

2014

# Examining the Efficacy of Adult Learning of Government-Mandated Content Using Andragogical Delivery Methods versus Traditional Pedagogical Delivery Methods

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The University of San Francisco

EXAMINING THE EFFICACY OF ADULT LEARNING OF GOVERNMENT-  
MANDATED CONTENT USING ANDRAGOGICAL DELIVERY METHODS  
VERSUS TRADITIONAL PEDAGOGICAL DELIVERY METHODS

A Dissertation Presented  
to  
The Faculty of the School of Education  
Department of Leadership Studies  
Organization & Leadership Program

In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education

by  
Richard K. Sealana  
San Francisco  
May 2014

THE UNIVERSITY OF SAN FRANCISCO

DISSERTATION ABSTRACT

To protect society from incompetent, unskilled, or out-of-date practitioners; to keep abreast of advances in knowledge and technology; and to respond to public demands for accountability and consumer protection; continuing education (CE) and mandatory continuing education (MCE) programs have significantly increased in the past 20 years. Individuals and organizations invest significant time and financial resources to comply with mandatory education and training requirements. Although the mandates and demand for CE and MCE continues to increase, there is minimal research on the efficacy of various delivery methods. The purpose of this study was to examine and document the efficacy of andragogical instructional delivery methods in comparison to traditional (pedagogical) instructional delivery methods to improve teaching and training methodologies for learning government-mandated course content. The findings from this study enhance the understanding of how best to teach and train adult learners when they are required to learn rather than when they choose to learn.

This mixed-methods study employed an explanatory design to sequentially collect quantitative and qualitative data, and use the results to understand a research problem. Quantitative data was prioritized and qualitative data was used to refine the results based on a debriefing process with participants. This study reinforces prior research indicating the value and benefit of andragogical delivery in instructional settings. It confirms the value of andragogical delivery methods (ADM) with government-mandated course content. It confirms prior assumptions that adult learners desire learning opportunities

based on their life experiences and personal situations; that adult learners desire an educational curriculum that allows learners to integrate their experiences into classroom efforts; that adult learners desire the instructor's role to be that of an "engager" of learning rather than a "transmitter" of knowledge; and that teaching strategies should consider learning times, place, styles, and pace. It was observed that ADMs require significant preparation, rigor, and "presence" to achieve the stated goals. Further research is required to determine to what extent ADM can be incorporated into online computer-based training and education and development of skills and andragogical techniques to deliver mandatory content in short sessions.

SIGNATURE PAGE

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements for the degree of Doctor of Education. The content and research methodologies presented in the work represent the work of the candidate along.

Richard K. Sealana

May 8, 2014

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May 8, 2014

## DEDICATION

This dissertation is dedicated to my wonderful wife

**Katherine Lorraine Sealana**

whose patience, love, and support has been unparalleled.

## ACKNOWLEDGEMENTS

I am grateful to Dr. Patricia Mitchell, my advisor and dissertation chairperson for her patience, continuous advice, and expertise. I thank Dr. Betty Taylor, and Dr. Darrick Smith for serving on my dissertation committee. Your time, advice, and knowledge are greatly appreciated.

To my many instructors and advisors at the University of San Francisco, I express my heartfelt appreciation for a quality education and life-changing experience that I received.

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## CHAPTER I

### THE RESEARCH PROBLEM

#### Statement of the Problem

In the United States, federal and state laws require certain organizations to provide annual training or continuing education (CE) to select employees. This training is referred to as CE or mandatory continuing education (MCE). The benefits of CE and MCE have been debated in a number of professions including academics. In 1889, the U.S. Supreme Court recognized the power of each state to require CE or MCE in certain professions for the protection of society in its ruling of the *Dent v. West Virginia* case. Although the Supreme Court did not comment on the value or effectiveness of CE or MCE in its ruling, it did empower states to mandate CE or MCE:

The power of the state to provide for the general welfare of its people authorizes it to prescribe all such regulations as in its judgment will secure or tend to secure them from the consequences of ignorance and incapacity, as well as of deception and fraud. (*Dent v. West Virginia*, [1889], as cited in Lazarus, Permaloff, & Dickson, 2002, p. 103)

According to Lazarus et al. (2002), laws have been passed to allow states to take actions necessary to protect the public from incompetent practitioners. Many states have adopted steps to create regulatory agencies that are empowered to “admit qualified individuals for licensure” (p. 102). In the State of California, examples of government-mandated CE and training include training or education for real-estate salespersons and brokers, accountants, pest-control operators, electricians, and insurance agents. Other examples of those required to take CE include bus drivers, hazardous-materials haulers, antiterrorism response-unit officers, teachers, and pesticide workers, who need frequent safety training.

Mandatory training has been expanded beyond the technical realm to areas of social etiquette. One example of mandatory training is for the prevention of sexual-harassment. In California, employers had to comply with Assembly Bill 1825 (Sexual harassment: Training and education, 2004) by January 2006. California State law requires sexual-harassment prevention training for all supervisors in companies that have 50 or more employees. Under this law, employers are required to provide 2 hours of sexual-harassment-prevention training to supervisory employees every 2 years.

Sexual-harassment prevention training must be delivered by trainers or educators with knowledge and expertise in the prevention of harassment, discrimination, and retaliation (Sexual harassment: Training and education, 2004, p. 93). The training must include “information and practical guidance” regarding federal and state laws that prohibit sexual harassment, including prevention and correction of harassment, and remedies available to victims. The statute specifically requires employers to use “practical examples” to instruct supervisors in the prevention of harassment, discrimination, and retaliation.

The importance of mandated sexual-harassment prevention training is underscored by government statistics. In fiscal year 2006, the U.S. Equal Employment Opportunity Commission (EEOC) received 12,025 charges of sexual harassment. The EEOC resolved 11,936 sexual harassment charges in 2004 and recovered \$48.8 million (not including monetary benefits obtained through litigation) in monetary benefits for charging parties and other aggrieved individuals (EEOC, 2005). In fiscal year 2007, the number of charges increased to 12,510, of which 11,502 were resolved and \$49.9 million in monetary benefits was paid. In spite of government-mandated education and training,

sexual harassment continues to be a major problem in the workplace (Queeney & English, 1994).

### Purpose of the Study

The purpose of this study was to examine and document the efficacy of andragogical instructional delivery methods in comparison to traditional (pedagogical) instructional delivery methods to improve teaching and training methodologies for learning government-mandated course content. The findings from this study enhance the understanding of how best to teach and train adult learners when they are required to learn rather than when they choose to learn.

### Background and Need for the Study

To address social problems, governments are, with increasing frequency, mandating CE and training in organizations. Companies must invest time and resources annually to comply with mandatory-training requirements. The implications of noncompliance or inadequate employee training can be punitive and socially harmful. It is therefore in the best interests of governments, employers, and employees to maximize the efficacy of learning in this context.

An example of government-mandated education is pesticide-worker safety training. In 1992, the federal Environmental Protection Agency revised the worker-protection standard (WPS) for agricultural pesticides. The WPS is a federal regulation designed to protect employees on farms and in forests, nurseries, and greenhouses from occupational exposure to agricultural pesticides. The WPS offers protection to approximately 2.5 million agricultural workers (people involved in the production of agricultural plants) and pesticide handlers (people who mix, load, or apply pesticides)

who work at over 600,000 agricultural establishments. All agricultural employers, owners, managers, and labor contractors are required to comply with the WPS when an agricultural establishment uses pesticides that have WPS labeling. Most WPS requirements apply to agricultural workers or pesticide handlers; however, some requirements apply to everyone and some apply only to certain people, such as those who handle pesticide application equipment or clean pesticide-contaminated personal protective equipment.

In California, for example, employees who use or supervise the use of certain pesticides are required to complete a minimum of 20 hours of pesticide worker-safety training every 2 years to remain certified to apply pesticides. Such training is typically provided by university extension services, professional associations, or individuals. Responding to the government-mandated training requirements, a new market for training consultants and training material vendors has emerged. Trainers, training methodologies, materials, and methods of delivery range widely. State and federal laws require training but do not set standards for employee comprehension of the training content.

As a trainer and educator in the area of pesticide worker safety for over 15 years, I have planned, designed, delivered, and participated in hundreds of CE or MCE classes, workshops, and seminars. In the vast majority of these experiences, a large percentage of participants appeared unmotivated and uninterested. Comments they made to me suggested that most participants attend CE or MCE events because they need CE credits or because their employer requires their attendance.

The social significance of the problems gives justification to the purpose of MCE in many occupations. However, the efficacy of redundant MCE has not been established or well documented. Researchers supported the notion that andragogical instructional methods improve adult learning in a classroom environment. Knowles (1984) examined teaching and training environments and methodologies and concluded that an adult's motivation to learn stems from a need to be self-directed. Hiemstra and Sisco (1990) drew similar conclusions after examining the need for an adult's self-directedness. Such methods have not been studied under conditions found in occupational environments where MCE is required. This study adds a new dimension to the body of knowledge of existing adult-learning theory.

#### Theoretical Rationale

The theoretical rationale for this study is based on the body of work of Knowles, who formulated a comprehensive adult-learning theory, published in 1973 and entitled *The Adult Learner* (1990). Knowles followed the research of Lindeman (1926), who wrote the classic work, *The Meaning of Adult Education*. Traditional pedagogy evolved long before Knowles or Lindeman held a discourse on adult learning. Based on the science of how children learn, the notions and methodologies that evolved were considered universal and equally applicable to children and adults. In traditional pedagogical thinking, the teacher was considered the central figure in every way. The teacher planned, designed, and delivered curriculum with minimal consideration for the individual needs or contexts of the learner. This teacher-centered/teacher-focused philosophy gave rise to many of the educational approaches used in 2009 (Cross, 1981).

Knowles (1970) determined that most adults learn differently from children. Initially identifying four characteristics, Knowles later added two additional characteristics that differentiated adult learners from child learners:

1. Adults possess a need to know.
2. Adults are self-directed.
3. Adults are experience-based.
4. Adults possess a unique readiness to learn.
5. Adults possess an orientation to learn.
6. Adults are motivated to learn (Knowles, Holton, & Swanson, 2005).

Knowles's (1990) notion of andragogy was based on a learner-centered situational model surrounding the characteristics listed above. Adult learners require rational justification for their learning; before they embark on a learning process they need to understand why they must learn. Adult learners desire to be in control of their learning. They want to take responsibility for their actions and outcomes. Adult learners seek relationships between their prior life experiences and that which they intend to learn. An adults' readiness to learn is related to their needs at the time learning is being considered, again reinforcing the need for relevance to life experiences. An adult's orientation to learning is task- or life-centered. Adults are motivated not as much by external pressures as by internal motivators (Knowles, 1990).

Knowles et al. (2005) clarified the distinctions between andragogy and pedagogy. For the purposes of this study, the term pedagogy also refers to traditional-learning theory. Knowles defined pedagogy as the "art and science of teaching children" (Knowles, 1990, p. 28). From his core assumptions, Knowles (1990) summarized

differences in educational delivery, noting that pedagogy is based on the following set of assumptions:

1. Students do not need to know why they must learn. They only need to know that the learning of the course material will help them to successfully complete the class.
2. A teacher's concept of students is based on dependent personalities. Likewise, students view themselves as being dependent on their teachers.
3. The experiences derived from the learning situation have minimal value to the students.
4. Students' "readiness to learn" is initiated by the teacher, when the teacher tells them they must learn to pass the class.
5. The students' orientation to learning is subject-centered.
6. Extrinsic factors such as grades, parental pressures, and the approval of the teacher are the factors that motivate students.

*Knowles's Assumptions Applied to Educational Delivery*

In the context of educational delivery, Knowles (1990) restated the assumptions of the andragogical model:

1. Learning should recognize the adults' need for growth and development.
2. Learning should be based on the life experiences of people.
3. Learning should be focused on life situations or people.
4. Educational curriculum for adults should allow learners to integrate their experiences into classroom efforts.

5. One of the instructor's primary roles should be that of an "engager" of learning rather than a "transmitter" of knowledge.
6. Teaching strategies should consider learning times, place, styles, and pace.

#### *Evolution of the Six Assumptions*

In Knowles's work (1977, 1978, 1980), andragogy initially underlays four assumptions as a contradistinction to the traditional, teacher-centered, pedagogical model.

The four initial assumptions were

1. Self-direction
2. Experience-based
3. Readiness to learn
4. Orientation to learning

In 1984, the assumption "motivation to learn" was added. In 1989 the assumption the "need to know" was added (Knowles et al., 2005) bringing the total to six assumptions.

Knowles's (1970) characteristic of self-directedness relates to the "concept of the learner" (p. 48). In the traditional pedagogical model, Knowles saw the role of the learner as a dependent role. In that teacher-centered context, the expectation is that the instructor assumes full responsibility for what, when, and how learning takes place. In contrast, the andragogical model recognizes that adults mature at different rates and naturally move from dependency toward self-directedness. In this student-centered model, teachers encourage and facilitate learning but work to nurture the adults' psychological need for self-direction.

As it relates to the characteristic of the learner's life experience, the pedagogical model does not consider what experience learners bring to a learning situation. In this

traditional model a learner's experience is not considered as valuable as that of the teacher, textbook writer, or academic. Knowles (1970) recognized the value of the learner's experience in the learning process, finding that people attach greater meaning to learning when such learning is facilitated by, and coupled with, life experience.

Adults develop a need to learn when real-life experiences require them to cope and address real-life tasks or problems (Knowles, 1984). Learners self-motivate and become ready to learn, and learning becomes more satisfying when linked with urgency to real-life experiences. After examining a learner's orientation to learning, Knowles linked the educational process to the achievement of personal goals, emphasizing the notion that learners "want to be able to apply whatever knowledge and skill they gain today to living more effectively tomorrow" (Knowles, 1984, p. 44).

