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Graduate Education in 'Conventional' Criminalistics: A Proposal and Reactions

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ABSTRACT: 'Conventional' criminalistics is defined in this study as: firearms and toolmark examination, microscopic examination of glass, soil, hair and fibers, fingerprint analysis and questioned documents examination. Since pre-employment access to graduate education programs and training opportunities in these conventional areas has traditionally been quite limited, a new graduate education model for conventional criminalistics was developed and presented to the membership of ASCLD for reaction. Based on a 51.8% response rate ($N = 177$) to a survey instrument, it was found that laboratory directors generally supported the model and believed that it could be appropriately linked to the 100 or so new hires projected annually by the directors for the conventional areas over the next five years.

KEYWORDS: criminalistics, graduate education, apprenticeship, laboratory survey, hiring projections

For students interested in preparing for a career in certain areas of criminalistics, access to a number of graduate education programs and training opportunities exists prior to being hired by a forensic science laboratory. This is especially true in the areas of serology, drug chemistry, and instrumental analysis of trace evidence. If students are interested in preparation for a career in certain other areas of criminalistics, however, they may find graduate education programs and training opportunities to be quite limited. This is especially true in the areas of 'conventional' criminalistics—defined here as: firearms and toolmark examination, microscopic examination of glass, soil, hair and fibers, fingerprint analysis and questioned documents examination. Given our perception (1) that relatively few graduate education programs and training opportunities exist in conventional criminalistics; and (2) that traditional academic programs have shown relatively little interest in developing courses of study in the conventional areas, we propose

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a new graduate educational model for conventional criminalistics and present the initial reaction of the nation's crime laboratory directors to the proposal.

Model

The model consists of a conventional criminalistics track located within a graduate criminalistics program. As shown in Fig. 1, the track is comprised of five main components: requisite courses in chemistry, exposure to the entire field of criminalistics, foundation courses in microscopy, emphasis on microscopy-related electives and an apprenticeship in two of the conventional areas.

Students will be required to demonstrate successful completion of at least two and one-half years of college chemistry in preparation for required courses in instrumental analysis and biochemistry. Students will also be exposed to required courses in all of the areas of criminalistics, in order to gain an appreciation for the entire field. Given the importance of microscopy, the fundamentals of microscopy and their application to evidentiary analysis will be a part of the core curriculum. There will also be an emphasis on microscopy-related electives from other academic disciplines. (In a geology course like optical mineralogy, for example, students will develop an understanding of the properties behind birefringence, optic signs, indicatrix, relief, extinction, retardation and interference colors, thus equipping them with thorough knowledge to identify mineral materials that may be encountered during a forensic analysis. Also, in a materials engineering course like quantitative microscopy, students will learn relationships between microstructural characteristics and properties.) Finally, reflecting the influence of the clinical training model for forensic science proposed by Stoney [1], we envision a programmatic linkage between our academic program and operational laboratories. Under this model, court-qualified criminalists will function in a role similar to that played by clinical instructors in teaching hospitals; specifically, these instructors will assist and monitor students in their development of research projects designed to demonstrate problem-solving ability in two of the conventional areas. Accordingly, the nature and quality of mentoring associated with this kind of an apprenticeship differs considerably from that usually experienced by a laboratory intern.

Methods

To elicit an initial reaction to the model, survey instruments were mailed to all 351 members of the American Society of Crime Laboratory Directors (ASCLD) in October,

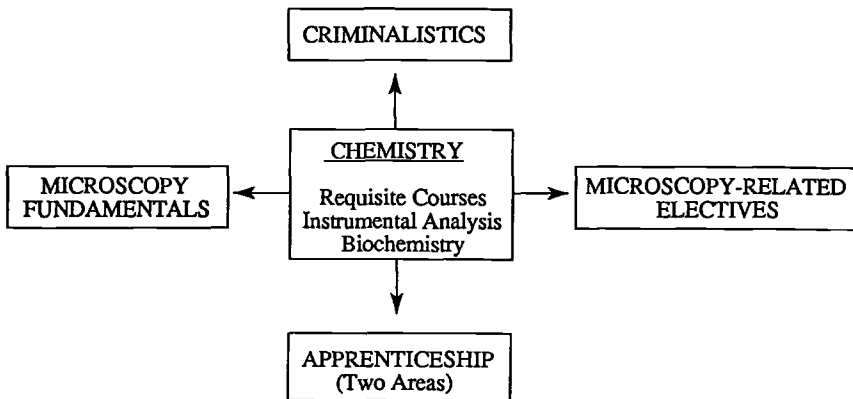


FIG. 1—Educational model for conventional criminalistics.

