DISSERTATION

DEVELOPMENT OF THE CONSTRUCTION TRAINING ATTITUDES AND INTENTIONS SCALE

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ABSTRACT

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The events of the Great Recession (2007-2009) have resulted in high unemployment and underemployment rates in the United States and abroad. The plight of domestic young adults, particularly young men with few work-related skills, is evident. Failing to receive a first job has long-term negative consequences for these individuals and their families. In the United States, job opportunities exist for properly trained individuals in the construction industry, which is currently experiencing a shortage of skilled labor. Recognition of the unemployment situation and job opportunity in new construction, renovation, and maintenance of existing infrastructure has led to the creation of publicly funded construction skills training programs that target young adults (16-24 years). However, despite the great deal of effort and funding, participant retention is a significant problem and dropout rates ranging between 45-65% have been reported. Training practitioners posit that no model exists for predicting performance and attrition of individuals in training and express the desire for a metric that measures individual characteristics to better inform individual training successes.

A review of literature revealed no instrument for predicting performance, completion, or attrition of the unemployed in training. Therefore, the purpose of this dissertation was to develop an internally consistent and valid instrument that measures the appropriate constructs to inform and predict human behavior within the domain of construction training for the unemployed. The resulting instrument, the Construction Training Attitudes and Intentions Scale (CTAIS), was developed through two phases.

The CTAIS was complete by construction management undergraduate students (N = 247) during phase one. The purpose of phase one was to reduce the number of CTAIS items (N = 98) using inter-item correlations and exploratory factor analysis (EFA). An evaluation of the internal consistency and validity was conducted on the reduced pool of CTAIS items. Phase one resulted in a 44-items CTAIS, which contain four emergent factors: planned training behavior (PTB), construction training self-efficacy (CTSE), training motivation attitudes (TMA), and training locus of control (TLOC). The CTAIS and its factors PTB, CTSE, TMA, and TLOC were found to be internally consistent ($\alpha = 0.926$, 0.943, 0.942, 0.941, and 0.829, respectively). Face and convergent construct validity were shown through significant ($p < 0.01$) correlations between the emergent factors that mirrored those found in previous construct validation research.

The 44-item CTAIS was administered during phase two to a separate group of undergraduate construction management students (N = 174). The internal consistency of the 44-item CTAIS ($\alpha = 0.902$) and PTB, CTSE, TMA, and TLOC factors ($\alpha = 0.909$, 0.950, 0.925, and 0.832, respectively) were confirmed in phase two. Significant ($p < 0.01$) correlations between the emergent factors mirrored those found in phase one and previous construct validation research, providing further support for the face and convergent construct validity of the CTAIS.

Supplemental analysis was performed using the phase-two data to investigate difference in mean PTB, CTSE, TMA and TLOC by the demographic characteristics of the sample. The results revealed significant differences in mean PTB, CTSE, and TMA ($p < 0.001$, $p = 0.008$, and 0.032, respectively) by gender and in mean PTB and CTSE ($p = 0.027$ and 0.019, respectively) by hands-on construction experience (dichotomous, experiences/no experience). ANOVA yielded significant differences in mean PTB and CTSE by age ($p < 0.001$ and $p = 0.01$, respectively) and mean PTB by level of hands-on experience ($p = 0.03$). However, it was noted

in the post-hoc analysis that these differences were considered statistical artifacts due to the small and unbalanced sample sizes and overlapping confidence intervals around the means. No significant differences ($p \geq 0.05$) were found between young adults (24 years and younger) and adults (25 years and older) or by respondent year in school, amount of construction management experience, participation in construction management competitions or internships. No significant differences ($p \geq 0.05$) in TLOC were found in the supplemental analysis.

The CTAIS developed and validated through this study allows training organizations to quantitatively measure and evaluate construction domain level characteristics that have been shown in research to predict performance in work setting and attendance in educational settings. Identification of participant characteristics, which contribute to attrition and performance in construction training, can assist training organizations in programmatic decision-making. Pre-training assessment of trainees allows practitioners to make informed decisions, at the individual level, about appropriate interventions to increase the likelihood of training success. The CTAIS, when administered at pre- and post-training intervals, provides trainers with a measure of individual characteristics that indicate training successes. High self-efficacy and motivation are predictive of persistence in job search activities and on-the-job performance. Therefore, higher post-training CTSE and TMA are indicators of training program effectiveness. The utility of the CTAIS can be enhanced with refinements based on its application in a variety of construction training programs.

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DEFINITION OF TERMS

Attitudes: The degree to which a person has a favorable or unfavorable evaluation or appraisal of a specific behavior (Ajzen, 1991).

Construction Training: A training intervention that focuses on improving or providing individuals with the needed skills to completed construction-related tasks.

Employment Training: Training programs intended to employ, or reemploy, an individual via skills gained through successful training program completion (Weigensberg et al., 2012). Employment training can be either general or career-specific training; the former provides skills that apply to many employers, while the latter provides specific skills that contribute to employment within a given industry (King, 2004).

Intention: Perceived ease or difficulty of performing a behavior that reflects past experience as well as anticipated impediments and obstacles (Ajzen, 1991).

Locus of Control: A generalized expectancy that rewards, reinforcements, or outcomes in life are controlled either by one's own actions (internality) or by other forces (externality). For Work Locus of Control in organizational settings, rewards or outcomes include promotions, favorable circumstances, salary increases, and general career advancement. (Rotter, 1990; Spector, 1988)

Motivated Behavior: A behavior intended to accomplish a particular end or purpose (Eagle, 2011)

Motive/Motivation: An individual's reason(s) for carrying out an action (Eagle, 2011).

Perceived Behavior Control: A person's perception of the ease or difficulty of performing a behavior of interest (Ajzen, 1991).

Self-Efficacy: One's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance (Bandura, 1986)

Subjective Norms: Perceived social pressure to perform or not to perform a behavior (Ajzen, 1991).

Training: A systematic process or intervention intended to enhance the knowledge, skills, and abilities of an individual to increase performance in a work setting (Holladay & Quiñones, 2003; Tabassi & Bakar, 2008)

Young Adult: An individual between the ages of 16-24 years. (United States Department of Labor, 2009)

CHAPTER 1: INTRODUCTION

Providing an adequate supply of jobs to support and sustain economic growth is a major challenge worldwide (International Monetary Fund & International Labour Organization, 2010). The financial crisis of 2007-2009 (the Great Recession) resulted in an increase of 30 million unemployed individuals during that timeframe (Wanberg, 2011). Since 2007, unemployment rate increases have been the most severe in the United States, New Zealand, Spain, and Taiwan with staggering unemployment levels of 20.6% in Spain (Felland, Cunningham, Cohen, November, & Quinn, 2010; International Monetary Fund & International Labour Organization, 2010; Wanberg, 2011). Globally, young adults (ages 16-24) are three times more likely to be unemployed than older adults (International Labour Organization, 2012) and the extremely limited employment opportunities for young men is evident among all unemployed persons (Haveman, Heinrich, & Smeeding, 2012). Individuals who report being jobless for an entire year are generally the disadvantaged, out-of-school, low-income, young adults who are in most need of employment (Sum, Khatiwada, McLaughlin, & Palma, 2011). For these young adults, the failure to receive a first job has long-term negative societal consequences (International Monetary Fund & International Labour Organization, 2010).

High young-adult unemployment rates in the United States (US), 19.6% in 2010 (United States Congress Joint Ecomnomic Committee, 2010), are not solely the result of limited employment opportunities, but also commonly reflect inadequate schooling and deficient basic skills (Haveman et al., 2012). In recent years, a significant numbers of jobs have been added to the labor market as a result of technical skills training (Hemphill & Perry, 2012). According to the US Department of Labor's Employment and Training Administration (2007, p. 23) "As the

demand for workers with specialized skills and training grows, some economists fear that America is facing a "skills gap", a situation in which the demand by employers for skilled workers outpaces supply". Construction is an industry sector facing a shortage of skilled workers (Brummett & Nobe, 2009) and has the capacity to employ properly trained individuals.

The Associated General Contractors of America (2012) reported that 171 of 337 metropolitan areas in the US reported increases in construction employment between February of 2011 and February of 2012. Of the remaining metropolitan areas, 47 maintained the same number and 119 reported decreases in construction jobs. While the construction industry represents 4.7% of the total national employment, it was responsible for more than 40% of the fluctuation in national job placement between 2007 and 2011, double that of any other industry. This indicates that construction-based employment, while volatile, has the potential to quickly employ individuals post-recession (Smith, Faberman, & Haltiwanger, 2012).

Construction has the potential to employ trained individuals in new building erection, remodeling, renovation, and maintenance of existing infrastructure. Several US governmental agencies and training organization including Denver Colorado's Regional Transportation District (2012) and the Los Angeles' Alliance for a New Economy (2011) report that the transportation and energy sectors, which includes construction, hold great potential for increasing employment. Moreover, the events of the Great Recession have provided the United States with the unique opportunity to simultaneously address economic, environment, and equity concerns through the creation and promotion of environmentally friendly employment opportunities (Crowe, Levine, & Sanchez, 2009). Accordingly, funding of the American Recovery and Reinvestment Act (ARRA) of 2009 was designated to promote employment training in the construction fields

related to building weatherization, sustainable energy production, and infrastructure creation (United States Congress, 2009).

Recognition of the plight of unemployed young adults and the existence of job opportunities in the construction industry has led to the creation of construction employment skills training programs which target this group. According to Holliday and Quinones (2003, p. 1094), "The ultimate goal of training is to enhance the knowledge, skills, and abilities of an individual, which will lead to an increase in performance in the work setting". Weigensberg et al. (2012) note that a common goal among training programs is the (re)employment of individuals via skills gained through successful program completion. Within the US, a great deal of time and resources ($18 billion in 2009) are being invested in training initiatives aimed at helping domestic low-income and unemployed individuals. Across all programs, the most frequently targeted populations are Native Americans, veterans, and youth (United States Government Accountability Office, 2011).

