



An Overview of RJLee Education



Assisting the educational community in the integration of analytical instrumentation in science curricula

October 23, 2008

RJ LeeGroup, Inc.

Scientists, Engineers and Technicians

- Use analytical tools to solve problems
- Specialize in the development of analytical methods, software and instrumentation
- Education outreach programs

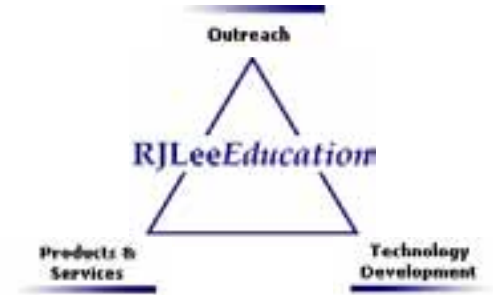
RJ Lee*Education*



Education Outreach Goals

- Provide access to “high-tech” analytical instrumentation
- Motivate students in science/technology education
- Develop technology, tools and products to support the educational community

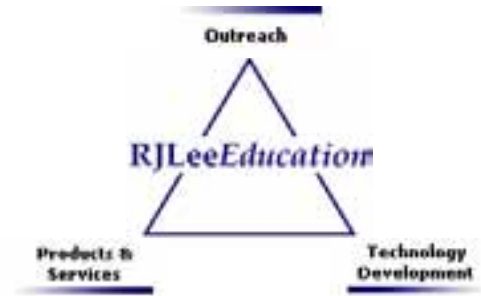
WGSD-RJ Lee Group Education Partnership



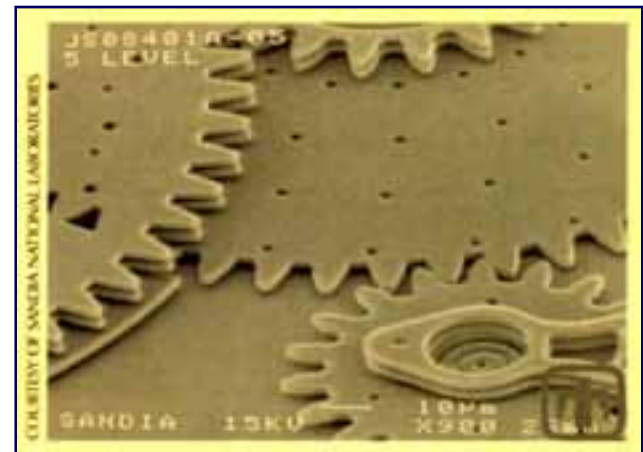
- Objectives...
 - Motivate students in science/technology education
 - Enrich the educational experience
 - Provide assistance to rural community
 - Help improve image of the community for future business growth



WGSD-RJ Lee Group Education Partnership



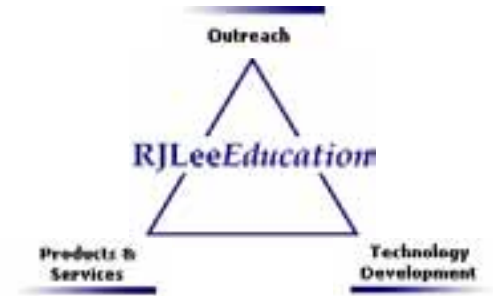
- Focus on microscopy
 - Ideal tool for hands-on measurements and observations
 - Promotes visual/critical thinking
 - Inquiry driven
 - We see the need
 - workforce development



Microscopy Lab at the West Greene Middle-High School



Appalachian Regional Commission

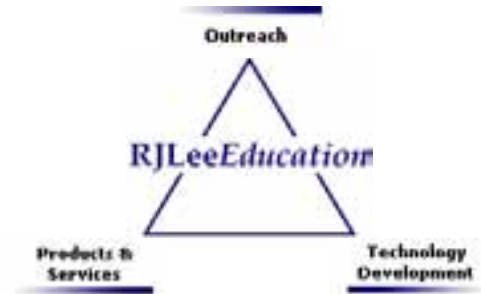


- ARC provided funding to support the project
 - Encourage an after school student program
 - Best Practice: Use of Technology in Education

