Training, Education, and Certification of Forensic Document Examiners as presented in the NIST/NIJ Expert Working Group for Human Factors in Forensic Handwriting Examination Report

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Introduction

Forensic Handwriting Examination and Human Factors: Improving the Practice Through a Systems Approach (1) (HFHE Report) addresses forensic document examiner (FDE) education, training, and certification. The National Institute of Standards and Technology (NIST)/National Institute of Justice (NIJ) Expert Working Group for Human Factors in Handwriting Examination (the Working Group) compared training models from within and outside the United States and offered possible methods to manage several issues in current training practices. The Working Group also recommended a training structure that incorporates current practices in academia, including specification of training program outcomes, trainee learning outcomes, and objective and empirically measurable standards for demonstrating competency. This article provides a brief overview of these topics as presented in Chapter 5 of the HFHE Report [1]. Readers should also refer to the introductory article of this special series [2].

Education and Training in Forensic Document Examination

In addition to identifying essential prerequisite FDE abilities, such as the ability to read and write hand printing and handwriting, and the physiological capabilities to see, attend to, and concentrate on task-relevant materials and processes, the HFHE Report discusses both foundational education and specialized training required to achieve competency as a forensic document examiner (FDE).

Foundational education refers to the prerequisite knowledge, or core competencies, that a person must obtain prior to qualifying for FDE training. Core competencies include knowledge, skills, and abilities that are characteristically acquired in academic settings. These include essential education in critical thinking; STEM areas (science, technology, engineering, and mathematics); behavioral and social sciences; probability, statistics, and research methods; computer skills; and essential literacy skills such as reading comprehension, active listening, and oral and written presentation skills.

Most government laboratories and several professional organizations, such as the American Academy of Forensic Sciences, require a college degree for employment or membership ([1], Section 5.2). Academic transcripts or similar methods of documenting proficiency in these core competencies should be required prior to admitting a candidate into specialized training, in which trainees acquire the discipline-specific knowledge, skills, and abilities required to qualify as an FDE ([1], Section 5.1).

These qualifications fall into 15 general content areas encompassing a wide range of topics and are listed in Table 1.

Training Methods

The HFHE Report offers a detailed discussion of the history of current United States (U.S.) training standards. The Working Group found that while widely accepted training programs are similar in content, training methods in the U.S. vary across organizations and across trainers, as did the amount

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Content Area	Topic Examples
Introduction to the field	History of FDE; scientific method; research methods
Evidence procedures and protocols	Evidence collection and preservation; chain of custody; documentation
Examination procedures and protocols	Case organization; report writing
Statistics, conclusions, and bias	Probability and statistics; uncertainty and conclusions; human factors and sources of bias
Scientific equipment and processes	Photography and imaging equipment and processes; measuring systems and devices; image manipulation software
Handwriting	Physiology and motor control; the handwriting comparison process; handwriting features
Paper	Manufacturing processes; indentations and impressions
Inks and writing instruments	Ink properties; writing instrument characteristics; stroke sequence, direction, and pressure
Physical matches	Fibers, tears, edge striations
Indented impressions	Procedures and protocols
Print processes	Typography; security features
Typewriters, printers, mechanical devices	Typestyle classifications; computer printing processes; electrostatic and other imaging processes; alteration and manipulation techniques
Alterations, fabrications, and obliterations	Detection and decipherment techniques
Charred and liquid soaked documents	Care and preservation; examination and decipherment
Courtroom procedures	Challenges and relevant law; preparation and use of demonstrative exhibits; expert witness preparation

Table 1. Training Content Areas and Examples of Training Topics

of time required to complete the various content areas. For example, in 2012, the Scientific Working Group for Forensic Document Examiners (SWGDOC) adopted ASTM standard E2388-11 *(Standard Guide for Minimum Training Requirements for Forensic Document Examiners)*, which requires a minimum training length of 24 months, to be completed within four years [3]. The Working Group identified several issues that should be addressed when specifying the number of training hours required for an examiner to reach competence ([1], Section 5.2):

1. The training standard sets the minimum training time frame at "24 months of training within a 4-year period or equivalent." The term "equivalent" has been interpreted by some to mean equivalent instructional methods rather the 4,000 hours of training obtained within 4 years of consecutive training.

