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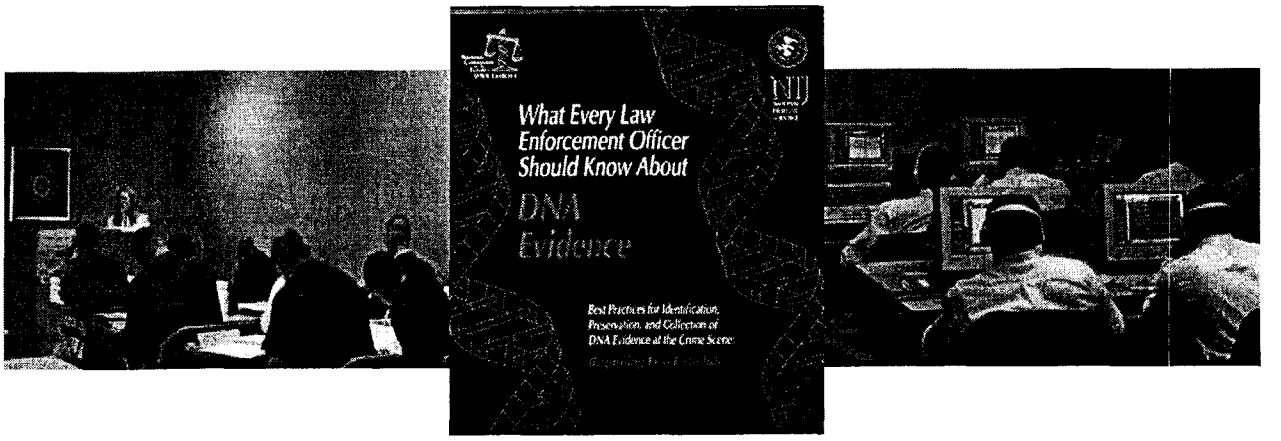
203054

Evaluation of a Computer Based Training Module:

DNA Evidence Collection – Beginning Level Module



Prepared by:

The Justice and Safety Center
Eastern Kentucky University

245 Stratton Building, 521 Lancaster Avenue
Richmond, KY 40475-3101
www.jsc.eku.edu

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Office of Science and Technology

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Sarah V. Hart
Director

Office of Science and Technology

John Morgan
Acting Assistant Director, NIJ

A. Trent DePersia
Chief, Research and Technology Development Division

Steve Schuetz
Program Manager, Training and Simulation Technologies

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Introduction

In this unpredictable world, criminal justice officials must be cognizant of the many challenges that they may encounter. The key to raising the overall awareness level is making current information and training readily available. The traditional approach in providing this information is through Lecture-Based Training (LBT), which usually takes place in a classroom setting. This is not the most advantageous model for training however, due to several factors including, not everyone learns the same, information is provided to a limited number of personnel, and inadequate resources often limit the number of personnel that can be sent to a training session. One solution for meeting training challenges is the use of distributed learning, especially in the area of Computer-Based Training (CBT). CBT is any training that uses a computer as the focal point for instructional delivery. Training is provided through the use of a computer and software, which guides the learner through an instructional program.

CBT has a number of features and benefits, for example, the integration of text, graphics, video and sound. According to Bixler (2000), this is important particularly when the training is content dense or uses a hierarchy of skill acquisition, because on average, people will remember 20% of what they see, 40% of what they see and hear, and 70% of what they see, hear and do, therefore, the multi-sensory delivery of training that CBT offers has the potential to facilitate greater retention of new knowledge. Additional benefits of CBT are that it offers consistency of training, can accommodate a separation of locations during the learning process, enables learning at the student's pace, and is usually overall less expensive than traditional instruction.

For instance, in any organization, an investment in time can be directly associated with an expense. Therefore, any reduction in training time can have a significant effect on training costs. Regarding employee time, traditional LBT requires sending the employee away for courses, which results in removing them from their job for a period of time and effecting organizational productivity. Also for consideration is the time and costs associated with travel and accommodations not only the employee but for the trainer. In addition, there is often a cost to

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obtain the time and services of the trainer that could also be reduced or eliminated through the use of CBT. Most organizations today use computers to perform daily tasks. CBT only requires the use of a Pentium based computer with the Microsoft Windows operating system to operate the CBT modules. Even if the organization does not have a computer capable of running the modules, a new computer system can be purchased in most instances for a one-time cost of under $1,000. For these and other reasons, this method of instruction is desirable for many groups including the military/government, corporations, and higher education.

