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AN ASSESSMENT OF THE RETENTION OF MASTERED

PSYCHOMOTOR SKILLS: A LONGITUDINAL STUDY

By

Gary M. Walker

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ABSTRACT

AN ASSESSMENT OF THE RETENTION OF MASTERED PSYCHOMOTOR SKILLS: A LONGITUDINAL STUDY

By

Gary M. Walker

The primary purpose of this study was to investigate the degree to which defensive psychomotor skills mastered and demonstrated in basic law enforcement training in Michigan may be retained over time while performing the duties of a law enforcement officer. Written comments provided by respondents were analyzed to infer possible factors that may influence retention over time.

The sample included 64 troopers from the Michigan Department of State Police and 16 officers from the Flint Police Department. All were sworn officers who had graduated within the last two and one-half years.

Four hypotheses were tested. Three concerned the ability to retain psychomotor skills over time; the fourth considered correlations with age, sex, and educational level against retest scores. The first hypothesis was tested with the t-test. The second and third were tested with ANOVA and post hoc with Duncan's. The fourth was tested with Pearson's product-moment correlation.

Content analysis was used to describe the content of written comments provided by the state troopers.

Individuals with the least experience on the job retained significantly better than those with more experience. Significant loss of retention ($p < .05$) began somewhere between 0 and 9 months and continued to decline through 26 months on the job.

Schools paired at 9 and 10 months and 22 and 26 months exhibited similar retest results. Declines in retention were present over time for each school and pairwise group tested. The decline in exhibited retention was least severe between 10 and 15 months of elapsed time and most severe between 15 and 26 months.

The rate of retention of defensive psychomotor skills was independent of age, male sex, and educational level. Significant correlations ($p < .01$) found in some cells for females were likely a result of small cell size. Content analysis of written comments revealed that techniques requiring multiple manipulations were often jettisoned and single-action techniques retained.

Law enforcement officers and troopers were unwilling to retain all defensive psychomotor skills over time. Conversely, they were willing and able to retain selected skills that required little or no thinking. Instinctive responses appeared to be more important to most of the officers tested.

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CHAPTER I

THE PROBLEM

Introduction

In recent years emphasis has been placed on requiring specific performance standards for those who seek to become sworn law enforcement officers. The emphasis has resulted in influencing Michigan to establish precise criteria in skill courses of the law enforcement basic training curriculum. The precise criteria are established with three things in mind: (a) that only those who meet high standards are allowed admittance to the law enforcement profession, (b) that a person is properly prepared for the job, and (c) that the recruit will be able to retain skills mastered in training while performing the job. The idea of high standards for law enforcement officers is generally accepted, but there is an undercurrent of disagreement as to the level of retention of skill on the job over an extended period of time.

The major emphasis of previous investigators has centered on determining the extent of course effectiveness by using pretest-posttest designs or Likert-style perception designs to assess retention of course work before assuming job responsibilities. Assessments of this nature leave unanswered questions about the relationship between training and job performance over time.

Basic Training in Michigan

The enactment of Public Act 203 on July 16, 1965, was the enabling piece of legislation that led to the statewide control of employment and training standards. The legislation is known and may be cited as the Michigan Law Enforcement Officers Training Council Act of 1965 (28.601, P.A. 203). Section 28.603 of the Act created the Council to carry out the intent of the Act and to consist of 11 members. Nine of the members are appointed by the Governor as follows: three from the Michigan Sheriffs' Association, three from the Michigan Association of Chiefs of Police, and one member each from the Fraternal Order of Police, the Detroit Police Officer's Associations, and the Metropolitan Club. The other two members are the Attorney General of the State of Michigan and the Director of the Department of State Police, who sit by directive of the statute.

This group of standard setters was given its mandate to establish minimum employment and training standards for all law enforcement agencies in Michigan. A summary of legislative directives as presented in Section 9 of the Act is as follows:

> The council shall prepare and publish minimum employment standards with due consideration to varying factors and special requirements of local agencies relative to:
> a. Minimum standards of physical, educational, mental and moral fitness which shall govern the recruitment, selection, and appointment of police officers.
> b. The approval of police training schools administered by a city, county, township, village, or corporation.
> c. Minimum courses of study, attendance requirements of at least 240 instructional hours, equipment, and facilities required by approved training schools.
> d. Minimum qualifications for instructors at approved police training schools.

e. Minimum basic training requirements which regularly employed police officers excluding the Sheriff shall complete before being eligible for employment.

In response to these legislative mandates, the Council has established rules published in the Administrative Code, which has the force of law in Michigan. The rules are modified as needed or required in order to insure that the rules do not have an adverse effect on protected groups and reflect current job-related standards for employment and training.

The selection and employment standards were last updated on June 18, 1985. All currently employed law enforcement officers in the state must meet the standards published in Rule 28.4102, which are as follows:

A person selected to become a law enforcement officer under the Act shall meet all of the following requirements:
  a. Be a citizen of the United States.
  b. Be at least 18 years old.
  c. Have obtained a high school diploma or a passing score on the general education development test indicating a high school graduation level.
  d. Have no prior felony convictions.
  e. Possess good moral character as determined by a favorable comprehensive background investigation.
  f. Possess normal hearing, color vision, and visual acuity in each eye correctable to 20/20.
  g. Be free from any other impediment of the senses, physically sound, in possession of extremities, and well developed physically, with height and weight in relation to each other as indicated by acceptable medical standards.
  h. Be free from any physical defects, chronic diseases, organic diseases, organic or functional conditions, or mental and emotional instabilities which may tend to impair the efficient performance of a law enforcement officer's duties or which might endanger the lives of others or the law enforcement officer.
  i. Possess a valid Michigan motor vehicle operator's or chauffeur's license.
  j. Read and write at the level necessary to perform the job of a law enforcement officer.

k. Demonstrate physical ability at a level necessary to per-
    form the job of a law enforcement officer.
l. Successfully complete the basic police training curricu-
    lum at a Council approved school.
m. Demonstrate mastery of the basic training curriculum as
    determined by passing the Council's examination for law
    enforcement officer certification.

The Council may enter into agreements with other agencies,
colleges, and universities to carry out the intent of the Act. The
purpose of these contracts is to ensure that approved schools are
delivering the course of study prescribed by the Council. A focused
summary of the Basic Training Rules reveals that:

To complete the prescribed course of study successfully, the
recruit shall do all of the following:
a. Attend and participate in 90% of the prescribed training,
    unless otherwise established in this rule.
b. Attend and participate in 90% of the physical training
    and defensive tactics course.
c. Demonstrate ability in those training objectives promul-
    gated by the council for the defensive tactics course.
d. Attend and participate in 100% of the classroom portion
    of the council approved firearms course.
e. Attend and participate in 90% of the range portion of the
    approved firearms course.
f. Attain a score of 70% on the basic revolver course.
g. Attain a score of 70% on a written examination addressing
    the academic objectives established by the council in the
    firearms course.
h. Attend 90% of the first aid course.
i. Attain a score of 70% on a written examination addressing
    the academic objectives established by the council in the
    first aid course.
j. Qualify for an American Red Cross first aid card.
k. Average 70% on all, but not less than six examinations
    addressing council approved training objectives, exclud-
    ing firearms, first aid, physical training, and defensive
    tactics.

The Training Council has published the mandatory 440-hour basic
training curriculum. The curriculum has six cognate areas. They are:

I.   Investigation   102 hours

II. Patrol Procedures   46 hours

III. Detention and Prosecution   15 hours

IV. Police Skills   142 hours

   First Aid (37 hours)

   Firearms (44 hours)

   Defensive Tactics (61 hours)

V. Traffic   88 hours

   Precision Driving (22 hours)

VI. Special Operations   21 hours

Administrative time for testing and other matters pertinent to the operation of a recruit school is also included in the total of 440 hours. The hours dedicated to administrative procedures are 26, which, when added to the above total of 414 instructional hours, brings the total to 440 hours.

P. A. 203 (1965), as amended, has provided the means of establishing a job-related training curriculum. The necessary ingredients are ingrained to permit the establishment of a statewide training system controlled by the Training Council. However, any system that does not provide a means of continuous evaluation for assessing curriculum and course results on the job may soon become outdated.

A summary of the above elements seems to indicate that the Training Council is capable of establishing employment and training standards. However, there is no evidence to indicate that it is pursuing the evaluation and assessment of the results of training over time. There is an apparent need for an investigative foray into retention of knowledge or skill.

The Problem

To complete basic law enforcement training in Michigan successfully, a person must demonstrate mastery of certain knowledge and skill. Recruits who demonstrate mastery are allowed to enter the law enforcement profession. If demonstration of mastery ensures that proper preparation has occurred, one must ask whether these officers retain, over time, the knowledge and skill they mastered.

In Michigan's mandated basic training curriculum, there are four skill courses and five cognate knowledge areas available for examining retention over time. Since this writer examined the retention of psychomotor skills, the research was focused on original skill development and longitudinal retention. The only course among those available that assesses skill mastery based on predetermined performance criteria is the defensive tactics course. The problem is that up until now no assessment to measure the retention of skill on the job has been conducted; thus no conclusions can be drawn as to the retention of those skills.

Purpose of the Study

The purpose of this study was to investigate the degree to which defensive skills mastered and demonstrated in basic training may be retained over time while performing the law enforcement officer job.

Need for the Study

The Michigan Law Enforcement Officers Training Council (MLEOTC) indicated an interest in and a need for an assessment of the retention

of defensive skills mastered during recruit school. Because the MLEOTC includes the defensive tactics course in its basic curriculum, this study may provide valuable information to them and to the law enforcement agencies that have their personnel trained in advanced defensive tactics techniques.

Research Questions

This study was directed at answering the following research questions:

1. What degrees of retention will officers show, as calculated by performance retest, after varying amounts of time have elapsed since graduating from recruit school?

2. Will there be any variation in retention levels, as reflected by mean scores on the retest, between schools from which retested recruits graduated?

3. Are there any correlations between educational level, age, and sex against retest scores and elapsed time?

4. What can be suggested by state troopers concerning how the defensive tactics course can be improved for the purpose of increasing its effectiveness in preparing officers for realistic law enforcement work?

Limit and Scope of This Study

In this longitudinal study, there were limitations and assumptions as follows:

1. The study was limited to examining only currently sworn officers employed by the Michigan Department of State Police and the

Flint Police Department. All participants were subjected to the same employment standards and were subjected to the same performance and evaluation criteria for the defensive tactics course. While a statewide focus might have enhanced the statistical stability of the study, the related costs were prohibitively high, and required degrees of access to officers on a statewide basis were problematic in any event.

2. The study was limited to examining post-academy retention. No attempt was made to assess the quality of the course or its instructors.

3. It was assumed that differences in test-item selection within the test reflected personal mastery potential and not degree of technique difficulty. While the MLEOTC's mastery exam may be a stronger indicator of skill if all tests were the same, the fact remains that their policy allows for personal selection of items within limited criteria.

4. It was assumed that the opinions reported by the troopers were actually held by those who wrote them.

Importance of the Study

This dissertation is important for many reasons. The study is a beginning toward the development of a significant and meaningful feedback loop for law enforcement curriculum developers in Michigan. Further, the findings should have an applicability for Michigan's colleagues throughout the country who face the same retention questions in their states.

The study findings can be considered by law enforcement administrators when determining the advanced training needs of their personnel in psychomotor skill acquisition and the potential for longitudinal retention.

Definitions of Terms

Definitions of critical terms are offered at this point to provide a better understanding of their meaning when used in this dissertation.

Assessment: Appraisal of individual accomplishment on the defensive tactics evaluation.

Assessor: An MLEOTC-certified individual who determines whether a person has successfully demonstrated a defensive skill.

Basic training curriculum: The 440-hour curriculum established in Michigan administrative law that recruits must successfully complete before being appointed as a law enforcement officer in the state.

Correlation: A numerical index of the degree of relationship between two variables on the same population. Coefficients of correlation range from +1.00, a perfect relationship, through .00, no relationship, to -1.00, a perfect inverse relationship.

Criterion: A standard for judging attainment.

Curriculum: All the subjects, courses, and other learning experiences from which the training school objectives are to be attained.

Defensive tactics course: The 48-hour course of study established in Michigan administrative law that recruits must successfully complete in order to complete basic training successfully.

Demonstrate: Show an ability to apply, as taught, a defensive tactics technique.

Elapsed time: The amount of time, in months, that an officer has worked since demonstrating original mastery of defensive tactics skills.

Job analysis: Analysis of a learning or problem-solving approach to find the most efficient description of the law enforcement officer milieu.

Mastery: Eminent ability in a defensive skill, as evidenced by demonstrating the skill without error.

Motor: Pertaining to a muscle, nerve, or center that affects or produces movement.

Motor ability: An individual's efficiency in executing motor skills--that is, the present level of performance in such activities as walking, speaking, writing, and defensive tactics.

Motor pattern: A movement or a series of movements for a purpose; provides the basis for meaningful orientation and the foundation for more complex skill development.

Motor performance: A relatively short-term aspect of movement behavior marked by movement oriented toward the execution of an identifiable task or skill.

Motor proficiency: Effective chain of motor response, increased proficiency in motor change brought out by practice, or refinement of motor ability to perform a defensive skill.

Performance test: The test mandated by the MLEOTC to determine whether a person has successfully mastered the skills in the defensive tactics course.

Proficiency: Acquired skill, understanding, or expertise in the performance of defensive techniques.

Psychomotor: Pertaining to muscular action which follows directly from a mental process; important in vocabulary proficiency, the performing arts, sports, and defensive tactics.

Retention: The ability to recall and perform a defensive skill after time has elapsed.

Skill: The ability to demonstrate a mastered defensive tactic without error in an easy, rapid, and accurate manner.

Skill, motor: Reasonably complex movement behavior considered valuable by some criteria.

Skill, psychomotor: A muscular proficiency or dexterity believed to ensue from conscious mental activity.

Organization of Remaining Chapters

The remainder of this dissertation is divided into five more chapters. Chapter II is a review of studies of relevant psychomotor skill acquisition and their potential for retention. Chapter III contains a discussion of longitudinal evaluation as a research method,

the sample, instrumentation, validity and reliability concerns, and a summary.

A discussion of the statistical results of the study is found in Chapter IV. Chapter V includes a discussion of the results of the qualitative analysis of the comments provided by Michigan state troopers. Chapter VI is a discussion of the major findings and conclusions. Recommendations for further research and current action are included.

CHAPTER II

SELECTED REVIEW OF THE LITERATURE

To understand the concepts discussed in this dissertation, the reader should be aware of (a) the research done addressing longitudinal retention overall, (b) the psychomotor domain, and (c) the need for longitudinal retention studies. A review of the research conducted leading to the implementation of the Michigan mandated defensive tactics course is included to more accurately interface the nature and scope of the retention needed to maintain the motor skills.

Job-Related Course Development

Wollack Study

Wollack (1979) conducted a job analysis targeted at physical performance requirements for Michigan law enforcement officers on a statewide basis. The focus was on physical and defensive motor skills. He found that in 85% of defensive situations for the officers, the subject offering resistance was male. Further findings indicated that the average height of the individual offering resistance was 5'9", with a standard deviation of 3.6"; the average weight of the resistor or aggressor was 165.66 pounds, with a standard deviation of 31.9 pounds.

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Wollack did not provide an explanation for or address why the variance was as large as it was. Because of this, the MLEOTC should be hesitant to use the means to establish training or testing criteria.

The types of resistance encountered (N = 524) included pulling away (30%), wrestling (28%), passive resistance (14%), hitting or kicking (14%), running away (10%), armed aggression (4%), and barricading or special tactics (1%).

The methodology used to gather the needed information was the diary approach. It was used to reduce the potential for criticism that might accrue if the more traditional retrospective method was used to focus on specifics.