Despite private and federally funded initiatives to encourage participation, young adult employment training programs experience significant challenges in participant retention (Ginsburg et al., 2000; Sabates, 2008). The US Department of Labor's (2011) audit of the Employment and Training Administration's Youthbuild construction training program reported an attrition rate of 47.9% in 2010. The Texas Workforce Commission (2001) reported that the Texas Job Corps training program's non-completion rate was over 65% in 2000. Across the US, a survey of over 340,000 Job Corps participants (ages 16-24 years) indicated that 14% dropped out within 30 days and 35% within 90 days of starting the employment training program (Ginsburg et al., 2000). In fact, the effectiveness of training programs is often gauged solely on the outcomes of participants who complete the program ("exiters") without reference to the

percentage of enrollees who do not complete the training, that is, the attrition rate. Ginsburg et al. (2000, p. 1), succinctly address the vulnerability of young adults to training dropout:

> It is clear that disenfranchised youth – whether through socioeconomic or more personal circumstances – are at greatest risk for (training) dropout. Within this cohort, those youth with negative life experiences, a lack of positive influential role models, low self-esteem, and an external locus of control (feeling that one's life is out of one's hands) are more attrition prone.

Young Adult Training Program Evaluation

According to Weigensberg et al. (2012), training practitioners recognize that effectiveness of employment training programs for young adults needs to be improved to encourage participant success. Weigensberg and colleagues note that training organizations commonly expend significant resources to collect participant "intake data" including demographics and education levels, as well as subjective information such as participant goals, motivations, and challenges. However, empirical comparison of intake data with training outcomes is limited, and merely collecting of such intake data does not necessarily reduce program attrition rates. Ginsburg et al. (2000, p. 2) state that no training assessment report has produced a highly predictive attrition model based on easily measured characteristics and "…this suggests that unmeasured factors [in their study] such as attitude, motivation, personal program experience, or events that occur outside of the program, are the key, but incalculable, factors that affect length of stay". In a more recent study by Weigenberg et al. (2012), training practitioners report a need to gain a more complete picture of each participant's individual characteristics to gauge individual training successes.

Ginsberg et al. (2000, p. 6) found that a young-adult trainee's commitment, attitude, motivation, and confidence were paramount in determining whether students complete or drop out of training. In addition, they posit that confidence building is a critical factor in the success

of young adult employment training programs; “Students who lack confidence will choose to leave the [training] program to save face, rather than taking the risk of experiencing a failure” and “reinforcing areas of competence gives an individual the needed confidence to confront future challenges”. Therefore, the role of individual characteristics (self-confidence, self-efficacy, attitudes, motivation, etc.) should be empirically investigated in an attempt to shed light on their role in young-adult performance in, completion of, and attrition from training programs.

Research Problem

A review of literature revealed that assessments of the effectiveness of employment training programs for young-adult populations need to be improved (Weigensberg et al., 2012). Despite the large number of young-adult employment training programs, their effectiveness has been questioned by researchers and evidence suggests that the positive results of these programs may be short-term, negligible, or even non-existent (Heinrich & Holzer, 2011). However, for an objective appraisal, one must consider the metrics used to gauge training program success. A survey of employment training program practitioners (Weigensberg et al., 2012, p. 19) found broad agreement for the “need to track more comprehensive and meaningful outcome measures that better reflect participant accomplishments, progress, and program impact”. While training programs collect and sometimes track participant outcomes, the typical metrics of program *success* emphasize the goals of the funding initiatives and focus on employment outcomes such as gaining a job, job retention, wage increases, and cost per participant. In light of these metrics, the practitioners surveyed by Weigensberg and her colleagues (2012) recognized that more comprehensive and valid measures of training success should include the analysis of individual participant characteristics.

According to Mathieu, Tannenbaum, and Salas (1992, p. 282) "to maximize the benefits of training, researchers and practitioners must know more than whether [the training] worked. Many authors have called for greater attention to why training worked". Empirical investigations of factors influencing training performance outcomes are not new. Training research has taken several approaches in identifying and determining metrics by which to evaluate, predict, and correlate individual and situational variables with training performance and outcomes (Colquitt, LePine, & Noe, 2000; Tracey, Hinkin, Tannenbaum, & Mathieu, 2001). In general, however, employment skills training studies have focused on samples of currently employed individuals participating in diverse forms of occupational training. A review of literature indicated that little investigative attention has been given to the relationships among the characteristics of unemployed young-adult populations and training performance, completion, and attrition. No research instrument tailored to the domain of construction training, to the unemployed, or to first-job-seeking young-adult trainees, has apparently been developed. Without a reliable and validated instrument measuring construction training domain-level constructs, one cannot hope to understand and address the high attrition rates that plague young-adult employment skills training programs.

Purpose Statement and Research Questions

The purpose of the study was to identify the appropriate constructs found in the literature to be included in an instrument that informs and predicts performance, completion, and attrition in training and educational settings. Using this information, the goal was to develop and validate a reliable survey instrument that measures these constructs among the unemployed participating in construction training. The instrument developed through this study was entitled The Construction Training Attitudes and Intentions Scale (CTAIS).

The development of the CTAIS was framed by addressing the following research questions:

1. What are the constructs to be included in a questionnaire that informs and predicts performance, completion, and attrition behaviors of unemployed individuals participating in construction training?

2. To what extent is the CTAIS reliable?

3. To what extent is the CTAIS valid?

4. Based on the validated questionnaire, is there a difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no construction management experience?

Significance of the Study

According to Tannenbaum and Yukl (1992) research on trainee characteristics has focused more on selecting trainees who will successfully complete training and less on placing individuals into appropriate training programs. Moreover they posit that revising training to match trainee attributes or understanding how trainee characteristics influence training effectiveness are important areas of research. Identifying participant characteristics that contribute to completion, attrition, and performance in occupational training programs for the unemployed can be used to assist training organizations in programmatic decision-making. Pre-training identification of individuals who are less likely to complete training programs based on individual characteristics will allow training organizations to more judiciously allocate scarce training resources and more effectively meet individual trainee needs. Results of the present

research will benefit training participants as training organizations implement appropriate interventions to increase training performance and the likelihood of program completion. For example, identification of training participants with low pre-training confidence or motivation signals the need for pre-training interventions that boost confidence or motivation prior to program enrollment. Eden and Aviram (1993) have shown that an individual's confidence level can be elevated through self-efficacy boosting interventions, which presumably increase a participant's likelihood to successfully complete training. Moreover, high levels of self-efficacy are particularly important for the unemployed, because the efficacious unemployed are more likely to persist in searching for employment in the face of adversity and setbacks (Creed, Bloxsome, & Johnston, 2001). The instrument developed through this study will allow training organizations to quantitatively measure and evaluate individual trainee characteristics, and in turn, make informed decisions about appropriate training interventions at the individual level.

Research Approach

A quantitative analysis approach was used to address the research questions. The literature was reviewed to identify constructs found in previous occupational, educational, and employment research that inform training behaviors and outcomes. The identified constructs were adapted for potential use within samples of unemployed individuals and the domain of construction training. The pool of adapted survey items (N = 98) was administered in phase one to construction management students (N = 247) at Colorado State University and the University of Nebraska Kearney. The purpose of phase one was to reduce the number of survey items through analysis of construct subscale inter-item correlations and exploratory factor analysis (EFA). In total, 54 items were removed in phase one yielding a 44-item CTAIS. Phase-one reliability coefficients (Cronbach's alphas) were calculated for all adapted construction subscales

as well as the CTAIS to determine internal consistency. The phase-one results were validated through EFA (face validity) and investigation of factor correlations in light of previous research (convergent construct validity).

The 44-item CTAIS was administered in phase two to a sample of students (N = 174) enrolled in construction management classes at Colorado State University. The phase-two sample contained different participants than phase one. The internal consistency and emergent factor correlations observed during phase one were confirmed using the phase-two data. The final research question was addressed through analysis of the phase-two data.

Delimitations

This dissertation is framed around the concept of psychological constructs adapted for use within the domain of construction training. The study sample, college students enrolled in construction management courses at two universities, was used to develop the instrument and evaluate its internal consistency and validity. Limitations posed by the sample are discussed below and in chapter 5. The administration of the CTAIS to a sample of unemployed young adults is a recommended focus of further research and is outside the scope of the current study.

Assumptions and Limitations

Study results must be understood within the context of the underlying assumptions. The first assumption is that the psychological constructs identified as important predictors of work performance in employed individuals will also be important in predicting training behaviors in unemployed individuals. Further, it was assumed that perceptions of certain characteristics in training will translate to improvements in job search and work performance behaviors if a job is gained post-training. While the constructs selected for inclusion in the CTAIS have been shown to have differing level of universality in various samples, it is assumed that the instrument that

was shown to be reliable and valid within a sample of college students will be valid within a sample of unemployed trainees. The second assumption is that respondents answered the questions honestly. Course instructors did not administer the survey in the course they taught, nor could the survey responses be linked to individual participants. However, with these precautions, it is possible that participant felt that their responses could be connected to their class grades which may have influence their answers.

Several of the limitations of the study are rooted in its sample and design. The purpose was to develop and determine the internal consistency reliability and validity of an instrument that could be applied to various populations. The convenience sample limited generalizability of the finding to other target populations, including unemployed individuals participating in construction training. However it is noted the inferring the result found in the study sample to the target population of unemployed individual is not recommended and not the purpose of this instrument development study. The design of the study did not allow for evaluation of criterion-related validity because previously validated measure or performance metrics were not administered in conjunction with the CTAIS. A complete discussion regarding criterion-related instrument validation is provided in chapter 5. Another limitation arises from the solely quantitative nature of the instrument development process. Since the CTAIS was developed through the adaptation of existing valid measures informed from the literature, the instrument was not subjected to review by a panel of training practitioners prior to administration. However, the study sample and design were adequate for meeting the study purpose; namely, to develop an internally consistent and valid (face and convergent construct validity) instrument useful for measuring construction training domain-level constructs that are shown in

occupational and educational research to inform and predict performance, completion, and attrition.

Researcher's Perspective

The researcher has six years of experience in the construction industry and has been teaching undergraduate construction management courses for the past five years at Colorado State University. Currently, the researcher is the instructor of a construction estimating course. For construction experience the researcher has worked in the field in hands-on settings as a laborer and carpenter and in the project management role on large commercial office building projects in urban settings.

From a research perspective, the author has been privileged to contribute to several federal and privately funded workforce development initiatives that focus on providing unemployed individuals with marketable skills and job opportunities in construction trades and management. It is from this experience that the researcher conducts this dissertation with the desire to contribute a useful, reliable, and valid instrument to the field. Is it the sincere hope of the researcher that the CTAIS can be used as a tool to better serve trainees by allowing practitioners to better align participant needs with training services. The ultimate goal is to provide data that are helpful in increasing training performance and reducing construction training program attrition so that trainees find fulfilling and sustainable employment.