Pennsylvania Junior Academy of Science (PJAS) Awards

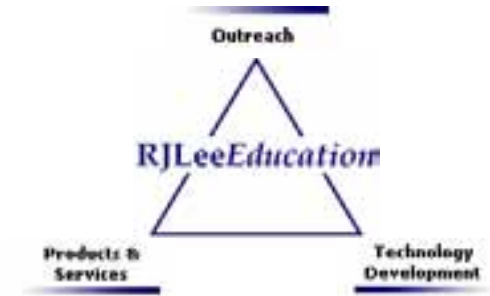


Microscope Simulators



- All teachers/students can have “access” to an optical microscope or SEM
- Cost effective
- Students can perform laboratory experiments at home
- Can be integrated with current science curricula

NSF SBIR Grant



- Development of a Scanning Electron Microscope Simulator for Use in Education



“Education Magnified 100,000x”

Properties of Rocks



Earth Science Series: Properties of Rocks

Rocks formed within fractures (veins) in igneous rocks are rich sources of many crystals mined for gemstones.



[Acknowledgements](#) [Standards](#) [Glossary](#)

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Properties of Rocks - Table of Contents

Investigation #1: Scientific Observation Tools



The students will demonstrate an understanding of magnification and make comparisons between observations with the naked eye, the LENS, and iOPT.

Investigation #2: Properties of Sedimentary Rocks



Students learn to recognize shape, arrangement, size, and color of grains in conglomerate, a sedimentary rock. From their observations, they will be able to describe how sedimentary rocks are formed.

Investigation #3: Properties of Metamorphic Rocks



Students learn to recognize shape, arrangement, size, and color of grains in gneiss, a metamorphic rock. From their observations, they will be able to describe how metamorphic rocks are formed.

Investigation #4: Properties of Igneous Rocks



Students learn to recognize shape, arrangement, size, and color of grains in granite, an igneous rock. From their observations, they will be able to describe how igneous rocks are formed.

Investigation #5: Classification of Unknown Rocks



Encompassed in a real-world situation, students are able to utilize their understanding of the properties of rocks. Using the iOPT, students will investigate and identify three unknown rock samples needed to repair three of our nation's famous buildings.

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Module: Rock Identification and the Rock Cycle (3rd Grade)



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Resources

Glossary

Suggested Links

Materials

- Hand specimen of conglomerate (1 per 2 students)
- Hand lens (1 per student)
- Reflected light optical microscope (if available)
- Student notebook



Specimen Numbering

Specimens are numbered the same way as those in the Rocks and Minerals module.

Tools



Tool 1 - Hand lens with conglomerate rock



Tool 2 - iOPT with lens



Tool 3 - iOPT with conglomerate rock

Investigation 1: Scientific Tools - Magnification

Student Background

Ever since the first cave man picked up a stick to look fruit from a tree, people have been using tools to help them do things. Microscopes are tools that are used by scientists to make things look bigger than they actually are. This way, the scientist can see things that cannot be seen with the unaided eye.

Objectives

The student will be able to:

- Correctly use visual observations, a hand lens, and a microscope software program to describe characteristics of rocks.
- Identify the advantages and disadvantages of using the different tools.

Teacher Background

In the investigation, students use a hand lens, a reflected light optical microscope (if available) and an optical microscope simulator (iOPT) to extend their sense of sight to view smaller objects than are visible with the naked eye.

To use the hand lens, hold the lens close to the eye (about an inch) and hold the specimen about a foot away. Move the specimen closer or farther until the image comes into focus.



Units of Measure

The iOPT uses metric units of measure. The metric system is based on the meter, slightly larger than a yard. You will also see millimeters and microns (short for micrometers). There are 1000 millimeters in a meter, and there are 1000 micrometers in a millimeter. For reference, a piece of paper is between 60 and 100 microns thick, and a dime is just over 1 millimeter thick.

Procedure

Student Exploration Activity

- Each group of students will use the naked eye to make observations of the hand sample.
- Each group of students will use the hand lens to make observations of the hand sample.
- Each group of students will use a reflected light optical microscope (if available) to make observations of the hand sample, record on the sheet.
- Each group of students will use the iOPT program to make observations of the hand sample.
- Each student will complete a notebook entry answering the question "what are the advantages or disadvantages of using each tool?"

