EXPERIENCE AND LEARNING

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By

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The purpose of this study is to examine the relationship between experience and learning. With specific emphasis placed on cognitive load theory concepts related to the relationship between experience and learning and the third precept of andragogy, “the role of the learners’ experiences” (Paas, Renkl, & Sweller, 2004; Knowles, Holton, & Swanson, 2012, p. 65). The development of learning theory, adult learning theory, andragogy, cognitive psychology, and cognitive load theory are included in the literature review. Training and experience evaluations from the human resources field and competency based education’s uses of experience are also touched upon in the literature review. The study was conducted at a U.S. Marine occupational training school using two different courses and three separate classes. Pre and post instruction surveys were used to gather pre, post, and experience information; as well as identify both experienced participants and non-experienced participants. Results from the experienced and non-experienced participant’s answers’ on both the pre-instruction and post-instruction surveys as well as the final unit scores were all analyzed for comparison. Very little relationship and association between experience indexes and unit scores was found in data from either course. Strong and moderate relationships were found in data from the
electronics course between experience indexes and self-report of benefits to the learning process indexes. Moderate and weak relationships were found in data from the driver’s course between experience indexes and self-report of benefits to the learning process indexes. The discussion suggests reasons for no correlations between experienced participants answers and academic outcomes and suggests reasons for the correlations found between the experience indexes and the self-report of benefits to the learning process indexes. Problems, limitations, and recommendations for future research are also discussed.
Chapter One:

Introduction

The study of learning has sparked curiosity in teachers and scholars for thousands of years. The Greek philosopher Socrates (c. 470–399 B.C.E.) is one of the first known to have pondered the nature of learning (Tokunama-Espinosa, 2011). As time went on inquiry continued but documented literature concerning the study of learning begins around 1885 with German psychologist Hermann Ebbinghaus (Knowles at el., 2012, p. 19). Through the progression of time, a great deal of research has contributed to our current understanding of learning theory. As theory has grown and developed our focus of inquiry has also grown and changed.

The study of experience and learning has been an area of focus for the last 50 years. As early as 1966 researchers were beginning to study differences between how experts (those with prior knowledge and experience) and novices (those without prior knowledge and experience) learned and performed differently (Sweller, van Merrienboer, & Paas, 1998). This area of research has led to a significant emergence of theories and dynamic implications for instructional design (Paas, Renkl, & Sweller, 2003; Paas et al., 2004). Several different fields and multiple disciplines have conducted research in the area of experience and learning.

Statement of the Problem

The adult education community has failed to adequately test andragogy (Wilson, 2005). The discussion, debate, and critiquing surrounding andragogy within the scholarly literature has consistently called for more empirical study of andragogy for over 25 years (Andre, 1996). One problem today’s adult education professional is facing is a lack of
research into experience and learning and adult learning theories such as andragogy and cognitive load theory. More research into experience and learning and andragogy is needed. Additionally, with the ultimate intention of serving the military a specific type and limited number of theories were considered appropriate and applicable for inclusion the study.

The first theory considered appropriate and studied for applicability is Malcom S. Knowles Andragogy. Andragogy means “the art and science of helping adults learn” (Knowles et al., 2012, p. 163). Andragogy is a well-known concept within the field of adult education. Merriam, Caffarella, and Baumgartner (2012) acknowledged andragogy as “the best know theory of adult learning” (p. 83). Currently andragogy is commonly referred to as; a theory, a conceptual framework, a set of assumptions, and a set of guidelines, depending on what author you read (Merriam, 2001). A deeper look into andragogy as a basis for practice is warranted.

The next theory considered appropriate and studied for applicability is Cognitive Load Theory. Cognitive load theory is defined as, “concerned with the learning of complex cognitive tasks, where learners are often overwhelmed by the number of information elements and their interactions that need to be processed simultaneously before meaningful learning can commence (Paas et al., 2004, p. 2, p. 1). Cognitive load theory is the result of years of research in cognitive psychology, experience and learning research, and cognitive architecture research. Cognitive load theory offers specific explanation regarding the relationship between experience and learning. It is necessary to study cognitive load theory as a supplemental and/or alternative theoretical base for the experience and learning relationship phenomenon and adult learning theory practice.
The study was additionally inspired from the personal experiences of the researcher, who noticed similarities between Marine Corps educational training he had experienced and a phenomenon described in cognitive psychology, andragogy literature, and cognitive load theory literature. The role of experience within human resources and competency based education, a direction in education dealing with the relationship between experiences and learning, were also found to be relevant to this study.

**Purpose of the study**

The purpose of the research is to study the relationship between experience and learning. The study was designed with the intention of examining the third precept of andragogy, “the role of the learners’ experiences” (Knowles et al., 2012, p. 65). It was also designed to investigate cognitive load theory concepts’ related to the relationship between experience and learning (Paas et al., 2004, p. 2).

Initial questions that guided this study included:

1. Is prior experience or prior knowledge related to academic outcomes?
2. Is prior experience or prior knowledge related to the individual’s experience of the learning process?
3. Is andragogy’s third precept related to academic outcomes or the individual’s experience of the learning process?

With these questions in mind it is hypothesized:

1. Previous learner experience will relate positively to academic outcomes.
2. Additionally, it is hypothesized that previous learner experience will relate positively to self-reports of benefits to the learning process due to previous experience.
By looking at both of these questions a greater perspective and understanding will be gained about how experience interrelates with learning.

In summary, Chapter One has introduced experience and learning as the area of focus. It has identified the theories of andragogy and cognitive load theory as relevant to the study. It has provided the two hypothesis questions, the questions guiding the study, a statement of the problem, and the purpose of the study. Chapter Two will be a critical review of the relevant literature. Chapter Three, methodology will describe how the study was conducted and include sub-sections of participants, materials, and procedure. Chapter Four, results will provide the results of the study and include the sub-sections of reliability and validity, experience and academic outcomes, and experience and the learning process. Chapter Five will discuss and summarize the overall findings of the study and include the following sub-sections summary and discussion, problems and limitations, and recommendations for future research.
Chapter Two:

Literature Review

The literature review will begin with a review of learning. Subsequently adult education, adult learners and andragogy are reviewed. Following this, cognitive psychology’s contributions to learning theory are reviewed. Then, schema theory, experience and learning research, automation, and cognitive load theory are reviewed. Finally, the literature review concludes with human resources and competency based education.

Learning

As mentioned in the introduction, learning has been contemplated for thousands of years. Greek philosophers like Hippocrates (c. 460–370 B.C.E.), Socrates (c. 470–399 B.C.E.), and Aristotle (c. 384–322 B.C.E.) are considered one of the earliest records of this question. Between 1500 and 1800 formalized education began in most of the world and was primarily located at religious institutions (Tokunama-Espinosa, 2011). Finally in the 1800’s, studies related to learning, began in physiology. Physiological studies into nervous impulses, sensory systems, and how sensory information is interpreted laid the foundation for Psychology as a science (Robinson-Riegler & Robinson-Riegler, 2008).

Wilhelm Wundt started the first psychological laboratory in 1869 in Germany at the University of Leipzig (Robinson-Riegler & Robinson-Riegler, 2008). Psychology is concerned with mental processes and behavior therefore learning and learning theory has been studied in psychology. Initially, psychology gravitated toward, “stimulus filtered through subjective experience” psycho-physics, and “consciousness or mental
experience, structuralism and functionalism” (Robinson-Riegler & Robinson-Riegler, 2008, pp. 7-10). Most of the written literature concerning the study of learning begins in 1885 with German psychologist Hermann Ebbinghaus who studied memory and learning (Knowles at el., 2012; Robinson-Riegler & Robinson-Riegler, 2008).

In the early 1900s a new psychological school of thought, Behaviorism challenged these initial directions in psychology, contending that psychology should concentrate on an observable and measurable content (Ormrod, 2003). Behaviorism, considers learning as, a change in observable behavior, resulting from environmental stimuli and does not acknowledge thought, thought process, expectations, desires, goals, or changes in behavior occurring from maturation (Eggen & Kauchak, 2013).

During the early to middle 1900’s challenges to Behaviorism’s banishment of mental representations began to accumulate. Frederick Bartlett’s (1932) studies of memory led him to concluded “memory was a reconstructive process… guided by schemata, generalized knowledge structures about events and situations that are constructed based on past experience” and these “mental structures exerted a causal influence over behavior” (Robinson-Riegler & Robinson-Riegler, 2008, p. 13).

New ideas like Bartlett’s were contrary to Behaviorism’s assumptions and followed a new direction of psychological thought that would later become cognitive psychology. Arguments by Karl Lashley in 1948 challenged a gap in Behaviorism’s stimulus response (S-R); highlighting, “the sequence and speed of movements involved in complex behaviors like Jerry Lee Lewis playing ‘Whole Lotta Shakin’ Goin’ On’ a breathlessly fast song, could not possibly be played out via a series of S-R connections” (Robinson-Riegler & Robinson-Riegler, 2008, p. 19). Lashley’s arguments that
“complex behaviors like this need to be planned out and organized in advance” added support for a new direction for psychology (Robinson-Riegler & Robinson-Riegler, 2008, p. 19). These initial studies into learning helped fuel popularity for a new theoretical direction in psychology. The middle of the 1900’s is considered the birth of cognitive psychology. In order to maintain chronological accuracy it is necessary to briefly switch to the field of adult education. The review of developments in learning beyond the 1950’s and into the benefits cognitive psychology has brought to the study of learning will continue after adult education is reviewed.

**Adult learners and Adult Education**

In the early 1900s, around the same time psychology was struggling with Behaviorism, the field of adult education was bursting into existence. Columbia University offered a formal course titled Adult Education Methodologies in 1918 and established the first department of Adult Education in 1930 (Glowacki-Dudka, & Helvie-Mason, 2004). To gain a better understanding of adult education and its context within andragogy the term “adult learners” will be described and defined. In order to do this the term “adult” will be defined and then, the term “learning” will be defined. Following this, the definitions of adult and learning will be merged and the term “adult learners” will be defined. Understanding the definition of the term “adult learners” provides context to adult education’s and andragogy’s place in adult learning theory as well as within the study.

Knowles, Holton, and Swanson, (2012) described the meaning of “adult” using four different definitions, from four different perspectives. They first defined ‘adult’ biologically as, “the age when one can reproduce” (p. 62). Second, they defined ‘adult’
legally as the age when one is individually held responsible as a member of society and afforded equal privileges as a member of society (p. 62). Third, they defined ‘adult’ socially as, “when one performs adult roles such as full time worker or spouse” (p. 62). Fourth and finally, they defined ‘adult’ psychologically as, “when one arrives at a self-concept of being responsible for one’s own life and being self-directed” (p. 62). This psychological definition is the one that adds context to what is meant by the term ‘adult’ within the term “adult learner.”

For perspective it is offered that, ‘adults’ can also be defined developmentally; specifically, in terms of brain development. One of the defining differences between adolescents and adults is an increase in cognitive capability. This increase is one of the final stages of brain development: it allows better communication and integration of ideas between various parts of the brain, especially between the right and left hemispheres of the brain. Berk (2014) explained it this way, “[the difference is] characterized by increased and further development of the cerebral cortex, especially the prefrontal cortex and its connections with other brain regions” (p. 450). This developmental definition used by Berk and the psychological definition used by Knowles et al. (2012) provide context to what is meant by the term ‘adult’ within the term “adult learner.” The occurrence of psychological adulthood and developmental adulthood will vary by individual but generally occur between the ages of 17 and 21.

To define the term “learner” which is simply defined as one who is learning, first the term “learning” must be defined. Numerous attempts to define “learning” have been made over the last 130 years of study, yet no single definition is complete. Boyd, Apps, and associates (1980) described learning as, “Learning is the act or process by which
behavioral change, knowledge, skills, and attitudes are acquired” (p. 101). Cronbach (1954) stated, “learning is shown by a change in behavior as a result of experience” (p.47). Haggard (1963) also described learning as, “being reflected in a change in behavior as the result of experience” (p. 1). Harris and Schwahn (1961) described learning as, “Learning is essentially change due to experience” (pp. 1-2) (as cited in Knowles et al., 2012, p. 12). Harris and Schwahn (1961) further explained the difference between learning as a product, (which is concerned with the end result or outcome) and learning as a process which is (what happens during the course of a learning experience in attaining a given learning product or outcome) (pp. 1-2) (as cited in Knowles et al., 2012, p. 12). Knowles et al. (2012) observed a common characteristic in many definitions’ of learning is, “learning involves change” (p. 11). Therefore, learning can be defined as an act or process in which knowledge, skills, attitudes, and behavior or behavioral change occurs or is acquired as a result of experience (Boyd, Apps, & associates, 1980; Cronbach, 1954; Haggard, 1963; Knowles et al., 2012).