CHAPTER 2: REVIEW OF LITERATURE

The chapter provides a review of the literature which frames the study need and objective: to develop an instrument that measures the constructs shown in research to inform human behavior (performance, completion, and attrition) within the domain of construction training. The intent of this chapter was to answer the first research question.

1. What are the constructs to be included in a questionnaire that informs and predicts the performance, completion, and attrition behaviors of unemployed individuals participating in construction training?

This chapter begins with a review of unemployment, the characteristics of unemployed persons, and employment opportunities in the construction industry. Next, existing construction training programs, attrition rates, and the need for evaluative training metrics which identify individual trainee characteristics and predict participant successes are discussed. The main thrust of the review focuses on identifying and describing the appropriate constructs for achieving the study objective and answering research question one. The constructs identified were self-efficacy, locus of control (LOC), and motivation, as well as the factors embedded in Ajzen's theory of planned behavior; planned behavioral control (PBC), intentions, subjective norms, and attitudes. The constructs are described including a brief discussion of their history and development. The review was focused on each construct's theoretical framework and pertinence to occupation training interventions and the unemployed.

Unemployment

The overall unemployment rate, which has been reported as high as 10% in the US (Felland et al., 2010) during the recession of 2007-2009 (Great Recession), is often the sole statistic used to gauge the health of the employment market. However, according to Haveman, Heinrich, and Smeeding (2012), overall unemployment rates mask our most serious unemployment situation; that of working-age men with modest education and few job-related skills. This vulnerable population is increasingly unemployed, underemployed, or out of the labor force. A very steep decline in employment was seen in the young-adult population (ages 16-24) during and after the Great Recession (McLaughlin, 2011). Economists note that inadequate schooling and deficient basic skills are common factors in unemployment (Haveman et al., 2012). The dire situation of unskilled young workers is succinctly address by Jenkins, Brandolini, Micklewright, and Nolan (2011, p. 19)

> An extended period of high unemployment [also] threatens to have long-term consequences. Rising poverty, especially among young jobless adults and families, is permanently scarring the futures of millions of unemployed younger (under age 30) unskilled adults. Unless short-term action is taken to improve employment prospects for these particular workers, and to support the incomes of their children as we come out of the recession, poverty will remain high among this group…These individuals need more-productive skills than they have at this time, given their current levels of education and human capital.

Since the Great Recession, the number of dislocated workers has greatly increased from 4.8% (266,391) in 2000 to 15.3% (1,147,812) in 2010 (McLaughlin, 2011; United States Department of Labor, 2010). Decreases in the unemployment rates and addition of significant numbers of jobs to the labor market have resulted from technical skills training (Hemphill & Perry, 2012). The Associated General Contractors of America (2012) indicated that 171 of 337 metropolitan areas in the US reported increases in construction jobs between February of 2011

and February of 2012. Of the remaining metropolitan areas, 47 maintained the same number and 119 reported decreases in construction jobs. Beyond new building construction, employment opportunities for trained individuals include remodeling, renovation, and maintenance of existing infrastructure.

Government agencies and training organization (Denver Regional Transportation District, 2012; Los Angeles Alliance for a New Economy, 2011) identify the transportation and energy sectors, including construction, as holding great potential for increasing employment. The US government recognizes the need for recovery from the Great Recession as demonstrated through the creation and enactment of the American Recovery and Reinvestment Act (ARRA) of 2009. Enacted in February of 2009, the ARRA has a primary goal of creating new and saving existing jobs through targeting the development and enhancement of infrastructure. The Act identifies the goals of assisting those most impacted by the recession through investment in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits (United States Congress, 2009). Accordingly, a portion of this funding is designated to promote employment training in the construction fields related to building weatherization, sustainable energy production, and infrastructure creation.

Employment Training

According to Holliday and Quinones (2003, p. 1094), "The ultimate goal of training is to enhance the knowledge, skills, and abilities of individuals, which will lead to an increase in performance in the work setting". Weigensberg et al. (2012) note that a common goal among training programs is the employment and/or reemployment of individuals via skills gained through successful program completion. According to King (2004), employment training can take many forms but is broadly divided into two basic categories: general and career-specific

training. The former provides skills that apply to many employers, while the latter provides specific skills that contribute to employment within a given market.

Within the US a great deal of time and resources are invested in publicly-funding training initiatives aimed at helping domestic low-income and unemployed individuals find jobs. According to the US Government Accountability Office (2011), there were 47 federally funded employment and training programs administered in 2009 across nine agencies including the United States Departments of Labor (USDOL), Health and Human Services (USDHHS), and Education (USDOE). During fiscal year 2009, these programs reported spending $18 billion on employment assistance and training services. Across all programs the most frequently targeted populations were Native Americans, veterans, and youth.

Evaluative Metrics for Employment Training Success

Workforce development and training programs are multifaceted, consisting of publicly and privately funded training organizations, and provide services to participants of widely varying skill levels. While training organizations generally aim to employ or reemploy individuals through skills gained via successful training program completion, the diverse nature of the programs and participants produce varying levels of success (Weigensberg et al., 2012). In general, training programs collect data with the intent of measuring participant success. However, like training methods and practice, evaluative metrics for defining success are diverse. According to Weigensberg et al. (2012), training organizations attempt to gather as much participant pre-training data as possible including demographics, level of education, professional history, family and housing composition, criminal history, and subjective information regarding participants' goals, motivations, challenges, and barriers to employment. Pre-training data are used during the screening process to align participant needs with program offerings and assess

participant likelihood for program completion and success. However, while training organizations collect pre-training data, correlations of participant performance and attrition statistics are rarely made (Weigensberg et al., 2012).

Even after pre-training data have been collected to identify trainee characteristics and likelihood for success, dropout rates remain high. According to Sabates (2008), a major problem evident in adult learning is the generally high attrition rate among participants from enrollment, to completion and achievement of the intended qualification. Research conducted on apprenticeship training programs in the construction industry reported attrition rates as high as 51.8% in a sample of 12,715 apprentice programs registered with the USDOL's Bureau of Apprenticeships and Training (Bilginsoy, 2003). It should be noted that apprenticeship programs generally require a long-term commitment from participants in comparison to short-term trainings; the average time in the program before drop out was 27 months in Bilginsoy's study.

While the long duration of apprenticeship programs may account for some of the dropout statistics, high attrition rates are also found in training program with shorter time commitments. USDOL Office of Inspector General's audit (2011) of the Employment and Training Administration's Youthbuild program indicated an attritions rate of 47.9% and the Texas Job Corps programs reported dropout rates of just over 65% (Texas Workforce Commission, 2001). On a national basis, a survey of over 340,000 Job Corps participants (ages 16-24) indicated that 14% dropped out within 30 days and 35% within 90 days of starting the employment training program (Ginsburg et al., 2000). In fact, many government evaluations of the effectiveness of training programs gauge success on the outcomes of participants who complete the program ("exiters") with no comparison made between program enrollees and exiters, that is, the attrition rate. Attrition from training represents a missed opportunity for participants to gain skills that

promote employment. Employment opportunities presumably provide jobs and income sources that can elevate the standard and quality of life for the individual and their families. Therefore, increasing trainee performance and reducing attrition rates are paramount to addressing unemployment and increasing training program success.

According to Mathieu, Tannenbaum, and Salas (1992, p. 282) "to maximize the benefits of training, researchers and practitioners must know more than whether it [training] worked. Many authors have called for greater attention to why training worked". Empirical investigations of factors influencing training performance outcomes are not new. Research in occupational training has taken various approaches to identify and determine metrics to evaluate, predict, and correlate individual and situational variables with training outcomes. The use of pre-training measures to predict individual behavior has received significant attention in the literature, however, many of the psychological measures were general in nature as opposed to domain or task-specific domains. The current study used this literature to develop and validate a survey instrument for measuring the characteristics of participants in the context that informs their performance, completion, and attrition within the domain of construction training.

Initial Construct Identification

Human behavior prediction has been the focus of psychoanalytic evaluation in various domains for many years. The initial step in this review was identification of constructs that have been studied and are pertinent to human behavior prediction within occupational and training domains. The constructs identified as influential in work and training settings were explored in greater depth to understand their origins, histories, and theoretical frameworks.

According to Barrick, Mount, and Li (2013), understanding and explaining occupational behavior at the individual level has been an objective of behavioral sciences for almost 100

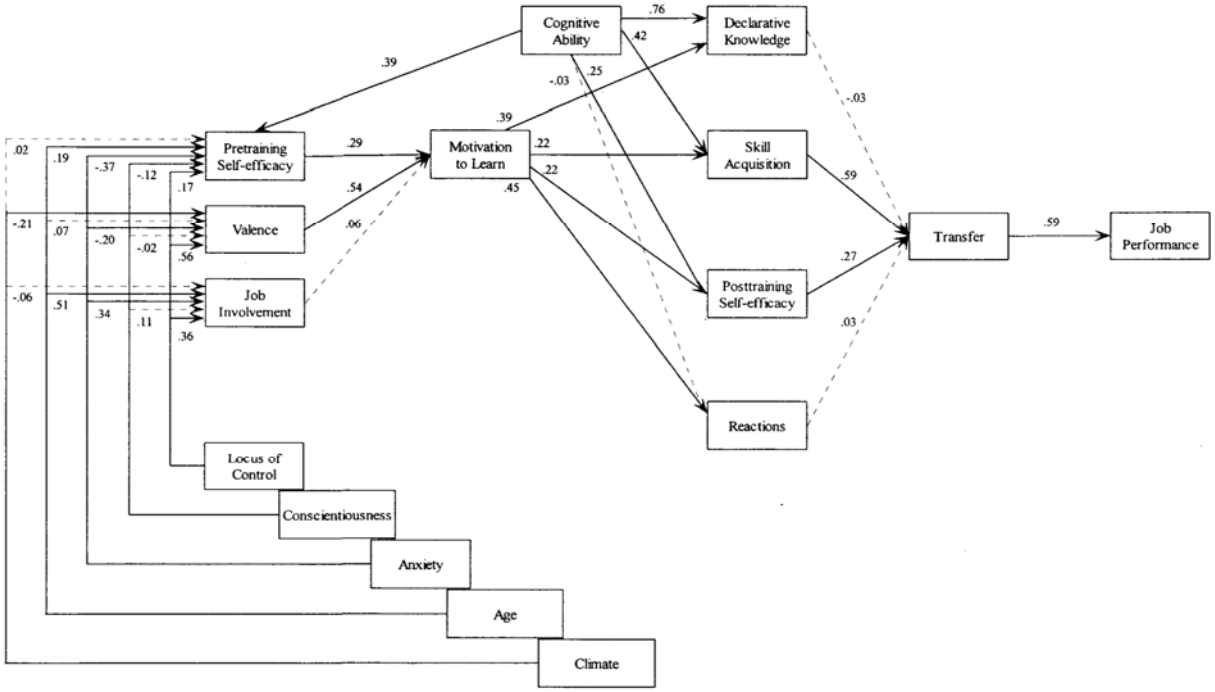
years. Noe and Schmidt (1986, p. 498) posit that "determining the specific individual characteristics that influence the effectiveness of training is of utmost importance in order to understand how to increase the likelihood that behavior change and performance improvement will result from participation in training programs." Ginsberg et al. (2000) and Weigensberg et al. (2012) identified that trainee's commitment, attitude, motivation, and confidence are of great importance in determining whether young adults complete or drop out of training. Others have predicted occupational training outcomes and skills transfer using locus of control (LOC), as well as training domain level self-efficacy and motivation (Colquitt et al., 2000; Martocchio & Judge, 1997; Noe, 1986; Noe & Schmitt, 1986; Noe & Wilk, 1993). Finally, Christian and Abrams (2004) and Fox and Spector (2010) found value in predicting human behavior in occupational and social program settings using the constructs (planned behavioral control (PBC), intention, norm, and attitudes) embedded in Ajzen's Theory of Planned Behavior (Ajzen, 1991).