Since weather in Michigan often affects job performance, the survey was conducted over three different periods including winter, spring, and summer. It was concluded that the spring weather was sufficiently identical to fall that it need not be included in the survey.

Wollack recommended that Michigan recruits "receive a basic police training program which would include defensive skills identified as critical to the performance of the police job."

Berner and Kohls Study

Berner and Kohls (1979) finished a statewide job analysis of the Michigan police patrol officer position. Final core tasks established for defensive motor skills were: subdue attacking

persons, subdue subject resisting arrest, handcuff suspects or prisoners, and physically restrain crowds.

Their methodology, at the request of the MLEOTC, was a modified Ammerman and Pratzer (1977) process. It was a 28-step analysis, which resulted in the identification of 304 core tasks. The flow chart of research activities is published in Appendix C of their analysis report.

From the statewide population of law enforcement officers, the study focused on 171 agencies from 12 different agency types. One of those agencies was the Michigan Department of State Police, and another was the Flint Police Department. Berner and Kohls concluded that "the rich store of data could form the basis for numerous decisions that will improve the quality of law enforcement in Michigan" (p. 46).

The defensive tactics course of study that was developed and implemented by the MLEOTC was supported by the research from these two studies. The result was a job-related, task-based training course that includes 38 critical tasks a recruit must master during recruit school.

Performance Assessment

Kirkpatrick (1977) suggested that "it is an acceptable and widely used practice for the training person to construct his own test to measure learning that takes place in a learning program" (p. 86). Law and Bronson (1977) indicated that "criterion referenced tests have gained in popularity until today they provide an

alternative to the more traditional norm-referenced tests" (p. D.21). Glazer and Cox (1981) made a useful distinction about the way in which the variables of training are controlled and measured. They suggested that "measures of training success can be classified as either norm-referenced or criterion-referenced," echoing Law and Bronson.

Evaluation of training results that compare trainees to one another or to achievement on subject matter in the program are norm-referenced in that they are comparative and completed on a relative scale of measurement. That is, norm-referenced testing assesses the strength of a person's score or performance in relation to the range of scores made by some defined reference group.

Evaluations that compare a trainee to a concrete criterion such as on-the-job results are criterion referenced. That is, criterion-referenced testing assesses the strength of a person's performance against a pre-established standard. Reports on criterion-referenced assessments of the effects of training on observable job-related behavior are rare in the training literature.

Based on a review of official documents held by the MLEOTC, the test they used to assess defensive skills is a criterion-referenced test. This test assesses the strength of a person's performance against the pre-established standard of 100% mastery.

The curriculum mandated by the MLEOTC requires the recruit to become aware of 38 different defensive and offensive psychomotor skills. The assessment separates the tactics into core groups and requires the recruit to demonstrate mastery of 18 techniques.

Since all critical core domains are covered during the test, the MLEOTC determined that recruits could decide for themselves which 18 techniques would be mastered during recruit school. Just how the recruits are able to determine which holds are best suited for themselves in relationship to the job has never been explained by the MLEOTC.

Since the implementation of this testing process, very few recruits have been denied access to the job based on a failure to perform during the mastery exam. Records are not available identifying precise numbers. However, three factors have been set forth by the MLEOTC for the virtually 100% passing rate for what appears to be a difficult skill requirement. First is the fact that the recruit is aware of what must be mastered and demonstrated early in the training course and can tailor his/her practice accordingly. Second, the retesting policy allows for one retest. Third, employment as a law enforcement officer is predicated on successful completion of the defensive tactics course, so each recruit is motivated to succeed.

Summary

The preceding discourse clearly established the fact that since 1984 the graduating Michigan law enforcement officer has mastered and demonstrated mastery of defensive motor skills. It also clearly established the fact that each officer can retain those motor skills for a sufficient amount of time during recruit school to allow for the demonstration of that mastery. However, this study did not focus

on the ability of the curriculum or the instructor. Rather, it concerned whether the law enforcement officer does or does not retain proficiency and mastery over a period of time while subsequently performing the job of a law enforcement officer.

Psychomotor Domain

Singer (1975) argued that "activities that are primarily movement oriented and that emphasize overt physical responses bear the label psychomotor" (p. 23). He distinguished psychomotor from cognitive or knowing and affective or feeling. He concluded that "these distinctions are by no means pure." Noble (1968) stated that "the label 'motor' skills is less satisfactory than 'perceptual-motor' or 'psychomotor' skills" (p. 204).

Since the activities within the defensive tactics course are primarily movement oriented, emphasize overt physical responses, and are highly refined skills, the concept of psychomotor domain was used in this study. Such action is not intended to suggest that these skills are exclusively applicable to that domain.

Permanence of Motor Skills

The German psychologist Ebbinghaus is consistently cited as the father of the study of retention. Although he used himself to study the retention of nonsense syllables over a period of time, subsequent studies have confirmed the fact that most forgetting occurs the first few hours after original learning and gradually diminishes with time (Weiss, 1963).

According to Sage (1977), retention is the savings of proficiency after a period of no practice. Retention, then, may be defined as the persistence of proficiency in a skill after a period of time. Thus, motor skills are often mastered with the intention of recalling and performing them at a later time. Singer (1975) argued that retention can be determined by "measuring the difference between the amount originally learned and the amount forgotten" (p. 453).

Motor skills are remarkably resistant to forgetting (Fischman, 1982). In fact, in studies of proficiency retention after extended periods of no practice, skills are rapidly recovered once practice is resumed (Fleishman & Parker, 1962; Jahnke & Duncan, 1956; Melnick, 1971; Meyers, 1967; Purdy & Lockhart, 1962; Ryan,1962, 1965).

The research cited above suggested that graduates of a police recruit school should retain their skills over time because they were mastered and their proficiency exhibited. Since the skills in question are also designed to be life saving in nature, the retention presumably should be very resistant to erosion over time.

The factors routinely reported as influencing retention include level of original mastery, nature of the task, levels of processing, practice schedules, use, reminiscence, and meaningfulness. These factors are discussed in the following pages.

Level of Original Mastery

Weakly mastered concepts and skills are soon forgotten (Frandsen, 1967). Research has indicated that the more proficient one becomes during the original learning period, the better the

retention level over time (Fleishman & Parker, 1962; Melnick, 1971; Purdy & Lockhart, 1962).

Since the requirement in Michigan is evidence of 100% mastery and proficiency, longitudinal retention should be exhibited by law enforcement officers. This qualitative level of original mastery (100%) suggests strongly mastered skills and proficiency and appears to enhance the potential for retention over time.

Nature of the Task

Whether a motor skill is continuous, discrete, or serial may influence retention levels (Ammons et al., 1958; Battig, Nagel, Voss, & Brogden, 1957; Bell, 1950; Bilodean & Levy, 1964; Fleishman & Parker, 1962; Leisten, 1969; Meyers, 1967; Ryan, 1962, 1965; Smith, 1971; Stelmach, 1974). Serial tasks have identifiable beginning and ending points, but are characterized by events that follow each other in rapid sequence (Fitts & Posner, 1967). An example of a serial task is a gymnastics routine. Gymnastics routines require the individual to master various skills and incorporate them in a prescribed sequence of events. Since the escalation and de-escalation of force is an essential matter for the officer to consider, the skills contained in the defensive tactics course may be defined as serial in nature and therefore more difficult to retain over an extended period of time. The implication for law enforcement officers may be that they ought to be making conscious decisions to practice and rehearse the techniques regularly once mastered.

Levels of Processing

A relatively recent approach to the problem of motor skill retention is the levels of processing approach articulated by Craik and Lockhart (1972). Essentially, they suggested that the more "deeply" one assimilates skill acquisition the better the retention over time. Thus by applying greater meaning, mastered skills are retained.

The more deeply a skill is mastered by the learner, the better the retention of that skill over time (Battig & Shea, 1980; Ho & Shea, 1978; Lockhart, 1980; Shea, 1977; Shea & Morgan, 1979). Fischman, Christina, and Vercruyssen (1982) suggested that "rehearsal is also a means by which information can be processed to such a degree that it becomes more resistant to forgetting" (p. 183).

In essence, processing information more "deeply" means applying a greater amount of meaning to the skill, the end result being better retention over time. Since the defensive tactics skills are designed to be life saving in nature, the meaning of each skill and tactic should be mentally processed to enhance retention over time. Whether or not they are is not known.

Rehearsal and Practice

Perfect practice alone does not make perfect. Practice should be accompanied by such conditions as the performer being aware of his direction or goal, his results, and, hopefully, motivated to improve.

Norman (1981) observed that when people think about doing some action or saying some sentence, they sometimes fail to translate the

thought into action and later mistakenly believe that they already carried out the behavior.

According to Rotella (1984), mastery rehearsal is designed to provide people with confidence in their ability to perform flawlessly in any stressful situation. Mastery rehearsal requires officers to induce a relaxed state and then visually to imagine themselves performing in a particularly stressful situation with perfect execution.

Kazoroski (1986) defined rehearsal as "the systematic mental repetition of some image, activity or behavior with no observable movements." He clarified further by writing that rehearsal is a term that is interchangeable with mental practice.

Oxendine (1968) reported the following common findings in the research studies related to mental practice:

1. Mental rehearsal is more valuable in motor learning than is generally assumed. Research has consistently shown that mental-practice groups learn and perform at a higher level than do control groups.

2. Mental practice should be used in combination with overt practice, not in place of such practice.

3. Mental practice can be effectively used with students of widely varying intelligence levels.

Hall and Erffmeyer (1983) concluded that "virtually any physical skill or combination of physical skills can be practiced mentally once becoming adapt at using imagery rehearsal." Whole-practice methods are generally more efficient than part-practice in that they

permit the learner to reach a criterion in fewer trials. If the total task is complex or involves a number of separate and independently performed components, however, it may be more realistic to use the part approach (Adams & Hufford, 1962; Bahrick, 1957; Seymour, 1954).

Research on the effects of type of practice schedule on motor skill retention "has yielded equivocal results and no clear guidelines are available at this time" (Fischman et al., 1982, p. 185). However, they identified studies finding distributed practice to produce better retention, some finding retention better when using massed schedules and others finding no differences (Adams & Reynolds, 1954; Jahnke & Duncan, 1956; Lewis & Lowe, 1959; Reynolds & Bilodeau, 1952; Singer, 1965).

While strong inferences may be made regarding practice within a recruit school because of final proficiency demonstration, no information is available on when or if current law enforcement officers practice their defensive skills.

Use

The phrase "use it or lose it" accurately describes why some forgetting takes place. Another possibility is that the officer subtly alters the skill with use--that is, tailoring the skill to personal preference. Kolesnik (1963) suggested that "for many years it was generally believed that the main reason and perhaps the only reason for forgetting was disuse" (p. 243). He proffered a second explanation described as "motivated forgetting," which is probably

negligible for purposes of this research review because it is related to subconscious memory.

Since the researcher was expressly prohibited from pursuing the use issue within the study, its effect on retention over time was not examined.

Reminiscence

Hilgard (1957) defined reminiscence as "a psychological term for the occasional rise in the curve of retention before it falls; that is, when under some circumstances more may be retained after an interval than immediately upon completion of the skill acquisition." According to Kolesnik (1963), "reminiscence may help explain why psychomotor skills, such as the ability to ride a bicycle, operate a typewriter, dance, or build something are ordinarily not readily forgotten" (p. 242).

Singer (1965) stated that "reminiscence is the opposite of forgetting, for it is the phenomenon in which performance increases after a rest interval and is therefore attributable to rest" (p. 459). Since law enforcement officers in Michigan are graduating from recruit school at the 100% level of mastery, it is unlikely that performance could increase over time.

Meaningfulness

According to Singer, "tasks that are more meaningful to the learner elevate motivation and consequently are learned more effectively" (p. 367). Clearly, the state has made original mastery

very meaningful by requiring demonstration of 100% mastery before becoming a law enforcement officer. One might be able to conclude that mastery is more related to fear than to the development of necessary job skills. Examining retention over time is one way of assessing how meaningful the defensive skills are.

Retention of Motor Skills

According to Singer (1975), "gross motor skills are retained for many years at a higher skill level than any other learning materials, such as fine motor skills and prose" (p. 462). Sage (1977) echoed by noting that "once learned, motor skills are remarkably resistant to being forgotten" (p. 353). Gross motor skills are those that incorporate the large muscles of the body or the whole body. Fine motor skills are those that require precision movement within a limited area, such as typing or drawing.

The long-term retention of psychomotor skills was demonstrated in a series of experiments conducted by Swift. In 1906 he used himself to examine typing skills after two years of elapsed time. It took 11 days to recover forgotten skill. In 1910 he mastered the art of juggling. Again, after six years between mastery and retention retest, it took 11 days to recover forgotten skill.

Since that time, motor skill retention has been subjected to numerous investigations. Jahnke and Duncan (1956) found no evidence of forgetting over a four-week period. Fleishman and Parker (1962) observed "virtually no loss in skill regardless of the retention interval." These studies, however, examined the retention of

tracking tasks, which are somewhat easier to recall than are gross or fine motor skills. Tracking a football or a baseball with the eyes are examples of tracking tasks.

Schmidt (1975) noted that "tasks that show the greatest retention are continuous tracking tasks and those that show the poorest retention are serial manipulative tasks; discrete tasks appear to be approximately intermediate in retention." Serial and discrete tasks tend to include more of a verbal/cognitive construct than do continuous tasks and gross motor repetitive skills.

Theories of Retention

Walker (1958) proposed that high arousal during practice results in greater permanent memory. Gestalt psychologist Koffka (1935) believed that a greater organization of the stimulus trace results in less probability of its loss over time. McGeoch (1961) categorized his theories among work, perseveration, and differential forgetting theories.

Singer (1975) wrote that long-term memory is relatively immune to forgetting. Keele (1973) theorized that rehearsal, organization, and imagery can improve the functions of long-term memory.

Longitudinal Retention

Cornwell (1980) defined bottom-line results as "on the job performance of trainees after training" (p. 87). Swierczek and Carmichael (1985) carried that thought one step further by suggesting that "one of the weaknesses of learning evaluation designs is the failure to do longitudinal studies" (p. 97).

That weakness is compounded in most areas of employment where the nature of the job is labor intensive. Clearly, it is necessary and essential to pursue the validation of the mandated law enforcement training curricula through means other than happiness indicators that are reported during many inquiries into retention over time. Swierczek and Carmichael wrote that "the post training application of skills is difficult to measure without access to employees back on the job" (p. 99). That observation is made more meaningful when one examines the type of experimental and applied research cited above that is being conducted and reported in the literature. This researcher found no evidence that a longitudinal inquiry of skill retention in the law enforcement discipline had ever been done.

Methods and Techniques for Evaluating Training

Kirkpatrick (1960) wrote a series of articles based on the assumption that a trainer cannot borrow evaluation results from another but can borrow evaluation techniques. The generally accepted techniques cited fall into four broad categories or steps, which are summarized as follows:

Step 1: Reaction
Step 2: Learning
Step 3: Behavior
Step 4: Results

Reaction

Kirkpatrick defined reaction as how well the trainees liked a particular training program. It is primarily an affective approach designed to measure the feelings of each individual.

The MLEOTC routinely uses the reactive technique at the end of each basic training session. A training session is defined as the fixed interval of time that a recruit is in basic training and for which credit toward certification is given. Kirkpatrick contended that it is important to determine how people feel about the programs they attend.

Reeves and Jensen (1972) conducted a study to consider (a) whether evaluations of identical programs by separate groups of participants were comparable, (b) if the evaluation was transitory, and (c) whether the institution's evaluations of its own programs were compatible with those of the participants. The procedure they used had seven groups divided equally, where the participants in both sections were taught identical subject matter by the same instructor at different times. The results of their study suggested that participant evaluation could be an effective tool for the development and refinement of future programs.