The term “adults” has been defined as; “characterized by further developed in the cerebral cortex, especially the prefrontal cortex and its connections with other brain regions” (Berk, 2014, p. 450) and “one with a self-concept of being responsible for one’s own life and being self-directed” (Knowles et al., 2012, p. 62). The term “learning” has been defined as an act or process in which knowledge, skills, attitudes, and behavior or behavioral change occurs or is acquired as a result of experience (Boyd et al., 1980; Cronbach, 1954; Haggard, 1963; Knowles et al., 2012). Based on these definitions does the term “adult learner” simply mean adults whose behavior changes? No, the term “adult learner” carries with it the connotation of everything to do with adult learning and
includes all the unique characteristics that adults bring with them to the learning situation. Adult learner have been defined by their level of expertise, because they have greater experience, their level of responsibility, because adults have many commitments, and their expectations, because they have many goals based on well-defined needs (Osgood-Treston, 2001). Additionally, the Osgood-Treston (2001) article helped provide perspective by dividing adult learners into two groups, one “seeking enrichment and community education” and the other seeking “academic credit” (p. 74). For the purposes of this study the term “adult learner” is considered an individual further developed in the cerebral cortex, with a self-concept of being responsible for one’s own life, having unique expertise, responsibilities, and expectations, in which knowledge, skills, attitudes, behavior or behavioral change occurs or is acquired as a result of experience. In the next section the concepts of “adult learning” and “adult learning theory” are reviewed.

It is very important to understand that although a great number of theorists and researchers have studied “learning” there is considerably less literature and research on “adult learning.” Adult learning as a discipline of study is relatively young with most of the documented writing beginning in the 1920’s. From the 1920s through the 1940s, researchers were able to identify many isolated insights, concepts, principles, and unique characteristics of adult learners (Knowles et al., 2012). Research generally took one of two directions, an empirical stream or a theoretical stream.

Edward Thorndike (1928; 1935) and Herbert Sorenson (1938) quickly addressed “adult abilities to learn” and “adult interests in learning” via the empirical stream (Aderinto, 2006; Knowles et al., 2012). The theoretical stream of research has contributed the remaining and majority of literature concerning adult learning and adult
learning theory. Eduard C. Lindeman’s (1926) *The Meaning of Adult Education* is considered a literary foundation within the field of adult education (Glowacki-Dudka, & Helvie-Mason, 2004). Lindeman, (1926) identified several key assumptions about adult learning including

- adults are motivated to learn as they experience needs and interests that learning will satisfy,
- adults’ orientation to learning is life-centered,
- experience is the richest resource for adults’ learning,
- adults have a deep need to be self-directing,
- and individual differences among people increase with age (as cited in Knowles et al., 2012, pp. 36-38 see also Glowacki-Dudka, & Helvie-Mason, 2004).

Many other important contributions to what we now understand about “adult learning” came from multiple disciplines. For example clinical psychologists Freud, Jung, Erikson, Maslow, and Rogers all contributed to our current understanding of adult learners (Aderinto, 2006, p. 139). Freud identified the influence of the subconscious mind on behavior (Knowles et al., 2012 p. 45). Erikson’s ‘eight ages of man,’ a framework for understanding stages of personality development identifies three different stages of adulthood and various unique characteristics of adults during each stage (Knowles et al., 2012 p. 45). Psychologist Carl Rogers conceptualized a student-centered approach to education and helped pave the way for the shift in attention from what the teachers does to what is happening in the student (Knowles et al., 2012 p. 48). Developmental psychologist Robert J. Havighurst (1972) acknowledged learning’s fundamental role in human development and that there are specific developmental tasks related to developmental periods. He further emphasized the occurrence of sensitive periods for learning that create what he called “teachable moments” (p. 7). Sociology and Social
Psychology have contributed a wealth of research about how the behavior of, groups, larger social systems, culture, race, and population characteristics influence learning and change (Knowles et al., 2012 pp. 50-51).

Finally there are the contributions to our current knowledge of adult learners from researchers who actually studied adult education such as, Bruner, Kempfer, Kidd, Verner & Booth, Houle, and Tough. While many just attempted to apply theories about child learning to adults, some such as Houle and Tough, specifically studied what, why, and how adults were learning. Cyril O. Houle’s (1993) work classified different types of adult learners into three distinct categories: “Goal-oriented learners, Activity-oriented learners, and Learning-oriented learners” (Houle, 1993, p. 15-16). Tough’s (1971) work found that adults effort’s to learn could be organized into, “learning projects which are a series of clearly related episodes…adding up to at least seven hours” (pp. 6, 13) and an episode, “is a well-defined period of time that is held together by the similarity in intent, activity, or place of the thoughts and actions that occur during it” (p. 6). Additionally, Tough’s work concluded adult learning is very common, “the typical person conducts about eight learning projects per year” and “spent roughly 90 hours at each of his learning projects” (pp. 17-18). As early as 1949 researchers and theorists began attempting to organize and arrange what we know about adult learning into a useful framework. These first works by Overstreet, Gibb, Knowles and Bruner did not accomplish a comprehensive theoretical framework but were more of descriptive listing of concepts and principles (Knowles et al., 2012 p. 57).
**Andragogy**

In 1968 American researchers were introduced to the term “Andragogy” when Malcom S. Knowles’s article ‘Andragogy, not Pedagogy’ was published in *Adult Leadership*. Knowles is credited with introducing and popularizing the theory or conceptual framework of andragogy in the United States. Knowles published several books about andragogy and it continues to be referenced in adult education literature and adult education curriculum. The term andragogy had been used previously in Europe but was virtually unknown in America. Andragogy means “the art and science of helping adults learn” (Knowles et al., 2012, p. 163). Andragogy became known as, “a rallying point for those trying to define the field of adult education as separate from other areas of education” (Merriam, 2001, p. 5). Rachal (2002) described Knowles as, “the best-know modern interpreter and advocate of andragogy as both a word and philosophically-rooted methodology” (p. 210). Since Knowles first introduction of andragogy in 1968 there has been much discussion, debate, and writing about andragogy. According to Knowles, andragogy is a “conceptual framework” and not necessarily a theory (Knowles et al., 2012, p. 231). Merriam et al. (2012) noted andragogy “also stimulated controversy, philosophical debate, and critical analysis matched only, perhaps, by the recent discussion of transformational learning” (p. 85).

Much of the discussion surrounding andragogy deals with how andragogy compares to pedagogy. This is not surprising when considering that our educational system is based on pedagogy. Aderinto (2006) explained there was little evidence to show any interest in the processes of adult learning by the early scholars of learning theories, the assumptions that adults learn the same
way as children often foreclosed any attempt to explore the process of adult learning, hence, the only theoretical framework for all educational settings (children and adults alike) was pedagogy (p. 140).

Aderinto (2006) also noted, “conventional education demands that the student adjust himself to an established curriculum whereas, in adult education [andragogical model] the curriculum is built around the student’s needs and interests” (p. 140). According to Knowles et al. (2012)

the pedagogical model assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned, it is teacher-directed education, leaving to the learner only the submissive role of following a teacher’s instructions (p. 60).

This leads to several negative elements of the academic experience. Cercone (2008) noted, “most adults were taught in a traditional and passive classroom” (p. 138).

Knowles et al. further explain Pedagogy assumes;

learners only need to know that they must learn what the teacher teaches if they want to pass, the learner’s experience is of little worth, learners become ready to learn what the teacher tells them they must learn, learners are motivated to learn by external motivation (grades and parental pressures), learners have a subject-centered orientation to learning, and the learner’s self-concept is that of one dependent on the teacher (pp. 60-62).

This dependent self-concept is perhaps the most damaging accusation of pedagogy because, “the result is a growing gap between the need and the ability to be self-directing;
which can produce tension, resistance, resentment, and often rebellion in the individual’’
(Knowles et al., 2012 p.61).

In contrast, andragogy or the andragogical model is based on several assumptions
or precepts about adult learners. The model Knowles proposes in *The Adult Learner 7th
Ed.* (2012) includes the following six precepts:

(1). The need to Know. Adults need to know why they need to learn something
before undertaking to learn it.

(2). The learner’s self-concept. Adults have a self-concept of being responsible
for their own decisions, for their own lives. Once they have arrived at that self-
concept, they develop a deep psychological need to be seen by others and treated
by others as being capable of self-direction.

(3). The role of the learners’ experiences. Adults come into an educational
activity with both a greater volume and different quality of experience from that
of youths. It also means that for many kinds of learning, the richest resources for
learning reside in the adult learners themselves.

(4). Readiness to learn. Adults become ready to learn those things that they need
to know and be able to do in order to cope effectively with real-life situations.

(5). Orientation to learning. Adults are life-centered (or task centered or problem
centered) in their orientation to learning. They learn new knowledge,
understandings, skills, values, and attitudes most effectively when they are
presented in the context of application to real-life situations.

(6). Motivation. Adults are responsive to some external motivators (better jobs,
promotions, higher salaries, and the like), but the most potent motivators are
internal pressures (the desire for increased job satisfaction, self-esteem, quality of life, and the like (Knowles et al., 2012, pp. 63-67).

After, Knowles original publishing of *The Modern Practice of Adult Education: Andragogy versus Pedagogy* in 1970; many teachers and educators responded with various reports of successes of andragogy. These reports included andragogy with adults and applications with children. There were also many reports of various occasions and situations where andragogy was not successful. Later issues of the book have the subtitle changed to *Andragogy to Pedagogy* contrary to the original *Andragogy versus Pedagogy*.

Knowles et al. (2012) also presents andragogy in the form of a process model not a content model which is used in most traditional pedagogical models.

The andragogical instructor (teacher, facilitator, consultant, change agent) prepares in advance a set of procedures for involving the learners and other relevant parties in a process involving:

1. Preparing the learner
2. Establishing a climate conducive to learning
3. Creating a mechanism for mutual planning
4. Diagnosing the needs for learning
5. Formulating program objectives (which is content) that will satisfy these needs
6. Designing a pattern of learning experiences
7. Conducting these learning experiences with suitable and techniques and materials
Evaluating the learning outcomes and re-diagnosing learning needs (Knowles et al. 2012, p. 114).

The two preceding numbered lists (the andragogical model and andragogy process model) are considered the conceptual foundations of andragogy (Knowles et al. 2012 p. 330).

Although the debate is still raging and more research is needed andragogy has already made a significant impact on education. Cercone (2008) summarized, “Andragogy is not perfect, but it represents an attempt to understand the difference between adult and childhood learning” (p. 147). Houle (1996) notes, “andragogy remains as the most learner-centered of all patterns of adult educational programming (...) andragogy has alerted educators to the fact that they ‘should involve learners in as many aspects of their education as possible’” (pp. 29-30) (as cited in Merriam, 2001, p. 6).

Cognitive Psychology

As stated earlier the discipline of cognitive psychology gained great momentum during the 1950’s. Psychologist George A. Miller’s 1956 studies into memory were groundbreaking and helped shape future studies of cognitive architecture. Miller’s findings concerning limited short-term memory capacity, being roughly seven elements, are well-know and widely accepted (Clarke, Ayres, & Sweller, 2005; Kalyuga, Chandler & Sweller, 2001; Kalyuga, Ayres, Chandler, & Sweller, 2003; Sweller et al., 1998). The limited working memory concept has since been acknowledged as, “the most central aspect of human cognitive architecture” (van Merrienboer, Kirschner, & Kester, 2003, p. 12). Limited working memory has also been similarly described as, “one of the defining aspects of human cognitive architecture” (Sweller et al., 1998, p. 262).
Atkinson and Shiffrin’s (1969) study of information processing and their model dividing human memory into three separate functions is foundational and widely accepted (Baddeley, 2001; Eggen, & Kauchak, 2013; Levine, 1999; Schneider, & Shiffrin, 1977; Shiffrin, & Schneider, 1977). Their work shaped the foundation of future information processing theory and cognitive psychology. (Baddeley, 2001; Eggen, & Kauchak, 2013; Schneider, & Shiffrin, 1977; Shiffrin, & Schneider, 1977). Psychologists Alan D. Baddeley and G. J. Hitch’s 1974 study into working memory (synonymous with short-term memory) expanded upon Atkinson and Shiffrin’s 1969 information processing model and addressed separate functions within working memory (Baddeley, 2001 see also Clarke, Ayres, & Sweller, 2005; Kalyuga et al., 2003; Sweller et al., 1998). Baddeley concluded working memory consisted of a three component system that works together including a phonological loop, visuospatial sketchpad and central executive (Baddeley, 2001). Although there is mixed opinion about the specific inner workings of working memory Baddeley work is well-known and provides additional theoretical direction.

In 1977 a two part study, by psychologists Richard M. Shiffrin and Walter Schneider, into controlled and automatic human information processing provided, “empirical and theoretical” evidence supporting “the delineation of the differences between, and the characteristics of automatic and controlled processing” in working memory (Shiffrin & Schneider 1977, p. 186) see also (Schneider & Shiffrin 1977). Shiffrin and Schneider’s seminal work forever changed cognitive psychology. These developments, during the first thirty years of cognitive psychology form the basis of today’s cognitive architecture. They provide connections to Frederick Bartlett’s 1932
concept of schemata and set the stage for the following critical new discoveries during the next thirty years.