The following paragraphs overview the connection between the constructs of interest; self-efficacy, LOC, and motivation which are embedded in Colquitt, LePine, and Noe's (2000) integrated theory of training behavior. Each construct was described, including its history, development, and empirical support. Next Ajzen's theory of planned behavior and its components; PBC, norms, intentions and attitudes are described. Finally, a discussion of the pertinence of these constructs in human behavior prediction within the domain of occupational training and/or education is presented.

Training Motivation, Self-Efficacy, and Locus of Control

Colquitt, LePine, and Noe's (2000) meta-analytic evaluation of training research identified a model (see Figure 1) by which training motivation, which leads to training outcomes, can be predicted through a series of individual and situational characteristics. Individual

variables such as trainee goals, levels of self-efficacy before, during, and after training, as well as LOC beliefs should be considered when investigating training program effectiveness (Holton, 2005; Mathieu & Martineau, 1993). Investigation of motivation to learn and transfer learned skills to a work domain, as well as their connection with social cognitive antecedents such as self-efficacy, represent a fruitful area of inquiry (Chiaburu & Lindsay, 2008).



.XX = correlation (r)
Solid lines represent significant correlations ($p < 0.05$), hashed line represent non-significant correlations

Figure 1: Colquitt, LePine, and Noe's (2001) Path Analysis of Fully Mediated Model of the Integrated Theory of Training Motivation

Several individual characteristics have been linked with motivation to train (MT). Anxiety with reduction in MT (Webster & Marrocchio, 1993) and internal LOC has been found to correlate with higher levels of MT (Noe, 1986; Noe & Schmitt, 1986). Colquitt et al. (2000) meta-analysis indicated which, and to what degree, individual characteristics play a role in influencing MT. In their training motivation model, they identified anxiety and LOC as

antecedents of self-efficacy and self-efficacy as an antecedent to MT. In turn, MT influences learning and the transfer of learned skills to occupational performance outcomes.

Self-Confidence Versus Self-Efficacy

Ginsburg et al. (2000) identified self-confidence as a factor of great importance in predicting training attrition. The terms self-efficacy and self-confidence are sometimes used interchangeably and while similar, they are not the same. Self-confidence refers to a person's judgment of their capabilities and skill, or their perceived competence, to deal successfully with the demands of a variety of situations (Shrauger & Schohn, 1995). Bandura (1977) succinctly defined self-efficacy as a set of attitudes about one's own competence to initiate behaviors and overcome obstacles. While self-confidence is an interesting personal trait, according to McCormick (2001, p. 23), "self-confidence is not a construct embedded in a validated theoretical system specifying its determinants, processes, and effects. Because of this, it has presented a problem for researchers interested in developing models of different kinds of human performance". While self-efficacy and self-confidence are not identical, they are highly associated constructs and it is plausible that self-efficacy can be substituted for self-confidence as done by others (Koen, Klehe, Van Vianen, Zikic, & Nauta, 2010; McCormick, 2001). Self-efficacy is embedded in the seminal work of Bandura's (1977, 1986, 1997) social cognitive theory (SCT).

Albert Bandura (1977) changed the direction of social and learning theory with his seminal publication "Self-efficacy: Toward a Unifying Theory of Behavioral Change". It was through this publication that Bandura first identified the important and missing element of self-belief as an influential factor in human behavior (Pajares, 2002b). Bandura continued to expand the theory and the concepts of self-regulation and self-efficacy through the early 1980s with his

writings on human agency. According the Bandura (1982, p. 1175), "Self-generated activities lie at the very heart of causal processes. They not only contribute to the meaning and valence of most external influences, but they also function as important proximal determinants of motivation and action". The idea that humans are proactive agents in their own development and have some measure of control over their beliefs, actions, and behaviors places humans in the position to affect or change their environments and social systems (Bandura, 1997; Pajares, 2002b). People with low levels of self-belief doubt their capabilities to change their circumstances in contrast to those with high levels of self-belief who exert more effort in their own personal development (Bandura, 1982).

Bandura's SCT operate under the premise that human behavior is simultaneously influenced by the interplay of personal, behavioral, and environment factors (Pajares & Usher, 2008). Bandura (1978, 1986) termed this triadic relationship "reciprocal determinism" (see Figure 2), which is the view that "(a) personal factors in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences create interactions that result in a triadic reciprocality" (Pajares & Usher, 2008, p. 392). The way individuals interpret the consequences of previous behavior, inform and modify their environment, and view their personal capabilities alter their subsequent behavior (Pajares, 2002b).

Social cognitive theory differs from other behavior theories because it postulates that environmental factors such as economic conditions, socioeconomic status, education and family structures do not directly affect human behavior; rather these factors influence an individual's self-efficacy beliefs, aspirations, and self-regulatory processes, which in turn influence human behavior (Pajares, 2002b). This concept is summarized by Pajares and Usher (2008, p. 394):

> Bandura's social cognitive theory stands in clear contrast to theories of human functioning that overemphasize the role that environmental factors play in the

development of human behavior and learning. Behaviorist theories, for example, show scant interest in self-processes because theorists assume that human functioning is caused by external stimuli. Because inner processes are viewed as transmitting rather than causing behavior, they are dismissed as a redundant factor in the cause and effect process of behavior and unworthy of psychological inquiry. For Bandura, a psychology without introspection cannot aspire to explain the complexities of human functioning.

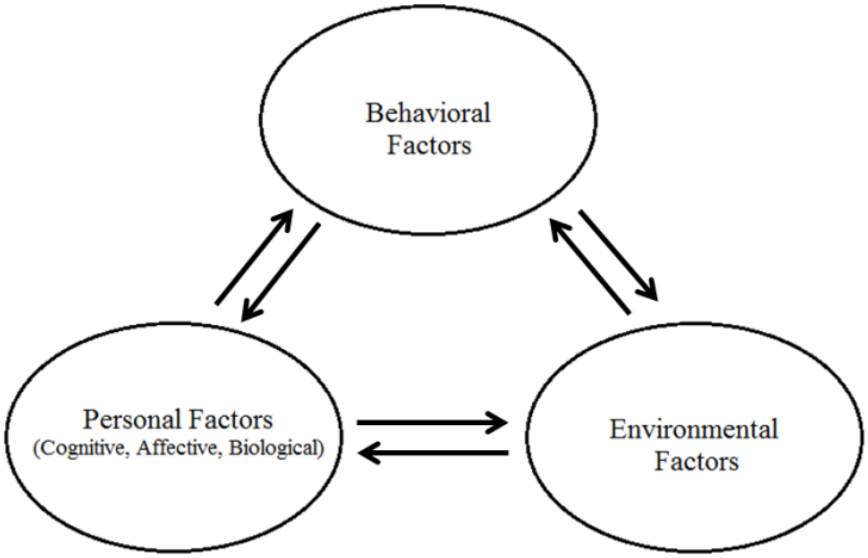


Figure 2: Bandura's (1986) Triadic Reciprocal Determinism Model

This is not to say that Bandura discounts the environment as an influential factor in human behavior, rather, SCT recognizes that environmental factors play a role in an individual's subsequent behavior after an experience. Bandura (2000) believed that humans are partly products of their environments, but because humans also actively select, create, and transform their circumstances they create their environments as well. Bandura posits that the environment influences human behavior through a mechanism of self-process and that behavior is not caused by environmental factors (Pajares, 2002b). Bandura (1978) further addresses this concept through his definition of reciprocal determinism, "the term determinism is used here to signify the production of effects by events, rather than in the doctrinal sense that actions are completely determined by a prior sequence of causes independent of the individual" and "in their

transactions with the environment, people are not simply reactors to external stimulation" (p.345).

In essence, humans are continually evaluating their self-concept and confidence to complete tasks (self-efficacy) through self-judgments and reflections on past performance. This self-process takes into account the influence of external conditions, such as low income, but it is not low income itself that directly hinders a person's performance. It is the internal process of self-evaluation that determines an individual's confidence and expectations for success. It is for these reasons that self-efficacy, perception of one's own competence to initiate behaviors and overcome obstacles, is an important cognitive measure to understand human behavior.

Self-Efficacy Theory

Self-efficacy, defined more specifically by Bandura (1986, p. 391), "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" plays a central and pivotal role within SCT (Bandura, 1997). Perceived self-efficacy is not a direct measure of skill level, but rather it measures an individual's beliefs about what he/she can accomplish under different sets of conditions with whatever skills they possess (Bandura, 1997). Self-efficacy beliefs comprise the foundation for individuals' motivation and level of personal accomplishment because the degree to which they can accomplish tasks is directly related to their incentive to act and obtain the desired outcome (Pajares, 2002b). According to Bandura (1997), an individual's level of motivation and actions are grounded more in what individuals believe they can accomplish (i.e., their self-efficacy) than what is objectively true about their capabilities. In turn, Pajares (2002) and Bandura (1997) contend a person's self-efficacy beliefs are often a better predictor of behavior than what they are actually capable of accomplishing. Individuals with the same skill level may achieve much different outcomes in the

same task based on their efficacy beliefs (Bandura, 1997) and "insidious self-doubt can easily overrule the best of skills"(p. 35). Highly efficacious people will likely persist in the face of obstacles and persevere in difficult situations to attain the expected outcome (success), whereas people who doubt their capabilities often quit, which confirms their expected outcome (failure) (Bandura, 1982).