The United States Department of Defense (DOD) has been a leader in the use of distributed learning and has capitalized on an emerging network that ties together distributed instructional resources, including intelligent tutors, subject matter experts, and traditional instruction to support "learner-centric" education on a continuing basis. The DOD strategy is to "harness the power of learning and information technologies to modernize education and training" (DOD Implementation Plan for ADL, 19 May 00). With troops stationed all over the world, the DOD has recognized the benefits of learning technologies and has utilized the technology to help support its mission into the 21st century.

Many corporations have also realized the benefits of distributed learning. According to International Data Corporation (IDC), U.S. corporate spending on e-learning reached $4 billion in 2001, up from $550 million in 1998. By 2004, this is expected to rise to $14.5 billion. Corporations are now able to deliver everything from compliance training to very specific occupational task training using CBT. For example, Daimler-Chrysler teaches maintenance engineers to troubleshoot automotive electrical systems, and companies such as Southwest Airlines have created cyber universities that provide training and development for all employees using learning technologies. Faced with retraining 50 million American workers, corporate America is using distributed learning, both internally and externally, for all aspects of training. Many major corporations save millions of dollars each year using CBT to train employees more effectively and more efficiently than with conventional methods (U.S. Distance Learning Association, 2002).

According to a 2000 report by the National Center for Education Statistics, the use of distributed learning at institutions of higher education is also increasing. Forty-four percent of

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two and four year degree-granting institutions offered distance education courses in 1997-98, in contrast to 33 percent in fall 1995. Distributed learning is allowing an estimated 3 million students to take classes and obtain an education that they may not have received otherwise.

Despite the successful use of distributed learning by the entities listed above, the law enforcement community has been sluggish in adopting and fully utilizing distributed learning technologies to train their personnel. Possible reasons for limited usage include cultural resistance (feelings about the way training should be conducted), and a lack of an infrastructure to provide distributed learning to the criminal justice community (nationwide or in that particular region). Consequently, little is known about the current state of the use of distributed learning, especially CBT, technologies in this nation's law enforcement community.

According to the International Association of Directors of Law Enforcement Standards (IADLEST) Survey for 2000, eighteen states reported using CBT at some point during officer training programs. Thirteen states reported using CBT during entry-level training, while seventeen states used CBT during in-service or refresher training (Flink, 2000). However, based on additional phone interviews it was discovered that states used varying definitions of CBT. For example, two respondents indicated that they were referring to the use of firearm simulation systems as CBT, and one respondent indicated that they did not use CBT in any capacity. Furthermore, many of the states using CBT supplemented their platform or lecture-based instruction with the CBT module.

Several studies have been conducted on the general usefulness of CBT. For example, Lewis (1999) in his evaluation of several types of training found CBT to be an effective training tool, cost efficient, flexible, and students comprehended and retained the information presented. In another study, Hammell and Kingsley (1999) evaluated the effectiveness of CBT courses at United States Coast Guard (USCG) duty stations. The authors concluded that the CBT courses conducted at USCG duty stations were as effective as lecture-based courses conducted at shore/stateside training centers. Additionally, the cost comparison analysis showed that CBT provided to students at duty stations can save training dollars (Hammell & Kingsley, 1999). Although several research studies provide insight into the general effectiveness of CBT, little research has been conducted regarding the effectiveness of this training tool in the field of law

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enforcement. While many agencies report using the technology, no information describing the effectiveness of law enforcement CBT was provided.

Background

After reading about how DNA technology was used to exonerate an innocent person, Attorney General Janet Reno requested that the National Institute of Justice to establish a national commission in April of 1997 to examine the future of DNA evidence and how the Department of Justice could best encourage its effective use (Asplen, 1999). From that request, the National Commission on the Future of DNA Evidence was formed. The project's charter states:

> The purpose of the *National Commission on the Future of DNA Evidence* is to provide the Attorney General with recommendations on the use of current and future DNA methods, applications and technologies in the operation of the criminal justice system, from the crime scene to the courtroom. Over the course of its charter, the Commission will review critical policy issues regarding DNA evidence and provide recommended courses of action to improve its use as a tool of investigation and adjudication in criminal cases (NIJ National Commission on the Future of DNA Evidence Website, 2002).

The Commission focused on five areas concerning DNA evidence, one of which was the proper collection of evidence by law enforcement officials. Other areas included the use of DNA in post-conviction relief cases, legal concerns and the scope of discovery in DNA cases, essential laboratory capabilities in the face of emerging technologies, and the impact of future technological developments on the use of DNA in the criminal justice system. Reports are available in most of these areas (National Commission on the Future of DNA Evidence Website, 2002).