**Schema, Experience and Learning, and Automation**

In the early 1980’s studies into problem solving and differences between experts and novices established the basis for the theory of schema. Research by Larkin, McDermott, Simon and Simon (1980) revealed that differences between expert’s (those with previous experience) and novice’s (those without previous experience) memory performances are the result of “chunking of familiar stimuli” and “a chunk is any stimulus that has become familiar from previous repeated exposure and hence is recognizable as a single unit” (p. 208). An expert’s capacity to use pattern-indexed schemata, [known as Chunks and later labelled Schema] guides them to relevant parts of the knowledge store, including crucial pieces of information, and a problem’s interpretation (Larkin, McDermott, Simon & Simon, 1980). Research by Chi, Glaser, and Rees (1982) likewise revealed “the superior memory capacity of skilled individuals, as exhibited in the large pattern of chunks” (p. 10) with “chunks as a defining unit of knowledge structure” (p. 8). Both studies noted superiority is limited to the knowledge area the expert is familiar with (Larkin, McDermott, Simon & Simon, 1980, p. 208; Chi, Glaser & Rees, 1982). Additionally both studies demonstrated through testing the experts have “no innate general superiority of memory or capacity to visualize” (Larkin, McDermott, Simon & Simon, 1980, p. 208; Chi, et al., 1982). Sweller, van Merrienboer, and Pass (1998) concurred with these findings, “all studies confirmed that the major factor distinguishing novice from expert problem solvers was not knowledge or sophisticated, general problem-solving strategies” (p. 254).
Studies into expert (those with previous experience) and novice (those without previous experience) differences and experience and learning differences occurred in many fields and domains. Sweller and Copper’s (1985) article involving mathematics examined more experienced students, less experienced students and learning algebra. They found that although capable of performing the same problems the less experienced students did not perform as well as the more experienced students in their abilities to “recall equations” and “distinguish between perceptually similar equations on the basis of solution mode” (p. 59). Wisniewski’s (1995) study involving prior knowledge and category learning concluded prior knowledge affected learning and specifically, increased processing time and reduced errors (p.461). Ozuru, Dempsey, and McNamara’s (2009) study concerning prior knowledge and reading comprehension concluded, “prior knowledge is a more significant predictor of text comprehension than reading skill” and “prior knowledge explained a significant amount of variance of performance on comprehension questions above and beyond reading skill…” (p. 237). The Ozuru et al. (2009) study found, “biology knowledge and topic-specific knowledge together accounted for about 20% of unique variance for performance on text-based questions, 19% on local-bridging questions, and 28% of unique variance for global-bridging questions above and beyond reading skill (pp. 235-236).

This is where there is an overlap of terminology between experts, experience, and prior knowledge within the literature. At this point in the progression of literature connections are being established between experience, expertise, prior knowledge, and schema. This is described by Pollock, Chandler, and Sweller (2002), “schemas [are] held in long-term memory and used to structure knowledge by organizing elements of
information comprising lower order schemas into higher order schemas that require less working memory capacity” (p. 62). The evidence in the proceeding studies connects experience to schema formation and Schema theory. Schema has been defined as, “cognitive constructs that incorporate multiple elements of information into a single element with a specific function” (Paas et al., 2003) see also (Clarke, Ayres, & Sweller, 2005). Kalyuga, Chandler and Sweller (2001) explained, “schemas allow us to treat multiple sub-elements of information as a single element in working memory, schemas reduce the burden on working memory” (p. 6). Sweller et al. (1998) explained schema theory, “through the building of increasing numbers of ever more complex schemas by combining elements consisting of lower level schemas into higher level schemas that skilled performance develops” (p. 255).

Automation is a term used to describe the automatic process in working memory purposed by Shiffrin and Schneider 1977 (Clarke, Ayres, & Sweller, 2005; Kalyuga et al., 2001; Paas et al., 2003, 2004; Sweller et al., 1998). Automation normally occurs after practice, usually significant practice and as a result of this practice a procedure can be carried out with minimal conscious effort (Sweller et al., 1998). Automation differs from controlled processing because “controlled processing of schemas requires conscious effort and, therefore, working memory resources” (Kalyuga, et al. 2001, p. 6). Sweller et al. (1998) explained, “automatic processing largely by-passes working memory and has quite different characteristics to conscious processing” (p. 256). Kalyuga et al. (2001) elaborated, “automated schemas allow us to efficiently deal with huge amounts of information that otherwise could not possibly be processed through limited working memory” (p. 6). Cognitive psychology has studied and evaluated memory, information
processing, expert and novice differences, schemas, prior knowledge and learning, experience and learning, and automation. It is these aforementioned processes that form a cognitive architecture that link and explain a relationship between experience and learning.

**Cognitive Load Theory**

Cognitive load theory started in the 1980s and was significantly developed and expanded during the 1990s (Paas et al., 2003). Cognitive load theory is defined as, “concerned with the learning of complex cognitive tasks, where learners are often overwhelmed by the number of information elements and their interactions that need to be processed simultaneously before meaningful learning can commence” (Paas et al., 2004, p. 1 see also Clarke, Ayres, & Sweller, 2005; Kalyuga et al., 2001; Kalyuga et al., 2003; Paas et al., 2003; Sweller, van Merrienboer, & Paas, 1998). One of cognitive load theory’s fundamental concepts is that of element interactivity. All information varies in the extent to which it imposes a working memory load (Paas et al., 2003). Sweller et al. (1998) explain, “the working memory load imposed depends on the number of elements that must be processed simultaneously in working memory, and the number of elements that must be processed simultaneously, in turn, depends on the extent of element interactivity” (p. 259). When the elements within the information are non-interacting or can be processed in isolation such as, learning the names of chemical elements from the periodic table or learning a single vocabulary word, then the task is considered a low-element interactivity task (Sweller at el. 1998). At the opposite end of the continuum are high-element interactivity tasks. High-element interactivity tasks are tasks that require
several elements to be manipulated in working memory simultaneously in order to understand (Sweller at el. 1998).

Cognitive load theory defines three types of cognitive loads: intrinsic, extraneous and germane cognitive loads (Clarke, Ayres, & Sweller, 2005). Element interactivity is the driver of intrinsic cognitive load (Paas et al., 2003). Intrinsic cognitive load can be defined as, “load placed on working memory by the intrinsic nature of the materials to be learnt” (Clarke, Ayres, & Sweller, 2005, p. 16) or as “demands on working memory capacity imposed by element interactivity that is intrinsic to the material being learned” (Paas et al., 2003, p. 1). Extraneous cognitive load has to do with how the information is presented. Extraneous cognitive load can be defined as, “the load placed on working memory by the instructional design itself” (Clarke, Ayres, & Sweller, 2005, p. 16). Paas, Renkl, and Sweller (2003) explained, “it is likely a heavy extraneous cognitive load is imposed when the instructional design requires the learners to engage in either a search for a problem solution or a search for referents in an explanation” (p. 2). The load is considered extraneous, “because working memory resources must be used for activities that are irrelevant to schema acquisition and automation” (Paas et al., 2003, p. 2).

Germane cognitive load has to do with effectively presented information, efficiently directed working memory resources, and a synergistic stimulation occurring in working memory leading toward schema construction. Germane cognitive load has been defined as, “the load evoked by the instructional materials that assist the process of schema formation” (Clarke, Ayres, & Sweller, 2005, p. 16). Paas et al., (2003) noted germane cognitive load, “is influenced by the instructional designer...enhances learning, and
results in those resources [working memory] being devoted to schema acquisition and automation” (p. 2).

The essence and final component of cognitive load theory is the relationship between the three identified cognitive loads. Paas et al., (2003) explained, “intrinsic, extraneous, and germane cognitive loads are additive in that, together the total load cannot exceed the working memory resources available if learning is to occur” (p. 2). Intrinsic cognitive load is considered irreducible, except through construction of new schema or the automation of existing schemas (Paas et al., 2003). Extraneous cognitive load is reducible and reducing it through effective instructional design can free valuable working memory capacity to be used for schema acquisition and automation or germane cognitive load (Paas et al., 2003). Cognitive load theory brings the issue of previous experience full circle when defining the expertise reversal effect. The expertise reversal effect has to do with, “instructional techniques that are highly effective with inexperienced learners losing their effectiveness and even having negative consequences when used with more experienced learners” (Kalyuga et al., 2003, p. 23). Kalyuga, Ayres, Chandler, and Sweller (2003) emphasized, “acquired schemas, held in long-term memory, allow experts to avoid processing overwhelming amounts of information and effectively reduce the burden on limited capacity working memory” and “instructional guidance, which may be essential for novices, may have negative consequences for more experienced learners” (p. 24). Therefore as described in the previous section experience can assist the learning process, but as described by the expertise reversal effect experience, can also hinder the learning process.
Human Resources and Competency-Based-Education

By looking at the field of human resources a more practical application of the relationship between experience and learning becomes apparent. The relationship between experience, learning or education, and performance is normally evaluated by employers during hiring. Methods of evaluating the training and experience of applicants are known as Training and Experience (T&E) evaluations (McDaniel, Schmidt, & Hunter, 1988a). T&E evaluations are used to attempt to, “predict future job performance and future learning (e.g., in training programs)” (Schmidt, & Hunter, 1998, p. 264). Although there are at least six different types of T&E evaluations; most T&E evaluations, primarily evaluate relevant experience, education, and training (Ash, 1984). T&E evaluations normally assign a value to experience, training, accomplishments, and education, e.g.; two points for each year of related work experience, one point for each year of related college, and half a point for related training (McDaniel et al., 1988a).

It is clear that within human resources a greater value is placed on experience compared to learning or education. McDaniel, Schmidt, and Hunter, (1988b) explained when using T&E evaluations, “in a point-method scoring procedure the length of an applicant’s job experience is a primary determinant of the score assigned” (p. 328) and “job experience is the most frequently used applicant assessment method” (p. 327). In Schmidt and Hunter’s (1998) study it was concluded years of experience as a predictor of future performance has a validity rating of .18 whereas years of education as a predictor of future performance has a validity rating of .10. Alternatively, a validity rating of .20 was given to years of education as a predictor of learning in job training programs and a validity rating of only .01 was given to years of experience as a predictor of learning in
job training programs. Schmidt and Hunter (1998) also noted, “In the general population, the correlation between education and ability is about .55” (p.265).

Another phenomenon related to experience and learning is competency-based education (CBE). The idea of competencies is not new to education. In the 1970s colleges started using models that incorporated competencies to support returning adult students. At that time U.S. Department of Education’s Fund for the Improvement of Postsecondary Education (FIPSE) provided grants that supported development of competency-based programs within adult learning programs (Klein-Collins, 2012). However these competency’ based programs could not recognize experience as formal credits.

Recently significant changes have been occurring in higher education. In May, 2011 the Western Association of Schools and Colleges (WASC) using a grant from the Lumina Foundation partnered with Brandman University to pilot, test, and study viable options in a competency-based baccalaureate degree program (Klein-Collins, 2012). This study used newly developed Degree Qualifications Profiles (Klein-Collins, 2012). In 2013 the most significant change thus far in competency based education occurred when the Department of Education approved the awarding of financial aid for students enrolled in competency-based programs (Field, 2013). This approval is based on the “direct assessment” clause in the revised Higher Education Act of 2005.

Ordonez (2014) explains, “the heart of competency based education programs is assessing what students already know [experience]” (p. 50). Prior learning assessments (PLA’s) are used to evaluate what students have previously learned in the classroom and learned from life experiences. Prior learning assessments assess learning from college
experience, work experience, on the job training, serving in the Military, open source
courseware, volunteer work, community service work, and studying independently
(Anderson, 2013). Competency-based education programs using degree qualifications
profiles can now assess learner’s experiences to equate to competencies and award formal
credits. These developments in competency-based education programs in higher
education are similar to what has been occurring in human resources for several years
except in reverse. In human resources, education is equated to experience and now in
education experience is equated to educational credits.

In summary the review of the literature began with the study of learning and
proceeded to the beginning of psychology. Next adult education, adult learners, adult
learning theory and andragogy were reviewed. After this cognitive psychology, schema,
experience and learning, automation, and cognitive load theory were reviewed. The
literature review concluded with human resources’ training and experience evaluations
and competency-based education. In the next section Methodology will be covered.
Chapter Three:

Methodology

In order to study the relationship between experience and learning a study was
designed that would include both those with previous experience and those with no
previous experience. The study would also have to gather pre-instruction, post-
instruction, demographic, and experience information. The target population was adult
students in a military setting. Two United States Marine occupational training courses
were selected to satisfy these requirements. A High Mobility Multipurpose Wheeled
Vehicle (HMMWV) Driver’s Course and a Basic Electronics Course were ultimately
selected for this study because they normally consisted of some students with previous
experience and some students with no previous experience. These occupational training
courses also provided instruction and evaluation in both cognitive tasks and psychomotor
tasks. The remainder of methodology is discussed in the following sub-sections
participants, materials, and procedures.

Participants

Initially one hundred and ten newly trained United States Marines from two
different courses and five separate classes participated in the study. Due to an error in the
implementation process the first set of thirty four surveys were unable to be completed
and therefore had to be dropped from the study. This problem is discussed further in the
discussion section.