As adults move from one developmental stage to the next, they become ready to learn the things they need to know to cope effectively with real-life situations (Knowles et al., 2005). Therefore the timing of learning experiences in relation to one's place in life is critical. Educators can induce readiness by exposing learners to models of performance, counseling, simulation exercises, and other techniques. Adult learners are somewhat motivated by external motivators, such as better jobs, promotions, and higher salaries. However, the most potent motivators are the internal pressures that adults experience, such as the desire for increased job satisfaction, self-esteem, and quality of life (Knowles et al., 2005).

#### Hypothesis for Quantitative Study

In this mixed-methods study, I hypothesized there would be a statistically significant difference, measured by gain scores, in participants' learning of MCE content

when they are taught using andragogical instructional methods versus traditional (pedagogical) instructional methods. The difference favors andragogical instructional methods over traditional methods for adult learners. The dependent variable (DV) was the learning of MCE course content; in particular, “pesticide worker safety training” prescribed by the California Agricultural Code. This study employed one independent variable with two levels ( $IV_1$  &  $IV_2$  indicating the instructional-delivery methods (a) andragogical delivery method (ADM) and (b) traditional (pedagogical) delivery method (PDM).

#### Research Questions for the Qualitative Study

The qualitative component of this study relates to the instructional delivery methodology used in CE and MCE for licensed and certified pesticide workers in the State of California. Toward this end, I sought to answer two research questions:

1. To what extent do andragogical teaching and training methods result in higher levels of learning of government-mandated course content (pesticide-worker safety training) versus traditional (pedagogical) instructional methods?
2. What factors influence attendee’s active participation in government-mandated course content (pesticide-worker safety training)?

#### Limitations

By design, this study employed a quasiexperimental (pretest/posttest) approach. I assigned, from intact groups, the experimental and control treatments, then administered a pretest to both groups. One of the two groups received the andragogical (ADM) experimental treatment. The other group received the pedagogical (PDM) experimental treatment. Each experimental group received a posttest to assess the differences between

the two groups. Because quasiexperiments include intentional assignment rather than random assignment of participants to groups, intact groups may exhibit similar prior knowledge. This would be the case if all participants from a single company or school chose to attend the same training session. This limitation is considered in the research discussion.

### Significance

Due to the potential for societal harm from many occupational activities, governments have mandated CE and skills training for certain occupations. The potential harm to society from incompetence and insufficient training in particular occupations provides justification to the purpose of MCE and training. The efficacy of traditional (pedagogical) instruction methods compared to andragogical methods has not been studied under conditions found in occupational environments where MCE is required. This study adds a new dimension to the body of knowledge on adult-learning theory.

Although the debate about the benefits of MCE continues among scholars and practitioners alike, the number of states requiring CE for many professions continues to increase. This trend was noted in the early 1990s when Queeney and English (1994) documented the growth of MCE, citing advances in knowledge and technology, as well as public demands for accountability and consumer protection. Federal, state, and local legislative bodies adopt MCE requirements for the following reasons:

1. They believe that expecting voluntary participation is not realistic
2. There is some evidence that well-designed programs can influence effective practice
3. MCE can provide equal access to a range of opportunities

4. Mandates are necessary to protect the public from incompetent or out-of-date practitioners
5. Although imperfect, it is better than alternatives such as examination or practice review.

In spite of the proliferation of MCE throughout the United States, the social, ethical, and environmental problems that MCE is supposed to address continue. This adds urgency and significance to the study of the efficacy of adult learning of government-mandated content using ADMs versus traditional PDMs.

#### Definition of Terms

The definition of terms is provided to define all technical terms used in this study that are essential to understanding the problem statement, hypothesis, research questions, procedures, and methods of analysis. Constitutive and operational definitions are provided.

*Active learning.* Active learning is a broad term used to describe models of instruction that place greater responsibility for learning onto the learner rather than the instructor or the learning institution. Active learning is thought to stimulate higher order cognitive processes such as critical thinking and analysis (Bevis, 1989). Adults who are involved in active learning are self-directed, motivated to learn, and prefer active learning strategies (Knowles, 1990). Constructivism theory guides learning that can occur electronically by maintaining a scaffolding effect as learners actively build on learner-centered principles (Bonk & King, 1998).

*Adult.* The term “adult is used to describe a person to the extent that she or he is performing social roles typically assigned by society to those it considers adults—the

roles of worker, spouse, parent, responsible citizen, soldier, and the like” (Wlodkowski, 1999, p. 10).

*Adult learning.* “The process of adults gaining knowledge and expertise” (Knowles et al., 2005, p. 174).

*Andragogy.* A model of assumptions about learners, to be used alongside the pedagogical model, thereby providing two alternative models to test assumptions as to alignment with particular situations (Knowles, 1970, p. 43).

*Andragogical delivery method (ADM).* In this study the term is used to describe a model whereby the instructor functions as a facilitator of learning. In contrast to PDM, the instructor prepares the learners to learn, modifies the physical and psychological climate, involves learners in planning for their learning, involves learners in formulating their own learning objectives, involves learners in designing their own learning plans, and helps learners carry out their learning plans (Knowles et al., 2005).

*Assumptions.* The literature referring to Knowles’s adult-learning theory uses the terms “assumptions, notions, orientations, principles, characteristics, and ways of learning” to describe similar concepts described below:

1. The need to know. Adults feel the need to know why they should learn (Knowles, 1984).
2. The learners’ self-concept. As people mature, they become less dependent and more self-directed; thus, they develop a need to be recognized, and treated, by others as a self-directed human being (Merriam, Caffarella, & Baumgartner, 2007).

3. The role of the learners' experiences. Adults enter education with a lifetime of experience that "has several consequences for adult education" (Knowles et al., 2005, p. 66).
4. Readiness to learn. For an adult to learn, the learning experience must align with his/her developmental tasks thus far (Knowles et al., 2005, p. 67).
5. Orientation to learning. Adults are motivated to learn new material if applicable to their real-life situations: adults are life centered (Knowles et al., 2005, p. 67).
6. Motivation. Adults' primary motivators to learn come from internal desires rather than external rewards (Knowles, 1984).

*Cognition.* Cognition is a term referring to the mental processes involved in gaining knowledge and comprehension. These processes include thinking, knowing, remembering, judging, and problem-solving. These are higher level functions of the brain and encompass language, imagination, perception, and planning.

*Experiential learning.* "The process whereby knowledge is created through transformation of experience" (Knowles et al., 2005, p. 197). Experiential learning is a philosophy and methodology in which educators purposefully engage with students in direct experience and focused reflection to increase knowledge, develop skills, and clarify values

*Engagement/Student engagement.* Student engagement refers to the degree of attention, curiosity, interest, optimism, and passion students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education.

*Holistic model.* “Represents the universe as a unitary, interactive, developing organism” (Knowles et al., 2005, p. 23). In relation to andragogy, the holistic model describes an educational paradigm that sees the learner as a participant with unique life experience and wisdom.

*Intelligence.* In psychology, the general mental ability involved in calculating, reasoning, perceiving relationships and analogies, learning quickly, storing and retrieving information, using language fluently, classifying, generalizing, and adjusting to new situations (Columbia Encyclopedia, 2008). Binet, the French psychologist, defined intelligence as the totality of mental processes involved in adapting to the environment (Binet, 1905). Although a strong tendency to view intelligence as a purely intellectual or cognitive function remains, considerable evidence suggests that intelligence has many facets.

*Learning.* “An enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience” (Schunk, 2008, p. 2). Learning is the act of acquiring new, or modifying and reinforcing existing knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information.

*Learner-centered model.* An approach to education focusing on the needs of the students, rather than those of others involved in the educational process, such as teachers and administrators.

*Motivation.* The psychological feature that arouses an organism to action toward a desired goal. This is a concept that explains why people think and behave as they do. (Weiner, 1992).

*Pedagogy.* “A set of assumptions about learning and strategies for teaching that came to be labeled pedagogy, literally meaning the art and science of teaching children” (Knowles et al., 2005, p. 36). For the purposes of this study, the term pedagogy is also referred to as traditional learning theory.

*Pedagogical delivery method (PDM).* A term used to describe a traditional teacher-directed method of instruction. In this model, students play a passive role while the instructor delivers information by lecture, example, or explanation.

*Prior knowledge.* The knowledge that stems from previous experience. Those with prior knowledge bring more knowledge to solving problems, and do so more effectively than those without prior knowledge (Merriam et al.,2007).

*Readiness to learn.* When a person is predisposed to learn based on the need to know and the need to cope effectively with their real-life situations. It is an internal state of psychological readiness to undertake self-directed learning (Guglielmino,1997).

*Reinforcement.* A stimulus that strengthens or weakens the behavior that produced it; a stimulus or event that leads to response strengthening (Schunk, 2008).

*Self-directed learning.* With the goals of enhancing the ability of adult learners to be self-directed, to foster transformational learning, and to promote emancipator learning, self-directed learning is a process in which students take the initiative to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes (Merriam et al.,2007 ).

*Teacher-centered (learning) model.* In this model the teacher plans, designs, and delivers curriculum with minimal consideration for the individual needs or contexts of the learner (Cross, 1981).

*Training.* An activity leading to skilled behavior. An educator's attempts to inculcate an awareness in adult learners of their learning styles (Smith, 1982).

*Transfer of learning.* Transfer-of-learning research can be loosely framed as the study of the dependency of human conduct, learning, or performance on prior experience.

### Summary

In the Chapter 1 statement of the problem, I identified the need to understand the dynamics and efficacy of MCE to enhance teaching and training methodologies. Chapter 1 next provided the purpose of the study, which was to examine and document the efficacy of ADMs compared to PDMs. The findings from this study are intended to enhance understanding of how best to teach and train adult learners when they are required to learn in contrast to when they choose to learn.

The purpose of the study section was followed by the background and need, which explained the social imperative such that institutions are required to provide CE to ensure safety and protections to society. The background and need section concluded with an explanation of how the findings from this study add to the body of knowledge, enhancing understanding of andragogy as it relates to MCE. The background and need section was followed by the theoretical rationale, hypothesis for the quantitative study, and research questions for the qualitative study.

## CHAPTER II

### REVIEW OF THE LITERATURE

The social mandate to protect the public from problems such as hazardous materials, unethical business practices, incompetent professionals, and sexual harassment, has given rise to a myriad of government-mandated training, CE/MCE in the workplace. With the expansion of mandated training and CE requirements, the need for ascertaining the most effective training methodologies continues to expand. Researchers supported the notion that andragogical instructional methods improve adult learning in classroom environments (Lazarus et al., 2002). Such methods now require study under conditions found in occupational environments where government-mandated course content is required.

In this section, I discuss andragogy, its history and development, theoretical roots, and significance to government-mandated training. The review of literature is divided into four sections. Section 1 examines core theories and principles of learning. In Section 2, I discuss the history and foundations of andragogy. Section 3 examines teaching/training methodologies used with adults. In Section 4, I discuss government-mandated education.

#### Core Theories and Principals of Learning

Scholars generally agree on the importance and definition of learning; however, here most agreement ends. The earliest studies of learning came from schools of psychology prior to 1950 (Merriam et al., 2007). However, scholars hold different views on the causes, processes, and consequences of learning. “Learning is an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or

other forms of experience” (Schunk, 2008, p. 2). Merriam et al. (2007) found agreement in the notion that “change” underlies most definitions of learning (p. 276). Early in Knowles (1984) career, the theorist cited a psychological definition of learning as “a process of need-meeting and goal-striving by learners” (p. 56). Knowles saw this cognitive and emotional process as unique to adults who possessed enough life experience to discern between needs and wants.

### Learning Orientations

Scholars share no universal agreement on the number of learning theories that exist. However, five general areas have emerged as significant schools of thought on the subject: (a) behaviorist, (b) humanist, (c) cognitivist, (d) social cognitive, and (e) constructivist. These “orientations” group specific learning theories based on the assumptions associated with each (Merriam et al., 2007). Early notions of learning evolved from the schools of psychology and from a behaviorist orientation. Theorists including Guthrie (1930), Pavlov (1927), Thorndike (1927), and Watson and MacDougall (1929) created conditioning theories that described how behavior can be modified by stimulus. Thorndike’s contributed studies surrounding the age in which learning declines and that behaviors followed by pleasant consequences are more likely to be repeated in the future. Pavlov examined physiological responses to stimuli and is best known for stimuli studies with dogs. Watson and MacDougall focused on tracking responses to stimulus origins. They posited most acts are but combinations of these simple stimulus-response patterns. Guthrie examined combinations of stimuli, averring that learning was a consequence of association between a particular stimulus and response and that stimuli and responses affect specific sensory-motor patterns.

Humanist orientations were introduced by theorists such as Maslow (1943) and Rogers and Freiberg (1993), who focused on purposeful acts by individuals to fulfill developmental needs. Maslow believed that conditioning theories did not adequately explain the complexity of human behavior, offering the notion that human actions are directed toward goal attainment. Rogers and Freiberg discussed the distinctions between cognitive and experiential learning, viewing cognitive learning as a function of rote or academic knowledge. To Rogers and Freiberg, experiential learning addressed the needs and wants of the learner and evoked qualities of personal involvement, self-initiation, and self-evaluation by the learner.

Cognitivists such as Ausubel (1963), Bruner (1961), Gagne (1985), Koffka (1924), Kohler (1947), Lewin (1935), and Piaget (1952) viewed the learning process as information processing, including insight, memory, perception, and metacognition. Ausubel was concerned with how individuals learn large amounts of meaningful material from verbal/textual presentations. Thus, learning was based on representational and combinatorial processes that occur during the reception of information.

Bruner (1961) posited that learning is an active process in which learners construct new ideas or concepts based on their current and past knowledge. Each learner constructs a cognitive structure to accept and transform the information they receive, then use that cognitive structure in the future to build on knowledge (Bruner, 1961). Gagne (1985) described the importance of different learning objectives to instructional design, drawing distinctions between internal and external learning conditions. Internal conditions include attention, motivation, and recall; external conditions include the arrangement and timing of stimulus events (Gagne, 1985).