Of particular concern to the Crime Scene Working Group of the Commission was the lack of educational and training resources to ensure proper identification, preservation, and collection of appropriate biological evidence that could yield a perpetrator's DNA profile. To remedy this problem, the Working Group developed a pamphlet for distribution to every law enforcement officer in the country. *What Every Law Enforcement Officer Should Know About DNA Evidence* (September 1999) explained the basics of DNA technology in simple terms, and

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outlined fundamental identification, preservation, and collection issues.

In addition to the brochure, the Working Group requested a more extensive, computer-based curriculum for training officers in DNA collection techniques. Working with the Commission, Crime Scene Working Group and a software development company, the Eastern Kentucky University Justice and Safety Center (JSC) managed the development of both a beginning and advanced version of "What Every Law Enforcement Officer Should Know About DNA Evidence" in a CD-ROM/ CBT format, which was funded by the National Institute of Justice, Office of Science and Technology. Building upon the brochure, the CBT utilizes interactive scenario training to educate officers. Specifically, the beginning level module focuses on issues that arise for the first-responding law enforcement officer, while the advanced level module delivers more in-depth information for the investigating officer and/or evidence technician (DNA CD, Fall 2000).

Despite the fact that the CBT modules were in great demand from law enforcement practitioners, it was not known whether the CBT was as effective in teaching the material as the classroom or LBI. Therefore, on November 6 and 7, 2000, the DNA Evidence Collection CBT was evaluated using the Lexington – Fayette Urban County (Kentucky) Division of Police.

Methodology

Statement of Purpose

The primary purpose of this project was to evaluate the effectiveness of CBT technology compared to traditional platform based instruction. Specifically, the following report will describe the DNA Evidence CBT, outline the evaluation and findings, and discuss the implications of those findings.

Instrumentation

Pre and post-instruction knowledge tests and attitudinal surveys were developed to evaluate the effectiveness of the DNA Evidence Collection – Beginning Level CBT module. The instrument's format was pen/pencil tests and surveys consisting of closed-ended questions. The tests were designed to determine the officers' knowledge before and after instruction.

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Additionally, the surveys were designed to obtain demographic information from the officers and to determine the officers' attitudes before and after the instruction.

Sample Selection

The effectiveness of the CBT was determined through the use of a classic experimental research design. This design consists of two comparable groups: an experimental and control group. Both groups had identical curricula and were equivalent except that the experimental group was exposed to the independent variable (CBT) (Nachmias & Nachmias, 2000). A recruit academy class of 41 was divided into two groups, 21 of which were randomly selected to participate in the LBT, with the remainder using CBT. A nationally recognized subject matter expert in the field of DNA evidence taught the LBT group.

Evaluation Administration

The evaluation began with the dissemination of a letter of informed consent (See Appendix A – Letter of Informed Consent), which was read aloud to the participants by the JSC staff member. The letter of informed consent described the purpose of the evaluation, authorization for study, and assured respondents of anonymity and confidentiality of the information they were providing.

Next, the LBT group was given a demographic survey (See Appendix B), while the CBT group was given a demographic and attitudinal survey (See Appendix C). Following the surveys, each group was given the same knowledge pre-test See Appendix D). After both groups completed the training, they were administered the knowledge post-test (See Appendix E). Additionally, the CBT group was given another attitudinal survey (See Appendices F). The LBT group was not given the attitudinal survey because it was not applicable. A JSC staff member proctored the administration of the surveys to each group.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 10 (2000) for the PC. Because most of the data collected were measured on rank-order scales (e.g., never, sometimes, often), most statistical analyses involved generating frequency and

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percentage distributions. However, inferential tests (such as paired sampled t-tests) were used to compare the performance between the two groups. Bivariate analyses were also conducted to determine whether a subject's performance in the computer-based course was affected by individual characteristics.

Results

Descriptive Statistics

The sample consisted of 41 participants, 20 randomly selected to the computer based training (CBT) group and 21 randomly selected to the lecture based training (LBT) group. Descriptive statistics are reported in Table 1. Seventy-eight percent of the participants were male (n = 32). Nearly 76% of the participants were white (n = 31). The average age of the subjects was 27.2 years (s.d. = 4.1). The majority had received at least some college education (80.5%, n = 33), while only 4.9% held a General Equivalency Diploma (GED) (n = 2).

An additional set of attitudinal questions pertaining to computer use were asked of the subjects in the CBT group. Fifty-five percent (n = 11) reported that they had completed computer-based courses in the past and the majority owned a personal computer (75%, n = 15). Only one participant reported having no computer experience; however 30% suggested that they were only a little familiar with computers (n = 6). Thirty-five percent indicated that they either had a considerable amount or a great deal of familiarity with computers (n = 7). Forty percent reported that they rarely or never used computers in the course of their jobs (n = 8); 35% indicated that they sometimes do (n = 7); and 20% said that they usually or always use computers on the job (n = 4).

