



D34 Science and Mathematics Education for Crime Scene Technicians and Crime Scene Reconstructionists

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The goal of this presentation is to initiate a discussion of the minimum educational qualifications in mathematics and natural science that should be required of crime scene technicians and crime scene reconstructionists. After this presentation, attendees will have a better idea of the minimum educational standards in mathematics and natural science that crime scene technicians and crime scene reconstructionists should have.

This presentation will impact the forensic community and/or humanity by promoting the discussion of the educational qualifications of crime scene technicians and crime scene reconstructionists, an area of concern that has yet to be explicitly addressed by technical working groups or professional societies.

Over the last few years technical working groups (TWGs) and scientific working groups (SWGs) in a number of forensic science disciplines have established minimum educational qualifications for practitioners of these disciplines. Some consideration should also be given to the educational qualifications of crime scene technicians and crime scene reconstructionists. What minimal levels of competence in mathematics, physics, chemistry, and biology should persons employed in these roles have attained, either in high school or college? The answers to these questions would be useful for high school and college guidance counselors and for high schools and colleges creating courses in crime scene processing and crime scene reconstruction. The International Association for Identification (IAI) has published guidelines for a three-level certification of crime scene technicians/analysts. Crime scene technicians (level I) are expected to have completed a minimum of two crime scene related courses; crime scene analysts (level II) are expected to have completed a minimum of four crime scene related courses; and senior crime scene analysts (level IIIB) are expected to have completed a minimum of six crime scene related courses. The IAI requirements do not address the issue of the minimal mathematics and natural science knowledge that crime scene technicians or crime scene analysts require to perform their basic functions.

Crime scene processing requires meticulous documentation of the scene of a crime through note taking, sketching, and photography. Rigorous laboratory course work in natural science is a useful introduction to disciplined note taking. A course in physical optics is a useful introduction to photographic optics. An introductory chemistry course provides an adequate basis for understanding the chemistry of crime scene processing (such as latent fingerprint development and tire and shoe impression enhancement), while an introductory biology course provides an adequate basis for understanding the handling of biological evidence (such as blood and other body fluids).

Crime scene reconstruction requires a somewhat different set of skills than crime scene processing. Texts on bloodstain pattern analysis and shooting incidents require a grasp of basic algebra, basic geometry, and basic trigonometry. Calculus (although it is the basis of classical kinematics) is not required. Nor are matrices and vectors required. Mastery of the deductive reasoning process used in mathematical proofs also has considerable value for crime scene reconstructionists. The most important scientific discipline for crime scene reconstructionists is physics. Traffic accident reconstruction, bloodstain pattern analysis and shooting reconstruction all require a thorough grounding in classical physics. One of the authors (E.R.) has worked with the Department of Physics of The George Washington University to create an undergraduate forensic physics course. This course would cover topics relevant to crime scene reconstruction: basic kinematics (including conservation of linear and angular momentum, coefficient of friction, projectile trajectories), fluid dynamics, electromagnetism, physical optics, and molecular physics.

Archaeology has great potential value for both crime scene technicians and reconstructionists. Crime scene technicians collect physical evidence, while archaeologists collect material culture remains. Crime scene reconstructionists reconstruct events that occurred over a short time span, while archaeologists reconstruct events that occurred over years, centuries, or millennia. Archaeologists approach the documentation of their sites in much the same way as crime technicians and crime scene reconstructionists approach the documentation of crime scenes. Most colleges and universities have Departments of Anthropology that offer introductory and advanced coursework in archeology. They also offer archaeology fieldwork courses. In Great Britain some universities have degree programs in forensic archaeology or offer forensic archaeology concentrations. Many Departments of Anthropology also offer courses in physical anthropology with laboratory work in human osteology.

The Information Technology Age has affected crime scene investigation and crime scene reconstruction. Computer-assisted design (CAD) crime scene/accident scene diagramming programs are



General Section – 2005

increasingly being used by law enforcement agencies, after precise measurements have been acquired by sophisticated tools like Total Station or photogrammetry techniques using a perspective grid and reverse projection. Computer generated simulations/animations and reconstructions are frequently used in court as demonstrative visual aids for the jury. Digital imaging, with the possibility of enhancing marginal images with Photoshop® and similar software programs, may end the use of traditional film cameras. As a consequence of these developments, crime scene technicians and crime scene reconstructionists should have significant course work in digital photography and computer-assisted design.

Crime Scene Technician, Crime Scene Reconstruction, Education