

Sherlock Holmes and The Case of the Missing Microscope

Section 1: Justification

A. Project Need: Inspired by Dr. Joseph Bell, a 19th century forensics expert, Arthur Conan-Doyle created Sherlock Holmes, the “world’s greatest detective” in 1888. Holmes was a dedicated observer whose main tools were science and deductive reasoning. This fictional detective along with French forensic pioneer, Edmond Locard, established the protocols for modern day crime scene investigation. With his always handy magnifying lens, Holmes "demanded acute observation, accurate data, and careful methodology.” (Conan-Doyle, 1888).

The same applies to the CSI: Helena High classroom where students are challenged to observe, collect, and analyze microscopic evidence ranging from bullet rifling to polyolefin microfibers. What brings such student engagement into the twenty-first century is the digital microscope. The ProScope HR2 is a handheld USB microscope that works on Windows and Mac and will go anywhere a laptop goes while imaging evidence in real time on the desktop. Images magnified from 10X to 500X can be captured as still photos or videos and easily saved for later examination.

B. Purpose of Project: By using the computer screen to view digitally magnified images, more accurate measurements and analysis can be conducted. Such technology raises the level of student interest as well as the desire to engage in rigorous inquiry. The ProScope digital microscope is this current generation’s Holmesian magnifying glass with the ultimate result of stimulating scientific data collection and deductive reasoning.

These aims are consistent with the objectives outlined in the Helena High CSI course as well as District educational goals.

Section 2: Relevance to Great Ideas Grants Programs Goals

A. Creativity and Innovation: Sherlock Holmes followed the purest code of logic and ethics to crack a case. His reasoning and knowledge were extremely high which allowed him the capacity to think out of the box. Edmond Locard established the primary principle of forensic investigation by stating that every contact leaves a trace.

"Wherever he steps, wherever he touches, whatever he leaves, even without consciousness, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it, can diminish its value."

Students are engaged when they have the opportunity to use innovative technology to solve challenging problems. At present, there are no hand-held digital microscopes in Helena High (or at the Helena Police Department, either). With the ProScope HR2 on a crime scene, digital evidence collection and analysis is just one click away. Back in the lab, the digital unit can easily download images to classroom desktop and laptop computers. When students are called as forensic expert witnesses, their courtroom presentations are professional and dynamic. Fingerprints, fibers, pollen, powder burns, hair, etc. are all explained in ultra-high magnification.

B. Extension Of Student Learning: The primary purpose of the CSI: Helena High class is to excite and intrigue students with real-world scientific applications so that they can feel confident about seeking potential careers rich in science based skills. Such careers include law

enforcement, evidence collection technician, toxicologist, ballistics technician, fingerprint technician, and DNA analysis technician.

C. Collaboration: Collaborative partners include two biology teachers: Claire Pichette and Missy Sampson. The use of a digital microscope is a necessary enhancement for biology labs and lessons. Biology, Honors Biology, and Senior Science Seminar students would greatly benefit by having access to this technology.

D. Availability of other funding sources: Due to the continuing recession and revenue issues, no funding source is available from the District or Helena High school to acquire such technology as the ProScope Digital Microscope.

Section 3: Project Description

A. Design: The CSI: Helena High course calendar of major activities that would use the digital microscope begins in September and concludes in May. Throughout the school year, students will engage in the following units: Fingerprint Collection and Analysis, Qualitative Analysis of Non-Metallic Powders, Lip Print Collection and Analysis, Handwriting Analysis, Polymer ID and Analysis, Hair & Fiber Collection and Analysis, Ballistics: Casing & Bullet Analysis, Entomology: Insects & Decay, Blood Spatter Analysis, and Anthropology: Dental Analysis. Other organizations that will be involved with the program include: Helena Police Department officers, detectives, and technicians, St. Peter's Hospital toxicologist, Montana State Asst. Attorney General, Lewis & Clark Co. Coroner, Montana State Crime Lab, and local Helena morticians.

B. Budget: See Attached Document

Section 4: Evaluation, Dissemination and Future Plans

A. Evaluation: Student success and progress will be measured by hands-on lab applications, crime scene examination activities, Montana State Crime lab video conferencing, state and national high school forensics competitions, and public presentations. Benchmarks have been determined by Montana and National Science Standards.

B. Dissemination: Success of the program will be shared with the greater Helena community via the Helena Independent Record, KTVH, local radio stations, and through demonstrations at the ExplorationWorks! CSI units can be shared with other educators through my webpage as well as professional development workshops. The ProScope has many applications in a variety of disciplines particularly in math and science. Because it is portable, it can go anywhere. It can bring the lab to the field so that biology, earth science, and math can be conducted on site. Students armed with the unit can photograph magnified images that would relate to minerals, structural deformation, geometry, botany, embryology, mammalogy, and ecology.

C. Future Plans: My future plans include the continuation and expansion of Twenty-first Century technology to support inquiry based curriculums such as CSI and Senior Science Seminar.