Table 1: Descriptive Statistics for Background Variables

Variable	Frequency	Percent
Gender (N = 41)		
Male	32	78.0%
Female	9	22.0%
Race (N = 41)		
White	31	75.6%
Nonwhite	10	24.2%

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Education (N = 41)		
Elementary	2	4.9%
High School	6	14.6%
Some College	10	24.4%
Associate Degree	14	34.1%
Bachelor's Degree	9	22.0%
Age (N = 41)		
Mean = 27.2		
Standard Deviation = 4.1		
Ever Completed Computer Based Courses (N = 20)		
Yes	11	55.0%
No	9	45.0%
Own a Personal Computer (N = 20)		
Yes	15	75.0%
No	5	25.0%
Use a Computer in Your Job (N = 20)		
Never	4	20.0%
Seldom	4	20.0%
Sometimes	7	35.0%
Usually	1	5.0%
Always	3	15.0%
Don't Know	1	5.0%
Level of Familiarity with Computers (N = 20)		
None	1	5.0%
Only a Little	6	30.0%
Some	6	30.0%
A Considerable Amount	6	30.0%
A Great Deal	1	5.0%

Inferential Tests

A series of paired sample t-tests were conducted to examine the question of whether students improved after completing the course, beginning with an analysis of the entire sample. The average score on the pre-test exam was 75.8% (s.d. = 8.7), while the mean score on the post-test was 95% (s.d. = 5.8). The analysis indicates that the difference between the two scores is

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statistically significant in the expected direction (t = -13.8, df = 40). That is, the overall group improved after receiving instruction. In addition, it should also be noted that in no instance did a participant's score decrease, which suggests that all of the students benefited from their respective courses.

Further analyses separate the participants in the computer-based training from those who attended a more traditional lecture. The average pre-test score for the CBT group was 74% (s.d. = 10.1) and the average score on the post-test was 93% (s.d. = 3.8). The t-test indicates that the group improved significantly on the post-test (t = -8.2, df = 19). The average pre-test score for the LBT group was 78% (s.d. = 7.0), and the mean score on the post-test was 97% (s.d. = 3.8). As expected, the difference between the pre- and post-tests was significant (t = -11.849, df = 20).

Since the scores for both groups showed an increase, it became important to explore the question of whether the improvement was greater for one group over the other. In order to investigate this question, a variable measuring the difference between the pre- and post-test scores was created. A t-test was then conducted to compare the degree of improvement across the two groups. The CBT group increased their scores on the post-test by an average 19 points (s.d. = .10), while the scores of the LBT group increased by an average 19.4 points (s.d. = .08). The t-test indicates that this difference is not statistically significant (t = .15, df = 39).

In order to determine whether a subject's performance in the CBT group was affected by individual characteristics, analyses were conducted on the following variables: age, gender, race, education, prior CBT experience, whether the participant owned a personal computer, whether the participant uses a computer on the job, and the degree to which he/she is familiar with computers. Bivariate analyses suggest that only the degree of computer familiarity and race were related to performance in the course. Participants with no or only some familiarity with computers increased their scores by 22.5 percentage points (s.d. = 11.0), while those with considerable or a great deal of familiarity increased their scores by only 12.6 percentage points (s = 4.9). The t-test indicates that this difference is statistically significant (t = -2.8, df = 19).

Race has an interesting effect. In the CBT group, nonwhites increased their scores by more than 27 percentage points (s.d. = 11.2), while whites improved by only 14.5 percentage points (s.d. = 6.6). Thus, nonwhites improved significantly more than whites (t = -3.3, df = 18).

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However, in the LBT group, race did not have a statistically significant effect on performance (t = .19, df = 19). It should be noted, however, that only 3 of the 21 participants in the LBT group were non-white compared to 7 out of 20 for the CBT group. The small number of non-whites in both groups means that the results may not hold true for the general population.

Another important aspect of a training curriculum is the attitudes students bring to the process. The degree to which the participants felt positively about computer based training was measured in a series of thirty attitudinal questions on a self-administered questionnaire. The survey was administered before training commenced and repeated after the course was completed.

The possible responses to the questions ranged from a score of 1, which indicated the least positive response, to 5, the most positive response. The items were combined into an index, which was averaged across the items in order to maintain the same response scale (1-5).

Prior to going through the course, students were generally positive about the process (mean = 3.7, s.d. = .3). Their outlook was even more positive after having completed the course (mean = 4.0, s.d. = .3). A t-test indicates that the change in attitude is statistically significant (t = -2.9, df = 19). Bivariate tests revealed that post-test attitudes were not related to gender, age, race, education, prior experience with CBT, whether the participant owned a computer, whether the participant used a computer at work, or the degree of familiarity with computers.