After correcting the implementation process problem, a total of seventy two
newly trained United States Marines from two different courses and three separate classes
participated in the study. Forty of the participants were students in the Basic Electronics
Course, classes 41 and 42. Thirty two of the participants were students in the Low Altitude Air Defense (LAAD) Basic High Mobility Multipurpose Wheeled Vehicle (HMMWV) Driver’s Course. All participants were students at the Marine Corps Communication and Electronics School (MCCES) located at the Marine Corps Air Ground Combat Center (MCAGCC) in Twentynine Palms CA. The participants were receiving their initial job training or (what the military calls) Military Occupational Skill (MOS) training. All participants have less than one year’s time served in the Marine Corps and will not report for regular duty in the Marine forces until after graduating their MOS School.

The participant’s ages ranged from 18 to 27 years old. There was a mean of 19.8 years in the electronics course and a mean of 21.1 years in the driver’s course.

**Figure 1:**

**Electronics Course Ages**
Gender diversity in the military is dramatically different than other institutions even when a sample is properly representative of the military. The driver’s course was 12% female and 88% male. The electronics course was 100% male. In total the Marine Corps is approximately 7.3% female Marines and 92.7% Male Marines (Office of the Deputy Assistant Secretary of Defense report, 2013). Thus females are underrepresented in the data from the electronics course and slightly overrepresented in the data from the driver’s course.
The Marine Corps as a whole is an ethnically and culturally diverse group; 71.5% report as white, 18.5% report as Black or African American, 11.6% report as being of Hispanic ethnicity, 3.6% report as Asian, 1.2% report as American Indian or Alaska native, 0.9% report as Native Hawaiian or other Pacific Islander, 2.3% report as multicultural, and 4.0% report as other or unknown (Office of the Deputy Assistant Secretary of Defense, 2013). Approximately 20% of all Marines are ethnic minorities (Office of the Deputy Assistant Secretary of Defense, 2013). Ethnicity reported for the electronics course is: 65% White Non-Hispanic, 20% Hispanic or Latino, 10% Black or African American, and 5% Asian or Asian American. The electronics course data has greater
diversity and a greater number of ethnic minorities are represented when compared to the statistics for the total Marine Corps forces.

**Figure 4:**

**Electronics Course Diversity**

Ethnicity reported for the driver’s course is: 65% White Non-Hispanic, 10% Hispanic or Latino, 10% Black or African American, 10% Asian or Asian American and 5% American Indian or Native Alaska.
The data from the HMMWV driver’s course also has greater diversity and a greater number of ethnic minorities are represented when compared to the statistics for the total Marine Corps forces. The percent of ethnic minorities reported in both courses is approximately 15% greater than that reported for the total Marine Corps.

In total education levels in the Marine Corps are as follows; 87.2% of Marines have a High School diploma or GED, 9.3% of Marines have a Bachelor’s degree, 2.0% of Marines have an Advanced degree, 1.4% reported unknown and 0.1% do not have a High School diploma or GED (Office of the Deputy Assistant Secretary of Defense report, 2013). The participants in the electronics course reported: 68% had graduated High
School, 25% had attended some college, and 5% had graduated college. The data from
the electronics course indicates a slightly greater number of college graduates when
compared to the statistics for the military in total (Office of the Deputy Assistant

Figure 6:

Electronics Course Education Levels
The participants in the HMMWV driver’s course reported: 55% had graduated High School, 35% had attended some college and 10% had graduated college.

Figure 7:

Driver’s Course Education Levels

The data from the HMMWV driver’s course indicates 10% of the driver’s course students had graduated college this is twice as many as average when compared to the statistics for the military in total (Office of the Deputy Assistant Secretary of Defense report, 2013).

Next the participants work experience prior to entering the Military is reported. The electronics course participants reported: 20% had no previous work experience, 7.5%...
had less than part time work experience, 37.5% had part time work experience and 32.5% had full time work experience prior to entering the military.

Figure 8:

Electronics Course Work Experience
The driver’s course participants reported: 29% had part time work experience and 71% had full time work experience prior to entering the military. Participants in the driver’s course reported no other categories of work experience.

Figure 9:
Driver’s Course Work Experience

The work experience data shows a large difference between the two classes. No data on previous work experience for comparison was available for the Marine Corps in total or the military in total.

In order for a participant to be eligible to participate in the experience and learning study the participant had to be a student that is enrolled in one of the designated courses at the Marine Corps Communications-Electronics School and be 18 years of age.
or older. Any students at MCCES that were not 18 years of age were excluded from the study.

Materials

The pre-instruction survey was designed to identify and assess a participant’s exposure, knowledge, and previous experience pertaining to the area of instruction they will subsequently receive. The curriculums for both courses were analyzed prior to survey development. Specifically the course learning objectives and learning tasks were analyzed for question development. Survey questions assessed schema related terms and learning objective knowledge over broad areas such as; work, college, recreation, self-study, or other formal/organizational experience (Clarke, Ayres, & Sweller, 2005; Cooper, & Sweller, 1987; Larkin, McDermott, Simon & Simon, 1980; Paas et al., 2003; Sweller at el. 1998). An experienced statistical researcher and members of the Marine Corps were also consulted during survey design and prior to implementing the survey. The conditions in which the survey was given and participants received instruction were natural. The survey times and administration were made as least intrusive as possible. Administration of the surveys occurred on non-training days and at the start of the day.

A total of seventy two Pre-instruction and Post-instruction/evaluation experience and learning surveys were collected for inclusion in study. After the paper based surveys were transferred to an electronic format the Statistical Package for the Social Sciences (SPSS) was used to create indexes and conduct statistical analysis. Several indexes were created from the electronics course data using both the Pre-instruction surveys and the Post-instruction/evaluation surveys. Also several indexes were also created from the
HMMWV driver’s course surveys likewise using both the Pre-instruction surveys and the Post-instruction/evaluation surveys.

Two individuals declined to complete the demographics portion of the survey. The demographics data is based on a total of seventy completed responses. Demographics data collected included age, gender, education level, ethnicity, and prior work experience. Other data collected on the surveys included self-reports of High School or College GPA, estimated math ability (scale of 1 – 10), estimated reading ability (scale of 1 – 10), practical application test score, written test score, and course outcome or unit test score. Unit test scores for the electronics course data are an average of the practical application score and the written test score. Any additional incomplete responses have been noted where specific results pertaining to those omissions are presented. See appendix A for electronics and drivers course Pre-instruction and Post-instruction/evaluation surveys.

**Procedure**

Initially a Marine liaison was consulted and three Marine schools were identified as possibilities based on geographic location and purpose of instruction. After a review of the curriculums at each school, the Marine Corps Communication and Electronics School MCCES was selected as the best fit with greatest number of possibilities for the study. The school’s Formal School Manager and Academics Officer FSM/AO (one person) was then contacted. Next, approval for the students to participate in the study had to be obtained from the school’s Commanding Officer (CO). After receiving approval from the school’s CO, an introduction and planning meeting was conducted with the FSM/AO, individual course Academics Officers and the researcher. As a result
of the planning meeting four courses were identified as good possible matches for an experience and learning study. The courses were from three distinct areas of the Communications and Electronics school, the Basic Electronics Course from the Aviation Communications Maintenance School, the HMMWV Driver’s Course from the Low Altitude Air Defense (LAAD) School, and the Field Radio Operator Course and Cyber Network Specialist Course from the Communications Training School. After receiving a second approval from each school’s CO the researcher coordinated with instructors from each course to establish specific classes, dates, and times to conduct the study. Due to scheduling conflicts the Field Radio Operator Course and Cyber Network Specialist Course from the Communications Training School were not able to participate in the study.

On the initial day of the study the researcher gave participants in the designated courses an introduction and explanation of the study. This included an explanation of voluntary participation and period for adult consent (25 mins). Next, participants were assigned a random participation number and given the pre-instruction survey (20-30 mins). After the Pre-instruction survey the participants then proceeded with and received a normal course of instruction. At the appropriate time within the courses the participants received a normal formal evaluation. One to two days after normal formal evaluations were completed a post evaluation self-report survey was given to the participant’s. Questions included: formal evaluation score, and opinions, either positive or negative, of the influence of their previous experience on the learning process, performance, and achievement (20-30 mins). Last, participants were debriefed informing them that their participation with the study was complete and all results would remain anonymous.
In summary, the methodology section has covered participants, which includes demographic characteristics in order to allow for future use of the study and comparison. Next, materials were covered which includes explanations and references to survey development. Finally procedures were covered where processes for arranging research as well as participant process was explained. In the next section results will be presented.
Chapter Four:

Results

This study was pursued in order to identify relationships between experience and learning. This study sought to answer questions such as: is prior experience related to academic outcomes, is prior experience related to the individual’s experience of the learning process, and is andragogy’s third precept related to academic outcomes or the individual’s experience of the learning process. Initially this study was prompted by the absence of an agreed upon definition of andragogy within the literature and then by observed similarities between the role of experience within andragogy and the role of experience within cognitive load theory. Additionally, due to a lack of research into andragogy’s third precept “The role of the learners’ experiences” this study specifically examined this aspect (Knowles et al., 2012, p. 65). It was hypothesized: a learner’s previous experience would relate positively to academic outcomes and a learner’s previous experience would relate positively to self-reports’ of benefits to the learning process.

In this study previous experience is the Independent Variable (I.V.) and unit test score and self-reports of benefits to the learning process are the Dependent Variables (D.I.)’s. The I.V. of previous experience is broken down further into several learning objective experience indexes and area specific experience indexes. The D.V. of self-reports of benefits to the learning process is broken down into several combined effect experience indexes. The D.V. of unit test score is reported as unit test score or unit score. Cronbach’s Alpha is used to demonstrate an internal consistency and reliability of the representative indexes.
All Assessment results using course outcome / Unit test score are trunked due to evaluation scores ranging from 80 to 100. In all Marine Corps occupational training courses a score of at least 80 must be earned on all evaluations including practical application tests, written tests and the overall academic outcome / Unit tests. If a participant earned a score below 80 they would receive additional help and be re-tested until achieving a satisfactory score of at least 80. For this reason all reported scores are between 80 and 100 and no correlation can be established between practical application scores and written test scores.

The results section will include the following sub-sections; first, reliability and validity, next, experience and academic outcomes, and finally, experience and self-reports of benefits to the learning process. The results section also follows a general format in each sub-section of presenting the electronics course data first and then driver’s course data.

**Reliability and Validity**

In the first table, “Table 1” the index names, index abbreviations, minimums, maximums, and standard deviations are presented. In the following paragraphs Cronbach’s alphas will be presented as evidence of internal consistency and reliability. A reliability coefficient of .70 or higher is generally considered acceptable in most social science research. In the first and second paragraphs indexes from the electronics course Pre-instruction survey are presented. In the third and fourth paragraph indexes from the electronics course Post-instruction/evaluation survey are presented. In the fifth and sixth paragraph indexes from the driver’s course Pre-instruction survey are presented and seventh paragraph, indexes’ from the driver’s course Post-instruction/evaluation survey is
presented. Finally, in the eighth paragraph explanation of the Construct Validity is provided.

Table 1:

**Index definitions and descriptives**

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<th>Abbreviation</th>
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<th>Max</th>
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</table>

Data from the Basic Electronics Course Pre-instruction survey was used to create four different learning objective experience indexes. The first of these indexes is the Direct Current Circuit Experience index (DCCE) which is comprised of four DCCE related questions. The DCCE index demonstrates internal consistency reliability
“Cronbach’s alpha” of .809. The second of these learning objective experience indexes is the Parallel Series Circuits Experience index (PSCE) which is comprised of four PSCE related questions. The PSCE index demonstrates internal consistency reliability “Cronbach’s alpha” of .863. The third learning objective experience index is the Measuring with Multimeter Experience index (MME) which is comprised of four MME related questions. The MME index demonstrates internal consistency reliability “Cronbach’s alpha” of .892. The fourth and final learning objective experience index is Ohm’s Law Experience index (OHME) which is comprised of four OHME related questions. The OHME index demonstrates internal consistency reliability “Cronbach’s alpha” of .879. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 2:

Electronics Course Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>DCCE</th>
<th>PSCE</th>
<th>MME</th>
<th>OHME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.809</td>
<td>.863</td>
<td>.892</td>
<td>.879</td>
</tr>
</tbody>
</table>

Data from the Basic Electronics Course Pre-instruction survey was also used to create three area specific experience indexes. The first of these area specific experience indexes is Work Experience (Work_Exp) which is comprised of four Work_Exp related questions. The Work_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .909. The second of these area specific experience indexes is Education Experience (Educ_Exp) which is comprised of four Educ_Exp related questions. The Educ_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .881. The last of these area specific experience indexes is
Personal Experience (Pers_Exp) which is comprised of four Pers_Exp related questions. The Pers_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .830. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 3:

<table>
<thead>
<tr>
<th>Index</th>
<th>Work_Exp</th>
<th>Educ_Exp</th>
<th>Pers_Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.909</td>
<td>.881</td>
<td>.830</td>
</tr>
</tbody>
</table>

