I. Rationale

The reason I chose to do an Ohio Graduation Test (OGT) preparatory unit is because of the low rate of passage of the Science OGT at Woodward High School in Toledo, Ohio. I teach Biology and Physical Science to freshman and sophomores. Students take the OGT for the first time in March of their sophomore year. Responsible teachers of freshman and sophomores should identify potential weaknesses in students about to take the test. If weaknesses can be addressed before the test is taken, students will avoid the frustration of failure.

In March of 2006 only 37.2% of Woodward students who took the science OGT were proficient. This compares to scores of 51.6% for math, 56.3% for social studies, 66.5% for writing and 72.3% for reading. Students across the Toledo Public school district failed to perform on the science OGT in 2006. The percentage of students in the district who passed the science portion was only 50.3%. Low science scores reported throughout the district indicate a problem with the science program district wide.

Based on my experience teaching within the Toledo Public School district, I believe this problem comes from the emphasis placed on reading and math achievement in elementary schools. Until recently, in Ohio, a district and a schools report card scores were based upon measured improvement in reading and math scores. Elementary students were required to spend at least 90 minutes of the school day in reading instruction. Often this time benchmark was surpassed. Math instruction became an equal priority. In addition to classroom math instruction that lasted at least an hour a day, computer lab time was dedicated to math practice. Most
schools employed a math specialist that spent an addition hour with each class every other week. This left precious little time for social studies and science instruction.

This summer I attended a workshop for science teachers, TEAMS. Many elementary teachers that participated in the workshop expressed a concern for their lack of content knowledge in science. During the workshop participants were involved in many modeled activities. The pre-assessments the elementary teachers participated in revealed that many of them had little or even incorrect knowledge of important science concepts such as electricity, energy, magnetism and fossil fuels.

The prioritizing of reading and math instruction over science and the lack of content knowledge of many elementary science teachers has contributed to a generation of students in Toledo who are seriously lacking in science skills. As a graduation requirement, students are expected to prove proficiency on a criterion referenced science test. Something must be done to assist the students of Toledo or they will continue to struggle to perform as they have done the past two years.

To determine the needs of the students entering Woodward High School I studied the item analysis reports provided by the Ohio Department of Education. Item analysis of the 2006 science OGT reveals a startling similarity in the measured weaknesses between tenth and eleventh grade test takers.

Of particular interest were the questions that yielded a passage rate of 30 percent or less. Less than 30% of tenth grade test takers were able to answer questions 3, 8, 9, 35, 36 and 44. Similarly, 30% of eleventh grade test takers were unable to answer questions 3, 8, 9, 35, 36 and 40 correctly. It is important to note that questions 3, 8, 9, 35 and 36 are all life science questions.
Assuming these questions are fair and unbiased, this similarity among test takers at different grade levels points to weaknesses in the overall science curriculum, particularly life science.

Woodward High School students performed poorly on short answer and extended response questions. On average 9% of the test takers did not even attempt to answer these questions. At least 87 students received no points for attempted answers. On question 31, a four-point earth science question, none of the 260 test takers received the full four points this question was worth. This could indicate a weakness in content knowledge or a weakness in communicating science through writing.

I have designed a set of materials for Woodward High School students based on the week benchmarks as measured by the 2006 science OGT. These materials can be used by teachers of freshman and sophomores in preparation for the OGT test. They may also be of use to teachers of OGT preparatory classes or OGT tutors in the Toledo Public School district.

II. Summary

The lessons in my set of materials have been designed as stand alone lessons, not a complete unit. This was done so the lessons could at any time and in any order.

The first lesson teaches the concept of Anaerobic vs. Aerobic respiration. It begins as a whole class discussion, followed by a Venn diagram to be completed in cooperative learning groups. The concluding activity is an extended response question that is to be peer graded. A rubric and checklist for peer grading is included.

The second lesson is Photosynthesis Cookies. It includes questions for inquiry, a cooperative learning activity where students make chocolate chip cookies, a graphic organizer where students compare and contrast the process of baking with photosynthesis and a peer
teaching experience where students pass out their cookies and explain the process of photosynthesis to the recipients.

The third lesson is: Will it float? This is a link to a virtual lab found on the Internet. In the lab students calculate the density of solids through the methods of measurement and displacement. Students use these methods to predict if the solids will float in various substances and test their theories in the virtual beaker.

The fourth lesson is a power point presentation that provides students with a strategy for answering short answer and extended response questions. Practice and a peer editing activity follow the PowerPoint presentation.

The fifth lesson is a cell organelle poster project. Students compare the jobs of cell organelles to jobs in a factory, place of business or institution they are familiar with. They draw a poster and write a short report about their comparison. Students share their posters in small groups then the posters and reports are displayed in the hallway for the benefit of the whole school.

The sixth lesson is Color of Stars. It provides a link to an online lesson plan. Students observe burning candles and make comparisons between the color and temperature of the burning flame with the color and temperatures of stars. In the second part of this lesson students use the measurement of balloon diameter to learn about the size of stars at different ages.

The seventh lesson teaches the symbiotic relationships of mutualism, commensalism and parasitism. This lesson includes a link to an online website that uses a set of cards to teach about various animals and how they interact with each other. I have included in the lesson plan a variation on the website activity that can be used as an assessment or a portfolio entry.
The eighth lesson teaches about the genetic principles of immigration, genetic drift and adaptive radiation. Students use creative paper folding to name, define, describe and illustrate these concepts of Natural Selection.

Students will find the ninth lesson very exciting. Students learn about the Plague and how some people inherited susceptibility and immunity to plague bacteria. The students will be introduced to or given practice using Punnett squares to determine genetic outcomes. This would be a great lesson to team-teach with a member of the social studies department.

The tenth document is not a lesson plan. It is a collection of teacher tools that can be used to enhance your lessons or review the concepts throughout the year. It includes links to bingo card makers, word search and crossword puzzle makers, a word wall maker, etc.

III. Conclusion.

The goal in creating this unit is to provide teachers with lessons that will help them prepare their students to take the Ohio Graduation Science test, particularly students at Woodward High School. The science benchmarks as written in the Ohio Academic Content Standards are very broad. These lessons will not address all topics associated with a specific benchmark, only the specific information that was used on the 2006 test to measure that benchmark.

Some may consider these lessons to be “teaching to the test.” As I see it, the Ohio Graduation Test is a measure of what should be taught, and what students should know before they leave high school. It can and should be used as a diagnostic tool to guide our instruction and identify strengths and weaknesses in a district's curriculum. Strengths should continue to be developed. Weaknesses must be addressed. This collection of lesson plans was designed to be a tool used by teachers in addressing the weaknesses.
Ohio Department of Education. (2006). *Ohio Graduation Test Item Analysis March 2006*