Summary

The analyses allow several conclusions to be drawn:

1. Both lecture and computer based training resulted in increased knowledge about DNA evidence. In fact, in no instance did a participant's score decrease, which suggests that all of the students benefited from their respective courses.

2. The amount of learning that occurs does not differ significantly across the two modes of instruction. Therefore, utilizing CBT instead of LBT to provide instruction about DNA Evidence Collection will provide the same amount of knowledge.

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3. Lack of familiarity with computers did not hamper participants in the computer based training from learning the material. In fact, those with little or no familiarity with computers showed greater improvement than individuals who believed they had considerable knowledge of computers. Officers who have little to no formal training with computers were able to easily manipulate the program and gain knowledge from the CBT.

4. Officers were generally positive about computer based training, both before and after course completion. In fact, attitudes were significantly more positive after the course was finished. Officers quickly understood the value of the CBT after completing the modules, and remarked that the multimedia components (sounds and movies) nicely complimented the subject matter to provide an enjoyable training experience.

The data indicate that computer based training is an effective method of instructing officers on the use of DNA evidence. The results presented above suggest that this mode of instruction may be a desirable option for law enforcement agencies with limited resources. Additional issues for consideration would be the time and costs involved in the training. For this evaluation a nationally recognized subject matter expert in the field of DNA evidence was provided a fee for services as well as travel and accommodations during the training whereas the CBT could be provided at no cost. Also, the training for the LBT group took place over the course of two days. For the CBT group the greatest amount of time to complete the CBT course was four hours, with the average amount of time to complete the training being 2 hours. Therefore, CBT has the potential to significantly reduce the amount of time officers would spend unavailable for departmental functions and potential costs to departments of providing this type of training to its officers.

It is, however, important to note the limitations of this evaluation. In particular, it is essential to remember that the sample size is very small and not very diverse, which means that

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the results may not generalize well to other groups. Further testing of the approach with larger, more diverse samples is imperative. It could also be considered a limitation in that the approach was not tested in an actual department setting. Future research should be directed at determining if this approach to training worked equally well for rural and urban police departments at their respective locations and with the resources available to them.

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APPENDIX A:

LETTER OF INFORMED CONSENT

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(859) 622 – 8106: PHONE
(859) 622 – 8038: FAX

EASTERN KENTUCKY UNIVERSITY
JUSTICE AND SAFETY CENTER
College of Justice and Safety
"A Program of Distinction"
245 Stratton Building
521 Lancaster Avenue
Richmond, Kentucky 40475-3102

EMAIL: JSC@eku.edu
WEB PAGE: http://www.jsc.eku.edu

November 6, 2001

Dear Officer:

Your agency has agreed to participate in an evaluation of computer-based training (CBT). The Justice and Safety Center, College of Justice and Safety, at Eastern Kentucky University is conducting this evaluation. The National Institute of Justice, Office of Science and Technology is the funding agency. We sincerely appreciate your willingness to participate in this project.

The training will occur over the course of two days. The control group will receive the traditional platform based instruction of DNA Evidence Collection while the test group will receive the CBT instruction. Both groups will take pre and post attitudinal and pre and post knowledge tests. Your placement in a group will be determined randomly. You may decline participation at any time. Should you choose to participate, all information you provide and all testing information will kept strictly confidential.

The National Commission for the Future of DNA Evidence developed the course curriculum and Advanced Systems Technology, Inc. assisted the Justice and Safety Center in the creation of the CBT module. An officer can decline participation in the training after the Justice and Safety Center introduction.

I have been informed of the nature of this evaluation and consent to participation in this study.

_____ _____

Officer's Printed Name Last Four Digits of SSN

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Officer's Signature _____ Date _____

EDUCATION PAYS

APPENDIX B:

DEMOGRAPHIC INFORMATION FORM

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DNA Evidence Collection CBT Evaluation: November 2001

Participant Demographic Information (LECTURE BASED)

Last Four Digits of Social Security Number: _____

1. What is your gender? _____ MALE _____ FEMALE

2. What is your age (in years)? _____

3. What is your ethnicity?

   _____ White _____ African American

   _____ Hispanic _____ Asian

   _____ Other, please specify: _____

4. What is the highest education level you have completed?

   _____ High School/GED

   _____ Some College

   _____ Associate Degree

   _____ Bachelor's Degree

   _____ Graduate Degree

5. How many years of law enforcement experience have you had?

   _____

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APPENDIX C:

ATTITUDES TOWARD COMPUTERS (FORM A: PRE-INSTRUCTION)

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ATTITUDES TOWARD COMPUTERS (FORM A)

NAME OF TRAINEE:

_____

DATE OF TRAINING: _____

Please answer each item below by marking the answer that MOST agrees with your response. Make sure erasures are complete because multiple responses are not allowed. When finished with this evaluation, please do not fold or staple. Thank you for your cooperation.

