unique Student Needs: [6 pts.] **(EL, Special Education, Gifted, Students who lack support for school)** In three separate paragraphs, one for each EL student (Edith, Edgar and Tasir), explain the EL accommodation made for each; 2. explain why the accommodation was made and 3. explain how it will help the EL student specifically at his/her level of language proficiency.

1. Accommodations for all EL learners
    a. The lesson is heavily focused on the acquisition and use of new language and vocabulary; some of it is general/conversational vocabulary, and some of it is subject-specific (focused content). More challenging words, the ones I would consider providing beforehand, have been italicized in the slides, and the number of challenging words and new concepts in the lesson are limited (focused content). For all learners with reading, language or comprehension challenges I would provide them with a vocabulary list the day before the lesson (comprehensible instruction). I also had EL students in mind while creating the presentation. I made sure to include many visual aids to the content, and most text is brief and bulleted; the intention of the text on the slides is to guide the direct instruction, so written text is also spoken aloud (comprehensible instruction).
2. Accommodations for Tasir (Advanced EL)
    a. For an advanced EL learner such as Tasir, the vocabulary list would not include definitions, as she is capable of looking them up herself. This will support her understanding of words on the slides during the lessons (comprehensible instruction). At the end of the lesson, when students are required to write their reflections about the comparison of their initial concept of the atomic models and their final concept, I would ask the class to turn in their reflections; for Tasir, I would allow her extra time to write by bringing the worksheet home and turning it in the next day.
3. Accommodations for Edgar (Intermediate EL)
    a. For an intermediate student such as Edgar, the vocabulary list given the day prior would include the words and definitions/explanations. The list would be in English, but he would be able to review them at home before the lesson, allowing him plenty of time for comprehension, or to translate them himself as needed using a web-based translation tool such as http://www.spanishdict.com/translation (comprehensible instruction). For a class with a student like Edgar, I would make sure to also include peer-to-peer discussion, perhaps at end of the lesson when students are taking time to reflect (increased interaction), as well as allowing Edgar to bring the worksheet home, like Tasir. I would encourage Edgar to talk with someone in his family about what they know about atoms, and to include something about that discussion in his reflection, in order to connect the content with his own family's cultural understanding of science (embedded content).
4. Accommodations for Edith (Beginner EL)
    a. For a beginner EL student such as Edith, I would also provide the vocabulary sheet, with definitions in both English and Spanish (comprehensible instruction). For a young learner, I would also have to simplify some of the content. To provide a supportive environment, I would place her near the front of the class, but to the side, so I could check in with her but not make her a center of attention. I would pair her with a student (preferably a bilingual one) who would be willing to quietly explain things she might be confused about, or simply model for her the appropriate classroom activities.

With her in front, I would be able to check in with her and give encouraging comments on her drawings; no corrections would be made to her work, but gentle encouragements would be given when she draws models accurately (supportive environment). Like Edgar, Edith would be asked to bring the worksheet home to work on with her family; she would also be provided with the slides, preferably in Spanish, so she could receive culturally-sensitive assistance either from a family member or a bilingual tutor who could review the content with her (embedded content).