Model Level	Level of Abstraction	Cognitive Tasks
1	Remembering/Knowledge	Recognizing and recalling factual knowledge, such as definitions and key terms, processes, patterns and structures, or methods.
2	Understanding/Comprehension	Understanding the meaning of facts presented at Level 1. Learners may recall and understand what they have learned, but not necessarily make connections or relate the information to other material.
3	Applying	Applying facts, rules, concepts, and ideas in certain situations.
4	Analyzing	Breaking information into its component parts. At this level, learners should understand and articulate the elements or parts of complex knowledge and the relationships between them.
5	Evaluating	Judging the value of information, methods, or ideas.
6	Creating	Combining parts to make a new whole. Putting information together in a new way, or creating new knowledge.

Table 2: Bloom's Revised Taxonomy [8, 9]

2. The Working Group questioned whether a minimum training requirement of 4,480 hours (320 days per year at 7 hours per day for two years) is realistic, given the different amount and complexity of the material in each topic area. People may progress to competency at different rates.
3. "Competency" is the desired outcome of every content area, but competency is not defined in terms that are observable and measurable.

International Working Group members offered a variety of perspectives on the structure and content of education, training, and certification programs. Comparing domestic and international training programs highlighted some possible modifications that the FDE community could make to current U.S. practices to conserve time and resources during the training process. The training models differ primarily in two ways:

1. *Competence vs. Time Requirements:* The modular approach allows trainees to certify in specific areas as soon as they demonstrate competence, which allows them to engage in live casework in those areas for which they are qualified. The

24-month mandatory training requirement currently accepted in the U.S. requires trainees to demonstrate competence in all areas prior to engaging in live casework, delaying benefits that might be accrued to the laboratory.

2. *General- vs. Micro-Credentials:* While general credentials are awarded to U.S. FDEs who successfully complete the training and certification process, micro-credentials are competency-based recognition of mastery in a specific area. (4) The current U.S. training model requires prospective FDEs to train under the mentorship of FDEs who are either in private practice or employed by government laboratories. Trainees are tested and evaluated by their mentors, and after a minimum of 24 months of training are eligible to be certified by an external body such as the American Board of Forensic Document Examiners (ABFDE or and the Board of Forensic Document Examiners (BFDE)). Training models currently being adopted across Europe (5) and in Australia and New Zealand (6) incorporate a modular training format in which trainees who have demonstrated competence in individual topic areas receive micro-credentials as "handwriting experts," "ink specialists," "document experts," or "document and handwriting experts." The HFHE Report discusses strengths and challenges that are inherent in both models. For example, the current 24-month model prepares FDEs to engage in the full spectrum of casework once they are certified. Under this model, trainees must demonstrate the knowledge, skills, and abilities needed to reach independent opinions, with less need to consult other FDEs in areas where the newly trained examiner might want the opinion of somebody with greater experience. One challenge to this approach is that a laboratory may invest significant time and money in trainees who may not achieve certification once their training is complete ([1] Section 5.2.6).

3. The micro-credentialing aspect of the modular approach might allow trainers to identify such trainees at an earlier stage, allowing the laboratory to consider whether continuing training is consistent with the needs of the organization. The modular approach would enable trainees to still engage in casework in areas where they are credentialed experts or specialists, mitigating the laboratory's lost investment if the trainee fails to qualify in all areas. One challenge of the modular approach is that trainees who are experts or specialists in one area may not be qualified to complete the full scope of activities needed to render an opinion. This challenge may require laboratories to engage external specialists, which could lead to possible delays in case processing or added expense ([1] Section 5.2.3).