1. What is your gender? _____ MALE _____ FEMALE

2. What is your age (in years)? _____

3. What is your ethnicity? _____ White _____ African American

   _____ Hispanic _____ Asian

   _____ Other, please specify: _____

4. What the highest level of education that you have completed?

   _____ High School / GED _____ Some College _____ Associate Degree

   _____ Bachelor's Degree _____ Graduate Degree

5. Have you ever completed a computer course(s) or training(s)?

   _____ YES _____ NO

6. If YES, what type(s) of course(s) or training(s)? _____

   _____

7. Do you own a personal computer? _____ YES _____ NO

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	Never	Seldom	Sometimes	Usually	Always	Don't Know
8. Do you currently use a computer (outside of your job) for leisure and/or other business?						
9. Do you currently use a computer in your job?						

10. If YES, in what capacity have you used a computer in your job? _____

_____

11. Have you ever utilized computer-based instruction as a teacher or trainer?

_____ YES _____ NO

12. If YES, in which capacity have you utilized computer-based instruction as a teacher or trainer?

_____

	None	Only a Little	Some	A Considerable Amount	A Great Deal
13. How much familiarity do you believe you have with computers?					

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	My Choice	Acting on Boss's Orders	Required for Job	Required for Certification	Other
14. Which of the following best describes the reason for your attendance at this training?					
15. If you indicated "Other," please specify the reason why you are attending this training:					

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
16. While taking computer-based instruction I will feel challenged to do my best.					
17. I will be concerned that I might not understand the material.					
18. I will not be concerned when I miss a question because no one will be watching me.					

	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never
19. While taking computer-based instruction I will feel isolated and alone.					
20. I will feel uncertain as to my performance in the programmed course relative to the performance of others.					
21. I will find myself just trying to get through the material rather than trying to learn.					

	Quite Often	Often	Occasionally	Seldom	Very Seldom
22. I will know whether my answer is correct or not before I am told.					

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23. I will probably guess at the answers to questions.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
24. In a situation where I am trying to learn something, it is important to me to know where I stand in relation to others.					
25. As a result of studying some material by computer-based instruction, I will be interested in trying to find out more about the subject matter.					
	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never
26. I will be more involved in running the machine than in understanding the material.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
27. I feel I could work at my own pace with computer-based instruction.					
28. Computer-based instruction will make the learning too mechanical.					
29. I will feel as if I have a private tutor while on computer-based instruction.					
30. I will be aware of efforts to suit the material specifically to me.					
31. I will find it difficult to concentrate on the course material because of the hardware.					
	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never

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32. Questions will be asked which I feel will not be relevant to the material presented.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
33. Computer-based instruction is an inefficient use of the student's time.					
	Quite Often	Often	Occasionally	Seldom	Very Seldom
34. While on computer-based instruction I expect to encounter mechanical malfunctions.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
35. Computer-Based instruction will make it possible for me to learn quickly.					
36. I will feel frustrated by the computer-based instruction situation.					
37. The computer-based instruction approach is inflexible.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
38. Even otherwise interesting material would be boring when presented by computer-based instruction.					
39. In view of the effort I will put into it, I will be satisfied with what I will learn while taking computer-based instruction.					
40. In view of the amount I will learn, I would say computer-based instruction is superior to traditional instruction.					

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41. I would prefer taking a course by computer-based instruction more than by traditional instruction.					
42. I am not in favor of computer-based instruction because it is just another step toward de-personalized instruction.					
43. Computer-based instruction will be too fast.					
44. Typing experience will be necessary in order to perform easily on computer-based instruction.					
45. Computer-based instruction will be boring.					

Additional Comments and Recommendations for Improvement (*you may use the back of this form if necessary)*:

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APPENDIX D: PRE-INSTRUCTION KNOWLEDGE TEST

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LAST FOUR DIGITS OF SSN: _____

INSTRUCTIONS: Circle the letter next to the *BEST* answer to each question.