In addition to application of effort, self-efficacy influences emotional reactions when approaching a difficult task; highly efficacious individuals experience a feeling of serenity while persons with low self-efficacy may envision tasks as more difficult than they really are, thereby eliciting feelings of stress or anxiety (Pajares, 2002b). Low self-efficacy belief is confirmed when expected outcome of failure is attained, this further lowers self-efficacy while increasing anxiety; the cycle leads to further failure as self-fulfilling prophecy (Eden & Kinnar, 1991; Pajares, 2002b). Strong self-efficacy beliefs are developed over long periods of time through multiple experiences making them highly predictable and resistant to change, whereas low self-efficacy beliefs are more susceptible to change and require frequent appraisal to serve as behavior predictors (Bandura, 1982).

Bandura (1977, 1997) proposes that one's self-efficacy is informed, gained, and reinforced through four primary sources: mastery experience, vicarious experience, verbal persuasion, and physiological states. The most influential source, mastery experience, is the personal completion of tasks in which success or failure informs one's confidence in subsequent experience. Vicarious experiences involve watching someone else successfully or unsuccessfully perform tasks. Verbal persuasion constitutes encouraging individuals by communicating that they have the capabilities to perform successfully. Lastly are individual physiological states. States of physiological arousal are a means by which people judge their levels of anxiety and

vulnerability to stress (Bandura, 1986). Strong emotional reactions to tasks, such as fear or anxiety, provide cues about anticipated success or failure and can trigger additional stressors that helps ensure inadequate performance in the feared task (Pajares, 2002b). According to Bandura (1997, p. 80), “enactive mastery produces stronger and more generalized efficacy beliefs than do modes of influence relying solely on vicarious experiences, cognitive simulations, or verbal instruction”.

It is noteworthy that Bandura’s sources of self-efficacy have the ability to increase and decrease the level of efficacy belief. For example, seeing a similarly competent person successfully perform a task will increase one’s self-efficacy level, while observing a similarly competent person fail will decrease it (Bandura, 1986). Verbal persuasion need to be used cautiously because “raising of unrealistic beliefs of personal competence only invites failures that will discredit the persuaders and will further undermine the recipient's perceived self-efficacy" (p. 401). Physiological state arousal (sick when nervous, for example) influence one’s level of anxiety and vulnerability, while treatments which eliminate emotional arousal to threats heighten perceived self-efficacy and performance (Bandura, 1986).

Behavior Prediction Using Self-Efficacy

Self-efficacy has received a great deal of attention since introduced by Bandura (1977), and it has been investigated in many fields as both a general and task-specific predictor of behavior and motivation. The versatility of self-efficacy is reflected in its wide usage in behavioral research such as parenting (Sanders & Woolley, 2005), smoking cessation (Perkins, Parzynski, Mercincavage, Conklin, & Fonte, 2012), academic performance (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011), weight lifting (Gilson, Chow, & Feltz, 2012), and career decision making (Bullock-Yowell, Andrews, & Buzzetta, 2011).

One of the early concerns about self-efficacy was its relationship with self-esteem. Although the two are similar and often correlated constructs, there are important differences. "Self-esteem usually is considered a trait reflecting an individual's characteristic, affective evaluation of the self (e.g., feelings of self-worth or self-liking). By contrast, self-efficacy is a judgment about task capability that is not inherently evaluative" (Gist & Mitchell, 1992, p. 185). Chen, Gully and Eden (2004) found for both upper-level undergraduate psychology students (n = 323) and customer service representatives (n = 165) self-esteem and self-efficacy were separate constructs with differing relationships to motivation. In their study, self-efficacy was significantly correlated more strongly with motivation than self-esteem in both samples.

Levels of Measuring Self-Efficacy

Self-efficacy can be assessed at three levels: the general (global) level without reference to a specific domain; the domain level assessing performances within a particular domain (such as occupational training), and the task-specific level measuring confidence in tasks under specified conditions (Sanders & Woolley, 2005). According to Miles and Maurer (2012, p. 25) "This is essentially a continuum of generality, with task-specific self-efficacy being very focused and specific, and general self-efficacy being very broad". More specific self-efficacy constructs are generally less stable and more susceptible to change while the broader construct is more stable and less susceptible to change.

Bandura (1986) cautioned researchers regarding misunderstanding of self-efficacy. He posits that the misuse of general, domain, and task-specific measures of self-efficacy in human behavior prediction can undermine study results. This concern was validated by Schwarzer et al. (1997), who reiterated that domain-level self-efficacy metrics are better than are general ones as predictors of behavior. Prominent psychologists (B. Zimmerman, 1996, as cited by Pajares 1996)

have reported that studies in self-efficacy research have been "plagued" by mismeasurement. The use of general self-efficacy measures to identify the relationships between self-efficacy and behavior (or expectations) have often been unsuccessful due to the lack of specificity of self-efficacy measurement, which weakens predictive value (Pajares, 1996). According to Bandura (1997, p. 49) "the optimal level of generality at which self-efficacy is assessed varies depending on what one seeks to predict and the degree of foreknowledge of the situational demands". Due to the varied focuses of occupational training programs, training domain level self-efficacy measurement is more convenient for this broad application, as task-specific metrics are unique and require customization (and validation) to specific training programs and tasks. According to Bandura (1997), self-efficacy assessments lose predictive power as they approach generality, but this has been and is often done for the sake of convenience.

Self-Efficacy in Employment and Training Settings

Perceptions of self-efficacy are linked to employment. According to Eden and Aviram (1993, p. 352), "self-esteem declines with job loss and is regained with reemployment" and "with self-esteem, self-efficacy declines as well, and the sense of impotence becomes a self-fulfilling prophecy as the chronically unemployed cease believing in their ability to regain employment." Thus, an understanding of the impacts of self-efficacy as reflected in confidence in finding and sustaining employment is an important topic for exploration.

Chen, Gully and Eden (2001) posit that an individual's self-efficacy is a predictor of several pivotal work-related outcomes, including training proficiency (Martocchio & Judge, 1997), job attitude (Saks, 1995), and job performance (Stajkovic & Luthans, 1998). High levels of self-efficacy are particularly important for the unemployed, because the efficacious person is more likely to persist in searching for employment in the face of adversity and setbacks (Creed et

al., 2001). An individual's self-efficacy is intertwined with employment, as a major portion of self-efficacy is derived from work (Eden & Aviram, 1993). According to Eden and Aviram (1993, p. 352), joblessness delivers a "devastating blow to self-concept" and "job loss caps a wellspring of self-efficacy."

According to Judge et al. (2007), self-efficacy has been used in nearly every area of occupational psychology with the focus on the connection between self-efficacy and work-related performance. Miles and Maurer (2012, p. 24) echo "Self-efficacy has been featured prominently in understanding motivation and its effects in organizational behaviour and human resource management". Karl et al. (1993) highlighted the importance of investigating self-efficacy in the training context, and individual differences in participant self-efficacy have been noted as worthy of study in response to training interventions (Latham, 1988; Mathieu & Martineau, 1993; Noe, 1986; Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991).

Research has been conducted regarding self-efficacy and occupational training in the several task-specific areas including computer software skills (Creed et al., 2001; Gist, Schwoerer, & Rosen, 1989; Sitzmann, Ely, Bell, & Bauer, 2010), problem solving (Harris et al., 2002), and salary negotiation (Stevens & Gist, 1997). However, the relationship between self-efficacy and training performance and attrition among the unemployed has received little investigative attention. The inclusion of a construction training specific domain-level measure of self-efficacy is therefore essential for meeting the objective of the current research.

Locus of Control

In tracing the early development of the concept of locus of control (LOC), Rotter (1990, p. 489) identified the construct as "one of the most studied variables in psychology and other social science". Generally, LOC is defined as the extent to which people believe they have

control over their own fate (Ng, Sorensen, & Eby, 2006). Originating in Rotter's social learning theory, LOC referred to the extent to which individuals display an internal/intrinsic or external/extrinsic perception of control over the outcome of varied situations. According to Rotter (1990, p. 489);

> Internal versus external control refers to the degree to which persons expect that a reinforcement or an outcome of their behavior is contingent on their own behavior or personal characteristics versus the degree to which persons expect that the reinforcement or outcome is a function of chance, luck, or fate, and is under the control of powerful others, or is simply unpredictable.

Rotter (1990) observed in his research that many participants did not change their performance expectancy based on success or failure to complete tasks. A pattern became evident. Participant expectancy was influenced by task success or failure in situations where one perceived their success was dependent on their own skill, whereas, expectancy was not influenced in situations where success was perceived to be dependent on factors external to their control. Through these observations Rotter's concept of internal versus external LOC emerged.

Since its inception, internal and external LOC continues to find application in many areas. Recently, LOC has been applied to postpartum depression (Richardson, Field, Newton, & Bendell, 2012), pro-environmental activity (Kalamas, Cleveland, & Laroche, 2013), and drivers education (Huang & Ford, 2012). Many studies of LOC in organizational settings have been specifically directed toward attitudinal, motivational, and behavioral outcomes (Spector, 1982).

Locus of Control and Social Issues

According to Wenzel (1993), a large portion of LOC research had been conducted in environments outside of a laboratory and focused on social issues. Wenzel posits that a distinction exists between two types of external LOC. An external LOC orientation is either

rooted in the belief in chance or a belief in the influence of powerful others (Levenson, 1981). The external LOC dichotomy is relevant to social problems such as unemployment. Although dated, and therefore considered with caution, research has shown that economically "disadvantaged" members of American society have stronger external LOC orientations than the "non-disadvantaged" (Gurin, Gurin, Lao, & Beattie, 1969; as cited in Wenzel, 1993). Wenzel (1993) proposed that economically disadvantaged employment trainees of color associated external LOC orientation more with the influence of powerful others than did their white counterparts. It should be noted that the distinction in external LOC, based on one's beliefs in control by powerful others or by chance, has not been universally accepted.

External LOC orientation has been viewed as a potentially critical problem among participants of low socioeconomic status and among minority groups in social programs and interventions (Marks, 1998). According to Ng et al., (2006), empirical observation that those who possess external LOC orientations (externals) are immune to interventions has led to a view they are not responsive to external reinforcement. This conclusion was drawn because externals fail to see a relationship between their behaviors and consequences, whether positive or negative. In contrast, those with internal LOC orientations (internals) have an enduring belief that outcomes are contingent, at least in part, on their behaviors.

