Table Top SEM Evaluation Report

Task 1: Evaluation of Teaching Effectiveness

8/8/2007

1. Teacher Workshop

Description of Event:

In this workshop we invited the nine high school and middle school teachers to University of Oregon. First thing on the agenda was a presentation on electron microscopes by a UO researcher who is an expert with the technology. We then gave them a presentation specifically on the Phenom and its capabilities. After this teachers got a chance to make samples and take turns using the device.

Initially we used a few of the FEI provided samples to show how the Phenom worked. Then we tried samples prepared by the teachers. At this point image quality degraded quickly until it was unusable.

The next day teachers worked together and with us to develop curriculum for use with the Phenom when it visits their classroom.

Environment:	Workshop consisting of two half days.
Samples Used:	Numerous; pollens, leaf, fern, insects, etc.
Topics:	Physics of an electron microscope, Phenom operation

2. Gold Beach High School

Description of Event:

A Gold Beach High School science class visited the UO science departments. Gold Beach High School is a small school near the southern Oregon coast. Part of their visit included an hour-long period of time to learn about the TTSEM and a chance to interact with it directly.

The basic physical principles of the operation of an electron microscope were explained, and the operation of the Phenom was demonstrated. After this the students were invited to use the device themselves and look at different samples.

Environment:	University visit by high school class
Samples Used:	Numerous
Topics:	This short visit was mainly used as a chance to wow the students and increase their interest in science and college.

3. South Eugene High School

Description of Event:

The Phenom was transported to South Eugene High School, which is approximately 10 blocks from the UO campus. It was transported the afternoon before, and shown the next morning. For this event we presented the capabilities and operation of the Phenom to the science department at the high school. The purpose of this was to give them some hands-on experience so that they could prepare curriculum ideas for a visit of the Phenom to their classroom.

Environment: Phenom transported to classroom, presented to teachers.
Samples Used: Plant material, insects, staple, etc.
Topics: Capabilities of Phenom, curriculum ideas.

4. Springfield High School

Description of Event:

The Phenom was transported to the Springfield High School. Specifically, it was transported to the classroom of Chemistry teacher Justin Field. The machine was there for one week. The teacher used a variety of samples. In particular they were interested in looking at the surface of a Mentos candy. They were attempting to understand the well-known reaction when Mentos is combined with Coca-Cola. Under the microscope it could be seen that the surface of the candy is very pitted. This gives a larger surface area for reaction compared to a smooth surface.

Environment: Phenom transported to classroom, teacher and students use the device.
Samples Used: Plant material, insects, mentos candy, diffraction glasses
Topics: Reaction surface area, physical principles of an electron microscope.

5. North Douglas High School

Description of Event:

The Phenom was transported to North Douglas High School in Drain, Oregon. It was left there for a week in the classroom of Lisa Main. Here is a quote from her on her experience with the Phenom:

"In my classes we were given a dead hard drive from our tech and we took it apart and made samples of the computer boards, hard drive readers, etc. Students also made samples using M&M's candies. They could see really bright spots on the M part b/c it is titanium oxide, an ingredient in sunscreens. Students also made samples using coin money, and were amazed when they saw that it wasn't smooth. I had one female student; who is very low achieving, spend every study hall period running the machine and she was comparing metals verses nonmetals. She found that items containing large amounts of metal showed up much better on the screen. Once the SEM settled down and we got over the manageable learning curve of how it worked and how to fix things when they went wrong, both the students and I had a great time with the machine. Next time, it would be very helpful to have the machine for two weeks, so that we have time to give small groups of students a chance to do some inquiry-type work on the machine. It would also give me time to possibly have an open house night for the community."

Environment: Classroom use
Samples Used: Hard drive components, candy, metals
Topics: Technology

6. "Science at the Pub" Community Event

Description of Event:

The main purpose of this community event was to inform the public about nanotechnology in general, and green nanotechnology research at UO specifically. UO Professor Jim Hutchison gave the largest part of the presentation. The Phenom was brought in and set up before the audience arrived. The plan was for the UO TTSEM fellow to describe and demonstrate the Phenom as well as describe the local school outreach that had been done. Unfortunately, while testing the device before the audience arrived the image quality quickly degraded until nothing was visible. The end result was the capabilities and outreach with the device was discussed, but the Phenom could not be demonstrated and community members didn't get a chance to interact with it themselves.

Environment:	Community science presentation at Eugene Pub
Samples Used:	None
Topics:	Phenom capabilities, classroom visits, nanotechnology research