1992. (Nine of the surveys were subsequently returned as undeliverable.) Completed surveys were returned by 177 of the 342 eligible respondents for an overall response rate of 51.8%. Using Babbie's [2] rule of thumb that a response rate of at least 50% is adequate for analysis and reporting, it is posited that respondents are representative of ASCLD's membership.

Results

Laboratory directors ($N = 151$; 26 no answer) were first asked about the current existence of effective training opportunities, other than in-house training, in the areas of conventional criminalistics. As indicated by Table 1, 60% responded that effective training programs were already in existence.

A review of the affirmative responses, however, indicates that most of these training opportunities are only available for criminalists already employed within one of the conventional laboratory areas. While Geer [3] would suggest that use of courses like those offered by federal law-enforcement agencies is because of their uniqueness and the lack of readily accessible alternatives, we are nevertheless left with Livingston's [4] observation that in-service training still plays an important role in the development of criminalists. With the exception of university courses, relatively few training opportunities exist in conventional criminalistics prior to hire.

The directors ($N = 138$; 39 no answer) were next questioned about whether persons trained in conventional criminalistics should specialize in one area or should they be trained in multiple areas. Table 2 shows a distinct preference for training in multiple areas.

Believing that laboratory size might be a key variable affecting responses, we analyzed the relationship between this variable and training preferences. The analysis showed that the preferences for scientists trained in multiple areas expressed by the smaller laboratories (1 to 5, 6 to 10 and 11 to 15) were 70%, 75% and 80%, respectively; however, the corresponding figure for the larger laboratories (>15) was only 38% ($\chi^2 = 12.13$, $df = 3$, $P < 0.01$). Therefore, we conclude that laboratory size is significantly related to training preferences; the smaller laboratories prefer conventional criminalists who are generalists, while the larger laboratories prefer specialists. Here, it may also be appropriate to note that several directors favoring multiple training indicated that criminalists

TABLE 1—Existence of effective training programs in conventional criminalistics.

Responses	
Yes (60%)	No (40%)
FBI Specialized Courses (70%)	
University Courses (26.6%)	
CA Criminalistics Institute (24.4%)	
McCrone Institute (24.4%)	
Workshops at Meetings (14.4%)	
FBI Academy (12.2%)	
Private Vendors (7.8%)	
ATF (5.5%)	
IL State Police (4.4%)	
Secret Service (3.3%)	
DEA (2.2%)	
Army CID (1.1%)	

TABLE 2—*Preferred type of training for conventional criminalists.*

Responses
Multiple Fields (60.2%)
Generalists needed in smaller labs (14%)
Generalists are more marketable (13%)
Cross-training especially appropriate in compatible fields (9%)
Facilitates knowing the potential of other evidence (4.6%)
Facilitates understanding relationships between various types of evidence (3.5%)
Single Field (39.8%)
Labs lack the time for cross-training (3.4%)
Appropriate for criminalist who has a clear direction (3.4%)
Philosophy of training generalists is not relevant today (3.4%)

should not be trained in more than two of the conventional areas. In a somewhat similar vein, several directors who preferred specialization indicated that criminalists must be aware of other areas and that some cross-training may be desirable if the areas are closely related. In summary, then, considerable support exists for the position that conventional criminalists would ideally be trained in two areas.

Within the context of a graduate criminalistics program, what would be an adequate length for an apprenticeship in one of the conventional areas in order to gain favorable consideration for entry-level employment? As indicated in Table 3, three conclusions can be drawn from the responses (N varies from 124 to 138) of laboratory directors. First, depending on the particular area, a 400 hour apprenticeship would be considered adequate by a large majority of the respondents. Second, microscopic examination of glass and soil and microscopic examination of hair and fibers could probably be combined in one 400 hour apprenticeship. Third, no consensus exists regarding the appropriate length of an apprenticeship in fingerprint analysis.