Koffka (1924) helped establish the theories of Gestalt psychology in the United States, putting forth that humans first perceive in a holistic framework. As they mature, they develop an ability to discern and perceive individual sensations that comprise the whole. Kohler's (1947) work on memory systems and the nature of mental associations led to a greater understanding of learning. Like other Gestalt psychologists, Kohler believed that human behavior must be studied in all its complexity rather than separated into discrete components.

Lewin (1935), a Gestalt psychologist, conducted theoretical studies on attitude change and group dynamics. Using a phenomenological approach to social science, Lewin believed that human behavior was determined by the totality of an individual's situation. Piaget (1952) focused on how humans, and in particular children, develop understanding. Piaget examined the role of maturation on capacity to understand concepts and believed that thinking does not develop in a linear fashion and does not develop smoothly.

Those with a social-cognitive orientation, such as Bandura (1977) and Rotter (1966), looked at the interaction with and observation of others in a social context. Bandura, best known for social-learning theory, emphasized the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. By observing others, Bandura believed humans form an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action. Rotter is known as one of the architects of social-learning theory. Focused largely on motivation, Rotter believed people are motivated to seek out positive stimulation or reinforcement, and to

avoid unpleasant stimulations. Personality represents an interaction of individuals with their environment (Rotter, 1966).

Finally, the constructivist orientation from such scholars as Dewey (1896), Lave and Wenger (1990), Rogoff (1990), von Glaserfeld (1974), and Vygotsky (1978), viewed the learning process as a construction of meaning based on lived experiences (all as cited in Merriam et al., 2007). Dewey believed learning was inspired by the learner's gap in knowledge and that this disequilibrium or cognitive dissonance was the primary motivation for the learner to desire a greater understanding.

Lave and Wenger (1990) believed that learning is situational in nature, and is a function of the activity, context, and culture in which it occurs. Social interaction is the primary component of learning and is more a function of unintentional rather than deliberate engagement (Lave & Wagner, 1990). Rogoff (1990) focused on the social and collaborative nature of learning, observing what adults and children do when they are engaged in a learning experience. Rogoff concluded that social communities foster collaborative learning relationships and emphasized the role of language, guidance, and the learning environment on the process of learning.

Building on Piaget's work, von Glaserfeld (1974) is known for radical constructivist thinking, arguing that through experience, the human consciousness creates structures. In those constructed formulations people experience reality. Von Glaserfeld believed that reality is largely created without a person's awareness. The theorist emphasized the importance of experience in the construction of new knowledge.

Vygotsky (1978) is best known for the social-cognition learning model, asserting that culture is the prime determinant of individual development. In contrast to Piaget's

(1952) notions regarding human development, Vygotsky believed social learning precedes development. Centered on the interactions between people and their sociocultural context as the primary driver for learning, Vygotsky's zone of proximal development focused on interactive problem solving, supporting Knowles's emphasis on collaborative learning and the prior knowledge of the learner. Where Vygotsky emphasized a maturation process, such that key learning occurs between what a learner can do without help and what he or she can do with help, Knowles emphasized the collaborative process.

#### Implications of the Five Orientations on Adult Learning

From a behaviorist orientation, overt behaviors can be observed and measured and stimulus can be observed quantitatively (Good & Brophy, 1990). This orientation views learning as establishing responses to discriminative stimuli. Through practice, responses can be strengthened so that complex skills can be developed by providing clear measurable objectives followed by consistent reinforcement (Schunk, 2008). The implications of the behaviorist orientation to adult learning are rooted in the view that learning is a process of forming associations between stimuli and responses. The adult who recognizes that behavior is associated with certain stimuli may be able to self-regulate. The individual may "choose which behaviors to regulate, establish discriminative stimuli for their occurrence, evaluate performance in terms of whether it matches the standard, and administer reinforcement" (Schunk, 2008, p. 60).

The humanist orientation is best known to originate from scholars such as Maslow (1968) and Rogers and Freiberg (1993). Maslow believed that at the lowest level are physiological needs, and at the highest level is self-actualization. Only when the lower

needs are met is it possible to fully move on to the next level. Learning can be seen as a form of self-actualization, a sense of accomplishment, and the controlling of impulses (Maslow, 1968).

Rogers and Freiberg (1993) posited that learning combines the logical and intuitive with intellect and feelings to create an experiential learning condition. Experiential learning has a quality of personal involvement, is self-initiated, is pervasive, is evaluated by the learner, and becomes the essence of meaning to the learner (Rogers & Freiberg, 1993). The significance of the humanist orientation for adult-learning theory includes the notion that adults desire to be self-directed and that the focus of learning is on the individual, with learners expected to assume primary responsibility for their own learning (Caffarella, 1993).

In the late 1920s, notable Gestalt psychologists challenged the behaviorist orientation by introducing the cognitive or information-processing notions of learning. Key to these notions are the assumptions that the human-memory system is an active processor of information and that prior knowledge is important for learning new information (Merriam et al., 2007). The cognitive or information-processing orientation implies that learning involves internal processes that are under the learner's control. Much of the focus of this orientation is built on models of cognition, comprehension, the nature of schemata, memory, and the development of skills.

The notion that human learning occurs primarily in social contexts gave rise to social-cognitive learning theory. Combining many of the elements of the behaviorist and cognitivist orientation, the dominant belief was that humans acquire knowledge by observing others. Learner motivation, learning contexts, observational learning, and self-

efficacy are key contributions. The implications of the social-cognitive orientation for adult learning include the notion that adults are motivated to learn, in part because of their varying degrees of external or internal control, the importance of context, and the learner's interaction with the environment (Gibson, 2004).

The constructivist orientation maintains that learning is the result of the construction of meaning and how people make sense of their experiences. Social constructivists believe that knowledge is "constructed" when people collaborate about shared problems or tasks. Implications for adult learning include the notion that self-direction is a constructionist view. Cognitive apprenticeship, situated learning, reflective practice, and communities of practice are notions found in the adult-learning and the constructivist literature (Merriam et al., 2007).

#### Active Learning Versus Passive Learning

Active learning requires students to be actively involved in all phases of the learning process. According to Bevis (1989) active learning stimulates higher order cognitive processes such as critical thinking and analysis. Knowles (1990) described adults as being self-directed and motivated to learn. Adult learners prefer active-learning strategies (Knowles, 1990).

In 1998, Bonk and King cited constructivism theory as a way to describe how learning can occur by learners actively building on prior teachings and learner-centered principles. Chickering and Gamson (1987) summarized seven principles of good practice in education that form the foundation of active learning. The initial principle, that of high expectations, are developed and communicated to the learner by educators. This encourages learners to develop specific goals that help them become successful.

Chickering and Gamson described the second principle as reciprocity and cooperation among students, encouraging learners to interact and learn from one another. In line with the third principle, active learning, the learner is involved with the learning process. This involvement provides for faster learning and greater retention of the knowledge. The amount of time the learner invests in the task at hand, is the fourth principle. Here the learner considers the appropriate amount of time needed to attain the objectives and outcomes of the desired training or education. The fifth principle is feedback, which includes meaningful interactions between learners, peers, educators, and technology. Interaction between the student and the educator is the sixth principle. Interaction includes structured and unstructured communications that enhance learning. The seventh principle is a mutual (student–educator) respect for diversity to understand cultural uniqueness, thereby enhancing learning.

Passive learning is characterized as the traditional pedagogical approach in which lectures are delivered by educators and learners are passive and minimally involved. Bevis (1989) defined passive learning as a means to acquire ideas and information from memory recall. Passive learning results in less use of higher cognitive skills that result in lower-level learning (Bever, 1989).

The goal of active-learning strategies is to engage the learner in higher order thinking, including analysis, synthesis, and evaluation. These forms of higher order cognition allow learners to assimilate, apply, and retain learning better than do passive-learning strategies. Austin and Mescia (2001) found that active-learning strategies accommodate different learning styles, promote learner achievement, and enhance learner

motivation. Their research revealed a significant number of learners preferred active-learning approaches to traditional passive-learning approaches.

When educators implement online active-learning strategies, the role of the learner changes from passive to self-directed and learners take responsibility for their own learning. The educator's role changes from that of the authoritarian expert to coach or facilitator. Zwirn (2005) described how the shift occurs from content-driven presentations to shared inquiry between learners and educators. For example, learners may participate in online discussions and primarily interact with one another. The educator guides the discussion with remarks about learners' responses and may summarize the content at the end of the learning segment rather than dominate the discussion with a predetermined agenda.

### Barriers to Learning

To appreciate the potential effectiveness of a learning methodology, an understanding of the basic barriers to learning is requisite. Most literature on barriers to learning relate to primary education for children. Nominal research has been conducted on barriers to learning related to adults.

Cross (1981) described a model of lifelong learning that integrates the theoretical frameworks of Knowles's (1980) andragogy and Rogers and Freiberg's (1993) discussion on experiential learning. Cross discussed three barrier categories to adult participation in learning: (a) situational, (b) institutional, and (c) dispositional. Situational barriers are those that arise from one's situation or environment at a given point, such as family and work, poverty and adult identity, cultural issues, and learning tracks. Institutional barriers

are those practices and procedures that exclude or discourage adults from participating in organized learning activities, such as politics, culture, and religious beliefs.

Examples of institutional barriers in education include inconvenient schedules, compulsory attendance, restrictive locations, and others that discourage working adults from participating in educational activities. Dispositional barriers are those related to the attitudes and self-perceptions about oneself as a learner. They include motivation, cognitive load, confidence, and prior learning. Examples of dispositional barriers include lack of confidence, the feeling of being too old to learn, and being bored with learning. Cross (1981) developed the “chain-of-response model” to explain what makes some people participate in education and training (see Figure 1). Cross first focused on individual and internal factors rather than external factors. If adults were not initially motivated to participate in education and training, it seemed unlikely they would eventually participate. Cross found this to be true regardless of efforts to eliminate external barriers. Later, Cross examined external factors including opportunities, barriers, and then the relationship between the learner’s beliefs that new learning would help accomplish personal goals. The impact barriers have on participation in adult education and training is dependent on the individual’s interest in the process of adult education and training. Cross’ model recognizes the interaction between various internal and external factors as reasons to participate or not participate in adult education and training.

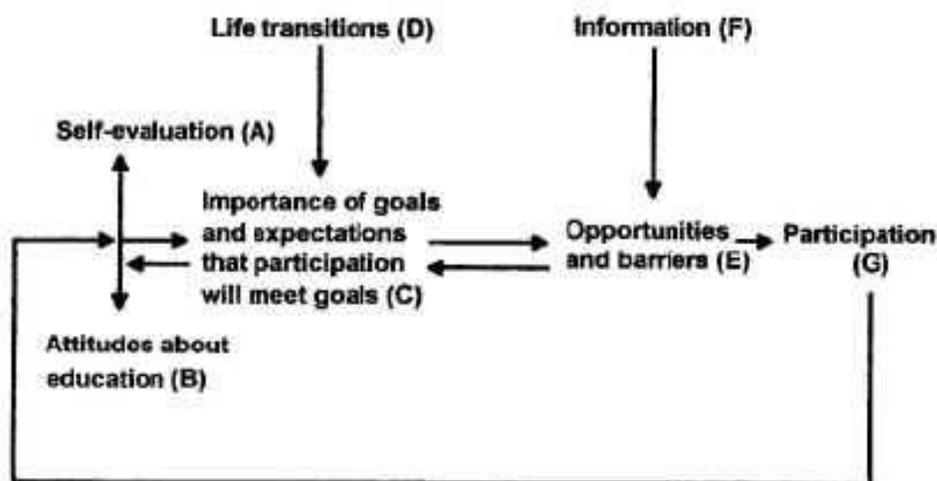


Figure 1. Chain-of-response model.

From *Adults and Learners*, by K. P. Cross, 1981, San Francisco, CA: Jossey-Bass.

Building on Cross' (1981) chain-of-response model, Darkenwald and Merriam (1982) examined why some people choose to participate in adult education and training. Barriers to learning correlated negatively with participation stimuli. In developing the psychosocial-interaction model, Darkenwald and Merriam argued the importance of socioeconomic status. According to their model, socioeconomic status has a positive effect on participation stimuli, affecting the learner's perceptions about the value and utility of adult education.

Kolb (1984) is best known for the experiential-learning model, describing learning undertaken by people who are to acquire and apply knowledge, skills, and feelings in an immediate and relevant setting, such as a school. The other type of experiential learning is education that occurs as a direct result of one's life experience (Houle, 1980). According to Kolb, the experiential learning model contains four elements: (a) concrete experience, (b) observation and reflection, (c) formation of

abstract concepts, and (d) testing in new situations. Kolb argued that the learning cycle can begin at any one of the four but should be viewed as a continuous spiral.

### History and Foundations of Andragogy

Defined as the “art and science of helping adults learn” (Knowles, 1990, p. 54),

Knowles’s identified six basic assumptions of how adults learn:

1. Adults need to know why they need to learn.
2. Adult learners embrace a self-concept of being responsible for their own learning.
3. The adult learner’s varied life experiences serve as rich resources in the learning environment.
4. Adult learners’ readiness to learn is linked to coping with real-life situations.
5. An adult’s orientation to learning is different from a child’s and is most likely life or task centered.
6. Adult-learner motivation comes mostly from internal motivators including promotion, job change, and quality of life (Knowles, 1990).

Since the 1960s, andragogy has been a dominant model for adult education in the United States. The term, thought to have been introduced by Kapp in 1833, is used to differentiate between the ways adults learn and the ways children learn. “Andragogy (*andr-* means ‘man’) in contrast to pedagogy (*paid-* means ‘child’ and *agros* means ‘leading’)” (Davenport & Davenport, 1985, p. 152; see Table 1 for a summary of key theorists).