Education and Training Opportunities

Training and Certification of Trainers. Other challenges inherent in the current U.S. training model involve the availability of training opportunities and access to mentors who are effective educators. The HFHE Report indicates that SWGDOC standards specify that trainers must be trained according to

published standards and certified prior to working with trainees (7). While these qualifications help to ensure that FDEs are competent examiners, even the most competent and proficient experts may not be effective educators and trainers. The Working Group recommended that FDEs who wish to become trainers should have documented formal training in instructional skills. Such training may be obtained through professional workshops, college-level courses, or by other forms of training as indicated by the specific requirements of individual laboratories ([1] Section 5.2.5).

Education and Training Programs. Formal education opportunities in Forensic Document Examination (e.g., programs of study offered via colleges or universities) are extremely limited. The Working Group reported that potential trainees who are well-qualified academically far outnumber the people who may be interested and available as trainers. This issue as the greatest obstacle to recruiting new trainees ([1] Section 5.2.3.1).

Current Trends in Cross-Training. The HFHE Report states that many agencies and laboratories are downsizing their forensic document examination laboratories. ([1] Section 5.2.4) The Working Group suggested that one way of addressing the need to maintain a well-trained workforce of fully qualified FDEs is to cross-train examiners in multiple forensic disciplines. Cross-training has several advantages:

1. Larger laboratories may retain their document examination departments, helping to ensure that enough qualified FDEs are available as the current workforce begins to age out.

2. Cross-trained individuals can help ensure that workflow is maintained in departments where high caseloads may result in evidence processing delays.

3. The ability to assign casework to those who are cross trained helps to manage workflow without increasing the number of laboratory employees.

International laboratories in Scotland and Australia have demonstrated effective cross-training. At this writing, a similarcross-training program has been initiated by the Los Angeles Sheriff's Department Crime Laboratory in which criminalists in the Questioned Documents lab have been trained to perform arson investigations, while the majority of questioned document cases are performed by non-criminalist FDEs ([1] Section 5.2.4)

Training Standards and Standardized Training

The HFHE Report offers an extensive discussion of the future of training in forensic document examination. Readers are encouraged to review Chapter 5 of the HFHE Report for details of the recommended training format. Here we will highlight a few of the key discussion points.

The Academic Model. Academic programs are built on a model in which students engage in successively greater levels of abstraction as their knowledge level increases. This model is exemplified by Bloom's Revised Taxonomy [8, 9], which is conceptually depicted in Table 2. Although this model is presented as levels or stages, learners may progress through the stages at different rates, depending on the information content. Higher levels of the model are associated with greater levels of abstract thinking, referred to as higher order thinking skills.

The Working Group suggested a modular approach to FDE training using a tiered method based on Bloom's model. The HFHE Report provides examples of how such a program might be structured, as well as suggestions for what learning activities might be included within the levels ([1] Section 5.2.6)

Learning Outcomes. Every education or training program should have approximately six or eight clearly articulated Program Learning Objectives (PLOs). PLOs should be derived from the knowledge, skills, and abilities that are required to perform the scope of work. According to the Office of Planning, Assessment, and Institutional Research at Pennsylvania State University [10]:

"PLOs are short statements that describe the knowledge(s), skills, values, and habits of mind that students completing a *given program* [emphasis added] should be able to demonstrate upon graduation. PLOs

can address a range of types of knowledge and skills, including cognitive (knowledge or mental skills), psychomotor (physical/motor and kinesthetic skills and knowledge), affective (feelings and attitudes), and interpersonal/social (interpersonal and social abilities)...Well-written PLOs are relatively short, specific, measurable, attainable, developmentally appropriate, and discipline or context-specific." [10]

The content areas identified in Table 2 might be grouped to create a smaller number of PLOs. For example, Print Processes and Alterations, Fabrications, and Obliterations might possibly be collapsed into a broader category of Document Alteration Methods, which could be reasonably measured together. An appropriate PLO for this kind of knowledge might be:

PLO 1: Training program graduates will be able to identify altered documents by recognizing known alteration techniques and the characteristics of altered document security features.