Employment is a critical component of one's well-being (Cvetanovski & Jex, 1994; Eden & Aviram, 1993) and unemployment has significant psychological consequences, especially for young people (Tiggemann & Winfield, 1984). Studies indicated that employed persons generally have an internal LOC disposition, while the unemployed demonstrate external LOC orientations (O'Brien & Kabanoff, 1979). Differences in LOC by employment status were not confirmed in Tiggemann and Winfield's (1984) research with unemployed young adults. Among the

unemployed, an external LOC (both general and work-related LOC) has been shown to be associated with high levels of anxiety and depression and lower levels of self-esteem and life satisfaction (Cvetanovski & Jex, 1994). In contrast, Caliendo, Cobb-Clark, and Uhlendorff (2010) posit that unemployed internals were more likely to search for jobs than externals, presumably making them more likely to obtain employment.

Since the goal of employment training is to enhance the knowledge, skills, and abilities of individuals, and thereby increase performance in the work setting (Holladay & Quiñones, 2003), investigation of LOC orientation within the occupational domain is important. Occupational research has shown that LOC is linked to several pivotal work outcomes. Specifically, internal LOC orientation has been associated with high levels of motivation, problem solving ability, confidence, effort, and performance in work settings (Judge & Bono, 2001; Ng et al., 2006; Spector, 1982). Internals expect that their efforts will lead to good performance and rewards, whereas externals may disregard good or poor performance outcomes as a consequence or condition outside their influence such as fate or good fortune. Pay increases are considered rewards (Spector, 1982) and females with internal LOC orientation were paid higher wages than externals (Groves, 2005; Semykina & Linz, 2007).

Locus of Control and Work Settings

Spector's (1988) work locus of control (WLOC) scale was adapted from Rotter's (1966) internal-external (I-E) general LOC metric. It was noted that Rotter's instrument measured LOC at the general level, and that the field would benefit from research developing domain-specific measures (Phares, 1976; as cited in Spector, 1988). Spector showed that WLOC correlated with general LOCs measures. However, relationships with job satisfaction, organizational commitment, leadership, and perceived influence in work setting were considerably stronger

using the WLOC scale than with the General I-E LOC scale. Therefore, the WLOC scale predicts work behavior more precisely than does the general scales (Spector, 1988).

LOC research in the training domain has generally focused on currently employed individuals participating in occupation training to improve and transfer learned skills to job performance outcomes (Blau, 1993; Colquitt et al., 2000; Judge et al., 2007; Mathieu & Martineau, 1993; Mathieu et al., 1992). In training, internals have a more positive attitude and motivation toward training than do externals. Further, internals believe that they can change their work-related abilities and motivation through their own actions whereas externals believe that performance enhancement is only possible through factors external to themselves (Holton, 2005). Persons with an internal LOC orientation improve their skills and performance by exerting effort in training and LOC has been shown to be a significant predictor of motivation to learn (Colquitt et al., 2000) .

Research has shown that internal LOC orientations are associated with, and in some cases predict, positive occupational training outcomes in employed persons. LOC research also indicates that unemployed and disadvantaged individuals are more likely to express an external LOC disposition. Adult learners with external LOC orientation participating in skills upgrading program were more likely to drop out of training than internals (Altmann & Arambasich, 1982). Also, unemployed individuals with an internal LOC orientation were more likely to search for job than externals (Caliendo et al., 2010). Thus, it is important to include a domain-level LOC measure when developing an instrument to predict performance and attrition of participants within the construction training domain.

Motivation and Attitudes

According to Tannenbaum and Yukl (1992), training organizations should determine if participants have the prerequisite attitude and motivation to benefit from training because a lack of motivation prior to training hinders success. Further, they posit that those with low motivation and poor attitude may require remedial preparation prior to entering a specific training program. Poor attitudes and low levels of motivation are associated more with external than internal LOC orientations (Holton, 2005).

Within the realm of human behavior there are numerous theories of motivation. According to Eagle (2011), all psychoanalytic theory is, at its core, a theory of motivation and all meaningful human behavior, aside from reflexes, is motivated by one's wishes and desires. Thus, motivation is especially pertinent to understanding various human behaviors. Motivation has been studied in many domains and a vast number of motivation theories exist. Since the 1950s many motivation theories have advanced in organizational and work behavior, yet no one has developed a conclusive theory on work motivation (Rainey, 2009; Ruthankoon & Ogunlana, 2003).

Motivation theories can be grouped into two categories, content and process (Ruthankoon & Ogunlana, 2003). The two categories of theories have also been termed internal and external theories of motivation, respectively (Jones & Page, 1987). Content theories investigate what is within an individual, or parts of one's environment, that elicits and sustains behavior. Process theories attempt to define and measure classes of variables to determine how they interact and influence human behaviors. In work settings, a widely recognized content theory of motivation in Maslow's hierarchy of needs (Jones & Page, 1987). Needs are often taken as a starting point for motivation theories (Cooper & Pervin, 1998). However, in psychology, distinguishing motives and needs is important. Eagle (2011, p. 42) provides a simple, yet illustrative, example:

> We need to sleep in order to replenish our body. However, the motive for going to sleep is generally not to replenish our body but rather to respond to a feeling of tiredness or sleepiness or perhaps to escape a burdensome task. A child may want to stay up most of the night, but he or she needs to get enough sleep. The child does not know that he or she is tired or sleepy and therefore is not motivated to go to sleep, yet the child nevertheless needs to sleep.

Lichtenburg (1989; as cited in Eagle, 2011) noted that motivation is based on fundamental needs, however in human behavior fundamental needs are not always reflected in motives.

Jones and Page (1987) suggest that content-based theories are problematic in organizational settings because they require managers, with varied level of training and capability, to identify and interpret the personal needs of the employees they supervise. This concern could be directly transferred to the training domain because trainers may not be capable or qualified to interpret the needs of trainees. Further, even if qualified to make needs-based judgments, the trainee or training organization may not have the resources to satisfy the needs that presumably elicit motivation. In place of content theories, such as that of Maslow's hierarchy of needs, organizations have relied on process theories to explain work motivation. Of the process theories, expectancy theory is identified as dominant in the determination of work motivation (Jones & Page, 1987; Rainey, 2009; Van Eerde & Thierry, 1996) and Noe (1986) suggested the use of an expectancy framework in training motivation research.

Expectancy Theory of Motivation

Accord to Van Eerde and Thierry (1996), Vroom's (1964) Expectancy Theory has been a predominant focus of research in both work and training motivation (Mathieu et al., 1992). Vroom's model contains three major tenants: valance, instrumentality, and expectancy, which are described as the VIE model of expectancy theory. Valance is generally defined as the importance, desirability, or anticipated satisfaction with outcomes (Van Eerde & Thierry, 1996)

and within training domains as the degree to which "trainees have preferences among the different outcomes that can result from participation in training" (Colquitt et al., 2000, p. 682). Instrumentality is broadly defined as a relationship between one outcome and another outcome and as a probability to obtain a desired outcome (Van Eerde & Thierry, 1996). And expectancy is identified at the general level as a subjective probability that an action or effort will lead to an outcome or desired level of performance (Van Eerde & Thierry, 1996). In training motivation, expectancy is defined more specifically as a trainee's belief regarding the probability that investment of effort will result in mastery of training content (Colquitt et al., 2000).

Training Motivation

The effectiveness of training programs is based, in part, on the quality of the training needs assessments and program design. However, other factors such as the attributes of trainees including pre-training motivation contribute to training effectiveness and trainee performance (Tannenbaum & Yukl, 1992; Tracey et al., 2001). In occupational training and education, motivation to learn and motivation to transfer learned skills to work outcomes are intertwined with LOC and self-efficacy (Colquitt et al., 2000; Holton, 2005; Noe, 1986; Noe & Schmitt, 1986; Tracey et al., 2001; Weiner, 1979). In training motivation studies, expectancy theory variables (e.g., valence and expectancy) have been related to training performance outcomes through the mechanism of one's self-efficacy (Colquitt et al., 2000; Mathieu & Martineau, 1993). Noe (1986) also identified that LOC was related to training performance outcomes through the expectancy theory of motivation (Colquitt et al., 2000).

The meta-analytic review of Colquitt et al. (2000) distilled the plethora of motivation theory concepts to identify the most relevant factors influencing training motivation and the transfer of learned skills to occupational performance. Colquitt et al.'s model can be found in

figure 1. Tracey et al. (2001) built and tested a simpler model of work motivation that linked several individual and organizational factors, outside of the immediate training context, with measures of training effectiveness. Their model can be found in figure 3. Both studies found that individual characteristics (e.g., pre-training self-efficacy and LOC) as well as job-related variables (e.g., job involvement and work environment) were significant factors influencing motivation to learn and motivation to train. Motivation to learn and motivation to train were found to be significant predictors of training effectiveness (e.g., application-based knowledge, skills transfer, and job performance).

These models were tested in samples of employed individuals participating in employment specific training programs. In the current study to develop an instrument, however, unemployed individuals are the target population. While Colquitt et al. (2000) and Tracey et al. (2001) indicate the importance of job-related factors (e.g., job involvement and work environment), these influences may not be present in the unemployed participating in training. Therefore the current study favored individual characteristics, LOC, and self-efficacy, which have been shown in the models to influence motivation to train and learn and the transfer of learned skills to work performance.

Weigensberg et al. (2012) noted a common goal among training programs for the unemployed is the gaining of employment, and/or reemployment, via skills gained through successful program completion. The hope is that the unemployed, through occupational training, will gain jobs. The question remains if self-efficacy and LOC, which influence motivation to train and motivation to learn, can stand empirically as indicators of training performance without the inclusion of job-related factors. And further, it is not known if training performance will lead to job performance (e.g., skills transfer) when a trainee gains employment after a training

interventions. These questions identify several areas of further research regarding the influence of motivation on training performance in groups of unemployed trainees, which have received little investigative attention.