Table 1

*Key Authors and Their Significant Contributions to Adult Learning*

Author	Date	Concept
Lindeman	1926	Individual learning experiences
Freire	1972	Critical consciousness and liberation
Ten Have	1975	Interventions for promoting well-being
Habermas	1984	Emancipatory learning and critical theory
Brookfield	1987	Critical reflective thinking and analysis
Knowles	1980, 1990	The direct facilitation of the development of individuals through improving the educative quality of their environment.
Field	2000	Lifelong learning and the new educational order

*Note.* Adapted from “Andragogy and social capital theory: The implications for human resources development,” by J. W. M. Kessels & R. F. Poell, 2004, *Advances in Developing Human Resources*, 6, 146 doi:10.1177/1523422304263326

Underlying theories of adult learning date back to the 1920s when Lindeman (1926) first wrote about adult learning in *The Meaning of Adult Education*. Lindeman described the process by which learners become self-aware of significant experiences. Lindeman believed that self-awareness leads to evaluation; from evaluation comes meaning. Lindeman’s influence on Knowles’s work is evident, as seen in Lindeman’s early assumptions about how adults learn. Adults are motivated to learn as they experience needs and interests that learning will satisfy:

1. An adult orientation to learning is life-centered.
2. Experience is the richest source for adult learning.
3. Adults have a deep need to be self-directing.
4. Individual differences among people increase with age (Moore & Bogotch, 1993).

Lindeman’s (1926) conclusions evolved from an examination of educational content in comparison to the educational process:

Education is a method . . . for giving situations a setting, for analyzing complex wholes into manageable, understandable parts, and a method which points out the path of action which, if followed, will bring the circumstance within the area of experiment. (p. 115)

*Other Theorists Contributing to the Understanding of Adult Learning Theory*

Freire (1972) is well known for the work, *Pedagogy of the Oppressed*, describing how pedagogy takes on different forms under varying social and cultural conditions. In The Netherlands ten Have discussed the potential impacts of andragogical research to society. Drawing distinctions between andragogy and andragogy and how scientific interventions can promote or restrict well-being (Kessels & Poell, 2004), Habermas (1996) distinguished among three cognitive areas in which human interest gives rise to new knowledge. In work on emancipatory learning and critical theory, Habermas discussed the mode of discovering knowledge as grounded in certain aspects of social existence; specifically in areas of work, social interaction, and power (as cited in Geuss, 1981).

Brookfield (1987) discussed methodologies of integrating critical thinking into adult-learning situations and their impact on relationships, the workplace, political involvement, and mass media. The greatest emphasis was placed on the relevance that adults place on their learning activities as they relate to their socioeconomic situation. Knowles's (1990) early works from 1980 through the 1990s focused on developing individuals by enhancing the quality of their educational environment. The contributions of the aforementioned authors established the foundation for Knowles's (1990) version of andragogy. Their work provided the basis for the development of andragogy as an alternative to the traditional pedagogical model.

### *Differences Between Pedagogy and Andragogy*

Knowles (1984) examined assumptions about traditional pedagogical methodology and contrasted those with methods found to be more appropriate for adult learners. Knowles observed five key assumptions that have shaped traditional pedagogical methods: First, learners requires the instructor to assume responsibility for decisions about curriculum, skills acquisition, teaching methodology, and evaluation of learning. This assumption most often forces a “teacher-centered” approach. Learners’ prior experience did not significantly influence their learning process or outcome. The third assumption was that learners’ “readiness to learn” was motivated mostly by external stimuli, such as an increase in salary or advancement of position. The next assumption was that people were “drawn” to specific educational subjects rather than exploring or experiencing interest in learning. Knowles’s final assumption about traditional pedagogical methodology was that learners were motivated by external negative pressures from parents, peers, and professional colleagues. Knowles saw the emphasis of the pedagogical model as more concerned with the system, institutional processes, learning content, and efficiency of learning transfer than on the needs and interests of the learner.

To further clarify this distinction between pedagogy and andragogy, Knowles (1984) stated that andragogy represents an alternative set of assumptions about how adults learn, whereby pedagogy represents a basic ideology. Knowles (1984) saw the assumptions of andragogy as inclusive of many of the assumptions of pedagogy, whereby traditional pedagogical assumptions were rigid and inflexible. Traditional pedagogy is “content-oriented,” whereas andragogy is “process-oriented.” Later, Knowles (1990)

rethought the emphasis on distinctions between pedagogy and andragogy and offered this version of andragogy:

Simply another model of assumptions about adult learners to be used alongside the pedagogical model of assumptions, thereby providing two alternative models for testing out the assumptions as to their 'fit' with particular situations. Furthermore, the models are probably most useful when seen not as dichotomous but rather as two ends of a spectrum; with a realistic assumption (about learners) in a given situation falling in between the two ends (p. 43).

#### Implications of Andragogy in the Workplace

Arising from the assumptions about andragogy is the conclusion that adult learning should be centered on the life experiences and situations of individual learners. Adult-education programs, whether academic, technical, or vocational, should be designed so that learners integrate their experiences into the learning curriculum. When life experiences and situations are integrated into the adult learner's curriculum, the role of the instructor changes. In a major departure from traditional pedagogy, the responsibility of the instructor changes from that of a leader or transmitter of the learning situation to a facilitator and engager in the learning experience. Piaget (1952), Dewey (1896), and Vygotsky (1978) were early authors who discussed the value of this paradigm shift (as cited in Estes, 2004).

#### Teaching and Training Methodologies as They Relate to Adults

In this research study, I view teaching and training methodologies as similar and complimentary concepts. Because this research study measures adult learning in a vocational context, I assumed that significant prior knowledge of learners is the result of a variety of learning methodologies. These would typically include some exposure to academic, vocational, traditional, nontraditional, formal, and informal approaches. However, I should distinguish between the concepts of teaching and training.

### *Teaching*

Teaching methodologies have arisen from traditional pedagogical thought.

Teaching is a pedagogic relationship between the teacher and the learner (Knowles, 1984). Schunk (2008) summarized teacher competency needs in three areas: (a) content knowledge, (b) pedagogical content knowledge, and (c) general pedagogical knowledge. Content knowledge is developed through an understanding of the concepts in the domain being taught. Pedagogical content knowledge is the ability of the teacher to convey their knowledge of the specific content through multiple teaching modes. General pedagogical knowledge refers to mechanics and classroom guidance skills, including management and communication (Schunk, 2008, p. 302).

Knowles et al. (2005) described the andragogical model of teaching as a *process model* in contrast to the content models employed by most traditional educators. In the andragogical model, the facilitator prepares the learner, establishes a climate conducive to learning, creates a mechanism for mutual planning, diagnoses the need for learning, assists in formulating objectives, designs a pattern of learning experiences, then evaluates the learning outcomes (Knowles et al., 2005, p. 115). Knowles et al. (2005) placed emphasis on process rather than content in the activity of teaching.

### *Training*

The concept of training is founded on the idea that vocational or practical skills and knowledge can be taught and lead to skilled behavior (Fellabaum, 1998). Brookfield (1986) defined the training process in terms of the educator's role to inculcate an awareness in adult learners of their learning styles. In the literature, Knowles (1984), Sleezer (1992), and Yelon (1992) as cited in Knowles et al. (2005) referred to the

educator or trainer's role, carrying the responsibility or obligation to deliver instruction (Knowles et al., 2005). Therefore, the traditional notion of training is an "educator-centered" process to meet the needs of the organization (p. 297). Merriam et al. (2007) concluded that "behaviorism is the philosophy that most underlies adult career and technical education" (p. 281). Merriam et al. studied the role of technical education to identify and teach the skills required to perform a certain occupation.

### Mandated Continuing Education

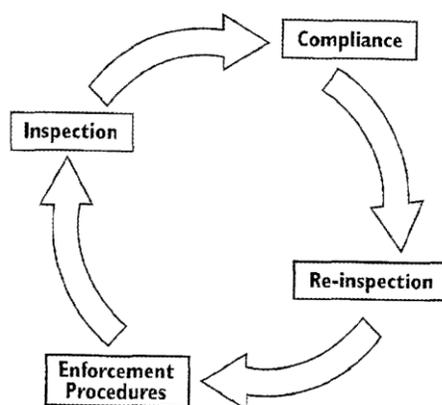
In the United States, federal and state laws require many organizations to provide annual training or CE to select employees. As a result of a 1989 Supreme Court decision, *Dent v. West Virginia* (2009); individual states are empowered to protect the welfare of their populations by establishing CE or MCE programs. The objective of the court was to provide protection from incompetent practitioners. Thus, many states created regulatory agencies to monitor and regulate CE or MCE programs as conditions of certification or licensure (Lazarus et al., 2002). In California, government-mandated CE and training include training or education for real estate salespersons and brokers, accountants, pest-control operators, electricians, insurance agents, driver's education for bus drivers or hazardous-materials haulers, antiterrorism-response-unit officers, teachers, and pesticide workers (Lazarus et al., 2002).

Society looks to mandatory training as a solution to social-etiquette problems such as sexual harassment (Sexual harassment: Training and education, 2004). California law requires sexual-harassment-prevention training for all supervisors in companies that have 50 or more employees. Under this law, employers are required to provide 2 hours of

sexual-harassment-prevention training to supervisory employees every 2 years (Sexual harassment: Training and education, 2004, p. 93).

For many occupations, government agencies rely on monitoring compliance with regulations and rules. The goal is to safeguard products, work places, homes, and environments (LaFollette, Broadbear, & Bazan, 1999). LaFollette et al. described the regulatory paradigm as one that focuses on reacting to problems rather than anticipating problems. They contrasted this approach with an education paradigm that focuses on assessing needs, planning, implementation, and evaluation of learning.

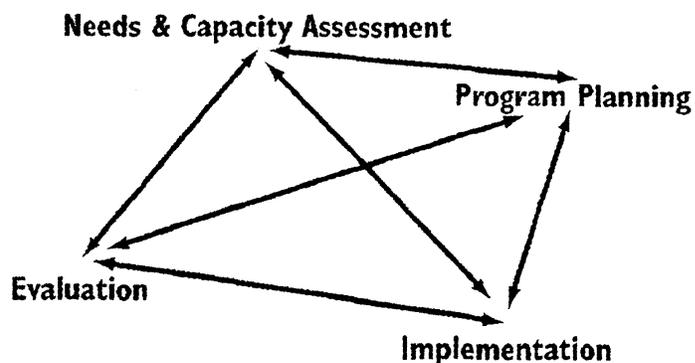
In the regulatory paradigm, regulated entities are resistant to change, and the relationship between regulators and entities being regulated is contentious or adversarial (LaFollette et al., 1999, see Figure 2). As a result, the cycle of inspections must be repeated to assure compliance with enforcement procedures (LaFollette et al., 1999).



*Figure 2.* LaFollette’s regulatory paradigm.  
From “Beyond Regulatory Compliance: Enhancing Environmental Health With an Education Paradigm,” by S. LaFollette, J. Broadbear, & C. Bazan, 1999, *Journal of Environmental Health*, 62(5), p. 19

In the education paradigm, cooperation and a participatory relationship are emphasized, resulting in greater effectiveness. LaFollette et al. (1999) described the

paradigm as one that structures personal interactions for dialogue, “not didactics” (p. 10, see Figure 3), and where activities are based on organizational needs and its capacities.



*Figure 3.* LaFollette’s education paradigm.  
 From “Beyond Regulatory Compliance: Enhancing Environmental Health With an Education Paradigm,” by S. LaFollette, J. Broadbear, & C. Bazan, 1999, *Journal of Environmental Health*, 62(5), p. 19

CE or MCE has been legislated and incorporated into many government codes in an effort to protect society from incompetent practices. Writing on the objectives of continuing professional education, Jarvis (1983) posited that the educational processes that support continuing professional-education programs are focused more on the needs of the learners than on the profession or society. Jarvis’ assertion suggested a disconnection between the stated societal goals of CE and the infrastructure that is suppose to support those goals. Houle (1980) offered a contrasting view to that of Jarvis by identifying the objectives of CE:

1. Clarifying the functions of the profession
2. Mastering theoretical knowledge
3. Self-enhancement
4. Formal training
5. Credentialing

6. Subculture creation
7. Legal reinforcement
8. Public acceptance
9. Ethical practice
10. Penalties
11. Relations to users of services (Houle, 1980)

Houle believed that the ultimate goal of CE is “to prepare practitioners to use the best ideas and techniques of the moment” (1980, p. 315). Houle’s objectives not only meet the personal needs of the learner but also of the profession and society.

Without the benefit of formal studies, some argue that MCE is ineffective and in some instances can be harmful. Writing in the *Journal of Adult Education*, Bromfield-Day (2000) examined some reasons MCE is opposed. From a societal perspective, Bromfield-Day cited that CE will not prevent all acts of negligence or the exercise of poor judgment. From a humanistic perspective, the idea of mandating CE may be repugnant to learners because it limits freedom in their learning experiences. Rockhill (1981) examined intrinsic and extrinsic motivators and concluded that individuals learn more when intrinsically motivated. In these cases, MCE may seem coercive, and thus counterproductive to learning. In summarizing the arguments for and against MCE, Bromfield-Day referred to the goal of MCE as “promoting effective professional function and some degree of social responsibility” (2000, p. 11). Bromfield-Day suggested that many who oppose MCE will set aside misgivings regarding the mandatory nature of CE requirements and will seek improvement in this area.

### Continuing Education for Pesticide Workers

Specific to this research is mandated education for pesticide-worker safety. In 1992, the federal Environmental Protection Agency revised the WPS for agricultural pesticides. The WPS is a federal regulation designed to protect employees on farms, forests, nurseries, and greenhouses from occupational exposure to agricultural pesticides. The WPS offers protections to approximately 2.5 million agricultural workers (people involved in the production of agricultural plants) and pesticide handlers (people who mix, load, or apply pesticides) who work at over 600,000 agricultural establishments. All agricultural employers, owners, managers, and labor contractors are required to comply with the WPS when an agricultural establishment uses pesticides that have WPS labeling. Most WPS requirements apply to agricultural workers or pesticide handlers; however, some requirements apply to everyone and some apply only to certain people, such as those who handle pesticide application equipment or clean pesticide-contaminated personal-protective equipment.