Organizations that effectively measure the reactions of trainees should realize, in the final analysis, that happiness indicators are not an assurance that any learning has taken place. This evaluation technique is often used because personal reaction is easy to measure and often readily available. According to Kelly et al. (1984), "research has shown all too often that questionnaires completed

immediately following training can reflect people's positive expectations about training effectiveness, but those expectations disappear quickly" (p. 32).

Learning

Kirkpatrick (1960) articulated the following guideposts for measuring the amount of learning that takes place:

1. The learning of each trainee should be measured so that quantitative results can be determined.

2. A before-and-after approach should be used so that any learning can be related to the program.

3. As far as possible, the learning should be measured on an objective basis.

4. Where possible, a control group should be used to compare with the experimental group which receives the training.

5. Where possible, the evaluation results should be analyzed statistically so that learning can be proven in terms of correlation or level of confidence.

In some cases, these guideposts are not effectively available to the MLEOTC. For example, it is not possible to have control groups and experimental groups as a part of the mandatory basic training process. The MLEOTC does, on the other hand, pursue statistical relevance in terms of correlation of certification exam results with program results.

The MLEOTC measures learning and skill mastery through two criterion-referenced tests. Using training objectives derived from

the job analysis and task inventory as the basis for the mandated curriculum and testing establishes the link between job-related learning and job-related assessment.

One test is the certification examination, which is designed to evaluate the total learning process. The second is the defensive tactics assessment. All recruits must pass these tests to become law enforcement officers in Michigan. The required score for passing the certification examination is 64%. The required score for passing the defensive tactics examination is 100%.

Siegel et al. (1961) attempted to correlate the importance of tasks to be performed by graduates of a technical school with the graduates' proficiency at those tasks, as observed by the authors. Siegel et al. stated that "one important purpose of job performance evaluation is to provide information regarding the effectiveness of a training program designed to prepare individuals for the job involved." The authors concluded that the task-proficiency measurements for a technical training program were relatively simple to collect and correlate.

The effectiveness of the defensive tactics course is clear if one only examines whether learning has taken place. That is, learning should be taking place if the criterion performance level is 100% mastery. The effectiveness may not be so clear if one examines whether mastery is retained over time.

Behavior

Kirkpatrick stated that "evaluation of training programs in terms of on-the-job behavior is more difficult than the reaction and learning evaluations." He believed that the most comprehensive research that has been done to evaluate the effectiveness of a training program in terms of on-the-job behavior was by Sorensen.

Sorensen (1958) used experimental as well as control groups. He used four different approaches to measure observed changes. They included the trainee and the trainee's peers, subordinates, and supervisors. When all levels within the organization are allowed to analyze behavior modification, the nature and scope of the results can be the basis for shaping behavior.

Evaluation of behavior is a very complicated procedure. Kirkpatrick stated that "it is worthwhile and necessary if training programs are going to increase in effectiveness and their benefits made clear to decision makers."

Results

The objectives of most training programs can be stated in terms of intended outcomes or results desired. Kirkpatrick contended that from an evaluation standpoint, it would be best to evaluate training programs directly in terms of results desired.

Lerda and Cross (1962) echoed by stating that "measurement of results can yield data which can serve as the basis for the following:

1. Bring training objectives in line with performance require-
ments.

2. Improve planning, design, and content to meet actual needs.

3. Improve the quality of instruction through better selection,
development, and preparation of instructors.

4. Pinpoint areas of work where trainees need additional or
special help.

5. Clarify experience, prerequisites, and pre-conditioning
required of the trainees.

Rose (1964) suggested that "performance tests may be used during
and after training to determine the ability of individuals to perform
specific tasks." This method appears to be consistent with the one
used in this study and the most objective measure because it deals
with elements that can be observed under controlled conditions.

Selected Review of Law Enforcement Training Literature

Talley's (1984) follow-up formative evaluation study stands by
itself as the first meaningful attempt to design an evaluative
methodology for examining curriculum results. The evaluation was a
curriculum product assessment and therefore did not pursue evidence
of skill retention. As a curriculum product assessment might imply,
the intention was to evaluate the relevancy of the training curricula
offered at Oakland Community College. Oakland is a Council-approved
training school. The stated purpose of the study was "to
comprehensively evaluate the Oakland Police Academy basic training

program in order to identify and prioritize curriculum deficiencies to facilitate program improvement."

The methodology used a task inventory instrument designed to pursue police officers' judgments concerning the adequacy of the training received at the academy. The instrument used in the study was the by-product of the task inventory instrument used in the job study conducted by the MLEOTC. The instrument contained 304 job tasks that had been deemed essential by the MLEOTC as basic tasks and thus a necessary part of the basic training curriculum. Talley did note a potential weakness related to the fact that the sample (N = 27) had not been exposed to all of the tasks during recruit school because the tasks were not a part of the approved curriculum when the sample went through training.

The instrument called for responses to criterion ratings represented by a five-point Likert ordinal scale. The ranges to be considered by the officers in judging adequacy of the curriculum were from (1) totally inadequate to (5) excellent. The operational standard was "satisfactory," which had the numerical value of 3. Talley decided that any mean value of less than 3 was considered a potential curriculum weakness or problem needing attention.

The major findings of Talley's study are interesting and potentially revealing. One may infer, in part, that the training offered at the Oakland Policy Academy prepared graduates to perform tasks. Such a finding should be tempered with the fact that Oakland's graduates routinely score well on the MLEOTC's final test.

Talley reported meaningful findings pertaining to the perceived adequacy of the curriculum. Of interest, for purposes of this study, was the existence of a substandard mean value for defensive tactics. Data revealed that this duty field came in first as least able to prepare. It is important to underscore the fact that these recruits were not trained using the curriculum that was in place for this study.

Deeper examination of the results by task within duty field revealed more pertinent results. The tasks found to be weak or needing attention were related to physical exertion. Examples of this are: performing duties while wearing heavy equipment (mean = 2.19, SD = .75) and crawl in confined areas (mean = 2.52, SD = .79). The tasks found to be acceptable were related to self-defense techniques. Examples of items are: subdue subject resisting arrest (mean = 3.81, SD = .83), subdue attacking persons (mean = 3.59, SD = .83), and handcuff suspects or prisoners (mean = 3.70, SD = 1.08).

Talley's study can be recognized as a meaningful basic-training evaluation for several reasons. First, there is a scarcity, if not an absolute void, of post-training evaluation studies. The study probed the minds of law enforcement officers in an effort to determine the reliability of the core tasks. As a result of the study, the practical need for analyzing diagnostic techniques and standards to identify potential curriculum shortcomings was established.

Second, the study demonstrated the advantage of using a Likert-type scale for assessing curriculum relevancy. The methodology

provided a rapid way of gathering information by focusing on what the MLEOTC understands to be essential job tasks. As a result, it may be possible to generate meaningful data to assess basic training on an on-going basis.

Third, the study appears to support the notion that the police occupation can take steps to safeguard against curriculum obsolescence that occurs as a result of the dynamic forces that influence the nature of law enforcement performance requirements.

A critique of the study does indicate some weaknesses. Talley did not obtain supervisory ratings of graduate recruits to discover if task perceptions were concurrent with agency expectations for new officers. Consequently, the evaluative ratings about curriculum relevancy that may have been based on naive expectations of inexperienced officers were not balanced with corroborative data.

The design of the study relied heavily on personal judgments of incumbent officers' ability to properly assess personal performance of a task. As a result, the relative value of the reported deficiencies was unclear. Further compounding the problem is the fact that the reader is unable to determine whether there were differences in results based on varying times in service. In fact, no mention was made regarding the numbers from each session who comprised the sample proper. As a result, the reader is unable to make comparisons among the three training schools.

Grammage (1963) provided an overview of training and a few notes on evaluation, in which he stressed criteria that should prevail in

evaluation, including precise objectives, the training environment, attitudes of those in charge, and the evaluative process should be able to interpret and evaluate evidence pertinent to the training procedure. Other studies by McManus (1970) and Earle (1970) indicated relationships of academy performance to later job performance with unclear and nonpredictive results.

Theoretical Statement

An assessment of the longitudinal retention of the entire basic-training curriculum mandated in Michigan to determine if training is adequately preparing a person for the job is very likely needed. The pursuit of an objective such as that was not within the reach of this researcher. Lerda and Cross (1962) stated that "the effects of complex training programs can be studied more effectively if each part is evaluated separately" (p. 38). A pursuit of longitudinal retention focused on a part of the curriculum was within reach.

Since the purpose of this study was to investigate the degree to which defensive skills mastered and demonstrated in basic training may be retained over time, and since there appears to be compelling evidence of job-related, task-based training, and since there is criterion-referenced assessment of individual proficiency against training requirements, it seemed logical to set forth the following theory: Given (a) a task-based course of study, (b) individual mastery of course requirements, (c) evidence of mastery and proficiency of psychomotor skill at the 100% criterion level, (d) successful completion of the entire curriculum, and (e) appointment

as a sworn law enforcement officer, then (f) mastery of training criteria will be retained over time while functioning as a law enforcement officer in Michigan.

The given factors are reflective of factors related to what is required to become a certified law enforcement officer in Michigan. Each is important because appointment requirements interface among the givens to create the whole. Then it seems reasonable to theorize that the complete officer is able to retain mastered knowledge and skill over time.

Summary

California and New York were the first states in the country legislatively to establish commissions for the purpose of establishing employment and training standards for law enforcement officers. Numerous visionaries within the law enforcement discipline had offered and supported compelling arguments and logic in support of this process intended to "professionalize" the law enforcement community. National commissions published voluminous reports and documents detailing the needs of and how to remedy the problems of "policing."

The boards and commissions established during the 1960s and 1970s have responded, for the most part, with well-designed training programs. There has been a general acceptance of the philosophy that an empirically supported training program is a necessary beginning for the law enforcement officer.

The investigators of the effects of retention within the training program have adequately reported the success of the instructors to deliver meaningful training. The very basic pretest/posttest design often provides ample evidence of the retention and mastery of the delivered material.

Those who have pursued evidence of retention over time after graduation have been less successful when focusing on skills retained on the job. There is a sense that gross motor skills (bicycling) are retained more easily than fine motor skills (typing). There is also general agreement that practice over time tends to help maintain motor skills.

The MLEOTC has mandated a criterion-referenced defensive tactics course. It requires that every person demonstrate mastery of and proficiency in established techniques before assuming the duties and responsibilities of a law enforcement officer. In effect, it is a bona fide occupational disqualifier. Therefore, an interested researcher might pursue the question of retention over time in order to reach some data-based conclusions relative to what police officers remember and forget about life-saving motor skills.

An extensive review of the related literature led to the conclusion that a study of longitudinal assessment of motor skill retention to determine if law enforcement officers retain mastered motor skills over time has never been done before.

CHAPTER III

RESEARCH METHODOLOGY

The purpose of this study was to determine the degree to which defensive skills mastered in basic training may be retained over time, while performing the job of a law enforcement officer. The subject matter presented in the defensive tactics course is mandated by the MLEOTC.

This longitudinal inquiry was conducted in cooperation with the Michigan Department of State Police, the Flint Police Department, the Michigan State Police Trooper's Association, and the MLEOTC. Longitudinal investigations and evaluations are normally conducted to assess how populations change over time. The design of this study focused on the retention of mastered psychomotor skills over time.