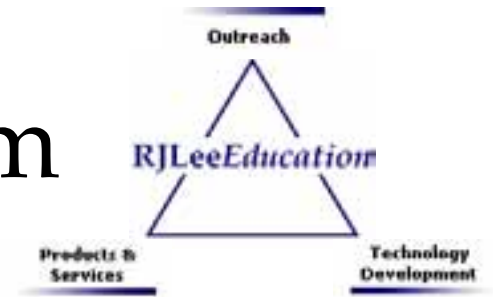
Reflection

As a full class, students will discuss, share and compare observations and notebook entry regarding the different tools.

Done

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Successes in the Classroom



- Student interest
 - interests in using a scientific tool
 - feel like real scientists
 - students can visit the Web-site at home

Forensics Initiative

Waynesburg College & RJ Lee Group

- Advanced forensics laboratory program
 - Enhance forensics curriculum
 - Provide real-world experiences
 - Commercial business component
- Equipment resources-analytical instrumentation
 - Center for Research and Economic Development
 - Financial assistance from DCED
- Scientific expertise
 - Strong business experience in forensic analysis
 - Resource curriculum and learning experiences

Waynesburg University/RJ Lee Group Forensics Initiative

- RJLG Role
 - Manage forensics lab and maintain instrumentation
 - Assist in the training of students; and development/implementation of forensics curricula
 - Use instrumentation for commercial purposes to promote economic development in the area

RJLG Wins!

- Meets RJLG's vision in education
- Creates potential for expansion of RJLG's forensics business
- Partnership will promote future commercial service and product opportunities

Waynesburg College Wins!

- Participation in actual research being used in the field of forensics
- Internships
- Future quality employment within the region for graduates
- Maintain curriculum based upon the most recent advances in the field

Microscopy Workshop

A Hands-On Introduction to
Forensics Science

Waynesburg University
RJ Lee Group, Inc.
Appalachian Regional Commission

March 8-9, 2007





Dave Exline (RJLG) provides overview on the use of analytical instrumentation in forensics investigations



Teachers being given instruction on the Scanning Electron Microscope by Brad Henderson (RJLG)



**Teachers being given instruction on the
Microspectrometer by Ryan Bittner (RJLG)**



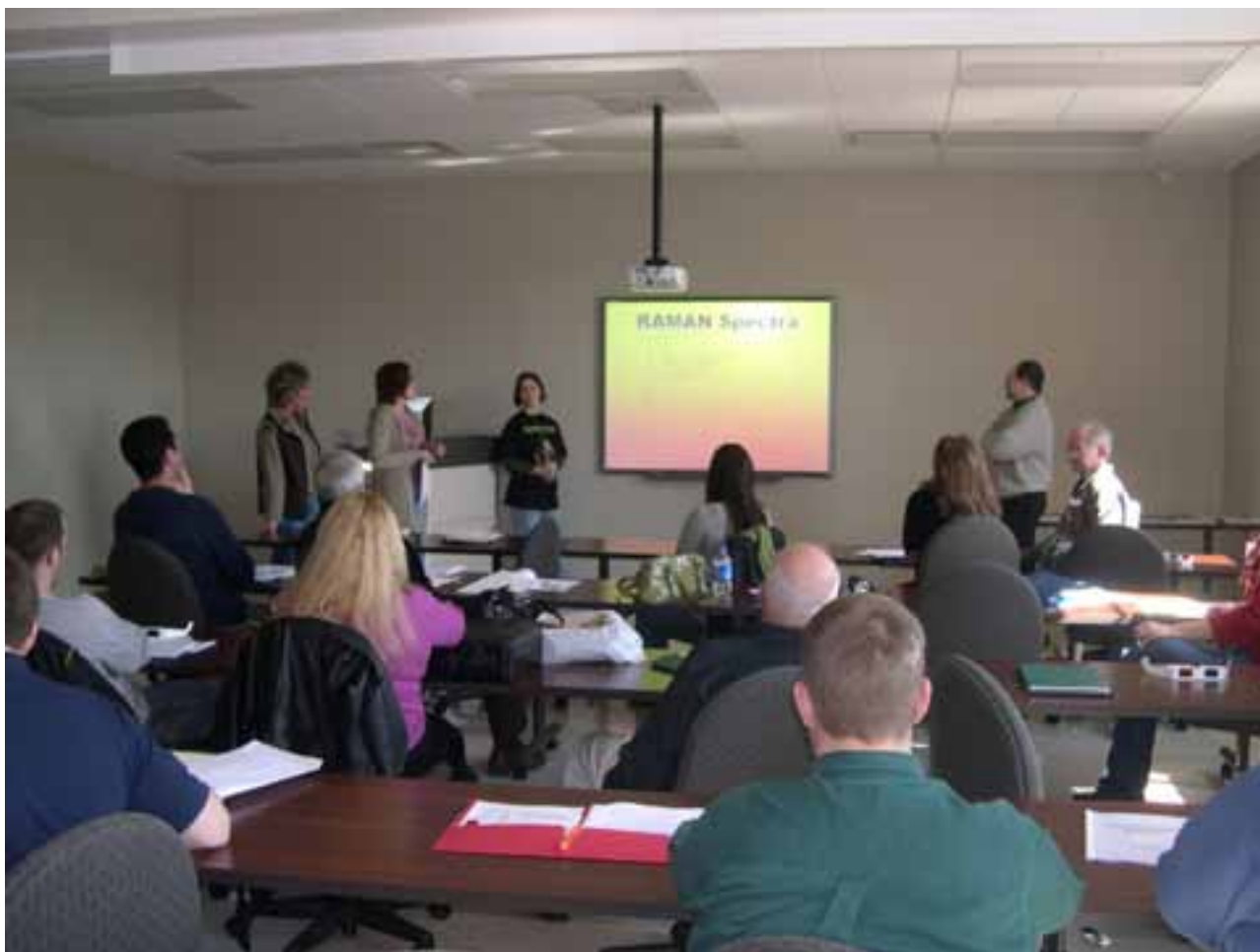
Teachers analyzing samples on the Microspectrometer