In California, employees who use or supervise the use of certain pesticides are required to complete a minimum of 20 hours of pesticide-worker safety training every 2 years to remain certified to apply pesticides. Such training is typically provided by the university extension, professional associations, or consulting professionals. Responding to government-mandated training requirements, a new market for training consultants and training material vendors has emerged. Trainers, training methodologies, materials, and methods of delivery range widely. State and federal laws require training but do not set standards for employee comprehension training content.

## Summary

In the review of literature, the basis for andragogical thought was described as an evolution from core theories of learning rather than new or opposing thought. Traditional pedagogical thought was described as highly structured and teacher centered, whereas andragogical thought incorporates the whole background and current experience of the learner. Further, it requires the learner to actively participate in the planning, design, and implementation of learning situations. The literature review started with a review of the core theories and principals of learning. Because no universal agreement exists on learning theories, a description of five learning orientations was presented as major schools of thought. These orientations, or schools of thought, provide a basis for research and application in the important areas of behaviorism, humanism, cognition, social-cognition, and constructivism.

Because learning is an active process, the next section examined literature related to the major barriers to learning, including situational, institutional, and dispositional barriers. This section included a description of Cross' (1981) chain-of-response model to explain what makes people participate in learning activities and Kolb's (1984) experiential-learning model, which is highly relevant to understanding learning dynamics for MCE. This section was followed by a chronology of key authors and their significant contributions to the understanding of adult learning.

The current study builds on and contributes to the existing literature on adult learning by examining and testing andragogical principals, assumptions, and theories in government-mandated CE or MCE. Thus, the consequence of this knowledge is an

improved understanding and practice of how adults learn best when required to participate in CE or MCE.

## CHAPTER III

### METHODOLOGY

#### Restatement of Purpose

The purpose of this study was to examine and document the efficacy of andragogical instructional-delivery methods versus traditional (pedagogical) instructional-delivery methods to improve teaching and training methodologies for learning government-mandated course content. The findings from this study enhance understanding of how best to teach and train adult learners when they are required to learn in contrast to when they choose to learn.

#### Research Design

This mixed-methods study employed an explanatory design to sequentially collect quantitative and qualitative data, and use the results to understand a research problem (Creswell, 2005). Using this design, I prioritized the quantitative data. I then used the qualitative data to “refine the results of the quantitative data” (p. 515) based on a debriefing process with participants.

For the quantitative component, I used a quasiexperimental (pretest/posttest) research design using participants, solicited at large, who are California State certified or state-licensed pesticide applicators (see Table 2). These certified or licensed pesticide applicators are required to amass annual CE credits to renew their certificate or license. In addition to assessing the learning of participants when exposed to andragogical (ADM) or pedagogical (PDM) instructional methods, this study examined the factors of age, ethnicity, education, and gender in relation to learning effectiveness. In this quasiexperimental design “the researcher assigns the intact groups the experimental and

control treatments, administers a pretest to both groups, conducts experimental treatment activities with one experimental group only, and then administers a posttest to assess the differences between the two groups” (Creswell, 2005, p. 298).

The qualitative component used the same population of participants and administered an interview following the andragogical (ADM) or pedagogical (PDM) treatment. This interview was “semi-structured, and designed to explore the extent, nature, and quality of the participants’ thoughts and feelings about a range of personal interpersonal, and behavioral phenomena” (Creswell, 2005, p. 539).

Table 2

*Quasiexperimental Pretest–Posttest Design*

Pretest and posttest design		Time	
Select Control Group Workshop #1 (Minimum 30 participants)	Pretest	No Treatment Pedagogical/Traditional Delivery Method (PDM)	Posttest
Select Experimental Group Workshop #2 (Minimum 30 participants)	Pretest	Experimental Treatment Andragogical Delivery Method (ADM)	Posttest

*Note.* Adapted from *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*, by J. Creswell, 2005, Table 11.3, p. 297.

*Experimental Treatments (Interventions)*

I tendered offers to provide two 4-hour CE workshops to state licensed or certified persons requiring CE. These CE workshops were offered at no charge in exchange for the individual’s participation in this research study. Each workshop treatment (PDM or ADM) contained a minimum of 30 participants, who were selected on a first-come basis. One group received andragogical (ADM) treatment and the other group received the traditional pedagogical (PDM) treatment. In the PDM workshop, participants heard a traditional lecture containing specific answers to the content

questions (pesticide laws and regulations). I conducted the PDM workshop; I am certified and experienced in the content and delivery of pesticide-worker-safety training. The basic concern of the PDM approach was *content* (Knowles et al., 2005). Using PowerPoint slides, the emphasis was on how effectively the instructor delivers the information to be covered and “how that content can be organized into manageable units; the most logical sequence for presenting these units; and the most efficient means of transmitting this content” (p. 294). In the ADM workshop, the emphasis was on *process*. The workshop employed the following eight elements described by Knowles et al. (2005):

1. *Preparing learners* by establishing the importance of the training and by establishing workshop goals and objectives.
2. *Modifying the physical and psychological climate* through room layout modification, use of multimedia, and warm-up/ice-breaker exercises.
3. *Involving learners in planning for their learning* by facilitating a content-relevant discussion to determine the interest and importance of mandatory topics to participants.
4. *Involving learners in diagnosing their own needs for learning* by facilitating a discussion on the personal and professional relevance and benefits of the training.
5. *Involving learners in formulating their own learning objectives* by facilitating goals and objectives-setting with emphasis on meeting personal and professional needs.
6. *Involving learners in designing learning plans* by facilitating a discussion on learning styles and motivation.

7. *Helping learners carry out their learning plans* by facilitating periodic learning checks against learning objectives and plans between content delivery.
8. *Involving learners in evaluating their own learning outcomes* by introducing participants to self-evaluation tools and exercises.

### *Population*

Participants were adult men and women who possess a California State certification or license for pesticide applicators. The state requires these certified or licensed individuals to amass annual CE credits to renew their certificate or license once every 2 years. Participants possessing this certification or license typically work in vocational fields associated with agriculture or horticulture. Because the state requires potential participants to amass CE credits to recertify or relicense, this demographic seeks year-round CE opportunities. I selected participants based on their relatedness to the test population, and by using the following selection criteria:

1. Participant is a working adult over the age of 18.
2. Participant, as a normal part of his/her vocation, works in an industry where agricultural pesticides are used and are subject to the laws and regulations of the State of California, Department of Pesticide Regulation.
3. Participant possesses a State of California Qualified Applicator Certificate or Qualified Applicator License requiring state-mandated CE.

### *Assignment*

As a qualified and experienced trainer in this content area (pesticide-worker-safety training), I tendered offers to provide two 4-hour CE workshops. I offered CE

workshops at no charge in exchange for the participants' participation in the research study. Each workshop contained a minimum of 30 participants (total  $n \geq 60$ ) who were selected on a first-come basis. One group received ADM treatment and the other group received PDM treatment.

### *Instrumentation*

I administered a pretest-instrument questionnaire (see Appendix A) consisting of 5 multiple-choice questions relating to demographics, 20 multiple-choice questions relating to required knowledge (mandated course content), and 7 multiple-choice questions relating to learning preferences prior to beginning the instruction to all participants (see Table 3). I administered a posttest instrument questionnaire consisting of 5 multiple-choice questions relating to demographics, 20 multiple-choice questions relating to required knowledge (mandated course content), and 7 multiple-choice questions relating to learning preferences to all participants after the course had been delivered (see Table 3).

Table 3

### *Test-Question Distribution*

Question area	Description	No. of test questions	
		Pretest questions	Posttest questions
I	Content Questions: Technical content questions drawn from the State of California, Department of Pesticide Regulation, Laws and Regulations study guide.	20	20
II	Demographic Questions:	5	5
III	Learning Preference Questions	7	7
Totals		32	32

### *Debriefing Process*

In this explanatory design mixed-methods approach (Creswell, 2005); quantitative and qualitative information were collected sequentially. In each workshop, I administered the pretest instrument, followed by the experimental treatments (PDM or ADM), then I administered a posttest instrument. After I administered and collected the posttest instrument, a participant debriefing was conducted whereby I asked participants two open-ended questions:

1. What attracted you to this training and why did you attend?
2. What did you like/dislike about this training?

### Validity

To determine validity, I assembled a panel consisting of three experts who reviewed the study in relation to the hypothesis and research questions. All panel members work in the pesticide-worker-safety area as managers or administrators and are familiar with pesticide worker safety laws and regulations.

On content validity, the panel determined that all questions adequately represented the subject content (pesticide-worker safety). On criterion-related validity, panel members determined that calculated gain scores on the instrument would adequately predict outcomes. On construct validity, the panel determined that the instrument failed to adequately address Research Question 2 because there was no means of comparing pretest and posttest gain scores for participants with various experience levels. Thus, Research Question 2 was stricken from the study (see Table 4). The validity panel recommended deletion of Content Questions 31–32 on the pretest and Question 31 on the posttest to maintain consistency in the numbering of content questions.

Table 4

*Validity Panel*

#	Name	Sections reviewed	Focus of review
1	Executive Director, Pesticide Applicator's Professional Association	All	<p>Criterion-Related Validity—How well do the scores on the instrument relate to the outcome (Creswell, 2005, p. 165)</p> <p>Relatedness of survey questions to andragogical and pedagogical concepts</p>
2	Deputy, County Agricultural Commissioner	Pre & posttest questions	<p>Content Validity—How well do the questions represent all of the possibilities of questions available (Creswell, 2005, p. 165)</p> <p>Technical accuracy and relatedness of content questions to the state-mandated continuing-education requirements (pesticide laws and regulations)</p>
3	Retired Consulting Pest Control Advisor	Pretest and posttest questions	<p>Construct Validity—What is the intended purpose or use for the scores from the instrument (Creswell, 2005, p. 165)</p> <p>Question format, readability and coherence</p>

## Reliability

To determine the reliability of the instrumentation, I assembled reliability panels of five persons who were representative of the test population and administered the instrument (see Table 5). “Stability” or “test–retest” reliability were used (Creswell, 2005) whereby I administered the instrument (pretest and posttest) once to each of five participants. Test results were analyzed to determine if both instruments “represent the same universe or population of items” (Creswell, 2005, p. 163).

Table 5

*Reliability Panel*

#	Qualifications	Vocation
1	State Certified Qualified Applicator	Retired Supervisor of Parks and Landscapes for the City of Newark, California
2	State Certified Qualified Applicator; Certified Arborist	Grounds Supervisor, City of Union City Public Works Department
3	State Certified Qualified Applicator	Supervisor, City of Fremont Parks and Landscapes
4	State Certified Qualified Applicator; Horticulturalist	Water Engineer, Alameda County Water District
5	State Certified Qualified Applicator	Union City Park & Landscape Maintenance

I used interrater agreement to determine if instrument scores were stable and consistent. Reliability-panel members commented on the instrument questions for clarity, test administration, and consistency. It was the consensus of panel members that the instrument was homogeneous.

## Data Collection

*Quantitative Data Collection*

I collected data for this study from populations of five 4-hour CE workshops over the course of 9 months in 2010. I collected the data using pretest and posttest questionnaires (quantitative survey instrument) at the beginning and end of the training sessions. Pretest and posttest questionnaires designed for anonymity clearly identified the research purposes of the instrument. I gave each participant the survey directions orally and in writing prior to asking them to answer the questionnaire. I provided the following statement to all participants before administering the pretest:

This survey is given in advance of the workshop to obtain information about your background, learning preferences, and your knowledge of the subject. Twenty questions are knowledge-content questions drawn from the state of California *Pesticide Worker Safety Training Study Guide*. Five questions are demographic

questions, and seven questions are learning preference questions. Nowhere on the survey do we ask for your name or specific identifying information. Questions are “fill-in” and multiple-choice. For “fill-in” questions, write your response on the blank line. For multiple-choice questions, please mark (circle) one best answer (response) for each question.

The following statement was provided to all participants before the posttest was administered:

This survey is given following the workshop to obtain additional information about your background, learning preferences, and your knowledge of the subject. Twenty questions are knowledge-content questions drawn from the state of California *Pesticide Worker Safety Training Study Guide*. Five questions are demographic questions, and seven questions are learning preference questions. Nowhere on the survey do we ask for your name or specific identifying information. Questions are “fill-in” and multiple-choice. For “fill-in” questions, write your response on the blank line. For multiple-choice questions, please mark (circle) one best answer (response) for each question.

#### *Qualitative Data Collection*

I collected qualitative data for this study in the form of debriefing notes and observations of the five 4-hour CE workshops, conducted over the course of 9 months in 2010. I transcribed the data within 3 weeks of conducting the CE workshops.

Following each workshop and after collecting the survey instrument, I asked two open-ended questions:

3. What attracted you to this training and why did you attend?
4. What did you like/dislike about this training?

#### Data Analysis

##### *Quantitative Data Analysis*

I analyzed quantitative data using Excel database spreadsheets descriptive statistics to test for effectiveness of both types of teaching styles (ADM and PDM treatments). Descriptive statistics showed correlation of demographic factors such as ethnicity, age, or position in the company. I computed mean scores for pretests and

posttests for both groups (ADM and PDM). I analyzed data for both types of instruction (ADM and PDM) by running dependent *t*-tests of the pretest and posttest mean scores to measure the gain and effectiveness of each instructional method.

#### *Qualitative Data Analysis*

I organized, coded and categorized the qualitative data, in the form of debriefing notes and observations, into themes (Creswell, 2005). I then related thematic data to quantitative findings and research questions.

#### Qualifications of the Researcher

I am uniquely qualified to conduct this study, due to my academic, technical, and vocational preparation and experience in the fields of adult education, integrated pest management, business management, and vocational training. I founded the Institute for Horticultural Studies, Union City, California, where I conducted more than 100 seminars, workshops, and courses in pest management, arboriculture, and landscape studies since the 1980s. The majority of students and clients participating in these programs were adult learners.

