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Letter to the Editor—Forensic Education 10 Years Later: A Research Update on Entry-Level Examiner Requirements.

Sir,

Over the past 20 years, the field of forensic science has undergone a myriad of technological as well as socio-legal changes. These changes include, but are not limited to, advancements in DNA technology (i.e., restriction fragment length polymorphism [RFLP] to polymerase chain reaction [PCR] method, the mapping of the human genome), the construction and maintenance of the Combined DNA Index System (1994) and the Integrated Automated Fingerprint Identification Systems (1999). In much the same vein, the face of forensic science education has also changed, with the development of the Forensic Science Education Program Accreditation Commission (FEPAC) the American Academy of Forensic Sciences in 2002.

FEPAC was established with the specific mission to maintain and enhance the quality of forensic science education at both the undergraduate and graduate level. In order to receive FEPAC accreditation, undergraduate programs must have a clear statement of the mission, goals, and objectives of the program and participate in a review of admission requirements and the curriculum and unit requirements (program-specific and general requirements for the baccalaureate degree—including natural science, specialized science, forensic science, and other courses). The director of undergraduate programs must also meet strict FEPAC specifications, and the program itself must be supported by qualified faculty, as well as foster success in student achievement and professional involvement. Graduate programs must adhere to the same standards, including a special focus on core forensic science topics and specializations included in the program, and graduate seminar and research requirements. For a full list and further details on FEPAC standards, please visit the American Academy of Forensic Sciences website. There are currently 29 FEPAC-accredited programs in 18 states and one in Canada.

Because of these and many other developments, decades-old research can no longer be expected to accurately describe the level of expected educational attainment for entry-level forensic examiners. In 2008, a survey was conducted of forensic laboratory directors and managers in the U.S. to update the previous survey work published in the *Journal of Forensic Sciences* in the late 1980s and 1990s (see [1–4]). Using traditional social scientific survey methodology (5), this study asked a battery of questions regarding educational standards and also requested information on the director or manager's own background (education, work history, etc.), desired educational background for entry-level examiners, amount and kind of prior professional experience, and explored a variety of attitudes toward forensic the forensic sciences.

Based on the 2004 Bureau of Justice Statistics census (6) estimate of 351 publicly funded crime laboratories in the U.S., a sample of 172 crime laboratories (*c*. half) were selected for the study, and their directors or managers were invited to participate in an online survey. This sample was chosen using a stratified selection procedure that ordered the sampling frame according to the number of publically funded laboratories in the state. This ensured that the probability of any individual director or manager selected was proportionate to the number of laboratories in the state to prevent the accidental overrepresentation of states with large numbers of laboratories. This probability-based approach was also taken to ensure that the results would be statistically generalizable to laboratories that were not sampled in this study. Contact information for the directors or managers of the laboratories sampled for this study was obtained through the assistance of the National Clearinghouse for Science Technology and the Law. Further details on the sampling methodology employed in the study are available from the authors of this letter. The questionnaire utilized for this study was designed after the measures used by Furton, Hsu, and Cole (1), replicating questions that assess education requirements for entry-level forensic examiners. The overall response rate for the survey was 51%, on par with other studies using a similar methodology.

Prior research (1) revealed that crime laboratory directors expect applicants to have "hard" science (i.e., physical rather than social science) degrees for the positions of drug chemist, trace/impression evidence, serologist/DNA, firearms, document examiner, and fingerprint examiner. Overall, laboratory managers who desired applicants with graduate forensic degrees felt that existing forensic science programs offered well-balanced training that contained an appropriate forensic focus (7). However, approximately half of the managers surveyed felt that there was not a distinct advantage in pursuing advanced degree work.

Studies by Siegel (3) and Higgins and Selavka (2) convey several different sources of educational expectations and preferred types knowledge domains and level of academic degree completion. Chemical knowledge was the most important ability, followed by instrumental knowledge and laboratory procedures. Siegel (3) also found that there was a differential emphasis on bachelors- and masters-level degree programs by a surveyed sample of forensic examiners employed by the Michigan State Police (n = 125) and members of the American Society of Crime Lab Directors (ASCLD [8]) (n = 240). The Michigan State Police voiced a preference for masters-level degrees in the physical, biological, or forensic sciences, whereas the ASCLD demonstrated a preference for bachelors-level degrees in the same fields.

The findings from the 2008 survey revealed that many of the entry-level education requirements have remained unchanged since the late 1990s. The study of general chemistry retains its seat of importance among the various forensic practice areas. Indeed, other types of chemistry (organic, analytic, physical, and inorganic) have also been unanimously required among all forensic practice areas. However, it is interesting to note that an emphasis has also been placed on mathematics/statistics for all of the forensic practice areas except for questioned document examination. Consistent with the survey work conducted in the late 1990s, graduate-level internship experience is rarely required for entry-level forensic examiners. Degree requirements for entry-level forensic examiners have also remained consistent with the previous survey work. The modal required degree across all forensic practice areas is a Bachelor of Science. Only a handful of laboratory directors required advanced degrees at the masters (n = 2) or doctoral level (n = 2).

Specializations within degree requirement were not reported as part of the original survey series conducted in the mid-1980s or the additional survey work produced in the late-1990s. Laboratory directors differentially emphasized the specialization they desired in entry-level applicants according to forensic practice area. The desired specialization for drug chemist was chemistry (n = 20), trace and impression was also chemistry (n = 7), serology/DNA

analyses was biology (n = 9), firearms examiner did not require a specialization (none; n = 10), neither did questioned documents (none; n = 7), and latent fingerprint (none; n = 18). The results of this survey were presented in poster form at the 2010 American Academy of Forensic Sciences conference in Seattle, WA. Additional details regarding this research are available from the authors.

In summary, despite the noteworthy socio-legal changes that have occurred over the past two decades regarding the admissibility of expert testimony, very little appears to have changed in respect to education requirements for entry-level forensic examiners. The emphasis on chemistry across all forensic specialty categories employed in this survey (drug chemist, trace/impression, serologist/DNA, firearms examiner, questioned documents, and latent fingerprints) is consistent with the research conducted by Furton, Hsu, and Cole (1). One notable descriptive difference that appeared is the seemingly increased emphasis on mathematics and statistics. The lack of required specialization within the degree background for entry-level examiners in the fields of firearms examination, questioned documents, and latent fingerprint examiners appears to differentiate those practice areas from drug chemist, trace/impression, and serologist/DNA analysts. There has been a historic division within the forensic sciences that differentiates between the "hard" and "soft" sciences. The descriptive results regarding areas of specialization suggest that this division is still present.

This study is not without limitations. Although the response rate was acceptable for the methodology that was utilized, the lack of a substantial sample size limits the conclusions that can be drawn from this survey. However, the sampling techniques were specifically chosen to allow the results to be generalizable to publicly funded crime laboratories that were not surveyed. Nevertheless, this brief update of the original research from the 1980s and 1990s may provide some insight into which entry-level examiner education requirements have changed and which have remained the same in the field of forensic science.

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