1. Using CODIS as an investigative tool, police can:

   a. estimate the time that the crime took place
   b. determine the cause of death
   c. link cases together
   d. match DNA with a psychological profile

2. DNA evidence can be compromised through exposure to:

   a. heat
   b. plastic
   c. cold
   d. atmospheric pressure

3. Forensic DNA analysis has been admitted in criminal cases:

   a. in all 50 states
   b. only in Canada
   c. only in Europe
   d. only in New England

4. Which of the following is *NOT USUALLY* a source of DNA evidence?

   a. blood
   b. saliva
   c. semen
   d. urine

5. How are DNA evidence and fingerprints similar?

   a. both use ink and paper
   b. both can only be seen using a microscope
   c. both require the use of tape for collection
   d. both are forensic tools used to link evidence to suspects

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6. DNA was first used as evidence in the USA in:

   a. the 1920s
   b. the 1960s
   c. the 1980s
   d. 2000

7. Contamination of biological evidence is *MOST LIKELY* to occur during:

   a. collection at the crime scene
   b. courtroom presentation
   c. storage
   d. laboratory analysis

8. DNA technology can be used to:

   a. determine when a suspect was at a crime scene
   b. link suspects to physical evidence
   c. determine consent in sexual assault cases
   d. determine the total number of perpetrators

9. Contamination can be prevented or minimized by:

   a. wearing proper protective equipment and using disposable collection tools
   b. turning off any portable radios and cellular telephones
   c. sneezing, coughing, and excessive talking near evidence
   d. all of the above

10. "Chain of custody" refers to:

    a. the type of DNA evidence discovered
    b. where evidence is found
    c. laboratory terminology used with DNA evidence
    d. the record of possession of evidence

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11. Which of the following share identical DNA?

a. mother and daughter
b. father and son
c. mother and son
d. identical twins

12. DNA at an outdoor crime scene may not be useful because of:

a. mishandling by an evidence technician
b. exposure by the news media
c. damage by environmental factors
d. contamination by a responding police officer

13. Which environmental factor is helpful to the preservation of DNA evidence?

a. cold
b. heat
c. sunlight
d. bacteria/mold

14. The first case where DNA evidence was used to solve a crime occurred in which country?

a. Norway
b. the United States
c. England
d. Japan

15. DNA evidence may be found:

a. anywhere in the crime scene
b. only soon after the crime
c. only on the victim
d. only on the suspect

16. Which of the following would be expected to have the *MOST* similar DNA?

a. two people from the same ethnic group
b. two people with similar physical characteristics
c. father and son
d. husband and wife

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17. DNA evidence can determine:

a. the time that the crime occurred
b. the type of weapon used
c. the motive for the crime
d. the identity of the suspect

18. In a homicide investigation, elimination or reference samples may be taken from:

a. the victim's relatives
b. anyone who had access to the crime scene
c. the suspect's relatives
d. laboratory technicians

19. CODIS stands for:

a. Combined Organic Data Index System
b. Cooperative DNA Investigation System
c. Combined Operational DNA Investigation System
d. Combined DNA Index System

20. DNA is an abbreviation for:

a. deribonucleic acid
b. deoxyribonucleic acid
c. dehydronucleic acid
d. dextronucleic acid

21. CODIS contains DNA profiles of:

a. convicted murderers and their victims
b. convicted offenders and unknown suspects
c. all arrested suspects
d. all violent crime victims

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22. DNA samples taken from recent consensual sex partners of a sexual assault victim are called:

a. reference or elimination samples
b. evidentiary samples
c. relevant or material samples
d. genetic samples

23. DNA is inherited:

a. directly from the individual's biological mother
b. directly from the individual's biological father
c. directly from the individual's biological parents
d. directly from the individual's biological grandparents

24. While transporting DNA evidence, care should be taken to avoid the following conditions:

a. proximity to portable radios and cellular telephones
b. direct sunlight or heat
c. extended periods of frozen storage
d. storage in airtight plastic bags

25. In a murder or assault investigation, whose DNA should always be collected as an elimination or reference sample?

a. the witnesses'
b. the victim's
c. the victim's neighbors'
d. the investigating officer's

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APPENDIX E: POST-INSTRUCTION KNOWLEDGE TEST

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LAST FOUR DIGITS OF SSN: _____

INSTRUCTIONS: Circle the letter next to the *BEST* answer to each question.