I am a State of California Licensed Pest Control Advisor through the Department of Pesticide Regulation. This is the highest license level for a technical advisor in the area of agricultural pesticide usage. This license is attained only after the applicant is determined academically, technically, and experientially qualified and after successful passage of a state-administered examination. Following licensure, the licensee must amass 40 hours of CE credit every 2 years to remain licensed.

I have worked in a training and management capacity for over 20 years in the private and public sectors. I have trained, supervised, and managed hundreds of adult

employees and sponsored or conducted numerous CE programs. As a consultant to business and government, I am an experienced speaker and have given numerous invited presentations in academic and professional venues. As an adjunct professor at the University of Phoenix School of Business, I have taught on-campus courses in business, management, and public administration since 2005. The students in the University of Phoenix program are characterized as nontraditional adult learners.

## CHAPTER IV

### FINDINGS

#### Introduction

For this study, I explored, documented, and compared the efficacy of andragogical instructional delivery methods and traditional (pedagogical) instructional delivery methods to improve teaching and training methodologies for learning government-mandated course content. The findings from this study enhance the understanding of how best to teach and train adult learners when they are required to learn, in contrast to when they choose to learn.

#### Quantitative Findings

Study data compared the effectiveness and preference of traditional PDM and ADM on test performance of CE participants. The sample consisted of 77 licensed or certified personnel who work with pesticides. The findings presented herein are derived from analysis of the data based on the administration of pretests and posttests. The findings include analysis of the descriptive data obtained from administering a researcher-constructed questionnaire. The findings also include qualitative measures based on observations of the treatment workshops.

Using a .05 level of significance, I computed a dependent *t*-test analysis to compare pretest and posttest gain scores for each group (ADM, PDM). I provide supplemental findings that describe participants' demographic profiles and learning preferences. I used the data to determine possible statistical differences, as described in the hypothesis and research questions in Chapter I.

## Descriptive Data

I hypothesized there would be a statistically significant difference, measured by gain scores, in participants' learning of MCE content when they are taught using andragogical instructional methods versus traditional (pedagogical) instructional methods. As reported in Table 6, the following findings were noted with respect to pretest to posttest PDM and ADM computed gain scores for participants ( $n = 77$ ). Participants did show a statistically significant gain from pretest to posttest when they participated in the PDM. Participants also showed a significant gain from pretest to posttest when they participated in the ADM.

Posttest mean scores were computed for participants to determine the effectiveness of both instructional methods. Table 6 shows the PDM posttest where participants displayed a statistically significant difference in gain scores when they participated in ADM rather than PDM classes.

Table 6

### *Descriptive Statistics to Test for Gain Scores*

Type of instruction	<i>N</i>	Pretest mean	Posttest mean	Difference	<i>t</i> value	<i>p</i>
Pedagogical (PDM)	31	22.2	23.83	1.61	0.062	0.239
Andragogical (ADM)	46	30.50	32.22	1.72	0.076	0.299

*Note.* Critical *t* value = 1.69 ( $df = 30, p < .05$ ) Pedagogical (PDM); Critical *t* value = 1.68 ( $df = 75, p > .05$ ); PDM = pedagogical delivery method; ADM = andragogical delivery method.

I surveyed study participants to investigate their learning preferences. Common themes were extracted and reported in Table 7 by number of responses. Findings presented were calculated percentages using Excel's Database Spreadsheet. Of all participants ( $n = 77$ ), more than half indicated a preference for PDM, whereas only a quarter indicated preferences for ADM.

Table 7

*Learning Preference (n = 77)*

Instructional delivery	Number of responses	Percentage
Pedagogical (PDM)	287	53.84
Andragogical (ADM)	146	27.08
Undecided	106	19.66

*Note.* PDM = pedagogical delivery method; ADM = andragogical delivery method.

Study participants are licensed or certified by the State of California as pesticide workers. The State of California requires pesticide license or certificate holders to complete a minimum of 20 hours of pesticide-worker-safety training every 2 years to remain certified to apply pesticides. By extrapolation, the minimum number of CE hours for any participant can be calculated based on the number of years holding a state-issued license or certificate. From the demographic data, I extracted participants' years of holding a state-issued pesticide license or certificate.

Table 8 summarizes the number of years participants have held a state-issued license or certificate. Based on a normal distribution, three categories of years of experience were selected. Two fifths of survey participants ( $n = 77$ ), had received 1 to 8 years of CE, whereas almost a quarter each had received 9 to 17 years of CE and 18 to 32 years of CE. For this study, the number of years that participants were licensed or certified, provides a value to the amount of prior CE or MCE that study participants completed. Because the State of California, Department of Pesticide Regulation requires all licensed or certified pesticide workers to obtain a minimum of 20 hours of CE credits in a 2-year period, a simple calculation of 10-credits per year times the number of years a person has been certified will yield a prior experience factor. Therefore a participant who has been licensed or certified for a period of 10 years can be expected to have received

100 CE or MCE credits (10 years of license or certification x 10 credits/year = 100 credits).

Table 8

*Number of Years Licensed or Certified (n = 77)*

Number of years	<i>N</i>	Percentage
1–8	31	40.25
9–17	18	23.37
18–32	17	22.07
Not reported	11	14.28

I collected demographic data to ascertain other common themes for inferential analysis. Table 9 summarizes the age of study participants. The average age of study participants ( $n = 75$ , no response = 2) was 48.41 years, a median and mode of 49 years, with a standard deviation of 8.58 years. The determination of the age of participants provides insight as to the life experience and maturity of the study participants. These characteristics may influence the motivation to learn of study participants.

Table 9

*Age of Participants*

Mean	Mode	Median	Standard deviation
48.41	49	49	8.58

*Note.* Calculations based on actual responses ( $n = 75$ ); two participants did not respond.

Table 10 identifies participants' country of origin: fully 87.01% identified the United States as their country of origin; others hailed from Mexico, the Philippines, England, Germany, Nepal, Scotland, and Vietnam. The country of origin of study participants may provide insight to the familiarity of participants' to PDM or ADM as well as learner motivation.

Table 10

*Country of Origin (n = 77)*

Country	<i>N</i>	Percentage
United States	67	87.01
Mexico	3	3.89
Philippines	2	2.59
England	1	1.29
Germany	1	1.29
Nepal	1	1.29
Scotland	1	1.29
Vietnam	1	1.29

Table 11 presents the racial background of study participants. Almost half self-identified as Caucasian and almost half as Spanish. Racial background of study participants may provide insight to social-cultural experiences.

Table 11

*Racial Background of Study Participants (n = 77)*

Racial background	<i>N</i>	Percentage
Caucasian	35	45.45
Spanish	34	44.15
Filipino	2	2.59
Other	2	2.59
African	1	1.29
Asian	1	1.29
Japanese	1	1.29
Vietnamese	1	1.29

Table 12 identifies participants' highest level of education completed. A third stated they completed one or more years of college but received no degree, whereas almost a quarter had received an associate's degree; only 1 had received a master's

degree. Educational level of study participants may provide insights to the participants' exposure, and familiarity, to nontraditional (PDM) delivery methods.

Table 12

*Highest Educational Level (n = 77)*

Education level	N	Percentage
>1 year college, no degree	25	32.46
Associate's degree	18	23.37
Bachelor's degree	12	15.58
High school/GED	10	12.98
Some college < 1 year	9	11.68
< 12th grade, no diploma	2	2.59
Master's degree	1	1.29

### Qualitative Findings

#### *Themes Derived From the Study*

Two open-ended questions followed:

1. What attracted you to this training and why did you attend?
2. What did you like/dislike about this training?

From analysis of participant responses, I developed three major themes:

1. Motivation for education/training opportunities
2. Familiarity to education/training approaches
3. Rigor of education/training approaches

The theme *motivation for education/training opportunities*, relates to the “choice by an individual to expend energy toward one particular set of behaviors over another” (Quinones, 1997, pp. 182–183). Considerable research has been conducted to show the various aspects of motivation on training. Most notably, Maurer and Tarulli (1994) and

Noe and Wilk (1993) discussed the role of motivation in a participant's initial decision to attend training. Ryman and Biersner (1975) showed that motivation influenced a trainee's decision to expend energy toward a training program. Cheng and Hoe (2001) concluded that motivation for training impacts performance and skills transfer.

The theme *familiarity to education/training approaches*, relates to the learner's prior orientation to teaching and training approaches. In the context of this study, I examined two broad categories, ADM and PDM. As defined and discussed in Chapter I, PDM is the traditional training method used in most CE/MCE.

The theme *rigor of education/training approaches*, relates to instruction, schoolwork, learning experiences, and educational expectations that are academically, intellectually, and personally challenging ("Rigor," 2014). Rigorous learning experiences, for example, help students understand knowledge and concepts that are complex, ambiguous, or contentious, and help students acquire skills that can applied in a variety of educational, career, and civic contexts throughout their lives.

#### *Researcher Observations*

In response to the two open-ended questions, five discussion responses, common to all workshops, occurred and were related to the three major themes. I documented and coded discussions to related themes (Creswell, 2005, pp. 243–245). Those discussions were as follows:

1. Mandated training (Theme 1)
2. Cost consideration (Theme 1)
3. Convenience consideration (Theme 1)
4. Participants are use to PDM—it is institutionalized (Theme 2)

## 5. ADM is harder than PDM (Theme 3)

### *Mandated Training (Theme 1)*

Participants overwhelmingly acknowledged the CE requirements, mandated by the State of California, to maintain their pesticide certification or license. Their responses indicated that many of their employers require their attendance and adherence to CE as a condition of continued employment.

### *Cost Consideration (Theme 1)*

Participants described two scenarios. For the majority of participants who worked for local government agencies or large private corporations, employers paid their CE expenses. This group reported that tuition costs were a secondary consideration compared to their requirement to meet CE hours.

The second scenario relates to private, individual, and independent operators who paid tuition costs “out-of-pocket.” For this group, CE expenses are a major consideration because they must pay for their own tuition as well as losing business revenue while they attend CE programs.

### *Convenience Consideration (Theme 1)*

Participant statements indicated that convenience of training opportunities, locations, and types of training were important motivational considerations. The American Heritage Dictionary of the English Language (2000) defined convenience as “something that increases comfort or saves work.” Convenience is a situational criterion in people’s choices about training opportunities, including their choice of a training source, their satisfaction with the source, and its ease of use/access. Rational-choice theory and gratification theory provide some explanation of how convenience motivates

learners in their choices about CE. Rational-choice theory, also known as satisficing theory, assumes individuals make decisions that provide them with the greatest benefit or satisfaction. Warwick, Rimmer, Blandford, Gow, and Buchanan (2009) observed that students choose information sources and strategies with which they are most familiar. They posited that convenience may act as a criterion in choosing information sources or strategies, and in judging their ease of use.

Gratification theory, also known as uses and gratification theory, attempts to explain how people use media for their needs and gratification. The theory identifies several needs people have including cognitive, affective, personal-integrative, social-integrative, and tension-free needs (Swanson, 1987). Dervin and Nilan (1986) found that for poorer subjects, information sources must be easily accessible and meet their immediate needs in a timely fashion.

*Participants are Used to PDM—It is institutionalized (Theme 2)*

The majority of participants discussed their prior experience with CE (for pest-control operators) as being largely traditional seminars or lecture-based delivery. The groups who received the ADM workshop were considerably more vocal about the differences in style and delivery of training. Many attendees experienced some anxiety about participating in a research study, citing discomfort with the notion that I would examine their test results and responses.

*ADM is harder than PDM (Themes 2 and 3)*

Those participants who received the ADM workshop described their experience as more rigorous and thought-provoking. Most described a greater sense of understanding

and overall engagement. In each of the ADM groups, one or two participants complained that ADM was excessively process oriented at the expense of knowledge transfer.

### Qualitative Findings Related to Research Questions

Table 13 explain how the qualitative questions aligned with the research questions.

Table 13

#### *How Qualitative Survey Questions Relate to Research Questions*

Open-ended survey question	Common discussion responses	Relates to theme	Relates to research question
What attracted you to this training and why did you attend?	Mandated training	1 (motivation)	R2 (prior exposure)
	Cost consideration	1 (motivation)	R2 (prior exposure)
	Convenience consideration	1 (motivation)	R2 (prior exposure)
What did you like or dislike about this training?	Institutionalized	2 (familiarity)	R2 (prior exposure)
	Level of difficulty	3 (Rigor)	R1 (methods)

#### *Research Question 1*

To what extent do andragogical teaching and training methods result in higher levels of learning of government-mandated course content (pesticide-worker-safety training) versus traditional (pedagogical) instructional methods?

Analysis of quantitative data, shown in Table 6, indicated that participants displayed a statistically significant difference in gain scores when they participated in ADM versus PDM. However, analysis of the qualitative open-ended (postworkshop) questions, as outlined in Table 13, provided limited insight to Research Question 1. Participants who received the ADM workshop described their experience as more

rigorous and thought-provoking. Most described a greater sense of understanding and overall engagement. These responses generally support the andragogical model by relating to the model's assumptions that "(1) adults need to know why they need to learn, (2) adult learners embrace a self-concept of being responsible for their own learning, and (3) the adult learner's varied life experience serve as rich resources in the learning environment" (Knowles, 1990, p. 54). Participant responses are more closely related to the notion of active learning.

### *Research Question 2*

To what extent does prior exposure to government-mandated course content influence learning when participants are instructed using andragogical (teaching/training) methods versus traditional lecture-based instructional methods?

Analysis of the qualitative open-ended (postworkshop) questions, as outlined in Table 13, provided significant insights to Research Question 2. Participant responses related most to Theme 2—motivation for education/training opportunities and Theme 3—familiarity to education/training approaches.