Data from the Basic Electronics Course Post-instruction/evaluation survey was used to create four combined effect of experience indexes. The first of these indexes is the Combined Effect of Experience Direct Current Circuit index (CEEDCC) which is comprised of four CEEDCC related questions. The CEEDCC index demonstrates internal consistency reliability “Cronbach’s alpha” of .916. The second of these combined effect of experience indexes is the Combined Effect of Experience Parallel Series Circuits index (CEEPSC) which is comprised of four CEEPSC related questions. The CEEPSC index demonstrates internal consistency reliability “Cronbach’s alpha” of .944. The third of these combined effect of experience indexes is the Combined Effect of Experience Measuring with Multi-meter index (CEEMM) which is comprised of four CEEMM related questions. The CEEMM index demonstrates internal consistency reliability “Cronbach’s alpha” of .948. The fourth and final of these combined effect of experience indexes is the Combined Effect of Experience Ohm’s Law index (CEEOHM) which is comprised of four CEEOHM related questions. The CEEOHM index
demonstrates internal consistency reliability “Cronbach’s alpha” of .969. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 4:

Electronics Course Combined Effect of Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>CEEEDCC</th>
<th>CEEPSC</th>
<th>CEEMM</th>
<th>CEEOHM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.916</td>
<td>.944</td>
<td>.948</td>
<td>.969</td>
</tr>
</tbody>
</table>

Data from the Basic Electronics Course Post-instruction/evaluation survey was also used to create three area specific combined effect of experience indexes. The first of these area specific combined effect of experience indexes is the Combined Effect Experience Work index (CEEWork_Exp) which is comprised of four CEEWork_Exp related questions. The CEEWork_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .890. The second of these area specific combined effect of experience indexes is the Combined Effect Experience Education index (CEEEduc_Exp) which is comprised of four CEEEduc_Exp related questions. The CEEEduc_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .862. The third and final of these area specific combined effect of experience indexes is the Combined Effect Experience Personal index (CEEPers_Exp) which is comprised of four CEEPers_Exp related questions. The CEEPers_Exp index demonstrates internal consistency reliability “Cronbach’s alpha” of .838. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 5:

Electronics Course Area Specific Combined Effect of Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>CEEWork_Exp</th>
<th>CEEEduc_Exp</th>
<th>CEEPers_Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.890</td>
<td>.862</td>
<td>.838</td>
</tr>
</tbody>
</table>
Data from the HMMWV Driver’s Course Pre-instruction survey was used to create three learning objective experience indexes. The first of these is the Motor Vehicle Operation Experience index (MVOE) which is comprised of two MVOE related questions. The MVOE index demonstrates internal consistency reliability “Cronbach’s alpha” of .645. The second of these experience indexes is the Motor Vehicle Operation Education Experience index (MVOED) which is comprised of two MVOED related questions. The MVOED index demonstrates internal consistency reliability “Cronbach’s alpha” of .692. The third learning objective experience index is the Motor Vehicle Maintenance Experience index (MVME) which is comprised of four MVME related questions. The MVME index demonstrates internal consistency reliability “Cronbach’s alpha” of .786. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 6:

Driver’s Course Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>MVOE</th>
<th>MVOED</th>
<th>MVME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.645</td>
<td>.692</td>
<td>.786</td>
</tr>
</tbody>
</table>

Data from the HMMWV Driver’s Course Pre-instruction survey was also used to create three area specific experience indexes. The first of these area specific experience indexes is the Work Experience index (WKE) which is comprised of two WKE related questions. The WKE index demonstrates internal consistency reliability “Cronbach’s alpha” of .810. The second of these area specific experience indexes is the Education Experience Index (EDE) which is comprised of three EDE related questions. The EDE index demonstrates internal consistency reliability “Cronbach’s alpha” of .439. The last
of these area specific indexes is the Personal Experience Index (PE) which is comprised of two PE related questions. The PE index demonstrates internal consistency reliability “Cronbach’s alpha” of .292. The reliability estimates indicate that in general the WKE index is amenable for analysis but the EDE and PE indexes have low reliability coefficients.

Table 7:
Driver’s Course Area Specific Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>WKE</th>
<th>EDE</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.810</td>
<td>.439</td>
<td>.292</td>
</tr>
</tbody>
</table>

Data from the HMMWV Driver’s Course Post-instruction/evaluation survey was used to create four combined effect of experience indexes. The first of these combined effect of experience indexes is the Combined Effect Experience Motor Vehicle Operation index (CEEMVO) which is comprised of two CEEMVO related questions. The CEEMVO index demonstrates internal consistency reliability “Cronbach’s alpha” of .862. The second of these combined effects of experience indexes is the Combined Effect Experience Motor Vehicle Maintenance index (CEEMVM) which is comprised of four CEEMVM related questions. The CEEMVM index demonstrates internal consistency reliability “Cronbach’s alpha” of .902. The third of these combined effects of experience indexes is the Combined Effect Experience Work Experience Index (CEEWKE) which is comprised of two CEEWKE related questions. The CEEWKE index demonstrates internal consistency reliability “Cronbach’s alpha” of .854. The fourth and final combined effects of experience index is the Combined Effect Experience Education index (CEEEEDE) which is comprised of two CEEEDE related questions. The
CEEDE index demonstrates internal consistency reliability “Cronbach’s alpha” of .867. The reliability estimates indicate that in general these indexes are amenable for analysis.

Table 8:

Driver’s Course Combined Effect of Experience Indexes Coefficients

<table>
<thead>
<tr>
<th>Index</th>
<th>CEEMVO</th>
<th>CEEMVM</th>
<th>CEEWKE</th>
<th>CEEDE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.862</td>
<td>.902</td>
<td>.854</td>
<td>.867</td>
</tr>
</tbody>
</table>

The construct validity for this type of study is demonstrated in similar studies such as (Chi, et al., 1982; Egan, & Schwartz, 1979; Larkin, McDermott, Simon & Simon, 1980; Ozuru, Dempsey & McNamara, 2009; Sweller & Copper, 1985; Wisniewski, 1995). In these types of studies results from those with no previous knowledge, experience or expertise are compared with results from those with previous knowledge, experience or expertise. Then the differences between the results from the no experience group are analyzed and compared with the results from the experienced or expertise group.

Experience and Academic Outcomes

In response to the hypothesis, previous learner experience will relate positively to academic outcomes. The results indicated one out of thirteen previous learner experience indexes has a moderate positive correlation to academic outcomes. However the majority of the results are not supportive of the hypothesis. Additionally, in response to the questions, is prior experience or prior knowledge related to academic outcomes and is andragogy’s third precept related to academic outcomes? Likewise the majority of the results did not indicate relationships between prior knowledge or andragogies third precept and academic outcomes.
In the following table (Table 9) correlation analysis was applied to the electronics course learning objective experience indexes and correlated to the electronics course self-reported unit test scores. No relationships were indicated between the experience indexes and the unit test scores. This means that the participant’s experience level as measured by the experience index is not associated with the participant’s performance level on the unit test / the end of course evaluation.

Table 9:

Electronics Course Experience Indexes to Unit Test Score Correlations

<table>
<thead>
<tr>
<th></th>
<th>DCCE</th>
<th>PSCE</th>
<th>MME</th>
<th>OHME</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>DCCE correlation</td>
<td>.787</td>
<td>.615</td>
<td>.720</td>
<td>-0.091</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.577</td>
</tr>
<tr>
<td>Practical Application Score</td>
<td>-0.091</td>
<td>.076</td>
<td>.911</td>
<td></td>
</tr>
<tr>
<td>Written Test Score</td>
<td>.076</td>
<td>.641</td>
<td>.911</td>
<td></td>
</tr>
<tr>
<td>Unit Test Score</td>
<td>.911</td>
<td>.641</td>
<td>.911</td>
<td></td>
</tr>
<tr>
<td>PSCE correlation</td>
<td>.401</td>
<td>.716</td>
<td>.026</td>
<td>.294</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.010</td>
<td>.000</td>
<td>.874</td>
<td>.066</td>
</tr>
<tr>
<td>Practical Application Score</td>
<td>.874</td>
<td>.066</td>
<td>.356</td>
<td></td>
</tr>
<tr>
<td>Written Test Score</td>
<td>.066</td>
<td>.356</td>
<td>.356</td>
<td></td>
</tr>
<tr>
<td>Unit Test Score</td>
<td>.356</td>
<td>.356</td>
<td>.356</td>
<td></td>
</tr>
<tr>
<td>MME correlation</td>
<td>.623</td>
<td>-0.214</td>
<td>-0.209</td>
<td>-0.262</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.185</td>
<td>.195</td>
<td>.102</td>
</tr>
<tr>
<td>Practical Application Score</td>
<td>-0.214</td>
<td>-0.209</td>
<td>-0.262</td>
<td></td>
</tr>
<tr>
<td>Written Test Score</td>
<td>-0.209</td>
<td>-0.262</td>
<td>-0.262</td>
<td></td>
</tr>
<tr>
<td>Unit Test Score</td>
<td>-0.262</td>
<td>-0.262</td>
<td>-0.262</td>
<td></td>
</tr>
<tr>
<td>OHME correlation</td>
<td>-.222</td>
<td>.115</td>
<td>.169</td>
<td>.610</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.169</td>
<td>.479</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Practical Application Score</td>
<td>.479</td>
<td>.40</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Written Test Score</td>
<td>.479</td>
<td>.40</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td>Unit Test Score</td>
<td>.40</td>
<td>.40</td>
<td>.40</td>
<td></td>
</tr>
</tbody>
</table>

In the following table (Table 10) correlation analysis was applied to the electronics course area specific experience indexes and correlated to the electronics course self-reported unit test scores. No relationships were indicated between the area specific experience indexes and unit test scores. This means that the participant’s experience level in specific areas such as work or education as measured by the experience index is not associated with the participant’s performance level on the unit test / the end of course evaluation.
Table 10:

Electronics Course Area Specific Experience Indexes to Unit Test Score Correlations

<table>
<thead>
<tr>
<th></th>
<th>Work_Exp</th>
<th>Educ_Exp</th>
<th>Pers_Exp</th>
<th>Practical Application Score</th>
<th>Written Test Score</th>
<th>Unit Test Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson</strong></td>
<td>1</td>
<td>.749</td>
<td>.756</td>
<td>- .277</td>
<td>.024</td>
<td>-.171</td>
</tr>
<tr>
<td><strong>Correlation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.000</td>
<td>.000</td>
<td>.084</td>
<td>.885</td>
<td>.291</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><strong>Pearson</strong></td>
<td>1</td>
<td>.671</td>
<td></td>
<td>-.185</td>
<td>.102</td>
<td>-.066</td>
</tr>
<tr>
<td><strong>Correlation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.000</td>
<td>.253</td>
<td>.533</td>
<td>.684</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><strong>Pearson</strong></td>
<td>1</td>
<td></td>
<td>.629</td>
<td>.671</td>
<td>.569</td>
<td></td>
</tr>
<tr>
<td><strong>Correlation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td></td>
<td></td>
<td>.629</td>
<td>.671</td>
<td>.569</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

In the following table (Table 11) correlation analysis was applied to the HMMWV driver’s course learning objective experience indexes and correlated to the driver’s course self-reported unit scores. A moderate positive correlation was found between the variables of MVME and Unit Score, r(12) = .56, p < .05. This means that the participant’s MVME experience level as measured by the experience index was found to be associated with the participant’s performance level on the unit test/ the end of course evaluation. Note due to low self-reports of unit score N size decreased from thirty two to fourteen.
In the following table (Table 12) correlation analysis was applied to driver’s course area specific experience indexes and correlated with the driver’s course self-reported unit scores. No relationships were indicated between the area specific experience indexes and the unit scores. This means that the participant’s area specific experience as measured by the experience index is not associated with the participant’s performance level on the unit test / the end of course evaluation. The driver’s course area specific experience indexes’ of EDE and PE have low reliability coefficients and therefore not considered. Note due to low self-reports of unit score N size decreased from thirty two to fourteen.
Table 12:

Driver’s Course Area Specific Experience Indexes to Unit Score Correlations

<table>
<thead>
<tr>
<th></th>
<th>WKE</th>
<th>EDE</th>
<th>PE</th>
<th>Unit Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>WKE</td>
<td>Pearson</td>
<td>1</td>
<td>.506</td>
<td>.674</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.003</td>
<td>.000</td>
<td>.188</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>32</td>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>EDE</td>
<td>Pearson</td>
<td></td>
<td>.493</td>
<td>.063</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.004</td>
<td>.830</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>32</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>Pearson</td>
<td></td>
<td></td>
<td>.468</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.091</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td></td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

Additional analysis of all other independent variables measured on the surveys likewise did not indicate any significant relationship between any variable and course outcomes. In the following table the electronics course data correlations between other I.V.’s and unit test scores are depicted. No relationships were indicated between any independent variables and unit scores. This means the participant’s performance level on the unit test / the end of course evaluation is not associated with any of the other independent variables measured. For example the participant’s performance level on the overall academic outcome was not correlated to education level, age, or GPA.
Table 13:

