

Tele-Tutoring – From Learning to Earning Part IV: The School-to-Work Program; The Student's Perspective

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This is the fourth in a series of papers that describe RJ Lee Group's (RJLG) *Schoolhouse Project*, an educational outreach initiative designed to evaluate the potential of using high technology analytical instrumentation (e.g., scanning electron microscope) to enhance high school science/technology classes. The project is being undertaken in partnership with West Greene School District, located 90 miles from Pittsburgh in Southwestern Pennsylvania. The first paper discussed the program and the objectives of the educational/business partnership, which include providing exceptional educational and business opportunities to the West Greene students; motivating students to pursue advanced education, especially in math, computer sciences, engineering, and the basic sciences; enriching the educational experience beyond that commonly available to students in rural communities; and improving the general attractiveness of the region for business growth.[1] The second paper discussed RJ Lee Group's efforts related to the development of the WebSEM™, which permits control and operation of Personal SEM® (PSEM) over the Internet. The WebSEM allows the PSEM to be used as a shared resource thus increasing its utility as an educational tool.[2] Last year, Jim Lang, a high school chemistry teacher at West Greene, discussed how he has used the PSEM in his first year chemistry and advanced (college level) classes.[3] A key component of the project is the establishment of an incubator laboratory extension of RJ Lee Group at the West Greene high school. The laboratory is being designed with broadband Internet access and video conferencing technology to facilitate distance learning activities and remote WebSEM use. The laboratory is designed to function as an SEM/Computer Learning Laboratory during the school day and as a business during the evenings and weekends. This paper discusses the RJ Lee Group school-to-work program and the lessons learned from working with two West Greene student employees over the past year.

In the spring of 2001, RJ Lee Group announced to the West Greene high school students that it would be considering applications for two part-time internship laboratory technicians to assist RJ Lee Group personnel on education related and commercial project work during the "off-hours" (evenings and weekends). Several West Greene students were interviewed and Laura Bosco and Jason Johnson were hired. In the summer of 2001, Laura and Jason were trained in the basic operation of the PSEM. As their microscopy skills developed, training focused on the computer controlled scanning electron microscopy (CCSEM) techniques. They began honing their analytical skills by initially working as a team on the characterization of steel inclusions and soil particle samples using manual SEM and CCSEM techniques. By the end of the summer, both Laura and Jason developed the skills necessary to perform manual SEM and CCSEM analyses with minimal assistance from RJ Lee Group personnel.

During the school year, Laura and Jason were assigned independent projects. Laura's research involved the characterization of mineral standards using manual SEM and CCSEM methods. The goal of this project is to begin development an electronic atlas with representative images and spectra of standard mineral species to assist in identifying these materials in the analysis of unknown

samples. This project is anticipated to take several years and numerous student employees to complete. To keep the project moving effectively, Laura will train the next student employee on this task, satisfying an ancillary goal of having students train students. Jason's research project involved the CCSEM analysis of high-Z particles in oil well drill cuttings. The goal of this project is to recognize changes in rock constituents with depth in the well, and relate these changes to information obtained from well logging tools. The major challenge is to recognize specific mineral constituents based on the elemental composition.

From the perspective of the students, Jason believes that the work-study program has provided a great source of both knowledge and work experience. He also noted that the range of samples, including steel inclusions, soil particulate, PM-10, and others, provided a wider scope of interests and examination methods. The various projects and related research have also proved, although at times tedious, to be a "decent learning experience". He noted, however, that the classroom applications of the SEM have still only scratched the surface of their capability.

Laura believes that the availability of the SEM in the classroom allows the students to learn by doing it rather than by reading about it, and has expanded their knowledge in various areas. Laura indicated that learning the techniques of the SEM out of a textbook does not compare to actually learning by operating the equipment. Not only are the students applying what they have learned to real-life working situations, she believes they are already on their way to a huge advantage over classmates in college who have not even had the chance to look at an SEM.

In summary, the students believe that the school-to-work program provided the opportunity to learn more about science, technology and responsibility. The wide range of samples (e.g., steel inclusions, soil and rock grains, fine airborne particulate) introduced them to the variety of materials analyzed in the real world setting and illustrated fields of work and study that some students never knew were available. Also importantly, the students learn that a portion of the work that needs to be performed is tedious. Both Laura and Jason believe that the program could be improved by incorporating it even more into the classroom, by either more student instruction time or developing a curriculum based only on the operation of the SEM.

Over the past four years WGSD and RJLG have made considerable progress towards development of an innovative educational/business partnership. The Schoolhouse Project is developing into a self-sustaining program beyond the space and time framework of the traditional school and is providing an exceptional educational experience for WGSD students.[4]

References

- [1] RJ Lee Group and West Greene School District, *Tele-Tutoring – From Learning to Earning: Part I. The Learning Part, Microscopy & Microanalysis* 1998.
- [2] J. Lang et al., *Tele-Tutoring – From Learning to Earning: Part II: The Use of Remote Technologies, Microscopy and Microanalysis* 2000.
- [3] J. Lang et al., *Tele-Tutoring – From Learning to Earning: Part III: The Fun Begins, Microscopy and Microanalysis* 2001.
- [4] This research was supported in part by the Appalachian Regional Commission.