Design Over Time

The design for this study was:

```
MSP-0098:   X   0   ...   ...   ...   ...   ...   02
FPD-1985    X   0   ...   ...   ...   ...   ...   02
MSP-0099:           X     0     ...   ...   ...   02
FPD-1986:                       X     0     ...   02
MSP-0100:                       X     0     ...   02
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where:  X    is the defensive tactics course
        0    is the first mastery examination
        02   is the second mastery examination
        ...  is representative of elapsed time
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It was a longitudinal design using stratified random assignment of subjects after graduation from recruit school. The subjects had been working as law enforcement officers since their graduation.

Levels of Significance

The hypotheses presented for statistical analysis in this dissertation appear in the null form signified by Ho. The alternative to the null is signified by Ha. The null form is a statistical tool for establishing a test of significance. The idea is that if true differences do exist between or among sampled groups, the null can be rejected and the alternative supported.

The method of rejecting the null hypothesis is to run a test of statistical significance. There are many mathematical methods available to establish significance. The significance level or probability level, reported using a probability value p, is expressed in decimal fashion. It is common for behavioral science research to accept a level of significance at .05 or below. This means that if one establishes a .05 level, or a $p < .05$, there is at most no more than one chance in 20 that because of random errors of measurement a difference in mean or average score of the size observed would occur even if there were in fact no differences between populations.

Statistical Errors

When rejecting a null hypothesis through a test of statistical significance, there is the possibility of committing two types of errors. According to Borg and Gall (1979), "the rejection of the

null hypothesis when it is correct is called a Type I error" (p. 424). This will most often occur when the accepted level of significance is not strict enough. They described their Type II error as "the failure to reject the null hypothesis ('no significance') when there is, in fact, a difference" (p. 424). This error will most often occur when the accepted level of significance is too strict. For purposes of this research, the conventional .05 level of significance was adopted.

Statement of Testable Hypotheses

Three research hypotheses were tested to examine retention over time and any differences between pairwise groups over time. One hypothesis was tested to determine if any correlations between educational level, sex, and age affected retention over time.

Hypothesis 1: Officers will not show significant loss of retention, as calculated by performance retest.

$$Ho: \quad R2 = R1$$
$$Ha: \quad R2 < R1$$
Where: R1 = original performance
           R2 = retest performance

Hypothesis 2: Officer retention levels, as reflected by mean scores on the retest, will not vary significantly among recruit schools.

$$Ho: \quad S1 = S2 = S3 = S4 = S5$$
$$Ha: \quad S1 \neq S2 \neq S3 \neq S4 \neq S5$$
Where: S1, S2, S3, S4, S5 represent mean retest
           scores of the five schools

Hypothesis 3: Officer retention levels of paired groups, as reflected by mean scores on the retest, will not vary significantly among groups.

$$Ho: \quad G1 = G2 = G3$$
$$Ha: \quad G1 \neq G2 \neq G3$$
Where: G1, G2, G3 represent mean retest scores of time-paired groups.

Hypothesis 4: Officer age, sex, and educational background will not show a significant relationship with retest scores.

$$Ho: \quad r = 0$$
$$Ha: \quad r \neq 0$$
Where: r represents Pearson's r

Content of the Defensive Tactics Course

The defensive tactics course consists of one knowledge objective and 17 performance objectives as follows:

1. Demonstrate decision-making ability in the escalation and de-escalation of physical force.

2. Demonstrate the proper subject approach for a police officer.

3. Demonstrate correctly, one of two high blocking techniques against a punching attack as taught.

4. Demonstrate correctly, one of two low blocking techniques against a kicking attack as taught.

5. Demonstrate correctly, one of the two submission holds as taught.

6. Demonstrate correctly, one of the two control holds as taught.

7. Demonstrate correctly, one of two come-along holds as taught.

8. Demonstrate correctly, two of four takedowns to the hand-cuff position as taught.

9. Demonstrate correctly, one of three elbow-strike techniques as taught.

10. Demonstrate correctly, the basic 1-2 punch combination as taught.

11. Demonstrate correctly, one of three foot strikes as taught.

12. Demonstrate correctly, one of two releases from a single-arm grab as taught.

13. Demonstrate correctly, one of two releases from a two-arm grab as taught.

14. Demonstrate correctly, one of two releases from a front choke (close) as taught.

15. Demonstrate correctly, one of two releases from a rear choke (close) as taught.

16. Demonstrate correctly, one of two releases from a rear bear hug (over the arms) as taught.

17. Demonstrate correctly, one of three releases from a head-lock as taught.

18. Demonstrate correctly, one of three vehicle takeouts methods as taught.

Original Performance Requirements

To complete successfully the presented course of study, the recruit must be able to demonstrate 100% proficiency in the tactic

selected within each training objective addressing a defensive skill. The performance evaluation form is attached as Appendix A. Each recruit is required to master 18 of the 38 techniques taught during recruit school. (Note: The present evaluation did not include an assessment of Objective 1 stated above. It was excluded because a psychomotor skill is not involved with this objective.)

Retest Performance Requirements

To examine retention, each officer was instructed to demonstrate those tactics originally selected while in recruit school. As a result, the retest was identical to the original. A maximum score of 18 was evidence of 100% retention over time.

Assessment Team

The members of the assessment team were certified defensive tactics instructors approved under requirements established and monitored by the MLEOTC. The roster of assessors is attached in Appendix B of this dissertation.

Population of the Study

The originally intended population consisted of all the graduates from the 98th, 99th, and 100th Michigan State Police recruit schools. Because the present study was investigative in nature, the researcher agreed to include a number of graduates from the 1985 and 1986 recruit schools of the Flint Police Department. This action was taken at the request of the Flint Police Department at the time the researcher requested access to the Flint Academy for

retesting. The training coordinator there expressed an interest in assessing the retention levels of his graduates. Since the assessment teams were being assembled to evaluate state troopers, it appeared appropriate to agree to the request. The results are provided for the inquisitive investigator to ponder.

A total of 44 recruits graduated from the 98th recruit school on March 27, 1985. A total of 36 recruits graduated from the 99th recruit school on February 21, 1986. A total of 119 recruits graduated from the 100th recruit school on August 1, 1986. The study population from the Michigan State Police therefore totaled 199 recruit school graduates.

A total of 35 Flint recruits graduated from the Flint Police Academy recruit school on August 22, 1985. A total of 15 Flint recruits graduated from the Flint Police Academy on August 15, 1986. The study population from the Flint Police Department therefore totaled 50 recruit school graduates.

The expanded population in total then became 249 law enforcement officers from two agencies (199 + 50 = 249).

Study Sample

Under normal circumstances within law enforcement agencies, it is possible routinely to order their personnel to do certain things. The nature and scope of this study would not allow for that to occur. There are several reasons for this. First, a Michigan State University requirement in research activity of this kind precludes mandatory participation upon being selected as part of the sample.

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Second, there are natural phenomena of leave days, vacations, court assignment, and forgetting to participate. Finally, some officers are assigned to duties that preclude an invitation.

Consequently, the researcher decided to invite the entire population that was made available by the Department of State Police and the Flint Police Department. That decision was made to maximize the potential for sufficient cell sizes.

The Procedure

Officers and troopers were notified by their respective departments to report for duty prepared to assist in a research survey. The nature of their assistance was not disclosed in order to avoid prompting rehearsals.

The first retest was conducted on April 3, 1987. The sites were the Flint Police Academy and the State Police Freeway Post in Detroit. The second retest was conducted on April 4, 1987. The site for that day was the State Police Academy in Lansing, Michigan.

The Final Sample

The final size of the sample included 27 troopers from the 100th recruit school, 19 troopers from the 99th recruit school, 18 troopers from the 98th recruit school, 6 officers from the 1986 Flint recruit school, and 10 officers from the 1985 Flint recruit school. The sample total was 80 persons.

Instrumentation

The measures taken were test results from a skill test instrument designed and mandated for use by the MLEOTC. The test instrument was one designed to assess psychomotor skill retention. It is used in recruit school to assess whether a recruit is proficient in the required skills. It is a criterion-referenced examination. The items selected for the retest were the same ones used to establish original proficiency.

After testing, each trooper was offered an opportunity to provide written comments regarding the defensive tactics on an open-ended basis. The comments are recorded in Appendix C.

Validity Concerns

Since the total sample was relatively small, cell size was considered to be a threat to internal validity. Because of this potential problem, all of the troopers in the population available were invited to retest. In addition, all of the officers in the population from Flint were invited to retest.

In longitudinal surveys and evaluations, a loss of subjects is often a potential problem. The actions articulated in the previous paragraph were also taken in an attempt to protect against experimental mortality.

An extended period of time, providing opportunity for other events to affect retention, could have influenced internal validity. No special steps were taken to alter this possibility.

Reliability Concerns

The reliability of a domain-referenced test is defined as the consistency of the test in making estimates of the examinee's level of mastery of the test domain. The reliability of this test has been proven over the years since its implementation to be an accurate indicator of individual mastery.

Interrater reliability could have affected test-result validity. Because of this, a measurement of interrater reliability was conducted.

First, a video tape was produced. The tape included two events from the defensive tactics test. Each event was demonstrated by MLEOTC-certified instructors. Neither of these people conducted retest assessments. The events selected for taping were the officer approach and stance and the basic 1-2 punch. They were selected because each must be demonstrated by every officer as part of the retest.

Second, 18 assessors were asked to view the tapes. The results of the ratings revealed that 15 of 18 raters agreed on a passing score for the approach and that all 18 raters agreed on a failing score on the basic 1-2 punch. This means that the raters were in agreement 83% of the time for one event and 100% of the time for the second.

Summary

A longitudinal evaluation type of research was designed for this study. This method was intended to discover the nature of

motor skill retention over time by comparing current ability with previous ability. The researcher, in effect, was attempting to determine whether law enforcement officers retained a life-saving, job-related skill that had previously been mastered at 100% proficiency.

The basis for selecting the population and sample was explained. The data-collection procedures were also explained. Validity and reliability concerns were discussed. Finally, the research hypotheses of this study were presented to prepare the reader to understand better the statistical analyses presented in the following chapter.

CHAPTER IV

ANALYSES OF RESULTS

The study was designed to examine the longitudinal retention of skills over elapsed time demonstrated by currently sworn law enforcement officers in Michigan. The methodology for these comparisons was described in Chapter III.

Analyses of the data presented in this chapter include the following: (a) the differences in individual retention as measured by comparisons of retest performance against original performance, (b) the differences in group retention as measured by comparisons of retest performance against original performance, and (c) correlations between age, sex, and educational level with retest performance levels.

The total number of subjects in the final statistical analyses was 80: 27 from the Michigan State Police 100th recruit school, 19 from the Michigan State Police 99th recruit school, 18 from the Michigan State Police 98th recruit school, 6 from the 1986 Flint Police Department recruit school, and 10 from the 1985 Flint Police Department recruit school.

The data collected from the participating subjects included retest scores, the number of months between original testing and retest, and the age, sex, and educational level of each respondent.

Data Preparation and Analysis

Data were entered for each of the 80 subjects who retested. The data were analyzed using the MIDAS statistical package on the Wayne State University computer. Descriptive statistics were generated for each school and each group. The differences in school and group retention as measured by retest scores were examined through the use of one-tailed t-tests. The analysis of variance procedure was used to compare differences in retest scores among the five schools and three groups. Duncan's multiple range test for unequal cell size was used to compare pairwise contrasts. Pearson's product-moment correlations were used to determine if significant correlations existed between retention and educational level, sex, or age. Content analysis was employed to analyze open-ended responses written by the troopers themselves. This content analysis is presented in Chapter V, separate from the following statistical analysis.

The t-Test

The purpose of the t-test is to determine the significance of difference between two correlated means. Use of the t-test for correlated means is less likely to lead to a Type II error.

Because it was considered to be the only possibility, the one-tailed t-test was employed throughout. The main advantage of the one-tailed test of significance is that a smaller critical ratio is needed to be statistically significant.

Analysis of Variance

The purpose of analysis of variance was to determine whether the recruit schools differed significantly among themselves. Since more than two means were being compared in Hypotheses 2 and 3, the t-test was not appropriate.

For purposes of this study, a significant F finding led to an internal comparison using Duncan's throughout. The Duncan method provides a means for making comparisons of all possible combinations using two means at a time. Duncan's was chosen over other alternatives because the method is acceptable when unequal cell sizes are involved.

Correlational Analysis

The Pearson product-moment correlation was used to determine the degree of relationship between variables employed in this study. The researcher proceeded to test a number of variables for their degree of association with the assumption that correlations only determine the degree of association and no cause-and-effect relationships.

Descriptive Statistics for Retest Scores

The distribution of scores and descriptive statistics for the 100th recruit school are presented in Table 4.1. The mean retest score for the 100th, which was retested after nine months had elapsed, was 15.19.

Table 4.1.--Frequency of scores for the 100th recruit school.

Score	Frequency	%	Cumulative %
10	2	7.4	7.4
13	2	7.4	14.8
14	4	14.8	29.6
15	6	22.2	51.9
16	5	18.5	70.4
17	6	22.2	92.6
18	2	7.4	100.0
Total	27	100.0	

Mean	15.19	Median	15.00	Std. Dev.	2.04
Variance	4.16	Kurtosis	1.37	Skewness	-1.09

The distribution of scores and descriptive statistics for 1986 Flint are presented in Table 4.2. The mean retest score for Flint, which was retested after 10 months had elapsed, was 15.50.

Table 4.2.--Frequency of scores for the 1986 Flint school.

Score	Frequency	%	Cumulative %
12	1	16.7	16.7
14	1	16.7	33.3
15	1	16.7	50.0
16	1	16.7	66.7
18	2	33.3	100.0
Total	6	100.0	

Mean	15.50	Median	15.50	Std. Dev.	2.35
Variance	5.50	Kurtosis	-.85	Skewness	-.35

These two schools were paired into Group A because the elapsed times between original and retest were considered to be adequately similar. The distribution of scores and descriptive statistics for Group A are presented in Table 4.3. The mean retest score for this group was 15.24.

Table 4.3.--Frequency of scores for Group A (MSP-0100 + FPD-1986).

Score	Frequency	%	Cumulative %
10	2	6.1	6.1
12	1	3.0	9.1
13	2	6.1	15.2
14	5	15.2	30.3
15	7	21.2	51.5
16	6	18.2	69.7
17	6	18.2	87.9
18	4	12.1	100.0
Total	28	100.0	

Mean	15.24	Median	15.00	Std. Dev.	2.06
Variance	4.25	Kurtosis	.81	Skewness	-.89

The distribution of scores and descriptive statistics for the 99th recruit school are presented in Table 4.4. Since the Flint Police Department did not have a recruit school graduating during the same approximate time as the 99th, the mean score of 14.47 established by the 99th was considered the score for Group B. The 99th was retested after 15 months had elapsed.

Table 4.4.--Frequency of scores for the 99th recruit school.

Score	Frequency	%	Cumulative %
5	1	5.3	5.3
7	1	5.3	10.5
9	1	5.3	15.8
13	1	5.3	21.1
14	2	10.5	31.6
15	4	21.1	52.6
16	3	15.8	68.4
17	3	15.8	84.2
18	3	15.8	100.0
Total	19	100.0	

Mean	14.47	Median	15.00	Std. Dev.	3.67