Electronics Course Independent Variables to Unit Test Score Correlations

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Work Experience</th>
<th>Education Level</th>
<th>Math Ability</th>
<th>Reading Ability</th>
<th>GPA</th>
<th>Practical Application Score</th>
<th>Written Test Score</th>
<th>Unit Test Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td>1</td>
<td>.449</td>
<td>.654</td>
<td>.009</td>
<td>.381</td>
<td>-.134</td>
<td>.129</td>
<td>.138</td>
<td>.165</td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.004</td>
<td>.000</td>
<td>.956</td>
<td>.017</td>
<td>.423</td>
<td>.433</td>
<td>.401</td>
<td>.316</td>
<td>.890</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td>1</td>
<td>.330</td>
<td>.085</td>
<td>.281</td>
<td>-.039</td>
<td>-.191</td>
<td>.132</td>
<td>-.050</td>
<td>.587</td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.040</td>
<td>.609</td>
<td>.083</td>
<td>.816</td>
<td>.243</td>
<td>.423</td>
<td>.763</td>
<td>.064</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td>1</td>
<td>.530</td>
<td>.158</td>
<td>.983</td>
<td>.941</td>
<td>.454</td>
<td>.699</td>
<td>.064</td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.191</td>
<td>.140</td>
<td>.079</td>
<td>.495</td>
<td>.117</td>
<td>.401</td>
<td>.40</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td>1</td>
<td>.191</td>
<td>.140</td>
<td>.079</td>
<td>.495</td>
<td>.117</td>
<td>.401</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.040</td>
<td>.609</td>
<td>.083</td>
<td>.816</td>
<td>.243</td>
<td>.423</td>
<td>.763</td>
<td>.064</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
</tr>
</tbody>
</table>

In the following table (Table 14) the HMMWV driver’s course data correlations between other I.V.’s and unit scores are depicted. No relationships were indicated between any of the independent variables and unit scores. This means the participant’s performance level on the unit test / the end of course evaluation is not associated with any of the other independent variables measured. For example the participant’s performance level on the unit test / the end of course evaluation is not associated with education level, age, or GPA.
Table 14:

Driver’s Course Independent Variables to Unit Score Correlations

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Sex</th>
<th>Education Level</th>
<th>Work Experience</th>
<th>Math Ability</th>
<th>Reading Ability</th>
<th>GPA</th>
<th>Unit Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlation</strong></td>
<td>Pearson</td>
<td>.483</td>
<td>.493</td>
<td>-.233</td>
<td>.314</td>
<td>.357</td>
<td>.401</td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>5.66</td>
<td>.006</td>
<td>.005</td>
<td>.214</td>
<td>.091</td>
<td>.057</td>
<td>.156</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

|                | Pearson   | -.028      | -.390           | -.373           | .239         | -.066          | .284     |            |
| **Sig. (2-tailed)** |          | .881       | .030            | .042            | .203         | .733           | .325     |            |
| **N**          | 31        | 31         | 30              | 30              | 29           | 14             |          |            |

|                | Pearson   | 1          | .207            | -.045           | .417         | .282           | -.187    |            |
| **Sig. (2-tailed)** |          | .264       | .815            | .022            | .138         | .522           |          |            |
| **N**          | 31        | 31         | 30              | 30              | 29           | 14             |          |            |

|                | Pearson   | 1          | .049            | .063            | .109         | .103           |          |            |
| **Sig. (2-tailed)** |          |           | .798            | .740            | .575         | .727           |          |            |
| **N**          | 30        | 30         | 30              | 29              | 14           |                |          |            |

|                | Pearson   | 1          | -.140           | -.053           | -.139        |                 |          |            |
| **Sig. (2-tailed)** |          |           | .454            | .782            | .635         |                 |          |            |
| **N**          | 31        | 31         | 30              | 30              | 14           |                |          |            |

|                | Pearson   | 1          | .163            | .129            | .308         | .284           |          |            |
| **Sig. (2-tailed)** |          |           | .390            | .659            | .14          |                 |          |            |
| **N**          | 30        | 30         | 30              | 14              |              |                |          |            |

Experience and the Learning Process

In response to the hypothesis, previous learner experience will relate positively to self-reports’ of the benefits to the learning process. Results indicated strong to weak positive correlations between the participant’s previous experience and self-reports’ of the benefits to the learning process. The data from the electronics course is the most supportive with five of seven experience indexes correlating strongly to self-reports’ of the benefits to the learning process indexes and the remaining two experience indexes correlating moderately to self-reports’ of the benefits to the learning process indexes. The data from the driver’s course is considerably less supportive with one of four experience indexes correlating weakly to self-reports’ of the benefits to the learning process.
process indexes. The remaining three driver’s course experience indexes do not correlate to self-reports’ of the benefits to the learning process indexes. Descriptive evidence from both the electronics course data and the driver’s course data is supportive of a positive relationship between, previous learner experience and self-reports’ of the benefits to the learning process.

In response to the question is prior experience or prior knowledge related to an individual’s experience of the learning process the results are again mixed. The majority of electronics course data is supportive of a relationship and the majority of driver’s course data is unsupportive of a relationship. Similarly, in response to the question is andragogy’s third precept related to an individual’s experience of the learning process the majority of electronics course data is supportive of a relationship and the majority of driver’s course data is unsupportive of a relationship. Descriptive evidence from both the electronics course data and the driver’s course data is supportive of a relationship between, prior experience or prior knowledge, andragogy’s third precept and an individual’s experience of the learning process.

**Electronics Course Data**

The results of the statistical analysis of the electronics course data indicates strong to moderate positive correlations between the learning objective experience indexes and the combined effect of experience indexes. Additionally, the result’s from electronics course data indicates strong to moderate positive correlations between the area specific experience indexes and the combined effect of experience indexes. These results also support a relationship between prior knowledge and benefits to the learning process and a relationship between andragogy’s third precept and benefits to the learning process.
Descriptive evidence from the electronics course data is also supportive of a positive relationship between; previous experience, prior knowledge, andragogy’s third precept and self-reports’ of the benefits to the learning process or an individual’s experience of the learning process.

In the following table (Table 15) correlation analysis was applied to the electronics course learning objective experience indexes and the combined effects of experience indexes. Specifically, the results indicated there was a strong positive correlation between the variables DCCE and CEEDCC, $r(38) = .66$, $p < .001$. There was a strong positive correlation between the variables PSCE and CEEPSC, $r(38) = .65$, $p < .001$. There was a strong positive correlation between the variables MME and CEEMM, $r(38) = .60$, $p < .001$. There was a moderate positive correlation between the variables OHME and CEEOHM, $r(38) = .52$, $p = .001$. This means the participant’s previous experience with the learning objectives as measured by the experience index is associated with the participant’s self-reports of benefits to the learning process.

**Table 15:**

**Electronics Course Experience Indexes to Combined Effect of Experience Indexes**

**Correlations**

<table>
<thead>
<tr>
<th></th>
<th>DCCE</th>
<th>PSCE</th>
<th>MME</th>
<th>OHME</th>
<th>CEEDCC</th>
<th>CEEPSC</th>
<th>CEEMM</th>
<th>CEEOHM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DCCE</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.787</td>
<td>.615</td>
<td>.720</td>
<td>.658</td>
<td>.603</td>
<td>.414</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.008</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>PSCE</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.401</td>
<td>.716</td>
<td>.625</td>
<td>.649</td>
<td>.276</td>
<td>.554</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.010</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.084</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>MME</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.623</td>
<td>.488</td>
<td>.388</td>
<td>.604</td>
<td>.233</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.013</td>
<td>.000</td>
<td>.147</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>OHME</strong></td>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.601</td>
<td>.648</td>
<td>.368</td>
<td>.515</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the following table (Table 16) correlation analysis was applied to the electronics course area specific experience indexes and correlated to the combined effects of experience indexes. Specifically, the results indicated there was a moderate positive correlation between the variables Work_Exp and CEEWork_Exp, \( r(38) = .52, p = .001 \). There was also a strong positive correlation between the variables Educ_Exp and CEEEduc_Exp, \( r(38) = .73, p < .001 \). There was a strong positive correlation between the variables Pers_Exp and CEEPers_Exp, \( r(38) = .66, p < .001 \). This means the participant’s previous area specific experience with the learning objectives as measured by the experience index is associated with the participant’s self-reports of benefits to the learning process.

**Table 16:**

Electronics Course Area Specific Experience Indexes to Combined Effect of Experience

<table>
<thead>
<tr>
<th></th>
<th>Work_Exp</th>
<th>Educ_Exp</th>
<th>Pers_Exp</th>
<th>CEEWork_Exp</th>
<th>CEEEduc_Exp</th>
<th>CEEPers_Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>1</td>
<td>.749</td>
<td>.756</td>
<td>.519</td>
<td>.473</td>
<td>.515</td>
</tr>
<tr>
<td>Correlation</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
<td>.002</td>
<td>.002</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

In the following four tables an emphasis is placed on those participants who reported previous experience and how many reported experiencing benefits to the learning process as a result of this previous experience.
The following table (Table 17) depicts the percentage of those who reported having experience with Direct Current Circuits and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 67% of those who reported having experience with Direct Current Circuits reported experiencing benefits to the learning process as a result of having that previous experience.

Table 17:
Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience Direct Current Circuits</th>
<th>0.0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>66.67%</td>
<td></td>
</tr>
</tbody>
</table>

The following table (Table 18) depicts the percentage of those who reported having experience with Parallel Series Circuits and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction
survey were used as a basis to determine reporting of benefits to the learning process.

Thus 64% of those who reported having experience with Parallel Series Circuits reported experiencing benefits to the learning process as a result of having that previous experience.

Table 18:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience Parallel Series Circuits</th>
<th>0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>3.0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4.0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td></td>
<td>64.29%</td>
</tr>
</tbody>
</table>

The following table (Table 19) depicts the percentage of those who reported having experience measuring with a Multi-meter and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 71% of those who reported having experience measuring with a Multi-meter reported experiencing benefits to the learning process as a result of having that previous experience.
Table 19:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience Ohm's Law</th>
<th>Effect of Experience Multimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.0</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>2</td>
</tr>
<tr>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>3.0</td>
<td>1</td>
</tr>
<tr>
<td>4.0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
</tr>
</tbody>
</table>

The following table (Table 20) depicts the percentage of those who reported having experience with Ohm’s Law and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 82% of those who reported having experience with Ohm’s Law reported experiencing benefits to the learning process as a result of having that previous experience.

Table 20:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience Ohm's Law</th>
<th>Effect of Experience Ohm's Law</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.0</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>1</td>
</tr>
<tr>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>3.0</td>
<td>0</td>
</tr>
<tr>
<td>4.0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>
**Driver’s Course Data**

The results’ of the statistical analysis of the driver’s course data indicates only a weak relationship between one of the three learning objective experience indexes and the combined effect of experience indexes. The results from the driver’s course data also indicate zero relationships between the area specific experience index WKE and the combined effect of experience indexes. These results from the driver’s course data offer very little support for a relationship between prior knowledge and benefits to the learning process or between andragogy’s third precept “the role of the learners’ experiences” and benefits to the learning process (Knowles et al., 2012, p. 65). However the descriptive evidence from the driver’s course is supportive of positive relationships between; previous learner experience and self-reports’ of the benefits to the learning process, prior experience or prior knowledge and an individual’s experience of the learning process, and andragogy’s third precept and an individual’s experience of the learning process.

In the following table (Table 21) correlation analysis was applied to the driver’s course learning objective experience indexes and correlated to the driver’s course combined effects of experience indexes. A weak positive correlation was found between the variables of MVME and CEEMVM, \( r(30) = .39, p < .05 \). This means that the participant’s MVME experience level as measured by the experience index was found to be associated with the participant’s self-reports of benefits to the learning process.
Table 21

Driver’s Course Experience Indexes to Combined Effect of Experience Indexes

Correlations

<table>
<thead>
<tr>
<th></th>
<th>MVOE</th>
<th>MVOED</th>
<th>MVME</th>
<th>CEEMVO</th>
<th>CEEMVOED</th>
<th>CEEMVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVOE</td>
<td>1</td>
<td>.355</td>
<td>.564</td>
<td>.185</td>
<td>.088</td>
<td>.102</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.046</td>
<td>.001</td>
<td>.311</td>
<td>.632</td>
<td>.579</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>MVOED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.400</td>
<td>.336</td>
<td>.256</td>
<td>.386</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.023</td>
<td>.060</td>
<td>.158</td>
<td>.029</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVME</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.439</td>
<td>.306</td>
<td>.390</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.012</td>
<td>.089</td>
<td>.027</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the following table (Table 22) correlation analysis was applied to the driver’s course area specific experience indexes and correlated to the driver’s course combined effects of experience indexes. No acceptable relationships between the area specific experience indexes and combined effect of experience indexes were indicated. There is a weak positive correlation between the variables EDE and CEEEDE $r(30) = .32 \ p < .010$. However the confidence interval falls below 95% and the reliability coefficient of EDE is below an acceptable level. Therefore the correlation was deemed unacceptable.
In the following four tables an emphasis is placed on those participants who reported previous experience and how many reported experiencing benefits to the learning process as a result of this previous experience.

The following table (Table 23) depicts the percentage of those who reported having experience with Motor Vehicle Operation and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 86% of those who reported having experience with Motor Vehicle Operation reported experiencing benefits to the learning process as a result of having that previous experience.
Table 23:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience Motor Vehicle Operation</th>
<th>0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>6</td>
<td>6</td>
<td>25</td>
<td>86.21%</td>
<td></td>
</tr>
</tbody>
</table>

The following table (Table 24) depicts the percentage of those who reported having experience with a Driver Education Course and reported experiencing benefits to the learning process as a result of having that previous experience. An answer of, 1 (Yes), on the pre-instruction survey was used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 77% of those who reported having experience with a Driver Education Course reported experiencing benefits to the learning process as a result of having that previous experience.