1. DNA was first used as evidence in the USA in:

   a. the 1920s
   b. the 1960s
   c. the 1980s
   d. 2000

2. The first case where DNA evidence was used to solve a crime occurred in which country?

   a. Norway
   b. the United States
   c. England
   d. Japan

3. Forensic DNA analysis has been admitted in criminal cases:

   a. in all 50 states
   b. only in Canada
   c. only in Europe
   d. only in New England

4. DNA is an abbreviation for:

   a. deribonucleic acid
   b. deoxyribonucleic acid
   c. dehydronucleic acid
   d. dextronucleic acid

5. DNA is inherited:

   a. directly from the individual's biological mother
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   c. directly from the individual's biological parents
   d. directly from the individual's biological grandparents

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6. Which of the following is *NOT USUALLY* a source of DNA evidence?

   a. blood
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   c. semen
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7. How are DNA evidence and fingerprints similar?

   a. both use ink and paper
   b. both can only be seen using a microscope
   c. both require the use of tape for collection
   d. both are forensic tools used to link evidence to suspects

8. Contamination of biological evidence is *MOST LIKELY* to occur during:

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   b. courtroom presentation
   c. storage
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10. Contamination can be prevented or minimized by:

    a. wearing proper protective equipment and using disposable collection tools
    b. turning off any portable radios and cellular telephones
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11. "Chain of custody" refers to:

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12. While transporting DNA evidence, care should be taken to avoid the following conditions:

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    d. storage in airtight plastic bags

13. DNA evidence can be compromised through exposure to:

    a. heat
    b. plastic
    c. cold
    d. atmospheric pressure

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    b. only soon after the crime
    c. only on the victim
    d. only on the suspect

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    c. mother and son
    d. identical twins

16. DNA at an outdoor crime scene may not be useful because of:

    a. mishandling by an evidence technician
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    c. damage by environmental factors
    d. contamination by a responding police officer

17. Which environmental factor is helpful to the preservation of DNA evidence?

    a. cold
    b. heat
    c. sunlight
    d. bacteria/mold

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c. the motive for the crime
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b. the victim's
c. the victim's neighbors'
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24. Using CODIS as an investigative tool, police can:

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c. link cases together
d. match DNA with a psychological profile

25. DNA samples taken from recent consensual sex partners of a sexual assault victim are called:

a. reference or elimination samples
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c. relevant or material samples
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APPENDIX F:

ATTITUDES TOWARD COMPUTERS (FORM B: POST-INSTRUCTION)

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ATTITUDES TOWARD COMPUTERS (FORM B)

NAME OF TRAINEE:

_____

DATE OF TRAINING: _____

Please answer each item below by marking the answer that MOST agrees with your response. Make sure erasures are complete because multiple responses are not allowed. When finished with this evaluation, please do not fold or staple. Thank you for your cooperation.

BROWN ATTITUDE TOWARD COMPUTER-BASED INSTRUCTION SCALE

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. While taking computer-based instruction I felt challenged to do my best.					
2. I was concerned that I might not be understanding the material.					
3. I was not concerned when I missed a question because no one was watching me anyway.					
	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never
4. While taking computer-based instruction I felt isolated and alone.					
5. I felt uncertain as to my performance in the programmed course relative to the performance of others.					
6. I found myself just trying to get through the material rather than trying to learn.					

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	Quite Often	Often	Occasionally	Seldom	Very Seldom
7. I knew whether my answer was correct or not before I was told.					
8. I guessed at the answers to questions.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
9. In a situation where I am trying to learn something, it is important to me to know where I stand in relation to others.					
10. As a result of studying some material by computer-based instruction, I am interested in trying to find out more about the subject matter.					
	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never
11. I was more involved in running the machine than in understanding the material.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
12. I felt I could work at my own pace with computer-based instruction.					
13. Computer-based instruction makes the learning too mechanical.					

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	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
14. I felt as if I had a private tutor while on computer-based instruction.					
15. I was aware of efforts to suit the material specifically to me.					
16. I found it difficult to concentrate on the course material because of hardware.					
	All of the Time	Most of the Time	Some of the Time	Only Occasionally	Never
17. Questions were asked which I felt were not relevant to the material presented.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
18. Computer-based instruction is an inefficient use of the student's time.					
	Quite Often	Often	Occasionally	Seldom	Very Seldom
19. While on computer-based instruction I encountered mechanical malfunctions.					
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

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20. Computer-based instruction made it possible for me to learn quickly.					
21. I felt frustrated by the computer-based instruction situation.					
22. The computer-based instruction approach is inflexible.					
23. Even otherwise interesting material would be boring when presented by computer-based instruction.					
24. In view of the effort I put into it, I was satisfied with what I learned while taking computer-based instruction.					
25. In view of the amount I learned, I would say computer-based instruction is superior to traditional instruction.					
26. I would prefer taking a course by computer-based instruction more than traditional instruction.					
27. I am not in favor of computer-based instruction because it is just another step toward de-personalized instruction.					
28. Computer-based instruction is too fast.					
29. Typing experience is necessary in order to perform easily on computer-based instruction.					
30. Computer-based instruction is boring.					

Additional Comments and Recommendations for Improvement (*you may use the back of this form if necessary)*:

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