Variance	13.49	Kurtosis	1.84	Skewness	-1.56

The distribution of scores and descriptive statistics for the 98th recruit school are presented in Table 4.5. The mean retest score for the 98th, which was retested after 26 months had elapsed, was 10.94.

The distribution of scores and descriptive statistics for 1985 Flint are presented in Table 4.6. The mean retest score for Flint, which was retested after 22 months had elapsed, was 9.50.

These two schools were paired into Group C because the elapsed times between original and retest were close enough together to be considered as adequately similar. The distribution of scores and descriptive statistics for Group C are presented in Table 4.7. The mean retest score for Group C was 10.43.

Table 4.5.--Frequency of scores for the 98th recruit school.

Score	Frequency	%	Cumulative %
1	1	5.6	5.6
4	1	5.6	11.1
7	2	11.1	22.2
8	1	5.6	27.8
10	2	11.1	38.9
12	3	16.7	55.6
13	4	22.2	77.8
14	1	5.6	83.3
15	2	11.1	94.4
18	1	5.6	100.0
Total	18	100.0	

Mean	10.94	Median	12.00	Std. Dev.	4.21
Variance	17.70	Kurtosis	.63	Skewness	- .82

Table 4.6.--Frequency of scores for the 1985 Flint school.

Score	Frequency	%	Cumulative %
0	1	10.0	10.0
4	1	10.0	20.0
9	3	30.0	50.0
10	1	10.0	60.0
11	1	10.0	70.0
12	1	10.0	80.0
13	1	10.0	90.0
18	1	10.0	100.0
Total	10	100.0	

Mean	9.50	Median	9.50	Std. Dev.	4.89
Variance	23.83	Kurtosis	1.22	Skewness	- .42

Table 4.7.--Frequency of scores for Group C (MSP-0098 + FPD-1985).

Score	Frequency	%	Cumulative %
0	1	3.6	3.6
1	1	3.6	7.1
4	2	7.1	14.3
7	2	7.1	21.4
8	1	3.6	25.0
9	3	10.7	35.7
10	3	10.7	46.6
11	1	3.6	50.0
12	4	14.4	64.3
13	5	17.9	82.1
14	1	3.6	85.7
15	2	7.1	92.9
18	2	7.1	100.0
Total	28	100.0	

Mean	10.43	Median	11.50	Std. Dev.	4.43
Variance	19.59	Kurtosis	.41	Skewness	- .65

The distribution of scores and descriptive statistics for all 80 participants who retested are presented in Table 4.8. The overall mean of retest scores was 13.38.

Differences Between Original Tests and Mean Retest Scores

The following null hypothesis was tested for each recruit school:

Hypothesis 1: Officers will not show significant loss of retention as calculated by retest performance.

Ho: R2 = R1
Ha: R2 < R1
Where: R1 = original performance
R2 = retest performance

Table 4.8.--Frequency of scores for all recruit schools.

Score	Frequency	%	Cumulative %
0	1	1.2	1.2
1	1	1.2	2.5
4	2	2.5	5.0
5	1	1.2	6.3
7	3	3.7	10.0
8	1	1.2	11.2
9	4	5.0	16.2
10	5	6.3	22.5
11	1	1.2	23.7
12	5	6.3	30.0
13	8	10.0	40.0
14	8	10.0	50.0
15	13	16.2	66.2
16	9	11.2	77.5
17	9	11.2	88.7
18	9	11.2	100.0
Total	80	100.0	

Mean	13.38	Median	14.50	Std. Dev.	4.04
Variance	16.31	Kurtosis	1.50	Skewness	-1.28

At the end of each school, each officer must pass the defensive tactics skills test at 100% proficiency. The required passing score is 18. Each subject retested had scored 18 on his/her recruit school test.

To determine whether the school retest scores were significantly below 18, they were examined through the use of t-tests. The .05 level of significance was selected as the basis for rejecting the null hypothesis. The descriptive statistics and one-tailed t-tests at the .05 significance level are shown in Table 4.9 for each of the schools.

Table 4.9.--One-tailed t-tests for the five retested recruit
            schools.

School	N	Elapsed Time in Months	Mean	S	t	df
MSP-0100	27	9	15.19	2.04	-7.17*	26
FPD-1986	6	10	15.50	2.35	-2.61*	5
MSP-0099	19	15	14.47	3.67	-4.19*	18
FPD-1985	10	22	9.50	4.88	-5.51*	9
MSP-0098	18	26	10.94	4.21	-7.12*	17

*$p < .05$.

Since for each session the calculated t-value was below the critical t-value, the null hypothesis that officers will not show significant loss of retention may be rejected and the alternative supported.

To determine whether the group retest scores were significantly below 18, they were examined through the use of one-tailed t-tests. The .05 level of significance was selected as the basis for rejecting the null hypothesis. The descriptive statistics and t-test results at the .05 significance level are shown in Table 4.10.

Since for each group the calculated t-value was below the critical t-value, the null hypothesis that officers will not show significant loss of retention may be rejected and the alternative supported.

Table 4.10.--One-tailed t-tests for the pairwise groups.

Group	N	Elapsed Time in Months	Mean	S	t	df
A	33	9/10	15.24	2.06	-7.68*	32
B	19	15	14.47	3.67	-4.19*	18
C	28	22/26	10.43	4.43	-9.05*	27

*$p < .05$.

Differences Among Schools on Retest Performance

The following null hypothesis was tested for each recruit school:

Hypothesis 2: Officer retention levels, as reflected by mean scores on the retest, will not vary significantly among recruit schools.

Ho: S1 = S2 = S3 = S4 = S5
Ha: S1 ≠ S2 ≠ S3 ≠ S4 ≠ S5
Where: S1, S2, S3, S4, S5 represent mean retest scores of the five schools

To determine whether the differences in the retest mean scores were significant, they were examined through the use of analysis of variance. The .05 level of significance was selected as the basis for accepting or rejecting the null hypothesis. The F-test at the .05 significance level and Duncan's multiple range test at the .05 significance level are shown in Table 4.11.

Table 4.11.--Analysis of variance for five schools with Duncan's multiple range test for unequal cell sizes.

Source	df	ss	ms	F
Among	4	394.99	98.75	8.29*
Within	75	893.76	11.92	
Total	79	1288.75		

*p < .05

Duncan's

Where	Session	Mean - Mean	SSR
1 = MSP-100	1 vs. 2	.32	3.10
2 = FPD-1986	1 vs. 3	1.03	3.25
3 = MSP-099	1 vs. 4	4.56*	3.33
4 = FPD-1985	1 vs. 5	6.00*	3.39
5 = MSP-098			
	2 vs. 3	.71	3.10
	2 vs. 4	4.24*	3.25
	2 vs. 5	5.69*	3.33
	3 vs. 4	3.53*	3.10
	3 vs. 5	4.97*	3.25
	4 vs. 5	1.44	3.10

*p < .05.

Since the F-test was significant for each recruit school, the acceptance or rejection of the null hypothesis for two-school comparisons rested on results presented by Duncan's a posteriori test. Given a significant F-test result and significant findings in schools 1 versus 4, 1 versus 5, 2 versus 4, 2 versus 5, 3 versus 4, and three versus 5, with Duncan's, the null hypothesis that officer

retention levels, as reflected by mean scores on the retest, will not be significantly different among schools may be rejected and the alternative supported. Given a significant F-test result and nonsignificant findings in schools 1 versus 2, 1 versus 3, 2 versus 3, and 4 versus 5, with Duncan's, the null hypothesis cannot be rejected.

Differences Among Groups on Retest Performance

The following null hypothesis was tested for three longitudinally paired retest groups of recruit-school graduates:

Hypothesis 3: Officer retention levels of paired groups, as reflected by mean scores on the retest, will not vary significantly among groups.

Ho: G1 = G2 = G3
Ha: G1 $\neq$ G2 $\neq$ G3
Where: G1, G2, G3 represent mean retest scores
of time-paired groups

To determine whether the differences in the retest mean scores of the time-paired groups were significant, they were examined through the use of analysis of variance. The .05 level of significance was selected as the basis for accepting or rejecting the null hypothesis. The F-test at the .05 significance level and Duncan's at the .05 significance level are shown in Table 4.12.

Since the F-test was significant for each group tested, the acceptance or rejection of the null hypothesis rested on Duncan's harmonic mean for unequal cell size. Given a significant F that was supported by significant findings between Group A versus Group C and Group B versus Group C with Duncan's, the null hypothesis that

officer retention levels will not be significantly different among time-paired groups was rejected and the alternative supported. However, given a significant F that was not supported by significant findings between Group A and Group B, the null hypothesis cannot be rejected.

Table 4.12.--Analysis of variance for three groups with Duncan's multiple range test for unequal cell sizes.

Source	df	ss	ms	F
Among	2	381.10	190.55	16.17*
Within	77	907.65	11.79	
Total	79	1288.75		

*p < .05.

Duncan's

	Group	Mean - Mean	SSR
Group A = MSP-100 + FPD-1986	A vs. B	.77	1.68
Group B = MSP-099	A vs. C	4.81*	1.77
Group C = MSP-098 + FPD-1985	B vs. C	4.05*	1.68

*p < .05.

Descriptive Statistics for Educational Level, Age, and Sex Against Retest Scores

Every person entering the law enforcement profession in Michigan must possess a high school diploma or the GED equivalent.

The data for the educational level of each school against retest score including totals are presented in Table 4.13.

Table 4.13.--Descriptive statistics for educational level by sex.

School	Sex	N	Mean	S	Minimum	Maximum
MSP-0100	M	21	14.62	1.28	12	16
	F	6	14.17	1.60	12	16
	Total	27	14.52	1.34	12	16
FPD-1986	M	5	13.80	1.48	12	16
	F	1	16.00			
	Total	6	14.17	1.60	12	16
MSP-0099	M	16	13.60	1.41	12	16
	F	3	15.33	1.15	14	16
	Total	19	13.79	1.51	12	16
FPD-1985	M	6	13.83·	1.83	12	16
	F	4	15.25	.96	14	16
	Total	10	14.40	1.65	12	16
MSP-0098	M	17	14.06	1.30	12	16
	F	1	15.00			15
	Total	18	14.11	1.28	12	16
Total	M	65	14.06	1.41	12	16
	F	15	14.86	1.30	12	16
	Total	80	14.21	1.42	12	16

The data for the age of each respondent by sex for each school against retest score are presented in Table 4.14. The table includes overall totals.

Table 4.14.--Descriptive statistics for age by sex.

School	Sex	N	Mean	S	Minimum	Maximum
MSP-0100	M	21	27.91	3.38	24	34
	F	6	25.33	1.51	24	28
	Total	27	27.33	3.22	24	34
FPD-1986	M	5	23.00	2.55	20	26
	F	1	26.00			26
	Total	6	23.50	2.59	20	26
MSP-0099	M	16	27.13	2.33	23	32
	F	3	28.33	2.52	26	31
	Total	19	27.32	2.33	23	32
FPD-1985	M	6	30.17	6.40	23	39
	F	4	26.25	.96	25	27
	Total	10	28.60	5.21	23	39
MSP-0098	M	17	29.29	2.64	24	35
	F	1	27.00			27
	Total	18	29.17	2.62	24	35
Total	M	65	27.91	3.63	20	39
	F	15	26.33	1.80	24	31
	Total	80	27.61	3.41	20	39

The data by sex of respondents for each school against retest score including totals are presented in Table 4.15.

Correlations Between Sex, Age, and Educational Level Against Retest Scores

The following null hypothesis was tested for each recruit school:

Hypothesis 4: Officer age, sex, and educational background will not show a significant relationship with retest scores.

Ho: $r = 0$
Ha: $r \neq 0$
Where: r represents Pearson's r

Table 4.15.--Descriptive statistics for score by sex.

School	Sex	N	Mean	S	Minimum	Maximum
MSP-0100	M	21	15.29	1.90	10	18
	F	6	14.83	2.64	10	17
	Total	27	15.19	2.04	10	18
FPD-1986	M	5	15.60	2.61	12	18
	F	1	15.00			15
	Total	6	15.50	2.35	12	18
MSP-0099	M	16	13.94	3.75	5	18
	F	3	17.33	1.15	16	18
	Total	19	14.47	3.67	5	18
FPD-1985	M	6	11.83	3.43	9	18
	F	4	6.00	4.97	0	11
	Total	10	9.50	4.88	0	18
MSP-0098	M	17	11.53	3.50	4	18
	F	1	1.00			1
	Total	18	10.94	4.21		
Total	M	65	13.68	3.40	4	18
	F	15	12.07	6.09	0	18
	Total	80	13.38	4.04	0	18

To determine whether any significant correlations existed, each school was examined through the use of Pearson's product-moment correlation coefficient. The results are presented in Table 4.16. Two significant correlations emerged.

Summary

The results of the various statistical analyses that were employed in this study indicated some significant differences in retention over time. The major points depicted by the results of

the analytical techniques are reported in Chapter VI. Chapter V contains the results of the content analysis.

Table 4.16.--Correlations of education and age by sex with score.

School	Sex	N	df	Age Correlation	Education Correlation
MSP-0100	M	21	19	-.21	.09
	F	6	4	-.29	-.32
	Total	27	25	-.16	-.02
FPD-1986	M	5	3	-.15	.62
	F	1			
	Total	6	4	-.18	.45
MSP-0099	M	16	14	.20	.04
	F	3	1	.80	1.00*
	Total	19	17	.27	.22
FPD-1985	M	6	4	-.66	-.45
	F	4	2	.63	.98*
	Total	10	8	-.04	-.28
MSP-0098	M	17	15	.12	-.14
	F	1			
	Total	18	16	.22	-.22
Total	M	65	63	-.23	.03
	F	15	13	.11	-.02
	Total	80	78	-.13	-.02

Note: These high correlations are likely to be mere artifacts of the calculation process using small cells.

*$p < .01$.

CHAPTER V

RESULTS OF CONTENT ANALYSIS

Analysis of the data presented in this chapter is focused on the written comments provided by the Michigan state troopers. No hypotheses were constructed.

Qualitative Content Analysis

In qualitative content analysis the elaboration of alternatives goes on throughout and may differ from point to point depending on the context. Because of the absence of a rigorous system, required in a quantitative analysis, inferences are based on individualized interpretations. These interpretations were made exclusively by the researcher to promote consistency of investigation and analysis.

The reasons the researcher elected to conduct a qualitative analysis are as follows. First, a qualitative analysis is advisable when it is done on small or incomplete samples. The data available for analysis in this study were based on relatively small samples.

Second, qualitative analysis is relatively less concerned with the content proper as such than with content as a reflection of deeper phenomena. The phenomena of concern to this researcher had

to do with how the troopers defined their own sense of retention over time.

Third, qualitative analysis employs a less formalized categorization than quantitative analysis. Since the underlying purpose of this research was investigative in nature, a supplementary pursuit of content analysis was considered to be appropriate for this research.

Fourth, qualitative analysis uses more complex themes than quantitative analysis. Interpretation of the content by the researcher to develop the themes was considered essential. Such an approach allowed for reflective judgment in the development of themes that relate to the present study.

Last, qualitative analysis is often a more timely and a less expensive venture than a quantitative approach. Since time and cost were considerations for this researcher, the qualitative approach to analysis was preferred.

Content Analysis

According to Berelson (1971), content analysis is "a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (p. 18). Berelson set forth the following three assumptions that this method implies:

1. Content analysis assumes that inferences about the relationship between intent and content or between content and effect can validly be made, or the actual relationships established.

2. Content analysis assumes that study of the manifest content is meaningful.

3. Content analysis assumes that the quantitative description of communication content is meaningful.

Data obtained from the written statements of the troopers were analyzed using the technique of content analysis.

Units of Analysis

The smallest unit applied in this content analysis was the word. Key analysis words are identified immediately before the presentation of the themes gleaned from the analysis.

The theme is an assertion about the subject matter being analyzed. This seemed to be the most useful unit of analysis because it is the form in which issues, attitudes, and reason are revealed. The resulting themes are those considered by the researcher to be relevant and pertinent to this study.

Validity

Careful definition of themes and judicious selection of key indicators, if successful, should adequately resolve validity issues. The themes include quality of the program, practice and rehearsal, use, difficulty of techniques, competing programs, and forgetting.

Reliability

Content analysis strives to be objective and reliable. Use is made here of relatively simple units, words, and themes. One person

coded the interpretations. It is hoped the reliability this achieved is acceptable. No other special steps were taken to ensure objectivity.

Limitations and Assumptions

The description of content was limited to the question at hand. It was assumed that the content provided was focused on the matters related to this research.

The scope of the content analysis was limited to the comments made by the state troopers. The unedited content is published in its entirety in Appendix D of this dissertation. It was assumed that their true feelings and concerns are reflected in the written communication. Meanings in this analysis reside in the totality of impression, the Gestalt, as opposed to smaller combinations of discrete units.

Results of Content Analysis

The number of troopers electing to provide written comments was 45. This represents 70% (45/64) of the sample of state troopers and 56.2% (45/80) of the total sample. Each officer from the Flint Police Department declined to offer written comments. The reason for this is not known. The reason some troopers elected not to offer written comments is not known. No effort was made to determine the reason for their actions.

Table 5.1 reflects the number of troopers making comments within a given theme. The percentages cited are reflected against the sample of 45 who made comments.

Table 5.1.--Themes based on content analysis.

Theme	N	% of Sample (N = 45)
Program quality	37	82.2
Practice and rehearsal	18	40.0
Competing programs	17	37.8
Program difficulty	13	28.8
Use	12	26.6
Forgetting	4	8.8

Program Quality

The word units accepted for examining this theme were program, class, course, and defensive tactics. The troopers qualified their comments about quality with words such as excellent (4), good (7), useful (3), and adequate (1).

An analysis of all content failed to reveal a single comment demeaning the quality of the defensive tactics program. However, some of the comments gleaned from the analysis indicated concerns about the training process. One example of those concerns dealt with disciplining recruits during the training. It was stated that "we sometimes spent up to half the class being disciplined with physical exercise." The comment closed with the suggestion that "it shouldn't be done at the expense of the defensive tactics training. I feel the entire hour should be used for DT; and we should be disciplined with exercise some other time." The exercise concern was reported by a second trooper, who indicated that there "were days when almost the whole hour was exercise."

The Department may find it useful to examine their disciplinary policies related to recruit training. Imposing sanctions as an integral part of the training process may be valid and serve a useful purpose. Its imposition during dedicated training time may be of questionable value. Should the Department become cavalier about unarmed skills, it presumably would be only a short time before recruits might reach the same attitude. If so, long-term retention of these skills may be seriously hampered.

Practice and Review

The word units accepted for examining this theme were practice, review, and polishing or perfecting. Table 5.2 contains the breakdown of focused responses generated by the troopers.

