I. Preliminary Information Section

Duty/Unit 03.03 Demonstrate the operation of hardware components of computer publishing
06.xx Xerography (proposed)

Task Xerographic Theory

Pennsylvania Academic Standards addressed in lesson: Speaking and Listening (1.6.11), Career and Technical Education (3.6), Technological Devices (3.7.11), Concepts, Principles and Strategies of Movement (10.5.10), Unifying Themes (3.1.10), 3.4.10 Physical Science, Chemistry and Physics

Accommodation(s) for Students with Special Needs Those students with disabilities will be given accommodations as per their IEP documentation. The current needs of my class are that extra time is to be given for study, reflection and evaluation as needed. One student needs magnification for reading, one student may not be called upon in class, and another needs an assistant to read during evaluation.

Student Levels 9th thru 12th grades Lesson Duration :20 minutes Date 3/18/07 Teacher James Scott

II. Lesson Approach Section

A. Enabling Objective Given a lesson on xerographic theory, students will demonstrate understanding by achieving a score of at least 80% accuracy on a cognitive test of the subject matter.

B. Introduction/Motivation

1. Enabling objective Given a lesson on xerographic theory, students will demonstrate understanding by achieving a score of at least 80% accuracy on a cognitive test of the subject matter.

2. Attention getter and holder(s) I will demonstrate the principles of static electricity with balloons.

3. Relationship of lesson to past lessons Students will have had experience in the basic outcome of using xerography in practical applications. Most students will have an understanding of paper, ink, and static electricity.

4. Relationship of lesson to student needs and interests experiences Although using a xerographic machine can be done without knowing the underlying physics of the machines, it is important to know such ephemera when problem solving or operating at intermediate levels of desktop publishing.

5. How students will be involved in lesson Following a lecture, discussion, demonstration, and oral questioning, students will participate by taking notes, observing, role-playing, and doing simple reading.

6. Resources, materials, and supplies
   Whiteboard, projected computer media, study sheets for notes, vocabulary.
   Sample imaging drum, toner cartridge, magnets, balloons or static bearing objects.
   Cognitive assessment materials.
III. Lesson Development Section

A. Establish/Develop Knowledge Base (Learning Activity 1)

1. Content outline

*Overriding Theory* “The most positively charged particle will always be attracted to the most negatively charged surface”

1/ Corona/Scoretron charges drum surface to a negative electrostatic charge.

2/ Laser/light source removes negative electrostatic charge from non-image areas.

3/ Toner brush/roller applies positively charged toner particles to the imaging drum’s negatively charged areas.

4/ Erasing lamp reduces the charge of negatively charged surface areas to prepare for transfer to paper.

5/ Paper is given a negative charge higher than the drum’s charge.

6/ Paper attracts the positively charged toner to it’s surface.

7/ Final erasing lamp cleans the drum and prepares it for the next cycle.

8/ Repeat process.

2. Safety Concerns: Safety procedures must be followed according to general safety practices prescribed by the printing technology lab. Caution should be used when moving in and around tables during demonstrations.

3. Teacher activity: Teacher will explain the process of xerography using whiteboard, overhead projection, flip chart, and handouts.

4. Student activity: Students will be involved in the lesson through discussion, questions and answers, participation in the demonstration, and the review of topics presented. Students will move charts, re order a flow chart on the whiteboard.

5. Rationale for teaching methods/strategies and visual resources: Demonstration, discussion, oral questioning, the students will be able to understand the physical process of electro magnetic transfer of toner in a xerographic machine.

6. Key questions:
   - What attracts/repels objects on a molecular level? electromagnetism
   - What is the most powerful force, visible light or magnetism? visible light
   - What is toner made of? colored plastic and iron mix
   - Does toner have a negative charge? no, a positive charge

7. Resources, materials, supplies:
   - Whiteboard, projected computer media, markers, study sheets for notes, vocabulary.
   - Sample imaging drum, toner cartridge, magnets, balloons or other magnetic or static bearing objects.

8. Methods to check for understanding: Oral questioning, discussion, review of demonstration for process order.

9. Summary and transition to learning activity two: Review steps using visual media again.

Xerography Theory
B. Guided Practice (Learning Activity 2)

1. **Teacher activity:** The teacher will circulate and facilitate discussion, and assist in the completion of study guides and schematics that students create.

2. **Student activity:** Students at individual tables will work as a team and complete a schematic that mimics the whiteboard and overheads as seen previously. Each team will include a note taker of study guides, a drawing illustrator, and spokespersons who will verbally participate in a competitive oral questioning review for the teams.

3. **Safety Concerns:** Safety procedures must be followed according to general safety practices prescribed by the printing technology lab. Caution should be used when moving in and around tables during demonstrations.

4. **Rationale for teaching methods:** The knowledge associated with understanding xerography are crucial for students pursuing a career in the printing technology field. Student practice in groups offers better opportunities for idea sharing and learning styles.

5. **Resources, materials, supplies:** Markers, poster paper, study sheets for notes, vocabulary, notations from lecture.

6. **Feedback I will provide:** Oral questioning, instructor observation and intervention.

7. **Summary and transition to learning activity three:** Question students as to what they have learned. Review steps by having groups show their posters and discussion of the posters.

C. Independent Application (Learning Activity 3)

1. **Teacher activity:** The teacher will assess each student using a written matching test.

2. **Student activity:** Student will independently complete written evaluation without assistance to 80% accuracy of the checklist.

3. **Rationale for the teaching methods employed:** The knowledge associated with understanding xerography are crucial for pursuing a career in printing technology field.

4. **Resources, materials, supplies:** A written matching answer cognitive evaluation

5. **Feedback to students:** Scoring of written evaluation.

6. **Transition to assessment and/or lesson summary closure:** Collect evaluations. Students will get ready to review and discuss what was learned. Students who have completed their

IV. Assessment Section

Assessment occurred in the LE3 evaluation.

V. Lesson Summary/Closure Section

1. **Student involvement in reviewing the lesson to determine whether learning has taken place:** Oral questioning and review steps on the content outline: Key Questions:

   - Why is it important to illuminate the drum with light before repeating the process.
   - To clean the drum of used toner.

   - What might happen if the paper was not charged? The toner would stay on the drum.
   - Does the paper ever have to touch the drum in xerography? No, the toner can jump the gap.

2. **How will students be involved with making the transition to the next lesson:** We will discuss hypothetical methods in doing multiple color copying by adding heads or repeating belts on xerography machines.

VI. Reflection (Self-Assessment) Section
Lesson not delivered at present. Will be videotaped before April 24, 2007