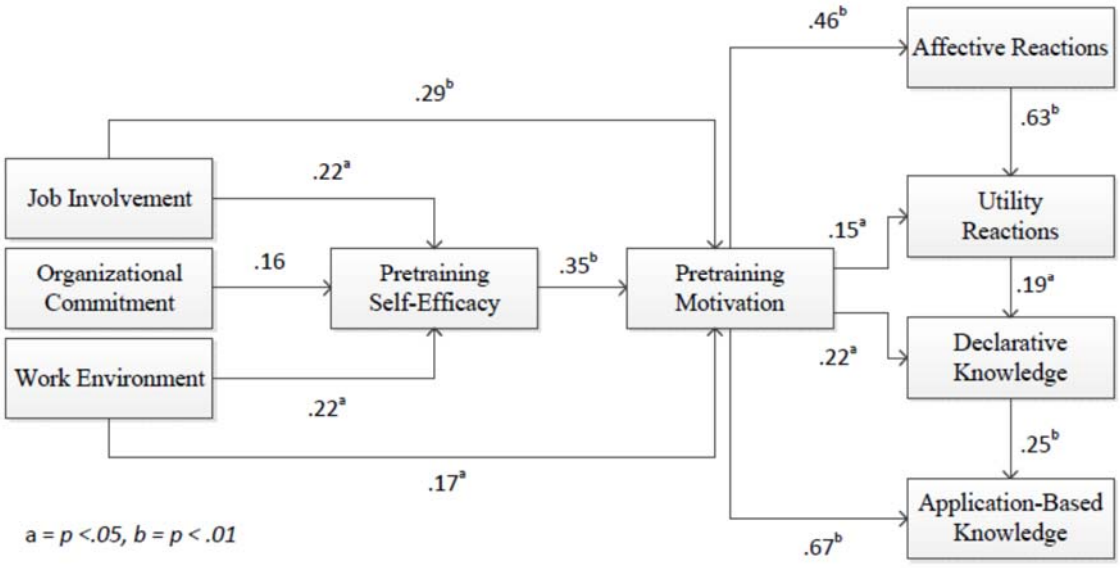


Figure 3. Tracey, Hinkin, Tannenbaum, and Mathieu's (2001) Path Analysis of the Training Effectiveness Model

Application of Training Motivation

An initial review of literature indicates a vast array of motivational theories, the number of which can seem bewildering (Perry, 2000). However, in the occupational training domain, the work of Noe and his colleagues (Ford & Noe, 1987; Noe & Schmitt, 1986; Noe & Wilk, 1993) was seminal in distilling motivation theory to the pertinent components that influence training outcomes and work-related performance. These authors operationalized learning and training motivation within their questionnaire; the Training Attitudes Inventory (TAI) (Noe, personal communication, June 15, 2012). TAI is a useful measure of participants' motivation to train and it antecedents (e.g., self-efficacy and LOC). These measures can be used to inform and predict a trainee's level of performance and the likelihood of attrition from training.

The practical implications of training motivation assessment of the unemployed are addressed by De Koning (2007). He identifies that employers look at the unemployed through a lens of heterogeneity, that is, the least motivated people have the most difficulty finding jobs and "it is uncertainty about and unemployed person's motivation and productivity [that] makes companies hesitate to hire and train unemployed job seekers" (p. 27). De Koning (2007, p. 26) posits that employers view long-term unemployment as particularly detrimental and it is a result of lack of motivation or competency in specific job-related skills;

> Employers are often reluctant to hire unemployed workers, particularly the long term ones, because they fear that personal characteristic (lack of motivation, low productivity, etc.) caused their unemployment. Statistical discrimination (judging individuals on a basis of group averages) and prejudice may both play a role.

Understanding trainee motivation and the impact of training on motivation is of the utmost importance in unemployed job seekers. Low levels of motivation may pose barriers in job search behavior (Caliendo et al., 2010), transfer of job-related skills (Colquitt et al., 2000), and in the way employers view an unemployed job seeker (De Koning, 2007). Therefore motivation to train is an important construct for inclusion in the current study's instrument.

Theory of Planned Behavior

According the Ajzen (1991, p. 179), concepts referring to behavioral dispositions, such as social attitude and personality traits, have played an important role in attempts to predict and explain human behavior. Specifically, Ajzen's (1991, 2001) theory of planned behavior proposes that the constructs of attitude, subjective norms, and perceived behavior control (PBC) are antecedents to behavioral intentions and it is these intentions that ultimately determine behavior. In brief, the theory is aptly described by Eng and Martin-Ginis (2007, p. 436):

> Intention to perform a behavior is determined by an individual's attitude, subjective norms, and perceived control regarding that behavior. The behavior, in turn, is determined by both the intention to perform the behavior, as well as the perceived control over performing the behavior".

Figure 4 (Eng & Martin Ginis, 2007) provides a visual representation of the theory of planned behavior. The theory of planned behavior (Ajzen, 1991, p. 188) postulates that attitudes, subjective norms, and PBC are conceptually independent determinants of one's intentions to perform a given behavior. According the Ajzen, attitude toward behavior "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question". Subjective norms involve social factors and are defined as "perceived social pressure to perform or not to perform the behavior". The final antecedent of intention is PBC control, which is the "perceived ease or difficulty of performing the behavior…it is assumed to reflect past experience as well as anticipated impediments and obstacles". It has been noted that PBC can stand alone empirically as a behavioral predictor (Ajzen, 2006; Armitage & Conner, 2001; Eng & Martin Ginis, 2007).

The initial theory of reasoned action (Ajzen & Fishbein, 1980), the predecessor to the theory of planned behavior, postulated that behavior was predicted by intentions alone, however PBC was added to account for situations in which individuals lack volitional control over the behavior in question (Ajzen, 1991, 2006). Ajzen (1991, p. 183) posits that PBC, which differs greatly from LOC, "refers to people's perception of the ease or difficulty of performing the behavior of interest". LOC is a generalized expectancy that remains stable across situations while PBC can, and often does, vary across situations.

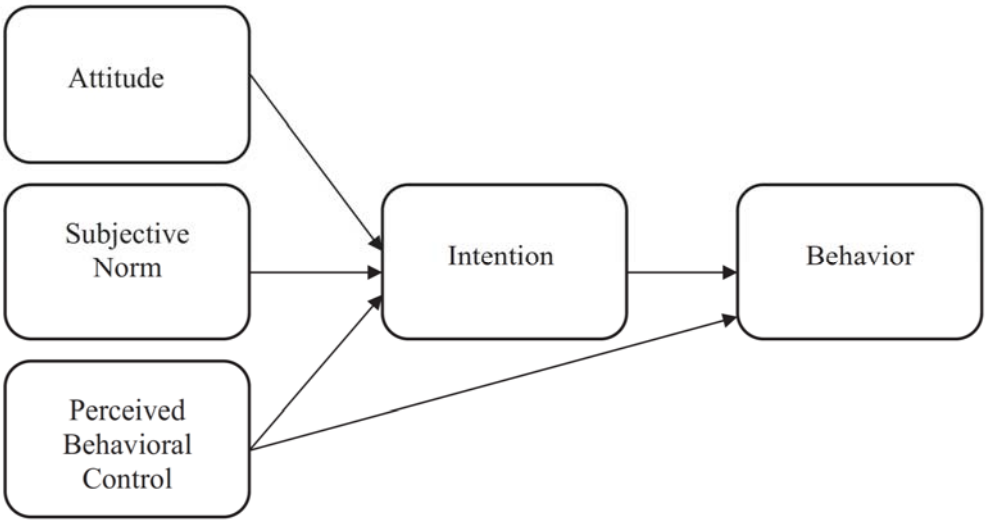


Figure 4. Theory of Planned Behavior Diagram Depicting Relationships Among Constructs

The theories of planned behavior and reasoned action (Ajzen & Fishbein, 1980) differ from other behavioral theories because they include a dimension of social influences. The concept is that a person's intentions have two primary determinants, those that are personal (i.e., characteristics) and those that are social (i.e., subjective norms) in nature (Ajzen, 1985). While many behavioral theories are two pronged, they generally assess personal and situational characteristics (Barrick et al., 2013) and Ajzen's inclusion of social influence is unique among behavior theories. The previous discussion of occupational behavior prediction models and research (Colquitt et al., 2000; Tracey et al., 2001) illustrates this concept. There it was noted that work and training behavior are predicted through situational characteristics (e.g., work environment, organizational commitment, job involvement, etc.) and personal characteristics (e.g., WLOC, pre-training self-efficacy, motivation, conscientiousness, etc.) with little consideration given to the perception of how others view one's behavior or actions which Ajzen (1991) identified as "subjective norms".

Research conducted in various domains provides support for the prediction of human action using the theory of planned behavior (Ajzen, 1991). Some examples include physical exercise and strength training (Bryan & Rocheleau, 2002; Dean, Farrell, Kelley, Taylor, & Rhodes, 2007); pollution reduction behavior (Cordano & Frieze, 2000); decisions of student to complete high school (Davis, Ajzen, Saunders, & Williams, 2002); and college-level academic misconduct (Stone, 2009). The theory of planned behavior has been applied in occupational settings to study counterproductive work behavior (Fox & Spector, 2010, as cited in Spector, 2011) and in social program participation by the homeless (Christian & Abrams, 2004). While support for the theory of planned behavior is evident, its application within training programs, particularly those targeting the unemployed, is limited.

Measurement

Ajzen (n.d.-a) recommends a four-step process for developing questionnaires to measure theory of planned behavior constructs. Step one involves gathering qualitative data from participants from each target population prior to creating the pilot instruments. The purpose of this step is to identify the most salient attitudes and subjective norms in the target population. However, according the Wiethoff (2004, p. 273), while "this method provides rich data for analysis, researchers and practitioners may not always have sufficient time and resources to use it", and further "researchers have demonstrated that the theory of planned behavior is a robust predictor of behavioral intentions even when study participants are asked generally about their attitudes and beliefs." Surveys measuring direct PBC, subjective norms, attitude, and intentions should be constructed under the guidelines of Ajzen (n.d.-a) and he (n.d.-c) maintains that if the intent of the research is to predict intentions and behavior, the direct measures of attitude, subjective norms, and PBC are sufficient.

Answering Research Question One

According to Barrick, Mount, and Li (2013, p. 132), understanding and explaining occupational behavior at the individual level has been the objective of behavioral science for almost 100 years; "Although there are many different ways to address this complex question, ultimately, any answer includes a discussion of individual characteristics such as personality and ability and situational factors such as job characteristics and the social context". This concept encompassed the finding of the literature review which answers the study's first research question:

1. What are the constructs to be included in a questionnaire that informs and predicts the performance, completion, and attrition behaviors of unemployed individuals participating in construction training?