When asked if an apprenticeship of appropriate length, incorporated into a graduate criminalistics program, would lead to favorable consideration for entry-level employment in one of the conventional areas, 94% of the respondents ($N = 152$; 25 no answer) answered affirmatively. The magnitude of this response was not totally unexpected because prior research has established that laboratory directors have the strongest entry-level hiring preference for applicants with strong undergraduate science training plus a masters degree in criminalistics. For example, Siegel's [5] 1986 survey of the then 240 members of ASCLD showed that 68% of the 153 respondents had the greatest preference for applicants with this background. In our survey, 50% of the respondents ($N = 163$; 14 no answer) indicated a preference for hiring laboratory scientists with masters degrees

TABLE 3—*Appropriate length of apprenticeship in conventional areas.*

	Responses (%)			
	<100 hrs	100–200	200–400	>400 hrs
Glass and Soil	28	38	23	12
Hair and Fibers	14	36	33	18
Questioned Documents	13	16	31	40
Firearms	11	23	35	32
Toolmarks	15	32	34	20
Fingerprints	19	29	25	28

in criminalistics. Positive comments about the apprenticeship concept included: providing an edge regarding employment, the likelihood of speeding up completion of in-house training, being a good way to evaluate potential hires and presenting an opportunity to train in the laboratory's own methodology. Several caveats, such as the apprenticeship would not eliminate the need for proficiency training and that some areas might require more time than is usually available, were also offered by the supporters. Those responding in the negative (6%) indicated that apprenticeships were inappropriate for generalists and that they would not significantly shorten the in-house training period. Given the overwhelming number of favorable responses, however, it would seem that the concept of an apprenticeship is well supported by the directors.

Having ascertained support for the apprenticeship concept, respondents were asked if they would be interested in providing an apprenticeship environment in one or more of the conventional areas. About one-third (36.5%) of the respondents ($N = 130$; 47 no answer) were in the affirmative and about two-thirds were in the negative. Here it is important to note that most of the negative responses were accompanied by comments indicating support for the apprenticeship philosophy, yet providing practical reasons for the inability of the particular laboratory to sponsor apprenticeships. For example, a number of laboratory directors indicated that they were too small to provide an extensive apprenticeship; others cited administrative opposition, case backlog and legal restrictions as obstacles precluding sponsorship. Accordingly, we are convinced that most directors are generally supportive of the educational model we have presented for consideration, even though many of them are not in a position to host apprentices.

Support for the educational model would not be very meaningful without some sort of linkage to job opportunities; accordingly, respondents ($N = 158$; 19 no answer) were asked about their laboratory hiring expectations in the areas of conventional criminalistics during the next five years. Responses were as follows: none 14%, one 25%, two 25%, three 9% and more than three 27%. These responses project hiring a minimum of 367 conventional criminalists over the next five years—or an average of 73 new hires per year. If the expectations of non-respondents are distributed similarly, the full membership of ASCLD projects hiring a minimum of 618 conventional criminalists over the next five years—or an average of 124 new hires per year. Taking these projections at face value, one might predict approximately 100 new hires per year in conventional criminalistics for the up-coming five year period. While this prediction is consistent with the survey data, a note of caution is probably in order. Concerns about validity and economic uncertainty suggest that an appropriate discount rate be applied.

Conclusions

The initial reaction of crime laboratory directors to a newly proposed graduate educational model for conventional criminalistics that emphasizes an apprenticeship under the supervision of court-qualified criminalists has been quite favorable. Students graduating from programs following this clinical training model should be able to compete successfully for the positions in conventional criminalistics which are projected for the up-coming five year period. Based on these conclusions, the Graduate Forensic Science Program at The University of Alabama at Birmingham is seriously considering the implementation of this model—perhaps by reserving one or two places within each entering cohort for students interested in conventional criminalistics. Hopefully, other graduate programs will also give consideration to this model.

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