Table 5.2.--Frequency of statements addressing practice and review of skills.

Theme	N	% Within	% of Sample (N = 45)
Practice	8	44.4	17.8
Review	8	44.4	17.8
Polishing and perfecting	2	11.2	4.4
Total	18	100.0	40.0

The troopers focused on a theme that may provide an insight into a reason why the loss of retention is so significant. The comments that were woven through this theme dealt with why individual troopers may or may not have retained a given technique.

The first dealt with practice, the second with review, and the third with perfecting the skill. The researcher does not intend to leave the reader with a clear sense of difference among the three. The differentiation may be useful for purposes of clarification.

The essence of the practice theme is focused by the statement that "very few people get constant practice." Practice as used by the troopers seems to suggest an individually focused process for practicing skills. One trooper thought yearly practice was a necessity, whereas another suggested that the moves "will not stay with you unless practiced about once a week."

The focus of the refresher theme was revealed by the statement that "if the techniques aren't reviewed with some consistency, the skills are forgotten." Refresher as used by the troopers seemed to suggest a group-focused and Department-sponsored activity to keep skills at peak proficiency.

The focus of polishing skills is most likely a synthesis of practice and refresher training. As one trooper put it, "we need to polish up more often than every three years."

The pattern of concern generated by the troopers seemed continually to focus on the Department's benign neglect related to policy for maintaining unarmed defensive skills at the same level they require of armed defensive skills. Without such action, there is little chance that the troopers will maintain skill over time given the relative complexity of the skill.

Competing Techniques

The word units accepted for examining this theme were pressure point, wrestling, and martial arts. Table 5.3 contains the breakdown of focused responses by the troopers.

Table 5.3.--Frequency of statements reporting competing techniques.

Theme	N	% Within	% of Sample (N - 45)
Pressure point	10	62.5	22.2
Wrestling	5	31.3	11.1
Martial arts	2	12.5	4.0
Total	17	100.0	37.8

The troopers identified three defensive schemes that they individually would prefer to embrace, or alternatively, use to enhance current defensive techniques. One trooper made the case that pressure-point skills are much simpler to learn and retain. This trooper suggested further that "the best performers don't think through the action; they simply react." This contention was supported by another, who concluded that "pressure point should be considered for teaching because in the field you do not have the time to position your body and perform the different techniques." A potential for synthesis of the two, pressure point and defensive tactics as currently constructed, was focused by the statement that there is a need for "more pressure point training during defensive tactics."

Five troopers indicated that wrestling skills need to be included in the defensive tactics program. They contended that most street confrontations lead to wrestling matches. This is consistent with Wollock's finding of 28% wrestling encounters cited in Chapter II of this report.

Two troopers suggested that the use of martial-arts skills is necessary. One expressed a personal feeling of discomfort with existing defensive skills. Because of that, the trooper was mastering a martial art. The other did not report such a pursuit but thought the martial arts would be effective.

The use of any defensive technique authorized and trained to by the Department is generally acceptable. However, troopers should be careful to ensure that the techniques they use meet the standards set by the Department.

This theme raises the question of whether the MLEOTC has kept abreast of what the job requires when considering the issues of criterion-based unarmed defensive tactics. As previously noted, the basis of the entire course of study is predicated on data generated in 1979. No documentation is available to indicate just how the MLEOTC has maintained a current curriculum.

Program Content and Difficulty

The word units accepted for examining this theme were complicated, confusing, too many techniques, and slim lined. One trooper captured the essence of this theme by stating that it is "most important the defensive tactics program should be slim-lined."

This suggests that there are too many techniques to remember over time. Another trooper concurred by indicating that "content should be lessened to fewer techniques for better retention."

A concept within the theme is the difficulty of some techniques. One trooper thought a few of the moves had too many steps and suggested that an effort toward simplicity may be appropriate. One trooper posed a serious question regarding the program: "The techniques look good in a controlled environment, but what about in a real-life situation?" An inquiry of that type may call into question the job relatedness of the testing system imposed by the MLEOTC.

In essence, those troopers bothering to discuss this issue seemed to suggest assertively that the program is too long and too complicated for basic training, and that the program should be lessened to a handful of techniques to enhance retention potential.

Use

The word units accepted for examining this theme were use, experience, and utilization. The range of noted use extended from none at all to a very few. The nil reflections suggested that the articulation of fewer techniques may not lead to increased use. One trooper contended that what is not used is probably forgotten anyway.

The uses cited primarily focused on controlling intoxicated persons. One trooper had found that field situations bring out instinctive responses not trained to in recruit school. Again, such

revelations do not portend well for the trooper, the Department, and ultimately the standard setter, the MLEOTC.

This theme appears to reinforce the previous themes. That is, the present program may be too broad in scope. As a result, the troopers rely on innate ability to survive in situations requiring defensive unarmed skill. In some cases, although not the reported norm, skills mastered during recruit school are used in the field.

Forgetting and Remembering

The word units accepted for examining this theme were retention, retained, remembering, and forgetting. Two focuses surfaced upon analysis: (a) that it is easier to remember the techniques than the word associations for the technique and (b) that less complicated techniques with fewer combinations of moves are easier to remember.

One trooper felt that "some of the simple techniques would probably be helpful on the road since they are easier to remember and would be more likely to be an automatic response." The concept of instinctive response was an ingredient of focus throughout the comments. Instinctive reaction may not be a part of trooper response patterns in real-world unarmed defensive situations.

Summary

The results of the content analysis employed in this study indicated a number of themes that may provide insight into retention of skill over time exhibited by the troopers. The

analysis also revealed potential shortcomings in instruction in defensive tactics as they relate to the Department of State Police and the Michigan Law Enforcement Officers Training Council. They include policy development, curriculum development, testing concepts, job relatedness, and an overall malaise regarding the whole concept of defensive tactics.

The analysis also was revealing for what it did not yield. It did not explain why some troopers would virtually jettison all of their skill. It did not reveal whether more threatening techniques were used but not reported. Finally, it did not reveal why so many troopers elected not to participate in the study.

The summary, findings, conclusions, and recommendations are presented in Chapter VI.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The enhancement of law enforcement services in Michigan through training has been a focus of concern in Michigan since 1965, when the legislature enacted Public Act 203. Since that time, the state has taken steps to improve the delivery of job-related curricula to law enforcement recruits through the use of mandated job-related training. The focus of this research was on the assessment of longitudinal retention of motor skills mastered during recruit school. The course selected was defensive tactics because 100% proficiency is required by the state to graduate from the academy. The purpose of this research was to determine the degree to which defensive skills mastered and demonstrated in basic training were retained over time while performing the law enforcement officer job.

To accomplish this, the researcher requested access to currently sworn law enforcement officers employed by the Michigan Department of State Police and the Flint Police Department. The directors of those two departments agreed to release their personnel to participate. Since longitudinal evaluations of retention of motor skills require active participation, their agreement to

release their personnel was vital to any success this researcher would enjoy in pursuit of the study.

During the first week in April 1987, 80 officers from these two departments were retested to determine their retention of mastered skills. There were 64 from the Michigan State Police and 16 from Flint. They were tested by 18 different MLEOTC-certified defensive tactics instructors.

In addition to assessing retention level, each respondent was offered an opportunity to write down his/her personal concerns regarding the state-mandated defensive tactics course. The writer also examined the individual skills that were selected for testing.

Once all of the results were in, the researcher, by applying pertinent statistical tests, conducted an analysis of retention over time. Relevant descriptive statistics focused on the test were gathered and reported to assist in the analysis of retention over time. From careful analysis of the resulting information, the following findings are reported and subsequent conclusions drawn.

Findings

The findings reported in this section were rendered by the data-collection instruments and procedures described in previous chapters.

Findings Regarding Individual Retention

1. At the 95% level of confidence, significant differences in scores were obtained by comparing retest scores against original scores for the total sample.

2. Nine respondents overall (N = 80) demonstrated no loss of retention over time.

3. Two respondents from Group C (N = 28) demonstrated no loss of retention after two years.

4. One respondent from Group B (N = 18) demonstrated no loss of retention after 15 months.

5. Four respondents from Group A (N = 33) demonstrated no loss of retention after nine months.

6. Since, for each school, the calculated t-value was below the critical t-value, the null hypothesis that officers will show significant retention was rejected and the alternative supported.

7. Since for each time-paired group the calculated t-value was below the critical t-value, the null hypothesis that officers will show significant retention was rejected and the alternative supported.

8. The amount of retention, defined as maintaining motor ability between initial test and retest, decreased progressively from the most recent graduates to the least recent graduates.

9. The decline in retention was least severe in the range of 9 to 15 months of elapsed time.

10. The decline in retention was most severe between 15 and 26 months of elapsed time.

11. Initial performance ability, defined as 100% mastery, can be maintained through as much as 26 months of elapsed time.

Findings Regarding School Retention

12. Significant differences were found among the five schools at the 95% confidence level in mean retest scores.

13. All five schools experienced an overall reduction in proficiency ranging from 15.19 to 10.94.

14. The F-value for the five schools was significant at the .05 level of confidence. Further examination of the data indicated that the loss of proficiency varied over time.

15. Significant loss of retention occurred as soon as nine months after demonstrating original mastery.

16. There were significant differences at the 95% confidence level between the Flint 1986 School (nine months elapsed time) when compared with the MSP-98th (22 months) and Flint 1985 (26 months) Schools. Similar differences were found (10 months) when compared with the MSP-98th and the Flint 1985 Schools, and again between the MSP-99th (15 months) when compared with the MSP-98th and Flint 1985 Schools.

17. Since the calculated F-value and t-value were beyond the critical levels in these pairings, the null hypothesis that officer retention levels will be equal between schools was rejected and the alternative supported.

18. The null hypothesis for all other pairings was not rejected. They are: Flint 1986 when compared with MSP-100th and MSP-98th, MSP-100th when compared with MSP-98th, and MSP-98th when compared with Flint 1985.

Findings Regarding Group Retention

19. Significant differences were found among the three pairwise groups at the .05 significance level in mean retest scores.

20. All three groups experienced an overall reduction in proficiency ranging from 15.24 to 10.43. The calculated F-value for the three groups was significant at the .05 level of confidence. The calculated t-value for each group was significant at the .05 confidence level.

21. Given significant differences at the .05 level between Group A (MSP-100th and Flint 1986) when compared with Group B (MSP-99th) and Group B when compared to Group C (MSP-98th and Flint 1985), the null hypothesis that officer retention levels will be equal between pairwise groups was rejected and the alternative supported.

22. The null hypothesis for Group A when compared with Group B was not rejected.

Findings Regarding Correlations

23. The null hypothesis of no significant relationship between retest scores when correlated with age, sex, and educational background was not rejected.

24. Significant relationships were revealed for educational level for females in the 99th recruit school and for females in the Flint 1985 School.

25. The rate of retention of defensive skills was independent of age and sex in this study.

Findings Regarding Content Analysis

26. The Michigan state troopers had positive things to say about the defensive tactics program.

27. Troopers indicated that continual practice is not a part of their regular routine and that its inclusion could enhance their potential for retention over time.

28. Competing techniques such as pressure point, wrestling, and the martial arts interfered with the maintenance of skill acquired during recruit school.

29. The defensive tactics program is too difficult and contains too many serial tasks to be remembered consistently.

30. There was some use of the holds in the field.

Conclusions

The conclusions from this research were drawn to answer the four research questions:

1. What degrees of retention will officers show, as calculated by performance retest, after varying amounts of time have elapsed since graduating from recruit school?

2. Will there be any variation in retention levels, as reflected by mean scores on the retest, between schools from which retested recruits graduated?

3. Are there any correlations between educational level, age, and sex against retest scores and elapsed time?

4. What can be suggested by state troopers concerning how the defensive tactics course can be improved for the purpose of increasing

its effectiveness in preparing officers for realistic law enforcement work?

It is acknowledged that some of the following conclusions could be included in more than one category. However, each conclusion is reported once in the category appearing to be most appropriate. The conclusions served as the basis for recommendations.

1. It was concluded that officers did lose retention over time, as evidenced by retest scores.

2. It was concluded that a significant relationship in loss of retention was demonstrated between schools and paired groups of schools.

3. There were limited correlations between educational level and retest score for females.

4. The defensive tactics course mandated by the MLEOTC does not properly focus on skills needed by troopers in work situations.

5. The assessment-of-skill examination mandated by the MLEOTC does not properly focus on outcomes that are relevant to job-related situations.

6. With increased practice, the troopers should be able to demonstrate greater retention ability regardless of test construct.

7. Department policy requiring redemonstration of mastery would increase retention levels.

Implications

It would appear that the defensive tactics course mandated by the State of Michigan is in need of review. The officers in the

field appeared to exhibit a casual indifference to many of the tactics they had mastered. In fact, their collective indifference to many of the tactics was evidenced by their original selections in recruit school. The MLEOTC needs to know why, because a great deal of energy is expended to reach 100% proficiency.

An implication that is of concern is the relationship between a job-related training course focused on motor skill development and the fact that many of the skills are allowed to deteriorate over time. If the course were, in fact, job related, officers presumably would have exhibited greater retention over time.

The greater implication is the relationship of the entire course of study and overall retention. What if other cognitive knowledge and other motor skills are also being lost over time in similar degrees?

Recommendations

Recommendations are addressed in three areas: (a) recommendations for the Michigan Law Enforcement Officers Training Council, (b) recommendations for the police agencies involved, and (c) recommendations for further research.

Recommendations for the Training Council

1. Establish a feedback loop for the purpose of keeping an eye on the job relatedness of the curriculum.

The fact that the law enforcement discipline is dynamic in nature is generally accepted. Therefore, the standard setter for

the profession must be equally dynamic. If the MLEOTC does not begin the task of routine verification of their job-related curriculum, their course of study may be in danger of becoming obsolete.

2. Establish a computer-based information system to keep track of what is happening at each subordinate training school.