Achieving this PLO involves introducing the trainee to the foundational knowledge, and then requiring the trainee to apply this knowledge to successively more challenging problems in which higher order thinking skills are engaged and evaluated. Multiple modules addressing specific topics in the training program will contribute to this PLO, including the module on print processes and the module on alterations, fabrications, and obliterations. Each learning module also contains several specific trainee learning outcomes (referred to as student learning outcomes, or SLOs, in academia). For example, a learning outcome for a module on print processes might be:

Trainee Learning Objective 1: Trainees will be able to describe the security features built into U.S. identity documents such as passports and driver's licenses.

Learning Assessments. These learning outcome examples are short and specific, as well as measurable once the criteria for success are specified. Assessments of learning outcomes must be observable and measurable behaviors. They may be oral or written assessments; demonstrations of procedures, such as successfully conserving, reconstructing, and evaluating shredded or charred documents; or writing an expert report that meets the requirements of the legal system. In any case, the criteria for success must be clearly indicated, as illustrated in these examples:

Trainees will meet the proficiency requirements for preparing expert reports if they achieve a score of "meets expectations" on 18 of the 20 requirements indicated on the scoring rubric.

Trainees will meet proficiency requirements for conducting an Electrostatic Detection Apparatus (ESDA) examination by correctly identifying all parts of the ESDA equipment on a written examination; correctly explaining how the ESDA creates an image on a written examination; demonstrating and describing the proper procedure for operating the ESDA equipment in a practical examination conducted by the trainer; and correctly evaluating the resulting ESDA image in a written opinion.

These assessments demonstrate the success of the learner in each module. By combining the module assessment outcomes, the trainer can then empirically evaluate the success of the training program, and make any adjustments needed to improve trainee success.

Training Documentation. All training must be fully documented. The Working Group suggested ([1] Section 5.2.6) that an FDE learning portfolio should include:

- CVs of all training officers, both internal and external to the lab of the principal trainer or mentor.
- A program of study for the entire training program.
- Syllabi for each training module.
- A bibliography or reference list of all reading material.
- Internal test results.
- A list of cases examined.
- Training on instrumentation.
- Pre-training test results or documentation of the potential trainee's qualifications prior to training.
- Weekly reports from the training officer.
- Assessments of trainee learning outcomes.
- Conferences, workshops, or outside classes attended.
- Other relevant assessments or information pertinent to professional preparation.

Final Competence Assessment and Certification

The Working Group identified a lack of standardized measures of competency in forensic document examination. Different agencies and laboratories have developed a variety of measures so the consistency, reliability, and validity of current competency testing is presently unknown. The Working Group suggested that an effective resolution for these issues might be to combine the competency testing and certification process into a single, externally administered process under a single external organization accredited to ISO/IEC 17024 standards. This solution ([1] Section 5.3) offers several advantages over current practices, including:

- Helping to ensure that those who pass the test are competent.
- Providing greater consistency in candidate assessments and in the certification process.
- Offering greater testing transparency and independence.
- Increasing the number of candidates who apply for certification.
- Increased credibility for the certification process.

Readers are encouraged to see the extended discussion of the issues surrounding competence testing and certification in Chapter 5 of the HFHE Report. ([1] Section 5.3)

Ongoing Professional Development

Finally, the HFHE Report discusses the importance of ongoing education and recertification for all certified FDEs. Continued professional development is required for many professionals who need to keep abreast with advances in the technology and knowledge in their fields. The Working Group suggested that FDEs should continue to add to their portfolios by including documentation of continuing education credits from workshops, academic coursework, or other sources of education and training. The HFHE report encourages examiners to contribute to their field through journal publications, professional presentations, and service to the various FDE regional and national organizations. Additional contributions might include working collaboratively with bar associations and members of the judiciary to improve communication and practice both within and outside forensic document examination ([1] Section 5.4)

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