### *Motivation for Education/Training Opportunities*

Mandated CE or training influences the organizations' and individuals' motivation for participation in education and training efforts. In this study, all participants cited the State of California CE requirement as the primary motivator for their attendance. However, none of the participants indicated they were motivated to learn as a result of the CE mandate. LaFollette et al. (1999) described this regulatory paradigm as one that focuses on reacting to problems versus anticipating problems. The authors

described a paradigm wherein regulated entities are resistant to change, creating an adversarial environment that is counterproductive to motivation to learn.

Study participants discussed cost considerations as a secondary motivator for attendance to CE or training. Most indicated they and their respective organizations considered the cost of education/training when deciding frequency and location of educational/training opportunities. Several participants indicated they and their employers used a “cost-per-credit-hour” form of analysis to determine the feasibility of their attendance. It is noteworthy that no participants indicated that cost considerations were a factor in their individual engagement in the workshops or learning in general.

Participants identified several factors, related to convenience, as important considerations. They described the following factors:

- Location of training to their home or employment
- Availability of parking
- Available of food and beverages during training
- Administration of their CE credits

One participant summarized these factors as “the ease of attending MCE in order to obtain the maximum credit in the shortest time possible.”

Participants discussed their familiarity with different training methodologies. As expected, this was more evident after an ADM workshop, where most participants were exposed to nontraditional workshop-delivery methods. Participants who attended PDM workshops characterized their workshop experience by how efficiently information was conveyed to them (in the traditional format). ADM participants discussed the differences in the workshop delivery and how it affected their engagement and learning. In each of

the ADM workshops, 1–3 participants cited discomfort with the nontraditional workshop delivery method.

## CHAPTER V

### SUMMARY & DISCUSSION

#### Summary

The purpose of this study was to examine, document, and compare the efficacy of andragogical instructional delivery methods and traditional (pedagogical) instructional delivery methods to improve teaching and training methodologies for learning government-mandated course content. The findings from this study enhance understanding of how best to teach and train adult learners when they are required to learn, in contrast to when they choose to learn. Knowles's (1980) theory of adult learning posits that adults learn more effectively when they have learning opportunities that include self-direction, can use their cumulative experience in the learning process, are mindfully ready for learning, have been oriented to learn, and are psychologically motivated to learn. Toward this end, Knowles and others developed instructional delivery methods (ADM) to achieve these ends Knowles (1984), Brookfield (1986). In this study, the dependent variable was the learning of MCE course content; in particular, the "pesticide worker safety training" prescribed by the California Agricultural Code. The study employed one independent variable with two levels: ADM and PDM. For this study, I used a quasiexperimental (pretest/posttest) research design with participants, solicited at large, who are California State-certified or state-licensed pesticide applicators. In addition to assessing the learning of participants when exposed to andragogical (ADM) or pedagogical (PDM) instructional methods, this study examined the factors of age, ethnicity, education, and gender in relation to learning effectiveness. The population of the study consisted of 77 participants who possess a license or certificate from the

California State Department of Pesticide Regulation: 31 study participants received the pedagogical (PDM) course delivery and 46 study participants received the andragogical (ADM) course delivery.

I used two instruments to collect data to test the hypothesis and respond to the two research questions. I administered a pretest instrument questionnaire (see Appendix A), consisting of 5 multiple-choice questions relating to demographics, 20 multiple-choice questions relating to required knowledge (mandated course content), and 7 multiple-choice questions relating to learning preferences prior to beginning the instruction to all participants. I administered a posttest instrument questionnaire consisting of 5 multiple-choice questions relating to demographics, 20 multiple-choice questions relating to required knowledge (mandated course content), and 7 multiple-choice questions relating to learning preferences to all participants after the course had been delivered. The researcher-constructed questionnaire collected data from both groups to assess participants' learning in courses using a specific method. I also collected demographic data as additional items on the researcher-constructed questionnaire.

I analyzed the mean scores for pretest and posttest data using a dependent *t*-test analysis. I analyzed participants' demographic profile and preference for type of instruction based on percentages using Excel's database spreadsheet. The dependent variables included participants' scores on the multiple-choice examination and the responses returned on the researcher-constructed questionnaire.

### Discussion

The quantitative findings showed there was a statistically significant difference, measured by gain scores, in participants' learning of MCE content when they were taught

using andragogical instructional methods rather than traditional (pedagogical) instructional methods. The difference favored andragogical instructional methods over traditional methods for adult learners. The finding supports previous research and confirms it is also applicable for use under government-mandated CE, MCE and course content. Knowles (1984, 1990) reported research findings that documented improved learning in organizational settings when ADMs were employed compared to PDMs. LaFollette et al. (1999) reported positive results in the application of adult-learning strategies to enhance the educational paradigm beyond regulatory compliance.

The qualitative findings from this study provided insights to the motivational factors that influenced adult learners when they were required to participate in CE, MCE. Cost and convenience were the two most significant drivers of learner motivation.

In the investigation of learning preferences, the majority of study participants (53.24%) answered survey questions with responses indicating a preference for pedagogical (PDM) methods while 27.08% indicated preferences for andragogical (ADM) methods. These responses are in sharp contrast to gain scores on the posttest examinations following the andragogical (ADM) delivery and contrary to debrief comments for the same. In postworkshop debriefings, participants voiced their liking for andragogical methods. However, participants indicated their lack of familiarity with the approach. This lack of familiarity gave rise to skepticism and general stress that may explain the high percentage (19.66%) of study participants who indicated they were undecided about their learning preference. These observations are consistent with research conducted by Choy and Delahaye (2002), who observed that although some participants prefer some aspects of andragogy, they are not prepared to relinquish

pedagogical practices of teachers. The authors posited that some students are not prepared or willing to assume the roles and responsibilities of the andragogical-oriented learner. In this study, participants in the ADM workshop assumed roles and responsibilities that required high levels of participation, including individual and group assessment, participation in workshop exercises, discussion, and presentation.

Participants' lack of familiarity and discomfort can be partially explained by Cross's (1981) chain-of-response model, discussed in Chapter 2. Cross posited that a participant's initial predisposition toward specific training and education, such as pesticide-worker-safety training, is influenced by the participant's self-evaluation and attitude about education and training in general. Therefore, participants will not fully commit to active-learning roles and responsibilities in a specific technical training program unless they believe CE or training will be of personal benefit (Cross, 1981).

Analysis of demographic data included the age of participants. In this study, the average age was 48 years old. Knowles et al. (2005) discussed that older adult learners may not "respond as quickly to new material or situations" (p. 209). However, when learning depends on prior experience, the older adult learner may have the advantage. In workshop debriefings, older adult learners (> 30 years old) often made comments related to their experience, whereas younger adult learners commented more on opinions. This supports the Knowles (1990) assumption that older adult learners desire relevant learning based on their cumulative experiences.

Research Question 1 asked, "To what extent do andragogical instructional (teaching/training) methods result in higher levels of learning of government-mandated course content versus traditional (pedagogical) instructional methods?" The quantitative

assessment showed a statistically significant improvement of learning using ADM compared to PDM. The qualitative review showed the value of participation and its effects on learner motivation, but failed to provide insight as to the extent of higher levels of learning.

Research Question 2 asked, “To what extent does prior exposure to government-mandated course content influence learning when participants are instructed using andragogical (teaching/training) methods versus traditional lecture-based instructional methods?” A quantitative analysis of the demographic data, ( $n = 77$ , 11 participants did not report), as presented in Table 8 in relation to net gain scores, also does not provide insight to the extent to which prior exposure contributes to learning. The qualitative assessment related to Themes 2 (Motivation) and 3 (Prior Exposure) indicates that prior exposure to government-mandated course content does influence a learner’s motivation to attend and participate in CE.

### Conclusions

This study reinforces prior research indicating the value and benefit of andragogical delivery in instructional settings. The current study confirms the value of ADM with government-mandated course content (pesticide-worker safety training). The significant distinction is between training and education for the purpose of self-growth and development versus mandatory training and education for compliance with the law.

My observations confirmed Knowles’s (1990) assumptions that adult learners desire learning opportunities based on their life experiences and personal situations; that adult learners desire an educational curriculum that allows learners to integrate their experiences into classroom efforts; that adult learners desire the instructor’s role to be

that of an “engager” of learning rather than a “transmitter” of knowledge; and that teaching strategies should consider learning times, place, styles, and pace. This was accomplished by allowing and facilitating in-depth discussion and exploration of participants’ work-related experiences.

I observed that ADMs require significant preparation, rigor, and “presence” to achieve the stated goals (Knowles et al., 2005). Explained in greater detail on pages 45 and 46, the following factors are intrinsic to ADMs:

1. *Preparing learners*
2. *Modifying the physical and psychological climate*
3. *Involving learners in planning for their learning*
4. *Involving learners in diagnosing their own needs for learning*
5. *Involving learners in formulating their own learning objectives*
6. *Involving learners in designing learning plans*
7. *Helping learners carry out their learning plans*
8. *Involving learners in evaluating their own learning outcomes*

#### Implications of the Research

The intent of MCE is to address certain social problems by providing minimum knowledge and competency in certain occupational fields. As discussed in Chapter I, the benefits of CE and MCE continue to be debated in academic and political circles. However, most state governments in the United States use CE and MCE as a means of assuring minimum knowledge and competency in occupations that may adversely impact the public. Another trend is toward online computer-based training and education to meet CE and MCE requirements. Due in part to economic pressures and time constraints;

online CE and MCE programs offer regulatory compliance but do not address efficacy in learning. This study contributes to the body of knowledge an awareness of the needs of adult learners and how ADMs enhances learning of government-mandated CE/MCE course content. The application of ADMs should be employed in any CE/MCE program that is aimed at mitigating harm to society.

#### Recommendations for Further Research

As discussed above, many CE or MCE programs employ online computer-based delivery. With the rapid growth of technology and the World Wide Web; online, distributed, and distance training/education formats are becoming commonplace. Further research is required to determine to what extent ADM can be incorporated into online computer-based training and education.

In the discussion of qualitative findings, I observed the significant rigor required to employ ADMs in a short workshop setting (4 hours). Further research is needed on skill development and andragogical techniques to deliver mandatory content in short sessions. Research and development of these techniques would certainly enhance vocational training and education in occupations/industries where time constraints are a factor.

#### Recommendations for Practice

This study provides confirmation of the effectiveness of ADMs when used for government-mandated CE and MCE. Starting as early as the 1920s, Lindeman (1926) asserted the value of teaching adults differently because of their unique and accumulated experiences. Knowles (1984) built on this thought to develop the assumptions, concepts, and principles that inform contemporary adult-learning theory. This study adds to that

body of knowledge an understanding of andragogical practice in the context of mandatory training or education. The results of this study inform practice by including the following core activities into CE and MCE programs:

1. Inform learners of the mission, vision, goals, objectives, and methodologies of the training and education program. Attain and measure their understanding of those goals and objectives as a way to prepare them for the learning experience.
2. Plan and modify the physical and psychological climate of the venue to meet the unique needs and interests of the learners. This is most often accomplished through the use of audiovisual technologies, multimedia, room layout, and assessment activities designed for different learning styles.
3. Obtain the participation of learners through preactivity surveys and by facilitating a content-relevant discussion to determine their interests and importance of mandatory topics. For those who express little or no interest in mandatory topics, involve them in a dialogue about their lack of interest.
4. Involve learners in their own pedagogy by facilitating a discussion on the importance of their CE as a function of their personal and professional lives. Seek their involvement in the design and implementation of their own learning approach.
5. Facilitate goals and objectives-setting, emphasizing meeting personal and professional needs. Facilitate a discussion to quantify and qualify those goals in relation to the course/workshop content.

6. Facilitate learners' understandings of their own learning styles, preferences, and performances through the introduction of learning tools and assessments.
7. Incorporate formative classroom/workshop assessment techniques designed to help learners achieve their learning goals and objectives while meeting content-specific objectives.

### Concluding Thoughts

In most sectors, government-mandated CE and MCE are employed to ensure the general welfare of people and to secure them from the consequences of ignorance, incapacity, deception, and fraud (Lazarus, Permaloff, & Dickson, 2002). With increasing frequency and cost, organizations are participating in CE/MCE to remain compliant with government-mandated training and education requirements. Although the objectives of CE/MCE programs are to improve the capacity, skills, behavior, and technical expertise of learner-participants; CE/MCE efforts are varied and their outcomes are rarely measured or reported. This study provides evidence that CE/MCE learning can be enhanced through ADMs.

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## APPENDIX A

## PRETEST QUESTIONNAIRE

Thank you for your participation in this research. The information in this questionnaire is confidential. This information will be used only by the researcher and will not be shared with the program administration or anyone else from this institution.

This survey is given BEFORE the workshop to obtain additional information about your background, learning preferences, and your knowledge of the subject. Twenty questions are knowledge-content questions drawn from the State of California Pesticide Worker Safety Training Study Guide. Five questions are demographic questions, and seven questions are learning preference questions. Nowhere on the survey do we ask for your name or specific identifying information. Questions are “fill-in” and multiple-choice. For “fill-in” questions, write your response on the blank line. For multiple-choice questions, please mark (circle) one best answer (response) for each question.