The Training Council needs to keep raw data on the tactics selected for testing by recruits. This will assist in monitoring what is happening at subordinate regional and local training schools. The information system would likely be of some use in monitoring other aspects of the mandated curriculum.

The MLEOTC should review the following techniques included in their curriculum: bar hammerlock hold, inside-out wrist takedown to cuffing position, bar hammerlock takedown to cuffing position, and the neck turn out. These tactics were selected by at least 70% of the sample, and each was retained at less than 70% proficiency.

3. Continue the policy of establishing job-related training standards.

The law enforcement discipline, writ large, is the benefactor of this positive approach to curriculum development, design, and implementation. Ultimately, it is the citizens of the state who will benefit from consistent and equal services from the law enforcement officers in the state.

Recommendations for the Law
Enforcement Agencies

1. Establish a policy requiring that officers periodically demonstrate their defensive skills.

Most, if not all, law enforcement agencies routinely require their sworn officers to requalify with their firearm. Such is not the case with mastered defensive techniques. Departments are, in effect, condoning the loss of motor skill. It seems likely that retention would dramatically increase if each department required periodic testing of all motor skills needed to perform the job.

2. Provide an opportunity for officers to refresh their knowledge, skill, and ability through refresher training.

The proactive police administrator should recognize the potential for retention loss over time in all parts of the officer's job. In fact, much of what an officer learns to do comes from street experience. The officers need the opportunity to integrate the field experience with the classroom experience to maximize the potential for both to be rewarding.

Recommendations for Further Research

1. Expand the scope of this research to include a greater cross-section of graduates.

The results of this research are somewhat restricted since only two departments were involved and the samples in some cells were small. The compelling results of this study need to be substantiated on a statewide basis.

2. Pursue the issue of tactic use while working on the job as a law enforcement officer.

The time-honored concept of "use it or lose it" accurately describes the use question. Did the officers suffer retention loss because they did not use the tactic? What are the officers using in the field if they are not using the techniques taught during recruit school? Answers to these kinds of questions should be considered vital to the Training Council and the departments and, moreover, to the practitioner in the field. The officers should be using what they have been trained to use, and the trainers should be training to what is used.

3. Conduct a study comparing retention between other motor skills designed to promote unarmed self-defense.

It would be important to know whether other motor skills are deteriorating in the same manner in which the skills in this research study had deteriorated.

Closing Remarks

This study revealed that police officers from two police departments in Michigan had experienced significant loss of motor skill over time. The consistency of the data between the departments was striking. Decision makers who may determine how to respond to these data should be aware of the remarks made by the respondents.

The results of this research indicated that the MLEOTC defensive tactics instructors were remarkably consistent in their

assessment of skill mastery. It would appear that Council activity in the areas of instructor certification should remain intact for the defensive tactics course.

Sage (1977) explained why motor skills were retained so well by explaining that "motor skills are generally very well learned and therefore well retained" (p. 354). The generality of his observation was not supported by the findings of this research.

It is possible that the psychomotor skills addressed in this research would be recovered quickly during a rehearsal effort. Some of the tasks mastered appeared to have become meaningless to some of the officers; consequently, their retention may have been rendered meaningless.

In the final analysis, it is probable that this criterion-referenced course of study must compete with emerging systems of unarmed self-defense, as does the rest of the curriculum. The dynamic nature of the law enforcement profession may, in fact, render any and all curricula immediately in need of scrutiny, beginning at the time they are first written.

In conclusion, it might be observed that the exact benefits derived from any retention of motor skills is subjected to many varied attitudes, beliefs, and behaviors. Possibly the truest value of skill retention is the sense of well being it may provide to those who retain mastery and proficiency over time.

APPENDICES

APPENDIX A

PERFORMANCE EVALUATION FORM

MICHIGAN LAW ENFORCEMENT OFFICERS TRAINING COUNCIL

Defensive Tactics Pre-Agreement Evaluation Form

_____   _____
(School)   (Date)

_____   _____
(Evaluator)   (Student's Name)

The Defensive Tactics Program consists of instruction in 49 defensive and offensive techniques contained within six major areas. While you are required to learn each technique thoroughly, you will only be tested over your preferred technique within each category. Please select the techniques (within the options given) you will be tested on for your final examination.

    (Techniques)   (Evaluation - Circle One)

1. Demonstration of proper subject approach position for a
    police officer (all students must demonstrate proper approach). . . . . Pass   Fail

2. Demonstration of blocking techniques against punching
    and kicking attacks.

    Technique Demonstrated (choose one High block & one Low block)

    Against Punching Attack   ___High block inside-out
                              ___High block outside-in . . . . Pass   Fail
    Against Kicking Attack   ___Low block inside-out
                              ___Low block outside-in . . . . Pass   Fail
    Comments:

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3. Demonstration of submission hold as taught (choose one).

    ___Carotid submission hold
    ___Bent arm submission hold . . . . Pass   Fail

    Comments:

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4. Demonstration of control hold as taught (choose one).

    ___Bar hammerlock hold
    ___Hammerlock with carotid hold . . . . Pass   Fail

    Comments:

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5. Demonstration of come along hold (choose one).

    ___Gooseneck hold
    ___Outside in wristlock to gooseneck. . . . . Pass   Fail

    Comments:

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6. Demonstration of two takedown techniques to cuff position as taught (choose two).

    ___Inside-out wrist T.D. to cuff position
    ___Outside-in wrist T.D. to cuff position . . . . Pass   Fail
    ___Outside leg sweep takedown to cuff position
    ___Bar hammerlock takedown to cuff position . . . . Pass   Fail

    Comments:

7. Demonstration of each of the following offensive striking techniques as taught.

   A. Elbow strike (choose one)

     ___Roundhouse   ___Uppercut   ___Reverse . . . . Pass Fail

   B. Basic 1-2 punching combination (all students must perform) . . . . Pass Fail

   C. Foot strikes (choose two)

     ___Front kick   . . . . Pass Fail
     ___Round kick
     ___Side kick   . . . . Pass Fail

   Comments:

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8. Demonstration of release from a single arm grab as taught (choose one).

   ___Simple twistout   ___Reverse leverage move. . . . . Pass Fail

   Comments:

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9. Demonstration of release from a two arm grab as taught (choose one).

   ___Two arm grab release   ___Reverse leverage move . . . . Pass Fail

   Comments:

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10. Demonstration of release from a front choke (close) as taught (choose one).

   ___Knee strike   ___Finger press to throat . . . . Pass Fail

   Comments:

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11. Demonstration of release from a rear choke (close) as taught (choose one).

   ___Chin tuck/elbow strike   ___Hip throw . . . . Pass Fail

   Comments:

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12. Demonstration of release from a rear bearhug over the arms as taught (choose one).

   ___Groin grab   ___Groin strike. . . . . Pass Fail

   Comments:

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13. Demonstration of release from a headlock as taught (choose one).

   ___Horsebite   ___Groin strike   ___Rear head hold release . . . . Pass Fail

   Comments:

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14. Demonstration of car takeout methods (choose one).

   ___Lip takeout   ___Neck twist takeout   ___Thumb or Finger takeout. . . . Pass Fail

   Comments:

Overall evaluation of student . . . . Pass Fail
Additional Comments:

I have reviewed the defensive tactics program thoroughly and have chosen (within the options provided) those techniques I am most skilled at to be tested over for my final examination. I clearly understand that failure to successfully perform any of the above selected techniques constitutes failure of the Defensive Tactics Program.

_____   _____
    (Date)   (Signature of Student)

APPENDIX B

ASSESSMENT TEAM

Assessment Team

Daniel G. Bailey	John Mangum
Bradford Barksdale	James A. Martin
Sally Beghin	Patricia Nowak
Patrick Bernethy	Brenda Parks
Rick Cook	Reginald Phillips
Robert Farber	Ronald Proudlock
Terry Hilden	Deborah Robinson
Sylvia Hubbard	Dennis Root
Angie Knauss	Clay Roth

APPENDIX C

STUDENT COMMENTS

Student Comments

1. I thought the program was very informative. The techniques that were shown were taught very well. I think that we should have picked the techniques for our test several weeks sooner than we did--reason being, more intense training for those specific techniques would or should result in better/longer retention. Plus, the number of times I have used a technique or had cause to has been nil. If we had worked on only a few techniques we might be able to utilize them better.

2. Most of the program is well done. I think a few of the moves have too many steps. Try and keep them a little simpler.

   It would be more beneficial if some of your holds came out of a wrestling-type move. In a lot of confrontations it usually starts out as a close-in encounter.

   From the step of where my arm is placed on the subject (physical arrest) to the point of submission.

3. I thought the overall program in DT was very useful. There are things I forgot, but I would probably not use them anyway.

   Coming to this review really let me know what I do and don't remember.

   I was surprised I retained some of it, but also surprised at what I forgot.

   I believe more time should be spent on perfecting technique, than on over variety of techniques.

4. Overall, the program was excellent, but since graduating from school there were some things that I forgot.

   This retention course is a very good idea. I had no idea why I was coming. I was very surprised to find that it was a DT retention course.

   I must admit I was a little worried, but I guess I did all right. I only use certain techniques when working, and I kind of forgot some of the others.

5. I did well on retention. However, the DT in recruit school was my second time through a DT program.

I think the DT program is outdated. I've tried DT and PPCT on the road. The PPCT is far and above more effective than the DT. Some of the DT moves are good and with constant practice they can be very effective. However, very few people get constant practice. DT moves are too complicated to stay proficient at.

The PPCT is much simpler to learn and retain. When people get in a stress situation (like a fight) their minds tell them to do what is easiest and what they are used to. In any physical activity, the best performers don't think through an action; they simply react. Striking is a simple act. PPCT involves a lot of one spot, one strike actions. This is much simpler than a several step DT move.

Parsons had a good idea and was a leader, but the times of DT are over. PPCT is the way to go.

6. Overall, the Defensive Tactics Program was excellent. I think, however, that the program should be developed more so that more vital areas are the targets of techniques. The diversity of defensive techniques is most important so you can use them under various conditions. But, the biggest need is to gain control of a situation as soon as possible; therefore, the vital areas should be preyed on more. Sometimes it is not necessary to use entire techniques; they can be .very useful even if you can only remember a small portion. Good program!

7. Defensive Tactics was a good class. I feel it is a very important part of a police officer's ability. However, if the techniques aren't reviewed with some consistency, the skills are forgotten.

8. You're trying to teach too much in the program. The techniques look good in a controlled environment, but what about in a real-life situation?

Pressure points seem good. However, we need to polish up more often than every three years.

9. They try to teach too much in recruit school. I don't remember a lot of the techniques. They should teach a few basic holds and take downs. Pressure points should be taught more.

10. I like: (a) pressure points, (b) one-on-one practice.

Dislike: Too many techniques taught--it's confusing. Once on the street, you go back to basics: what you've learned or practiced the most. It's usually a wrestling match.

11. Defensive Tactics--was good, except most of the tactics you don't use on the road. And when a technique is attempted, often the suspect offers quite a bit more <u>resistance</u> than your partners do in recruit school.

12. Need more in basic blocks, kicks, counter moves to kicks and punches. The academy was <u>very</u> limited in counter moves. Maybe should have black belt instructors.

13. Good training, but too much to remember. Need a couple of techniques to do and concentrate on those. Need more pressure point training <u>during</u> DT.

14. I feel that the program was important but, the fact is, "If you don't use it, you'll lose it."

15. I feel the DT program was extremely valuable but some of the techniques that were more complicated are soon forgotten.

     The control holds, come alongs, and proper stance are very important.

     I feel that the pressure points training we received was extremely valuable and should be included in the DT program.

     My experience with field confrontations has shown me the assaults happen very quickly and reactions are usually instinctive. Techniques should be simple due to the fact that most street confrontations result in "wrestling matches."

16. We should have longer classes and more aggressive training. Bring back "Carotid."

17. I feel that the material is difficult to remember. For the year I have been on the road, I have had only one occasion to use the DT. On this occasion the different things used were ineffective due to the subject's drug intoxication.

18. I believe the Defensive Tactics program was very interesting overall. I think there should be a yearly practice session for all troopers, with more emphasis placed on takedown techniques and kicks. The program is put together and instructed well. I feel it is a valuable asset to law enforcement.

19. I feel the initial program is very effective. However, without practice, most of the material is not used.

     I have used a couple of the holds in my past two years, mostly pressure point or submission arm holds.

I feel that a 6 months refresher or test at each post would require better retention. Maybe a certified instructor at each post for refreshers would help.

I have not personally practiced any of the items and am not comfortable doing about 80% of them. The rest I have used.

20. Initial training was okay. However, there has been no attempt to keep training current.

I have only used this training once or twice in two years.

Pressure points work better.

Refresher courses are needed every 6 months or more.

A review was needed long ago. I hope your efforts pay off.

This type of approach should also be used to patrol stop procedures.

21. I feel we need more training in practical exercises. The material is good and very useful. I feel that if you have more practical exercises working with each one that retention would be better.

22. I feel the DT program is useful. It teaches basic techniques under ideal conditions. With the basics you can improvise on the road to get suspect(s) to a position of control, then implement the technique (i.e. cuff positions, choke holds, etc.). Even though there is a lot of emphasis on DT I have not had any experience with this on the road. But at least I have some experience to draw from if needed.

23. Good program. More review would be helpful. I don't remember many of the different techniques, but some of them are remembered and useful.

24. There are too many techniques to learn and keep current with. Program should be limited to four or five techniques. The techniques taught in defense tactics are hardly ever used in the field.

25. I feel that Defensive Tactics was very helpful in giving me confidence for the first year or so after. The techniques that I learned, if kept current, would be very useful.

26. DT was a class that I might need to use someday on the road, but to date I haven't had to use it. I think that everyone could use it.

27. Program should be continued, but content should be lessened to fewer techniques for better retention.

28. Although the intent was good, Defensive Tactics does not follow you out into the field.

   From my experience as a P.E. instructor and advance training in coaching, I know that the moves will not stay with you unless practiced about once a week.

   I have found that in situations in the field I go back to moves I made while playing football and basketball, rather than what was covered at training in recruit school. Sports was taught to me over a long period and thus it became habit.

29. With regard to Defensive Tactics taught in the 98th Recruit School: the basic holds were good, but the armlocks to the take downs were of no use. In any type of physical confrontation-- you would use any means to put the cuffs on.