**Teachers being given instruction on the
Optical Microscopes by Allison Murtha (RJLG)**



Teachers being given instruction on the RJLG SEM simulator on NSF website by Frank Pazzynski (Waynesburg College)



Teachers presenting their results of analysis of unknowns



- **Waynesburg University**
- **C.S.I. Camp Manual**
- **July 27-31, 2008**



Waynesburg University CSI Camp

- 44 campers from around the world
- 15 Waynesburg students as “camp counselors”
- 2 RJ Lee Group employees as directors
- 1 Waynesburg employee as advisor
- Several students who attended the camp are now students at Waynesburg.
- Community involvement & interaction
- Forensic experts including several RJ Lee Group employees.

Waynesburg University CSI Camp

Fingerprinting

- Fingerprinting Lab conducted by Sara Rafferty of RJ Lee Group.
- Students learned about collecting, processing, and analyzing latent fingerprints.
- They also learned about the history of latent prints and tried their hand at comparisons.
- Students received hands-on training in all aspects.

Waynesburg University CSI Camp Fingerprinting



Waynesburg University CSI Camp Burial Excavation – Deer Carcass

- Students learned how to quadrant off a burial site.
- They uncovered the burial remains of deer carcasses at several stages of decay and were able to compare them.

Waynesburg University CSI Camp Burial Excavation – Deer Carcass



Waynesburg University CSI Camp Surveillance, Search & Seizure

- Students learned the techniques for following a suspect and actually conducted a mock surveillance set in downtown Waynesburg. The students followed the suspect all the way up to the time of arrest.
- Students also conducted a mock search & seizure of the crime scene houses on the campus. They learned the necessity and implications of executing a search warrant as well as the methods for properly searching a house when suspects are present.

Waynesburg University CSI Camp Downtown Surveillance & Apprehension



Waynesburg University CSI Camp Canine Unit

- Students were treated to a presentation by the Canine Unit from the Cumberland Township Police Department.
- Several other federal, state, and county groups gave presentations during the camp including the ATF, Westmoreland County DA's Office, PA State Police, and the Innocence Project.

Waynesburg University CSI Camp Canine Unit



Waynesburg University CSI Camp Hit-and-Run & Trace Evidence

- Demonstration and presentation conducted by Mr. David Exline of RJ Lee Group.
- Students learned the methods and techniques for collecting evidence from several types of crime scenes including a hit-and-run and burglary.

Waynesburg University CSI Camp Mock Hit-and-Run



Waynesburg University CSI Camp Our Campers