1. What is your age? \_\_\_\_\_ 1b. What is your gender (M, F)? \_\_\_\_\_
2. Where were you born? (Country) \_\_\_\_\_ (City) \_\_\_\_\_ (State) \_\_\_\_\_
3. What is your primary racial background? (check one that most applies)
 

<input type="checkbox"/> Spanish/Hispanic/Latino	<input type="checkbox"/> Caucasian/White
<input type="checkbox"/> African American/Black	<input type="checkbox"/> American Indian or Alaska Native
<input type="checkbox"/> Asian Indian	<input type="checkbox"/> Native Hawaiian
<input type="checkbox"/> Chinese	<input type="checkbox"/> Guamanian or Chamorro
<input type="checkbox"/> Filipino	<input type="checkbox"/> Samoan
<input type="checkbox"/> Japanese	<input type="checkbox"/> Korean
<input type="checkbox"/> Vietnamese	<input type="checkbox"/> Other Pacific Islander
<input type="checkbox"/> Other	
4. What license or certificate do you possess? (PCA) \_\_\_\_\_ (QAC) \_\_\_\_\_ (QAL) \_\_\_\_\_
5. How long have you been licensed or certified (no. of years)? \_\_\_\_\_
6. What is your preferred method of learning? (Check only one preference)
  - Reading information (e.g. books, magazines, articles) \_\_\_\_\_
  - Listening to information (e.g. tapes, CD's, podcasts, radio) \_\_\_\_\_
  - Discussing information with others (e.g. groups, workshops, classes) \_\_\_\_\_
  - Multi-media information (e.g. television programs, DVD's) \_\_\_\_\_
  - Hands-on activities (e.g. field work, internships, on the job experience) \_\_\_\_\_

For the next six questions, decide whether you agree or disagree with each statement. For example, if you strongly agree mark:

SD <i>Strongly Disagree</i>	D <i>Disagree</i>	U <i>Undecided</i>	A <i>Agree</i>	SA <i>Strongly Agree</i>

Item	SD	D	U	A	SA
7. When I read instructions, I remember them better.					
8. When I build something, I remember what I have learned better.					
9. I learn better when I hear a lecture.					
10. In class, I learn best when I work with others					
11. I understand things better in class when I participate in role-playing					
12. When I study alone, I learn better					

The next 20 questions are drawn directly from the State of California, Department of Pesticide Regulations, Laws and Regulations Study Guide, 2001 (latest) edition. These questions are multiple-choice questions. For each question, please mark (circle) only one answer (response).

13. The difference between laws and regulations is:
  - a. Laws are passed by county agricultural commissioners and regulations are passed by the California legislature.
  - b. Laws are statutes passed by the California legislature and regulations are adopted by the Director of DPR to carry out the laws.
  - c. Laws are supplements to federal regulations.
  - d. Laws are adopted by the Director of DPR to carry out regulations signed by the Governor.
  
14. Which agency cooperates with DPR to enforce pesticide laws in California?
  - a. The University of California.
  - b. The Department of Health Services.
  - c. The Department of Labor.
  - d. The Department of Consumer Affairs.
  
15. A *supplemental label* is:
  - a. Literature distributed by the pesticide.
  - b. A sample pesticide label produced by the manufacturer or others.
  - c. The same as a special local need label.
  - d. A pamphlet containing required pesticide label information that will not fit on the container label.
  
16. The purpose of the *signal word* on any pesticide label is:
  - a. To inform users and handlers of the relative acute toxicity or hazard of the product.
  - b. Tell users the formulation type of pesticide product.
  - c. Specify on which crops the product is registered.
  - d. Specify the pest the product controls.
  
17. The *precautionary statements* section of the label contains information about the:
  - a. Application rate.
  - b. Crops on which the product can be applied.
  - c. Relative toxicity of the product.
  - d. Hazards to people and domestic animals.

18. A decrease below the label rate of the amount of the pesticide product applied to a crop is:
- Always allowed.
  - Illegal.
  - Allowed only if you obtain written authorization from the county agricultural commissioner.
  - Allowed only if the product is tank mixed.
19. Any person in California who applies or supervises the application of a restricted use pesticide must:
- Attend 20 hours of special training.
  - Notify the local UC Cooperative Extension advisor before making or supervising an application.
  - Obtain a medical release from a physician.
  - Be a California-certified commercial or private applicator.
20. Permits for the agricultural use of restricted pesticides must be:
- Site and time specific.
  - Mailed or personally delivered to anyone living within ¼ mile of the application.
  - Approved by the Director of the California Department of Food and Agriculture.
  - Posted in a central location for 30 days after the application.
21. Each piece of mixing equipment and application equipment owned by a pest control business must be:
- Painted a conspicuous color.
  - Given a special identification number.
  - Inspected weekly by the county agricultural commissioner's office.
  - Marked with the name of the business or other similar wording.
22. Reports of pesticides applied for the production of an agricultural commodity by a pest control business must be filed with the agricultural commissioner in the county where the application took place within:
- 24 hours.
  - 5 days.
  - 7 days.
  - 30 days.
23. The signs attached to a pesticide storage area must be readable from:
- 10 feet.
  - 15 feet.
  - 25 feet.
  - 50 feet.

24. Generally, a service container is:
- The original pesticide container.
  - Any container other than the original labeled pesticide container.
  - A special heavy duty container provided by the pesticide manufacturer.
  - A special container approved by the Department of Defense.
25. It is illegal to store pesticides in:
- Service containers.
  - Original pesticide containers.
  - Spray equipment that is properly identified with labeling.
  - Containers that are commonly used for food, drink, or other household products.
26. Proper rinsing of an empty container involves:
- Filling the pesticide container three times and pouring the contents onto the ground at the application site.
  - Draining the empty pesticide container into the application equipment for 30 seconds.
  - Washing the application equipment tank with soap and water three times after an application.
  - Partially filling an empty pesticide container with water, shaking, and draining the contents into the spray tank, then repeating the process two more times.
27. Engineering controls for handling pesticides include:
- Water retention basins.
  - Wheel-move sprinklers.
  - Closed mixing systems.
  - Global positioning units.
28. Pesticide handler safety training for employees must be completed before:
- Employees are allowed to handle any pesticide.
  - The first work day of each month in which a pesticide might be handled.
  - By the 10th of the month following the month in which pesticides were used.
  - The beginning of each year.
29. Employers must retain training records of pesticide handler employees for:
- One year.
  - Two years.
  - Three years.
  - Four years.

30. Reasonable grounds to suspect the possibility of a pesticide illness or injury include all but which one of the following symptoms?
- Scratches on the arms or hands.
  - Headache.
  - Blurred vision.
  - Abdominal cramps.
31. The primary purpose of fieldworker safety regulations is to:
- Reduce pesticide exposure to children of fieldworkers.
  - Shield employers from liability.
  - Protect fieldworkers from pesticide residues in treated fields.
  - Comply with federal mandates.
32. When there is an inconsistency between the regulation-specified restricted-entry interval and the label-specified restricted-entry interval, you must always:
- Average the two restricted-entry intervals.
  - Follow the regulation-specified interval.
  - Follow the label-specified interval.
  - Use the longest interval.

## APPENDIX B

## POSTTEST QUESTIONNAIRE

Thank you for your participation in this research. The information in this questionnaire is confidential. This information will be used only by the researcher and will not be shared with the program administration or anyone else from this institution.

This survey is given AFTER the workshop to obtain additional information about your background, learning preferences, and your knowledge of the subject. Twenty questions are knowledge-content questions drawn from the State of California Pesticide Worker Safety Training Study Guide. Five questions are demographic questions, and seven questions are learning preference questions. Nowhere on the survey do we ask for your name or specific identifying information. Questions are “fill-in” and multiple-choice. For “fill-in” questions, write your response on the blank line. For multiple-choice questions, please mark (circle) one best answer (response) for each question.

1. What is your highest level of education you completed? (check the one that most applies)
  - No schooling completed
  - Nursery school to 4<sup>th</sup> grade
  - 5<sup>th</sup> grade or 6<sup>th</sup> grade
  - 7<sup>th</sup> grade or 8<sup>th</sup> grade
  - 9<sup>th</sup> grade
  - 10<sup>th</sup> grade
  - 11<sup>th</sup> grade
  - 12<sup>th</sup> grade, No diploma
  - High school graduate – diploma or GED
  - Some college credit, but less than 1 year
  - 1 or more years of college, no degree
  - Associate degree (for example: AA, AS)
  - Bachelor’s degree (for example: BA, AB, BS)
  - Master’s degree (for example: MA, MS, MEng, MEd, MSW, MBA)
  - Professional degree (for example: MD, DDS, DVM, LLB, JD)
  - Doctorate degree (for example: PhD, EdD)
  
2. What business or industry do you work in? (for example: hospital, landscaping, park & recreation, construction, etc.):
 

\_\_\_\_\_
  
3. What is your job title? \_\_\_\_\_
  
4. What is your approximate annual income? \$\_\_\_\_\_ /year

5. What is your marital status? (check the one that best applies)

- Now married  
 Widowed  
 Divorced  
 Separated  
 Never married

For the next seven questions, decide whether you agree or disagree with each statement. For example, if you strongly agree mark:

SD <i>Strongly Disagree</i>	D <i>Disagree</i>	U <i>Undecided</i>	A <i>Agree</i>	SA <i>Strongly Agree</i>

Item	SD	D	U	A	SA
6. I am more interested in HOW to do something rather than knowing WHY it is done.					
7. In the classroom, I want a teacher who is an expert in the field and who gives a lot of advice.					
8. I would rather have the instructor guide me as opposed to figuring something out myself.					
9. I want my learning to relate to my work life.					
10. I want my learning to help me solve problems.					
11. I want to learn new things for self improvement as opposed to meeting employment needs.					
12. I undertake study more for my employer than for myself.					

The next 20 questions are drawn directly from the State of California, Department of Pesticide Regulations, Laws and Regulations Study Guide, 2001 (latest) edition. These questions are multiple-choice questions. For each question please mark (circle) only one answer (response).

13. The difference between laws and regulations is:
  - a. Laws are passed by county agricultural commissioners and regulations are passed by the California legislature.
  - b. Laws are statutes passed by the California legislature and regulations are adopted by the Director of DPR to carry out the laws.
  - c. Laws are supplements to federal regulations.
  - d. Laws are adopted by the Director of DPR to carry out regulations signed by the Governor.
  
14. Which agency cooperates with DPR to enforce pesticide laws in California?
  - a. The University of California.
  - b. The Department of Health Services.
  - c. The Department of Labor.
  - d. The Department of Consumer Affairs.
  
15. A *supplemental label* is:
  - a. Literature distributed by the pesticide.
  - b. A sample pesticide label produced by the manufacturer or others.
  - c. The same as a special local need label.
  - d. A pamphlet containing required pesticide label information that will not fit on the container label.
  
16. The purpose of the *signal word* on any pesticide label is:
  - a. To inform users and handlers of the relative acute toxicity or hazard of the product.
  - b. Tell users the formulation type of pesticide product.
  - c. Specify on which crops the product is registered.
  - d. Specify the pest the product controls.
  
17. The *precautionary statements* section of the label contains information about the:
  - a. Application rate.
  - b. Crops on which the product can be applied.
  - c. Relative toxicity of the product.
  - d. Hazards to people and domestic animals.
  
18. A *decrease* below the label rate of the amount of the pesticide product applied to a crop is:
  - a. Always allowed.
  - b. Illegal.
  - c. Allowed only if you obtain written authorization from the county agricultural commissioner.
  - d. Allowed only if the product is tank mixed.

19. Any person in California who applies or supervises the application of a restricted use pesticide must:
  - a. Attend 20 hours of special training.
  - b. Notify the local UC Cooperative Extension advisor before making or supervising an application.
  - c. Obtain a medical release from a physician.
  - d. Be a California-certified commercial or private applicator.
  
20. Permits for the agricultural use of restricted pesticides must be:
  - a. Site and time specific.
  - b. Mailed or personally delivered to anyone living within ¼ mile of the application.
  - c. Approved by the Director of the California Department of Food and Agriculture.
  - d. Posted in a central location for 30 days after the application.
  
21. Each piece of mixing equipment and application equipment owned by a pest control business must be:
  - a. Painted a conspicuous color.
  - b. Given a special identification number.
  - c. Inspected weekly by the county agricultural commissioner's office.
  - d. Marked with the name of the business or other similar wording.
  
22. Reports of pesticides applied for the production of an agricultural commodity by a pest control business must be filed with the agricultural commissioner in the county where the application took place within:
  - a. 24 hours.
  - b. 5 days.
  - c. 7 days.
  - d. 30 days.
  
23. The signs attached to a pesticide storage area must be readable from:
  - a. 10 feet.
  - b. 15 feet.
  - c. 25 feet.
  - d. 50 feet.
  
24. Generally, a service container is:
  - a. The original pesticide container.
  - b. Any container other than the original labeled pesticide container.
  - c. A special heavy duty container provided by the pesticide manufacturer.
  - d. A special container approved by the Department of Defense.
  
25. It is illegal to store pesticides in:
  - a. Service containers.

- b. Original pesticide containers.
  - c. Spray equipment that is properly identified with labeling.
  - d. Containers that are commonly used for food, drink, or other household products.
26. Proper rinsing of an empty container involves:
- a. Filling the pesticide container three times and pouring the contents onto the ground at the application site.
  - b. Draining the empty pesticide container into the application equipment for 30 seconds.
  - c. Washing the application equipment tank with soap and water three times after an application.
  - d. Partially filling an empty pesticide container with water, shaking, and draining the contents into the spray tank, then repeating the process two more times.
27. Engineering controls for handling pesticides include:
- a. Water retention basins.
  - b. Wheel-move sprinklers.
  - c. Closed mixing systems.
  - d. Global positioning units.
28. Pesticide handler safety training for employees must be completed before:
- a. Employees are allowed to handle any pesticide.
  - b. The first work day of each month in which a pesticide might be handled.
  - c. By the 10th of the month following the month in which pesticides were used.
  - d. The beginning of each year.
29. Employers must retain training records of pesticide handler employees for:
- a. One year.
  - b. Two years.
  - c. Three years.
  - d. Four years.
30. Reasonable grounds to suspect the possibility of a pesticide illness or injury include all but which one of the following symptoms?
- a. Scratches on the arms or hands.
  - b. Headache.
  - c. Blurred vision.
  - d. Abdominal cramps.
31. When there is an inconsistency between the regulation-specified restricted-entry interval and the label-specified restricted-entry interval, you must always:
- a. Average the two restricted-entry intervals.
  - b. Follow the regulation-specified interval.
  - c. Follow the label-specified interval.
  - d. Use the longest interval.