30. Not enough time was spent on teaching the holds, take downs, etc. in DT.

   Excellent course--very informative. Helps keep you in good physical shape--just need more time learning and doing.

31. Less exercise, more DT. There were days when almost the whole hour was exercise.

   If we cannot choke people out anymore, we should learn new techniques to handle mentals.

   Overall, it was a good program. I have used a rear choke hold release already and it was just habit, but it is the only hold I did that I really remember. I think basically because I never had any prior knowledge of getting out so in my mind I had nothing to fall back to except what I was taught.

32. Defensive Tactics class was a good learning experience. I learned a lot that I never knew before. I think that at times it was too high pressure and used as a secondary p.t. class. It would have been much better if we had much more time to practice on our own. Also I think that if we were to have updated training in D.T. every three to six months it would help the officer in the field. Also it would be beneficial if we were able to come to the academy and practice once a month.

33.   Most important, the Defensive Tactics Program should be slim-
      lined. For the average police officer, even one just leaving
      recruit school, there are too many holds, take downs, etc., to
      remember. Fewer main, basic techniques should be taught with
      longer time to ingrain the technique.

      The Defensive Tactics originally performed should be gone over
      again (a refresher course) during advanced trooper school to
      enhance the retention of the techniques.

34.   Overall, I think the program is excellent. At first it was a
      bit confusing learning all the techniques, but once you got to
      pick the ones you enjoyed; then it was easier to retain.

      When I left the academy and got out into the field, I didn't
      feel as though I could unconsciously take someone down with the
      techniques I learned (maybe a few) but I didn't feel
      comfortable.

      Because of this, I started taking karate classes. I'm now a
      green belt and have the confidence to deal with an unruly
      subject. My karate classes, along with the D.T. program, give
      me the tools I need for the road.

35.   As far as the retention study is concerned, I feel that it is
      important. However, I feel that in the field, in an actual
      struggle, you will perform a defensive tactic somewhat
      instinctively, whereas in the study, you are told to perform
      something, and you must stop and think--trying to connect the
      name of the movement to the actual maneuver. In the field, the
      name of the move is unimportant. But, of course, it is
      important to know the movement's name during training.

      Defensive Tactics Class: Is very important. But there is a
      problem. During the 100th school, we sometimes spent up to half
      the class being disciplined with physical exercise. Now, being
      disciplined with physical training is important. But it
      shouldn't be done at the expense of Defensive Tactics training.
      I feel the entire hour should be used for DT; and we could be
      disciplined with exercise some other time.

36.   Remembered more of the moves than the names of the moves. Some
      of the moves were confusing.

      Training was adequate; however, a refresher course, or required
      review of the book issued would have been extremely helpful.
      Most people don't review it on their own.

      Some moves came more easily than others. Less complicated holds
      with fewer combinations were easier to remember.

37. I thought the Defensive Tactics Program was very helpful. Some of the techniques will be very useful on the road while some of the others were rather difficult and could not be done properly to be effective, unless they were practiced all the time.

    Some of the techniques I have tried on friends, in an unstressful situation, and have found some very difficult and ineffective. For instance: the wrist take downs. It was hard to control the wrist, especially if used on a person with a strong arm.

    It was helpful to learn areas of the body that are more sensitive to pain. I feel even if you run into difficulties with a person you would still use partial techniques if unable to use the full technique.

    Overall it was educational, but the martial arts would be more effective.

38. I have no problem with this testing, but they shouldn't hold you to the exact letter of the training. This is a good refresher and should be done. It would help to learn about pressure points in more detail.

39. I thought the Defensive Tactics Program was good. I feel that some of. the simple techniques would probably be helpful on the road since they are easier to remember and would be more likely to be an automatic response. The program helped to instill some aggressiveness.

    I don't feel that the more complicated techniques would help out on the road, because people won't remember them.

    I feel that more time should be spent on some pressure point techniques--i.e. stunning or disabling subjects, at least temporarily.

40. The overall DT Program in Recruit School was good, and no real improvements could be made. But I believe that there should be a refresher course every year or two for a day at the academy or have a MLEOTC qualified trainer come to the Post and take a day to reinforce skills learned and teach new techniques to keep troopers sharp and up to date.

41. The Defensive Tactics class was taught well, but some of the forms are outdated and you would have to be positioned in certain spots around the subject to perform the techniques. The pressure points should be considered for teaching because in the field you do not have the time to position your body and perform the different techniques.

42. There are several items in Defensive Tactics that are good, but for the length of the training, the more complicated routines are hard to remember.

    I believe they should have a basic in-service test that everyone must complete once every six months at the post level. This would help to keep this fresher in everyone's mind.

    My overall evaluation of the class was good, but the tactics are sometimes not effective unless you keep practicing them.

43. The Defensive Tactics Program was an excellent segment of recruit school. I have only been involved with one physical confrontation to date. This was with an intoxicated driver who wouldn't exit his vehicle. I effectively used the head twist method to remove him from the car.

    The holds taught in the program are all good and the program as it was for the 100th should be maintained. I have only one suggestion: more time for instruction, and add some wrestling moves.

44. I think a lot of the techniques taught in the DT program work well with a passive subject that is not resisting, but are of little value with a subject who wants to fight/resist. Many times we are faced with drunk and/or disorderly subjects that are prepared for an officer to grab them, and it is necessary to use wrestling-type holds, etc., to subdue them. I think that some training in the use of these types of moves would be good to help officers survive in these types of situations. Having wrestled in high school for four years and also a little in college, I have found wrestling moves to be extremely valuable for use on the road. I think that the pressure point training should be expanded a great deal. That was some of the best DT training I've ever had. It enables a smaller/weaker person to subdue a much larger subject without having to resort to more dangerous tactics (Kel-Light to head, etc.). Perhaps some moves could be devised where pressure points are integrated with a few simple wrestling moves for use to control people.

45. The program is very useful if the officer would review the techniques every so often. Just like anything else, if you don't use it, you will forget how.

APPENDIX D

TEST ITEM TABLES

Table D.1   Tactics Selected With Percentages of Pass and Fail
             for the 1985 Flint School

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	10	100	7	70	3	30
2. High Block I.O. Against A Punch	5	50	1	20	4	80
3. High Block O.I. Against A Punch	5	50	4	80	1	20
4. Low Block I.O. Against A Kick	3	30	2	67	1	33
5. Low Block O.I. Against A Kick	7	70	6	86	1	14
6. Carotid Submission Hold	9	90	6	67	3	33
7. Bent Arm Submission Hold	4	15	2	50	2	50
8. Bar Hammerlock Hold	9	90	2	22	7	78
9. Hammerlock with Carotid Hold	1	10	0		1	100
10. Gooseneck Comealong Hold	9	90	6	67	3	33
11. Outside-In Wristlock to Gooseneck	1	10			1	100
12. Inside-Out Wrist Takedown To Cuff	9	90	3	33	6	67
13. Outside-In Wrist Takedown To Cuff	2	20	1	50	1	50
14. Outside Leg Sweep Takedown To Cuff	0	0		0		0
15. Bar Hammerlock Take Down To Cuff	9	90	2	22	7	78
16. Roundhouse Elbow Strike	10	100	5	50	5	50
17. Uppercut Elbow Strike	0	0		0		0
18. Reverse Elbow Strike	0	0		0		0
19. Basic 1-2 Punch	10	100	9	90	1	10
20. Front Kick	10	100	9	90	1	10
21. Round Kick	0	0		0		0
22. Side Kick	0	0		0		0
23. Simple Twistout Single Arm Grab	10	100	7	70	3	30
24. Reverse Leverage Move Two Arm Grab	0	0		0		0
25. Two Arm Grab Release Two Arm Grab	10	100	5	50	5	50
26. Reverse Leverage Move Two Arm Grab	0	0		0		0
27. Knee Strike	10	100	4	40	6	60
28. Finger Press to the Throat	0	0		0		0
29. Chin Tuck/Elbow Strike	6	60	2	33	4	67
30. Hip Throw	4	40			4	100
31. Groin Grab From A Rear Bear Hug	0	0		0		0
32. Groin Strike From A Rear Bear Hug	10	100	6	60	4	40
33. Horsebite	10	100	3	30	7	70
34. Groin Strike From A Headlock	0	0		0		0
35. Rear Head Hold Release	0	0		0		0
36. Lip Take Out	0	0		0		0
37. Neck Turn Out	6	60	2	33	4	67
38. Thumb or Finger Take Out	4	40	2	50	2	50

Table D.2.   Tactics Selected With Percentages of Pass and Fail
for the 1986 Flint School

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	6	100	6	100		0
2. High Block I.O. Against A Punch	2	33	1	50	1	50
3. High Block O.I. Against A Punch	4	67	4	100		0
4. Low Block I.O. Against A Kick	0	0		0		0
5. Low Block O.I. Against A Kick	6	100	5	83	1	17
6. Carotid Submission Hold	6	100	6	100		0
7. Bent Arm Submission Hold	0	0		0		0
8. Bar Hammerlock Hold	6	100	5	83	1	17
9. Hammerlock with Carotid Hold	0	0		0		0
10. Gooseneck Comealong Hold	6	100	5	83	1	17
11. Outside-In Wristlock to Gooseneck	0	0		0		0
12. Inside-Out Wrist Takedown To Cuff	6	100	6	100		0
13. Outside-In Wrist Takedown To Cuff	0	0		0		0
14. Outside Leg Sweep Takedown To Cuff	0	0		0		0
15. Bar Hammerlock Take Down To Cuff	6	100	4	67	2	33
16. Roundhouse Elbow Strike	5	83	5	100		0
17. Uppercut Elbow Strike	1	17		1		100
18. Reverse Elbow Strike	0	0		0		0
19. Basic 1-2 Punch	6	100	6	100		0
20. Front Kick	5	83	5	100		0
21. Round Kick	0	0		0		0
22. Side Kick	1	17	1	100		0
23. Simple Twistout Single Arm Grab	6	100	6	100		0
24. Reverse Leverage Move Two Arm Grab	0	0		0		0
25. Two Arm Grab Release Two Arm Grab	6	100	6	100		0
26. Reverse Leverage Move Two Arm Grab	0	0		0		0
27. Knee Strike	1	17	1	100		0
28. Finger Press to the Throat	5	83	5	100		0
29. Chin Tuck/Elbow Strike	0	0		0		0
30. Hip Throw	6	100	5	100	1	17
31. Groin Grab From A Rear Bear Hug	0	0		0		0
32. Groin Strike From A Rear Bear Hug	6	100	4	67	2	33
33. Horsebite	6	100	3	50	3	50
34. Groin Strike From A Headlock	0	0		0		0
35. Rear Head Hold Release	0	0		0		0
36. Lip Take Out	0	0		0		0
37. Neck Turn Out	6	100	4	67	2	33
38. Thumb or Finger Take Out	0	0		0		0

TablD D.3.   Tactics Selected With Percentages of Pass and Fail
            for the 98th Recruit School

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	18	100	13	72	5	28
2. High Block I.O. Against A Punch	15	83	9	60	6	40
3. High Block O.I. Against A Punch	3	17	2	67	1	33
4. Low Block I.O. Against A Kick	14	78	9	64	5	36
5. Low Block O.I. Against A Kick	4	22	2	50	2	50
6. Carotid Submission Hold	15	83	9	60	6	40
7. Bent Arm Submission Hold	3	17	1	33	2	67
8. Bar Hammerlock Hold	13	72	2	15	11	85
9. Hammerlock with Carotid Hold	5	28	1	20	4	80
10. Gooseneck Comealong Hold	14	78	12	86	2	14
11. Outside-In Wristlock to Gooseneck	4	22	1	25	3	75
12. Inside-Out Wrist Takedown To Cuff	9	50	2	22	7	78
13. Outside-In Wrist Takedown To Cuff	13	72	7	54	6	46
14. Outside Leg Sweep Takedown To Cuff	3	17	1	33	2	67
15. Bar Hammerlock Take Down To Cuff	11	61	3	27	8	73
16. Roundhouse Elbow Strike	13	72	9	69	4	31
17. Uppercut Elbow Strike	4	22	2	50	2	50
18. Reverse Elbow Strike	1	6		0	1	100
19. Basic 1-2 Punch	18	100	16	89	2	11
20. Front Kick	15	83	13	87	2	13
21. Round Kick	0		0	0		0
22. Side Kick	3	17	2	67	1	33
23. Simple Twistout Single Arm Grab	17	94	11	65	6	35
24. Reverse Leverage Move Two Arm Grab	1	6	1	100		0
25. Two Arm Grab Release Two Arm Grab	17	94	11	65	6	35
26. Reverse Leverage Move Two Arm Grab	1	6	1	100		0
27. Knee Strike	13	72	10	77	3	23
28. Finger Press to the Throat	5	28	5	100		0
29. Chin Tuck/Elbow Strike	6	33	2	33	4	67
30. Hip Throw	12	67	10	83	2	17
31. Groin Grab From A Rear Bear Hug	2	11	2	100		0
32. Groin Strike From A Rear Bear Hug	16	89	12	75	4	25
33. Horsebite	5	28	2	40	3	60
34. Groin Strike From A Headlock	11	61	10	91	1	9
35. Rear Head Hold Release	2	11			2	100
36. Lip Take Out	5	28	2	40	3	60
37. Neck Turn Out	11	61	5	45	6	55
38. Thumb or Finger Take Out	2	11			2	100

Table D.4. Tactics Selected With Percentages of Pass and Fail
for the 99th Recruit School

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	19	100	16	84	3	16
2. High Block I.O. Against A Punch	18	95	16	89	2	11
3. High Block O.I. Against A Punch	1	5	1	100		0
4. Low Block I.O. Against A Kick	17	89	15	86	2	12
5. Low Block O.I. Against A Kick	2	11	2	100		0
6. Carotid Submission Hold	19	100	16	84	3	16
7. Bent Arm Submission Hold	0	0		0		0
8. Bar Hammerlock Hold	17	89	12	71	5	29
9. Hammerlock with Carotid Hold	2	11	1	50	1	50
10. Gooseneck Comealong Hold	17	89	15	88	2	12
11. Outside-In Wristlock to Gooseneck	2	11	1	50	1	50
12. Inside-Out Wrist Takedown To Cuff	13	68	7	54	6	46
13. Outside-In Wrist Takedown To Cuff	10	53	9	90	1	10
14. Outside Leg Sweep Takedown To Cuff	2	11	1	50	1	50
15. Bar Hammerlock Take Down To Cuff	13	68	10	77	3	23
16. Roundhouse Elbow Strike	12	63	10	83	2	17
17. Uppercut Elbow Strike	7	37	5	71	2	29
18. Reverse Elbow Strike	0	0		0		0
19. Basic 1-2 Punch	19	100	19	100		0
20. Front Kick	13	68	12	92	1	8
21. Round Kick	3	16	3	100		0
22. Side Kick	3	16	3	100		0
23. Simple Twistout Single Arm Grab	16	84	13	81	3	19
24. Reverse Leverage Move Two Arm Grab	3	16	3	100		0
25. Two Arm Grab Release Two Arm Grab	19	100	16	84	3	16
26. Reverse Leverage Move Two Arm Grab	0	0		0		0
27. Knee Strike	15	79	14	93	1	7
28. Finger Press to the Throat	4	21	3	75	1	25
29. Chin Tuck/Elbow Strike	14	74	7	50	7	50
30. Hip Throw	5	26	5	100		0
31. Groin Grab From A Rear Bear Hug	3	15	1	33	2	67
32. Groin Strike From A Rear Bear Hug	16	84	14	88	2	12
33. Horsebite	11	58	10	91	1	9
34. Groin Strike From A Headlock	6	32	3	50	3	5
35. Rear Head Hold Release	2	11	2	100		0
36. Lip Take Out	0	0		0		0
37. Neck Turn Out	16	84	9	56	7	44
38. Thumb or Finger Take Out	3	16	2	67	1	33

Table D.5.   Tactics Selected With Percentages of Pass and Fail
for the 100th Recruit School

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	27	100	24	89	3	11
2. High Block I.O. Against A Punch	23	85	23	100		0
3. High Block O.I. Against A Punch	4	15	4	100		0
4. Low Block I.O. Against A Kick	24	89	21	88	3	12
5. Low Block O.I. Against A Kick	3	4	3	100		0
6. Carotid Submission Hold	23	85	20	87	3	13
7. Bent Arm Submission Hold	4	15	2	50	2	50
8. Bar Hammerlock Hold	25	93	12	48	13	52
9. Hammerlock with Carotid Hold	2	7	1	50	1	50
10. Gooseneck Comealong Hold	26	96	20	77	6	23
11. Outside-In Wristlock to Gooseneck	1	3	1	100		0
12. Inside-Out Wrist Takedown To Cuff	13	48	10	77	3	23
13. Outside-In Wrist Takedown To Cuff	17	63	16	94	1	6
14. Outside Leg Sweep Takedown To Cuff	7	26	4	57	3	43
15. Bar Hammerlock Take Down To Cuff	17	63	9	53	8	47
16. Roundhouse Elbow Strike	23	85	21	91	2	9
17. Uppercut Elbow Strike	4	15	4	100		0
18. Reverse Elbow Strike	0	0		0		0
19. Basic 1-2 Punch	27	100	25	93	2	7
20. Front Kick	23	85	23	100		0
21. Round Kick	1	4	1	100		0
22. Side Kick	3	11	3	100		0
23. Simple Twistout Single Arm Grab	26	96	24	92	2	8
24. Reverse Leverage Move Two Arm Grab	1	4	1	100		0
25. Two Arm Grab Release Two Arm Grab	27	100	25	93	2	7
26. Reverse Leverage Move Two Arm Grab	0	0		0		0
27. Knee Strike	18	67	16	89	2	11
28. Finger Press to the Throat	9	33	5	56	4	44
29. Chin Tuck/Elbow Strike	19	70	13	68	6	32
30. Hip Throw	8	30	5	63	3	27
31. Groin Grab From A Rear Bear Hug	2	7	2	100		0
32. Groin Strike From A Rear Bear Hug	25	93	23	92	2	8
33. Horsebite	12	44	11	92	1	8
34. Groin Strike From A Headlock	12	44	11	92	1	8
35. Rear Head Hold Release	3	11	1	33	2	67
36. Lip Take Out	1	4	1	100		0
37. Neck Turn Out	26	96	24	92	2	8
38. Thumb or Finger Take Out	0	0		0		0

Table D.6.   Tactics Selected With Percentages of Pass and Fail
for All Five Recruit Schools

Defensive Tactic	N Selected	%	N Pass	%	N Fail	%
1. Proper Stance	80	100	66	82	14	18
2. High Block I.O. Against A Punch	63	79	50	79	13	21
3. High Block O.I. Against A Punch	17	21	15	88	2	12
4. Low Block I.O. Against A Kick	58	73	47	81	11	19
5. Low Block O.I. Against A Kick	22	28	18	82	4	18
6. Carotid Submission Hold	66	83	51	77	15	23
7. Bent Arm Submission Hold	8	10	3	38	5	62
8. Bar Hammerlock Hold	70	88	33	47	37	53
9. Hammerlock with Carotid Hold	10	13	3	30	7	70
10. Gooseneck Comealong Hold	72	90	58	81	14	19
11. Outside-In Wristlock to Gooseneck	8	10	3	38	5	62
12. Inside-Out Wrist Takedown To Cuff	50	63	28	56	22	44
13. Outside-In Wrist Takedown To Cuff	42	53	33	79	9	21
14. Outside Leg Sweep Takedown To Cuff	12	15	6	50	6	50
15. Bar Hammerlock Take Down To Cuff	56	70	28	50	28	50
16. Roundhouse Elbow Strike	63	79	50	79	13	21
17. Uppercut Elbow Strike	16	20	12	75	4	25
18. Reverse Elbow Strike	1	1		0	1	100
19. Basic 1-2 Punch	80	100	75	94	5	6
20. Front Kick	66	82	62	94	4	6
21. Round Kick	4	5	4	100		0
22. Side Kick	10	13	9	90	1	10
23. Simple Twistout Single Arm Grab	75	94	61	81	14	19
24. Reverse Leverage Move Two Arm Grab	5	6	5	100		0
25. Two Arm Grab Release Two Arm Grab	79	99	63	80	16	20
26. Reverse Leverage Move Two Arm Grab	1	1	1	100		0
27. Knee Strike	57	71	45	79	12	21
28. Finger Press to the Throat	23	29	18	78	5	22
29. Chin Tuck/Elbow Strike	45	56	24	53	21	47
30. Hip Throw	35	44	25	71	10	29
31. Groin Grab From A Rear Bear Hug	7	9	5	71	2	29
32. Groin Strike From A Rear Bear Hug	73	91	59	81	14	19
33. Horsebite	44	55	29	66	15	34
34. Groin Strike From A Headlock	29	36	24	83	5	17
35. Rear Head Hold Release	7	9	3	43	4	57
36. Lip Take Out	6	8	3	50	3	50
37. Neck Turn Out	65	81	44	68	21	32
38. Thumb or Finger Take Out	9	11	4	44	5	56

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