Table 24:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Effect of Educational Experience Motor Vehicle Operation</th>
<th>0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Education Course</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>12</td>
<td>2</td>
<td>20</td>
<td>77.00%</td>
<td></td>
</tr>
</tbody>
</table>

66
The following table (Table 25) depicts the percentage of those who reported having experience with a Behind the Wheel Training Class and reported experiencing benefits to the learning process as a result of having that previous experience. An answer of, 1 (Yes) on the pre-instruction survey was used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 78% of those who reported having experience with a Behind the Wheel Training Class reported experiencing benefits to the learning process as a result of having that previous experience.

Table 25:
Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Effect of Educational Experience Motor Vehicle Operation</th>
<th>0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behind the Wheel Training Class</td>
<td>.0</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>14</td>
<td></td>
<td>78.00%</td>
</tr>
</tbody>
</table>

The following table (Table 26) depicts the percentage of those who reported having experience with Motor Vehicle Maintenance and reported experiencing benefits to the learning process as a result of having that previous experience. Answers of, 2 (average), 3 (above average) or 4 (very experienced or expert) on the pre-instruction survey were used as a basis to determine participants with previous experience. Answers of, 2 (moderate), 3 (significant) or 4 (very experienced or expert) on the post-instruction survey were used as a basis to determine reporting of benefits to the learning process. Thus 85% of those who reported having experience with Motor Vehicle Maintenance
reported experiencing benefits to the learning process as a result of having that previous experience.

Table 26:

Percentage of Experienced Reporting Benefits to the Learning Process

<table>
<thead>
<tr>
<th>Experience</th>
<th>.0</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Maintenance</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>22</td>
<td>84.62%</td>
<td></td>
</tr>
</tbody>
</table>

In summary the results section has provided definitions and the reliability and validity of the indexes created for analysis. The results section has also provided correlation analysis of experience indexes and academic outcomes as well as correlation analysis of experience indexes and self-reports of benefits to the learning process. Percentages of those participants who reported previous experience and how many reported experiencing benefits to the learning process as a result of this previous experience were also presented. In the next section the results are discussed.
Chapter Five:

Discussion and Conclusion

This study’s intention was to examine the relationship between experience and learning. This was primarily driven by questions about andragogy’s third precept “the role of the learners’ experiences” and cognitive load theory concepts’ related to the relationship between experience and learning (Knowles et al., 2012, p. 65). It was hypothesized that previous experience would relate positively to academic outcomes. It was also hypothesized that previous experience would relate positively to self-reports of benefits to the learning process. It was expected that a small but statistically insignificant positive relationship between experience and academic outcomes would be apparent. It was also expected that a positive relationship between the individual learner’s perception of “their own” previous experience and self-reports of benefits to the learning process would be apparent but the extent to which this would occur was unknown. The answer to the question, is previous experience related to learning, is “Yes” but just how, and the extent of the way it is related, will be questions that must be answered with further research.

Summary and Discussion

The first hypothesis suggested previous learner’ experience would relate positively to academic outcomes but contrary to what was hypothesized the majority of results do not indicate a relationship between the learner’s previous experience and academic outcomes. The electronics course data allowed for measurement of four learning objective experience indexes and three area specific experience indexes for relationships between experience and the unit test scores. The resulting correlations and
p levels did not come close to any reportable relationship. The HMMWV driver’s course data allowed for measurement of three learning objective experience indexes and one area specific experience index for relationships between experience and the unit test scores. Interestingly one of the HMMWV driver’s course experience indexes the Motor Vehicle Maintenance Experience MVME index was moderately correlated to unit test scores $r(12) = .56$, $p < .05$. This particular index is also the only driver’s course index positively correlated to self-reports of benefits to the learning process. These relationships of the MVME index will be discussed further in the fourth paragraph. The majority of results from this study do not indicate a relationship between previous experience, prior knowledge, and/or andragogy’s third precept being related to academic outcomes.

These results correspond with findings in expert and novice studies where differences between experts (those with prior experience) and novices (those with no prior experience) performance could not be attributed to differences in cognitive ability such as memory, problem-solving strategies or ability to visualize (Larkin, McDermott, Simon & Simon, 1980; Chi, et al., 1982; Sweller et al., 1998). The combination of effective instruction and cognitive ability is equal performance on course evaluations. The combination of previous experience, effective instruction and cognitive ability equals differences in the learning process.

The second hypothesis suggested previous learner experience would relate positively to self-reports’ of benefits to the learning process. Interestingly, in accordance with what was hypothesized the majority, eight of eleven experience indexes correlated positively with combined effects of experience indexes. From the electronics course data
three of four learning objective experience indexes had strong correlations with combined effects of experience indexes and the remaining learning objective experience index had a moderate correlation with a combined effect of experience index. Also from the electronics course two of three area specific experience indexes had strong correlations with combined effects of experience indexes and the remaining area specific experience index had a moderate correlation with combined effects of experience indexes. Additionally, percentages of those participants who reported previous experience and how many reported experiencing benefits to the learning process due to this experience were measured. Again the majority reported experiencing benefits to the learning process ranging from 64% to 82% across four learning objective areas.

From the HMMWV driver’s course, results are less supportive. Only one of three learning objective experience indexes was weakly correlated with a combined effect of experience index. The single area specific experience index that was correlated with a combined effect of experience index indicated no relationship. Interestingly, the MVME index was correlated with both unit test scores and combined effects of experience indexes. This is possibly due to the nature of motor vehicle maintenance tasks. The strong psychomotor nature of motor vehicle maintenance tasks could be responsible for the variation in results from the MVME index. Psychomotor tasks such as those found in sports may use different paths and/or methods for schema construction.

The percentages of those participants who reported previous experience and how many reported experiencing benefits to the learning process due to this experience were also measured for the HMMWV driver’s course. These results are surprisingly supportive in light of only one weak correlation found in the driver’s course data. The
percentage results from the driver’s course are higher than those from the electronics course ranging from 77% to 86% across four learning objective areas. These results are similar with findings presented in schema theory literature and cognitive load theory literature where experience or schema, allows multiple elements to be treated as one, frees the burden on working memory, and skilled performance develops (Clarke, Ayres, & Sweller, 2005; Kalyuga et al., 2001; Paas et al., 2003; Sweller et al., 1998). This may also be facilitating germane cognitive loads which would improve the learner’s experience of the learning process (Clarke, Ayres, & Sweller, 2005; Paas et al., 2003). The percentage evidence coupled with the correlational evidence supports the conclusion that there is a relationship between a learner’s previous experience and the learner’s experience of benefits to the learning process. This evidence is also supportive of prior knowledge and andragogy’s third precept being related to the learner’s experience of benefits to the learning process.

**Problems and Limitations**

A process implementation problem did occur during the initial administration of the electronics course post-instruction/evaluation survey. Due to an error in the process implementation the first set of thirty four surveys were unable to be completed and therefore had to be dropped from the study. In an effort to protect anonymity, the original study design called for student leadership from each participating class, to maintain a list of random number assignments during the period between the pre and post evaluation surveys. Student leadership was unable to properly maintain the random numbering assignments and a design correction was implemented to have a third party maintain the list in the future. The original design used student leadership to ensure
school instructors did not have access to student responses. The design correction also ensured complete anonymity was maintained. The implemented change called for an unrelated School Staff member such as Supply Officer or Records Clerk to maintain the random numbering assignments list during the period between pre and post instruction surveys. No problems were experienced with this method and complete anonymity was maintained.

There were several limitations to this study such as the use of self-reporting. Several elements factor into the accuracy and weight attributed results obtained from surveying a learner’s self-report. One is the individual learner’s ability to correctly and unbiasedly evaluate their previous experience and its beneficial impacts on the learning process. Another is the individual learner’s ability to correctly and accurately report what they experienced. Another limitation was the occurrence of truncated results from military testing. All reported results from the Marine Corps school were between 80 and 100. The number of self-reported unit scores for the HMMWV driver’s course was very low. Although the data from thirty two participants was able to be used for the majority of analysis, only fourteen unit scores were included in the driver’s course unit score correlations.

**Recommendations for Future Research**

Research findings must always be considered in perspective of the research methods, controls, and larger body or research evidence. Recommendations for future research include obtaining a larger set of unit scores for the driver’s course, attempting to obtain the first test scores (even if they are below 80 if military schools are used) thus eliminating the truncated results, and more specific measures of the benefits to the
learning process. Studies into the differences in individual’s confidence or comfort levels prior to tests or final exams between those with previous experience and those without may further reveal effects of previous experience on the learning process. Studies using four groups: one more experienced participants, two less experienced participants, three participants with below average GPA, and four participants with above average GPA. Additional studies in motor vehicle maintenance and similar tasks exploring in greater depth the differences between them and purely cognitive tasks. Finally, studies that examine the specific beneficial effects to the learning process experienced by learner’s with previous experience.
References


Appendix A

Experience Survey

This survey is completely anonymous and for research purposes only. The purpose of this survey is to gather information about the student’s previous experiences as they pertain to learning. Survey results are for a Civilian University Study and will not be used by the U.S Government or the Marine Corps.

Pre Instruction survey

Please fill out all questions as completely and accurately as possible.

1. Do you have a Driver’s License?
   a. Yes
   b. No

2. Do you have a Learner’s Permit (only) without Driver’s License?
   a. Yes
   b. No

3. Have you ever taken a (Drivers Education Class or Course)?
   a. Yes
   b. No

4. Have you ever taken a (Behind the Wheel Drivers training Class)?
   a. Yes
   b. No

5. What is your prior EXPERIENCE LEVEL with (Motor Vehicle Operation/Driving Experience)?
   a. None
   b. Less than 6 Months
   c. 6 Months, to 2 Years
   d. 2 Years, to 6 Years
   e. More than 6 Years

6. Have you ever a job that involved (Motor Vehicle Operation)? If yes mark level of experience.
   a. No
   b. Less than 6 Months
   c. 6 Months, to 2 Years
   d. 2 Years, to 6 Years
   e. More than 6 Years
7. What is your prior EXPERIENCE LEVEL with (Motor Vehicle Maintenance)?
   a. None (completely new) ( )
   b. I only know what Motor Vehicle Maintenance means (NOT the details about it) ( )
   c. I know a LITTLE about Motor Vehicle Maintenance ( )
   d. I have EXPERIENCE with ROUTINE Motor Vehicle Maintenance such as (Oil Change, Fluids, Tires, etc.) ( )
   e. I have EXPERIENCE BEYOND ROUTINE Motor Vehicle Maintenance such as (Work, Training, Hobby, School Lab, or Personal). ( )

8. What is your prior work experience with (Motor Vehicle Maintenance)?
   a. None ( )
   b. Less than 6 Months / very little ( )
   c. 6 Months, to 2 Years / moderate or average ( )
   d. 2 Years, to 6 Years / above average ( )
   e. More than 6 Years / expert ( )

9. Have you ever taken a (Motor Vehicle Maintenance Class or Course)? If yes how many?
   a. No ( )
   b. 1 Class/1 Semester ( )
   c. 2 Classes/2 Semester ( )
   d. 3 to 4 Classes/Semester ( )
   e. More than 4 Classes/Semesters ( )

10. What is your prior personal experience doing (Motor Vehicle Maintenance)?
    a. None ( )
    b. Less than 6 Months / very little ( )
    c. 6 Months, to 2 Years / moderate or average ( )
    d. 2 Years, to 6 Years / above average ( )
    e. More than 6 Years / expert ( )

11. What is your prior EXPERIENCE LEVEL with (Towing a trailer)?
    a. None ( )
    b. Very little or limited ( )
    c. Average ( )
    d. Above average ( )
    e. Very experienced or expert ( )

12. Please rate your Math ability on a scale of 1-10; “1” being the lowest and “10” being the highest.
    1 2 3 4 5 6 7 8 9 10
13. Please rate your **Reading ability** on a scale of 1-10; “1” being the lowest and “10” being the highest.

1  2  3  4  5  6  7  8  9  10

14. What was your **High School GPA** or college if attended? (Estimate if needed)

Please list any other experience related to **Motor Vehicle Operation or Motor Vehicle Maintenance**

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________
________________________________________________________________________

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Post Test survey

What score did you receive on the HMMWV test? ________

1. What is your opinion of how your prior EXPERIENCE LEVEL with (Motor Vehicle Operation) influenced (helped or hurt) your learning?
   a. None. (___)
   b. Very little or limited (___)
   c. Moderate or average (___)
   d. Significant above average (read literature, received training) (___)
   e. Very experienced or expert (tested, certified, qualified) (___)

EXPLAIN______________________________________________________
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_______________________________________________________________
_______________________________________________________________

2. What is your opinion of how your prior work experience or training with (Motor Vehicle Operation) influenced (helped or hurt) your learning?
   a. None. (___)
   b. Very little or limited (___)
   c. Moderate or average (___)
   d. Significant above average (read literature, received training) (___)
   e. Very experienced or expert (tested, certified, qualified) (___)

3. What is your opinion of how your prior educational experience with (Motor Vehicle Operation) influenced (helped or hurt) your learning?
   a. None. (___)
   b. Very little or limited (___)
   c. Moderate or average (___)
   d. Significant above average (___)
   e. Very experienced or expert (tested, certified, qualified) (___)

EXPLAIN______________________________________________________
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4. What is your opinion of how your prior EXPERIENCE LEVEL with (Motor Vehicle Maintenance) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

EXPLAIN_____________________________________________________
_________________________________________________________________
_________________________________________________________________

5. What is your opinion of how your prior work experience or training with (Motor Vehicle Maintenance) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

6. What is your opinion of how your prior educational experience with (Motor Vehicle Maintenance) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

EXPLAIN_____________________________________________________
_________________________________________________________________
_________________________________________________________________

7. What is your opinion of how your prior personal or recreational experience with (Motor Vehicle Maintenance) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

EXPLAIN_____________________________________________________
_________________________________________________________________
_________________________________________________________________
Please provide any additional comments, ideas, or information that may be beneficial to the researcher in understanding how previous experiences influence learning.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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Demographics

1. What is the highest grade or year of school you have completed?
   a. 11th Grade or less
   b. Grade 12 or GED (High school graduate)
   c. College 1 Semester through 2 years (Some college or technical school)
   d. College 3 years to 4 years (College graduate)

2. What is your previous work experience before entering the Armed Forces?
   (include only employment lasting 3 months or longer)
   a. I have worked full time (40 Hrs./week or more)
   b. I have worked part time (approximately 20 Hrs./Week)
   c. I have worked less than part time (paper route, other)
   d. I have not been employed before the Armed Forces

3. How do you describe yourself? (please check the one option the best describes you)
   a. American Indian or Alaska Native
   b. Native Hawaiian or Other Pacific Islander
   c. Asian or Asian American
   d. Black or African American
   e. Hispanic or Latino
   f. Non-Hispanic White

4. What is your sex?
   a. Female
   b. Male

5. What is your age?
   a. Enter the month and year of your birth, _____/_____

6. Have you ever been a member of Boy Scouts, Girl Scouts, or a similar organization, if so how many years?
   a. Less than 1 year
   b. 1 year to 3 years
   c. 3 years or more

7. Have you ever participated in organized team sports such as Football, Soccer, or Swimming?
   a. Less than 1 season/year
   b. 1 season/year through 3 seasons/years
   c. 3 seasons/years through 5 seasons/years
   d. 5 seasons/years or more
8. Have you ever participated in 2 or more team sports such as Football, Soccer, or Swimming at the same time or during the same year?
   a. Less than 1 season/year
      (☐)
   b. 1 season/year through 3 seasons/years
      (☐)
   c. 3 seasons/years through 5 seasons/years
      (☐)
   d. 5 seasons/years or more
      (☐)

THANK YOU FOR PARTICIPATING IN THIS STUDY
Experience Survey

This survey is completely anonymous and for research purposes only. The purpose of this survey is to gather information about the student’s previous experiences as they pertain to learning. Survey results are for a Civilian University Study and will not be used by the U.S Government or the Marine Corps.

Pre Instruction survey

Please fill out all questions as completely and accurately as possible.

1. What is your prior EXPERIENCE LEVEL with (Direct Current Circuits)?
   a. None. (completely new / never heard of before the Marine Corps) ( )
   b. I only know what Direct Current Circuits means (NOT the details about it) ( )
   c. I know what Direct Current Circuits means and some details ( )
   d. I know what Direct Current Circuits means and some details; and I have Read, Received Lesson(s) or Watched Media about Direct Current Circuits ( )
   e. I have EXPERIENCE with Direct Current Circuits such as (Work, Training, Hobby, School Lab, or Personal). ( )

2. What is your prior work experience with (Direct Current Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

3. What is your prior educational experience with (Direct Current Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

4. What is your prior personal or recreational experience with (Direct Current Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )
5. What is your prior EXPERIENCE LEVEL with (Parallel and/or Series Circuits)?
   a. None. (completely new / never heard of before the Marine Corps) ( )
   b. I only know what Parallel / Series Circuits means (NOT the details about it) ( )
   c. I know what Parallel / Series Circuits means and some details ( )
   d. I know what Parallel / Series Circuits means and some details; and I have Read, Received Lesson(s) or Watched Media about Parallel / Series Circuits ( )
   e. I have EXPERIENCE with Parallel / Series Circuits such as (Work, Training, Hobby, School Lab, or Personal). ( )

6. What is your prior work experience with (Parallel and/or Series Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

7. What is your prior educational experience with (Parallel and/or Series Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

8. What is your prior personal or recreational experience with (Parallel and/or Series Circuits)?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

9. What is your prior EXPERIENCE LEVEL with (Measuring with a Multimeter)?
   a. None. (completely new / never heard of before the Marine Corps) ( )
   b. I only know what Measuring with a Multimeter means (NOT the details about it) ( )
   c. I know what Measuring with a Multimeter means and some details ( )
   d. I know what Measuring with a Multimeter means and some details; and I have Read, Received Lesson(s) or Watched Media about Measuring with a Multimeter ( )
e. I have **EXPERIENCE** with **Measuring with a Multimeter** such as (Work, Training, Hobby, School Lab, or Personal).

10. What is your prior **work** experience with **(Measuring with a Multimeter)**?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (read literature, received training) (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

11. What is your prior **educational experience** with **(Measuring with a Multimeter)**?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

12. What is your prior **personal** or **recreational** experience with **(Measuring with a Multimeter)**?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

13. What is your prior **EXPERIENCE LEVEL** with **(Ohm’s Law)**?
   a. None. (completely new / never heard of before the Marine Corps) (_)
   b. I only know what **Ohm’s Law** means (NOT the details about it) (_)
   c. I know what **Ohm’s Law** means and some details (_)
   d. I know what **Ohm’s Law** means and some details; and I have Read, Received Lesson(s) or Watched Media about **Ohm’s Law** (_)
   e. I have **EXPERIENCE** with **Ohm’s Law** such as (Work, Training, Hobby, School Lab, or Personal). (_)

14. What is your prior **work** experience with **(Ohm’s Law)**?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (read literature, received training) (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

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15. What is your prior educational experience with (Ohm’s Law)?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

16. What is your prior personal or recreational experience with (Ohm’s Law)?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

17. Please rate your Math ability on a scale of 1-10; “1” being the lowest and “10” being the highest.

   1  2  3  4  5  6  7  8  9  10

18. Please rate your Reading ability on a scale of 1-10; “1” being the lowest and “10” being the highest.

   1  2  3  4  5  6  7  8  9  10

19. What was your High School GPA or college if attended? (Estimate if needed).

   __________________________

Please list any other experience related to Direct Current Circuits, Batteries, Switches, Variable Resistors, Power, and Troubleshooting Circuits

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STOP

DO NOT COMPLETE THE FOLLOWING PAGES

UNTIL AFTER COMPLETING INSTRUCTION AND TESTING

FOR DC-FUNDAMENTALS first annex
Post Test survey

What score did you receive on the DC Fundaments Practical Application test. 


What score did you receive on the DC Fundaments Written test. 


What score did you receive for the DC Fundaments annex. 


8. What is your opinion of how your prior EXPERIENCE LEVEL with (Direct Current Circuits) influenced (helped or hurt) your learning?
   f. None. (___)
   g. Very little or limited (___)
   h. Moderate or average (___)
   i. Significant above average (read literature, received training) (___)
   j. Very experienced or expert (tested, certified, qualified) (___)
   EXPLAIN_____________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________


9. What is your opinion of how your prior work experience or training with (Direct Current Circuits) influenced (helped or hurt) your learning?
   a. None. (___)
   b. Very little or limited (___)
   c. Moderate or average (___)
   d. Significant above average (read literature, received training) (___)
   e. Very experienced or expert (tested, certified, qualified) (___)

10. What is your opinion of how your prior educational experience with (Direct Current Circuits) influenced (helped or hurt) your learning?
    a. None. (___)
    b. Very little or limited (___)
    c. Moderate or average (___)
    d. Significant above average (___)
    e. Very experienced or expert (tested, certified, qualified) (___)
11. What is your opinion of how your prior personal or recreational experience with \(\text{(Direct Current Circuits)}\) influenced (helped or hurt) your learning?

a. None. 
   
   b. Very little or limited 
   
   c. Moderate or average 
   
   d. Significant above average 
   
   e. Very experienced or expert (tested, certified, qualified) 

12. What is your opinion of how your prior EXPERIENCE LEVEL with \(\text{(Parallel and/or Series Circuits)}\) influenced (helped or hurt) your learning?

   f. None. 
   
   g. Very little or limited 
   
   h. Moderate or average 
   
   i. Significant above average (read literature, received training) 
   
   j. Very experienced or expert (tested, certified, qualified) 

EXPLAIN______________________________________________________

_______________________________________________________________

13. What is your opinion of how your prior work experience or training with \(\text{(Parallel and/or Series Circuits)}\) influenced (helped or hurt) your learning?

   a. None. 
   
   b. Very little or limited 
   
   c. Moderate or average 
   
   d. Significant above average (read literature, received training) 
   
   e. Very experienced or expert (tested, certified, qualified) 

14. What is your opinion of how your prior educational experience with \(\text{(Parallel and/or Series Circuits)}\) influenced (helped or hurt) your learning?

   a. None. 
   
   b. Very little or limited 
   
   c. Moderate or average 
   
   d. Significant above average 
   
   e. Very experienced or expert (tested, certified, qualified) 

15. What is your opinion of how your prior personal or recreational experience with \(\text{(Parallel and/or Series Circuits)}\) influenced (helped or hurt) your learning?

   a. None. 
   
   b. Very little or limited 
   
   c. Moderate or average 
   
   d. Significant above average 
   
   e. Very experienced or expert (tested, certified, qualified)
16. What is your opinion of how your prior EXPERIENCE LEVEL with (Measuring with a Multimeter) influenced (helped or hurt) your learning?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (read literature, received training) (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

EXPLAIN______________________________________________________
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17. What is your opinion of how your prior work experience or training with (Measuring with a Multimeter) influenced (helped or hurt) your learning?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (read literature, received training) (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

18. What is your opinion of how your prior educational experience with (Measuring with a Multimeter) influenced (helped or hurt) your learning?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (_)

19. What is your opinion of how your prior personal or recreational experience with (Measuring with a Multimeter) influenced (helped or hurt) your learning?
   a. None. (_)
   b. Very little or limited (_)
   c. Moderate or average (_)
   d. Significant above average (_)
   e. Very experienced or expert (tested, certified, qualified) (___)
20. What is your opinion of how your prior EXPERIENCE LEVEL with (Ohm’s Law) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

EXPLAIN______________________________________________________
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21. What is your opinion of how your prior work experience or training with (Ohm’s Law) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average (read literature, received training) ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

22. What is your opinion of how your prior educational experience with (Ohm’s Law) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )

23. What is your opinion of how your prior personal or recreational experience with (Ohm’s Law) influenced (helped or hurt) your learning?
   a. None. ( )
   b. Very little or limited ( )
   c. Moderate or average ( )
   d. Significant above average ( )
   e. Very experienced or expert (tested, certified, qualified) ( )
Please provide any additional comments, ideas, or information that may be beneficial to the researcher in understanding how previous experiences influence learning.

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Demographics

9. What is the highest grade or year of school you have completed?
   a. 11th Grade or less
   b. Grade 12 or GED (High school graduate)
   c. College 1 Semester through 2 years (Some college or technical school)
   d. College 3 years to 4 years (College graduate)

10. What is your previous work experience before entering the Armed Forces?
    (include only employment lasting 3 months or longer)
    a. I have worked full time (40 Hrs./week or more)
    b. I have worked part time (approximately 20 Hrs./Week)
    c. I have worked less than part time (paper route, other)
    d. I have not been employed before the Armed Forces

11. How do you describe yourself? (please check the one option the best describes you)
    a. American Indian or Alaska Native
    b. Native Hawaiian or Other Pacific Islander
    c. Asian or Asian American
    d. Black or African American
    e. Hispanic or Latino
    f. Non-Hispanic White

12. What is your sex?
    a. Female
    b. Male

13. What is your age?
    a. Enter the month and year of your birth, _____/_____

14. Have you ever been a member of Boy Scouts, Girl Scouts, or a similar organization, if so how many years?
    a. Less than 1 year
    b. 1 year to 3 years
    c. 3 years or more

15. Have you ever participated in organized team sports such as Football, Soccer, or Swimming?
    a. Less than 1 season/year
    b. 1 season/year through 3 seasons/years
    c. 3 seasons/years through 5 seasons/years
    d. 5 seasons/years or more
16. Have you ever participated in 2 or more team sports such as Football, Soccer, or Swimming at the same time or during the same year?
   a. Less than 1 season/year
   b. 1 season/year through 3 seasons/years
   c. 3 seasons/years through 5 seasons/years
   d. 5 seasons/years or more

THANK YOU FOR PARTICIPATING IN THIS STUDY