Individual Characteristic

The review of literature identified a number of psychology concepts that have been applied in empirical research to predict and understand human behavior. Self-efficacy, LOC, and motivation were identified for inclusion in the current study due to their interconnected nature, as well as their predominance and frequent use in empirical behavioral research. Support for these constructs in human behavior prediction was found across highly varied domains of human behavior. The repeated study of self-efficacy, LOC, and motivation in occupation behavior and work-related performance setting, as well as the intertwined nature of self-efficacy and LOC (Cvetanovski & Jex, 1994), was identified. Researchers (Colquitt et al., 2000; Holton, 2005; Tracey et al., 2001) postulate that self-efficacy and LOC are antecedents of motivation to participate in occupational training and complete work-related tasks. Empirical research in the occupation training domain has identified the value of self-efficacy, LOC, and motivation in

predicting job performance, and the transfer of skills learned in training to work settings (Colquitt et al., 2000; Tracey et al., 2001). It was these factors that brought self-efficacy, LOC and motivation to the forefront of the current study to focus on understanding and predicting trainee behavior in construction training interventions for the unemployed.

Much human behavior and training research was conducted in groups of currently employed individual participating in varied forms of occupational training while limited investigative attention has been directed toward the unemployed. Within unemployed and disadvantaged groups, self-efficacy, LOC, and motivation have been identified as important indicators of high frequency and persistence in searching for employment (Creed et al., 2001). Specifically Creed et al. (2001) posit that the highly efficacious person is likely to persist in searching for employment in the face of adversity and setbacks. In addition these constructs were shown to be important in predicting the level of participation of the homeless in social services (Christian & Abrams, 2004). This is important because employment training programs are often intended to assists economically disadvantaged groups as part of a social service program. The importance of self-efficacy and motivation was further supported in young-adult specific training by Ginsburg et al. (2000) and Weigenberg et al. (2012), who believed that commitment, attitude, motivation, and confidence (e.g., self-efficacy) are of great importance in determining whether young adults complete or drop out of training. According to Eden and Aviram (1993), self-efficacy is intertwined with employment, and people derive a major portion of their self-efficacy from work. Under the premise that self-efficacy can be increased through training interventions (Eden & Aviram, 1993) and that efficacious unemployed persons are more persistent in searching for employment (Creed et al., 2001), bolstering a trainee's self-efficacy may be, in and of itself, considered a training success.

Situational Characteristics

For situational characteristics, the literature review identified two predominant studies, those of Colquitt et al. (2000) and Tracy et al. (2001), that were conducted within the training domain. These training motivation and behavior models (See figure 1 and 3, respectively) relied on vocation-specific situational characteristics such as job involvement, organization commitment, work environment, and job climate. By definition the unemployed will not have these influences and may have experienced these influential situational characteristics to varying degrees in past employment settings. In addition, the situational characteristics that apply to training performance in each model were antecedents to the psychological characteristics of self-efficacy, LOC, and motivation. The inclusion of situational characteristic is important for research, however the instrument developed here is intended to be flexible enough to be applied within various training programs. Therefore, training-specific situational characteristics (e.g., training climate, environment, and commitment) should be tailored to training program curriculum and participants. It is for these reasons that metrics for situational characteristics were not included in the instrument developed through this study.

Social Context and Norms

The review of literature revealed that Azjen's theory of planned behavior differs from other behavioral theories because it includes a dimension of social influences (i.e., subjective norms) in addition to personal characteristics. Other behavioral theories give scant consideration to the perception of how others view one's behavior or actions or the cultural and societal norms inherent to a given task or occupation. Because the instrument is designed for use in the construction training domain, understanding the social and cultural norms regarding construction as an occupation is particularly important. The review of literature showed that the construction

industry has a poor image (Simon, 2013). According to Pratt (2002, p. 1), "People envision a guy with a tool belt hanging low…someone who's not very bright, maybe didn't graduate from high school or even have a GED, and that this was the best they could do". If this perception of construction is common, it may pose barriers to construction training participation, performance, and completion. Inclusion of the theory of planned behavior framework in the instrument is critical for understanding the influence of social norms on trainee intentions and behaviors.

Conclusion

The construction industry is experiencing a skilled worker shortage, and hence job opportunities exist in construction for properly trained individuals (Brummett & Nobe, 2009). However, high attrition rates (45-65%) have been identified in construction domain-level occupational training programs (United States Department of Labor, 2007). Understanding the factors when influence trainee performance, completion, and/or attrition from training programs is important because it informs practitioners regarding appropriate trainee curricula at the individual level. Training services that bolster a trainee's chance of high performance presumably increase the probability of successfully program completion. In turn completing training presumably increases the chances of gaining employment and employment increases the quality of life of the individual and their family.

The review of literature revealed several theories and their constructs that were empirically supported as behavioral predictors. Within the occupational training domain, the most pertinent constructs reviewed were self-efficacy, LOC, and motivation, as well as those embedded in the Ajzen's theory or planned behavior: PBC, intentions, subjective norm, and attitudes.

CHAPTER 3: METHODOLOGY

As identified in chapter two, the constructs selected for inclusion in the current study instrument originate in Bandura's social cognitive and self-efficacy theories (Bandura, 1977, 1982, 1997) as well as Ajzen's (1991) theory of planned behavior. Also essential in construct selection was Noe and colleagues' (Ford & Noe, 1987; Noe & Schmitt, 1986; Noe & Wilk, 1993) development of an integrative theory of motivation and Spector's (1988) work regarding perception of control in occupational settings. Constructs intended to measure participant performance expectation (self-efficacy), perception of control (locus of control), and motivation were identified. In addition, measures used to predict attendance within the educational domain (e.g. perceived behavior control, norms, attitudes, and intentions) were selected for inclusion in the study instrument.

This chapter provides an overview of construct selection, adaptation, instrument development and sample section. Survey administration procedures and reliability and validity analyses are also discussed. Reliability and validity analyses were conducted to answer research questions two and three regarding the Construction Training Attitudes and Intentions Scale (CTAIS):

2. To what extent is the CTAIS reliable?
3. To what extent is the CTAIS valid?

Finally, this chapter describes the methods of analysis used to answer research question four.

4: Based on the validated questionnaire, is there a difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no construction management experience?

Need for Construct Adaptation

A review of literature revealed no instrument targeting the selected constructs within the domain of construction-related training. Moreover, selected measures were generally administered in samples of currently employed individuals participating in various forms of occupational training or to college students in the case of academic measures. Therefore the instrument was an adaptation from existing construct measures for use in construction training targeting unemployed and/or first job seeking adults. Combining constructs within one instrument and adapting survey items to construction-related training necessitated instrument piloting and validation. Piloting was completed to address the purpose of the research, which was to develop a reliable and valid instrument for measuring the constructs shown to predict performance and attrition within the construction training domain.

Construct Selection and Level of Measures

The predictive value of psychological measures such as self-efficacy can be improved through the adaptation of survey items to the domain being investigated (Bandura, 1997; Pajares, 2002b; Schwarzer et al., 1997). Noe and colleagues (Ford & Noe, 1987; Noe & Schmitt, 1986; Noe & Wilk, 1993) developed the Attitude Toward Training Utility (ATTU) scale and Training Attitudes Inventory (TAI) (Noe, personal communication, June 15, 2012). The ATTU and TAI are intended to measure motivation to train (MT), attitude toward education (ATE), attitude toward training utility, and training self-efficacy (TSE) within the occupational training domain. Spector's (1988) Work Locus of Control (WLOC) was designed to measure perceived LOC

within vocational settings. Ajzen's (n.d.-b) Class Attendance Opinion Survey is intended to predict student class attendance behavior through measures of perceived behavioral control (PBC), norms, attitudes, and intentions toward class attendance. The constructs selected for adaptation and inclusion in the current instrument are described in Table 1.

Table 1. Description of Existing Measures

Existing Measures	Scale Format	Domain of Measurement	Author, Year	Reliability Observed in Previous Research (α)
Training Self-Efficacy	Likert, 5-point, Disagree-Agree	Training	Noe and Wilk, 1993	0.79
Work Locus of Control	Likert, 5-point, Disagree-Agree	Occupational	Specter, 1988	0.75 - 0.85
Motivation to Train	Likert, 5-point, Disagree-Agree	Training	Noe, 2012	0.80
Attitude Towards Education	Likert, 5-point, Disagree-Agree	Academic	Noe, 2012	Not Reported
Attitude Toward Training Utility	Likert, 7-point, Disagree to Agree	Training	Ford and Noe, 1987	Not Reported
Perceived Behavioral Control	Bipolar Adjective, 7-point	Academic	Ajzen, n.d.-a	0.61 - 0.90
Attitudes	Bipolar Adjective, 7-point	Academic	Ajzen, n.d.-a	Not Reported
Subjective Norms	Bipolar Adjective, 7-point	Academic	Ajzen, n.d.-a	Not Reported
Intentions	Bipolar Adjective, 7-point	Academic	Ajzen, n.d.-a	Not Reported

Adapted Constructs

Nine existing measure were adapted for inclusion in the instrument. Attitude Toward Education and Attitude Toward Training Utility were combined into one construct (Attitude Toward Training) yielding eight construction training domain-level subscales. Survey items were intended to measure respondent perceptions of 1) Training Self-Efficacy (CTSE); 2) Training Motivation (CTM); 3) Training Locus of Control (TLOC); 4) Attitude Toward Training (ATCT); 5) Perceived Behavioral Control in Training (CTPBC); 6) Training Value Attitudes (CTVA); 7) Training Norms (CTN); and 8) Training Intentions (CTI). The initial adapted survey, called the Construction Training Attitudes and Intention Scale (CTAIS), contained 98 items. The number of items in each subscale, the response format, and examples of original and adapted survey items can be found in Table 2 (See appendix A for a complete list of original and adapted survey items).

Table 2. Constructs with Response Format and Item Adaptation Example

Existing Construct	Number of Existing Items	Scale Format	Example Original Survey Items	Adapted Construct Name	Number of Adapted Items	Scale Format	Example Adapted Survey Items
Training Self-Efficacy	16	Likert 5-point	1) I am confident that I can do well in training courses that deal with things (e.g., tool operation, using tools or body to move objects). [Strongly Disagree - Strongly Agree]	Construction Training Self-Efficacy (CTSE)	20	Likert 5-point	1) I am confident that I can do well in construction-related training that deals with things (e.g., tool operation, using tools or body to move objects). [Strongly Disagree - Strongly Agree]
Motivation to Train	16	Likert 5-point	1) I am willing to exert considerable effort in training programs in order to improve my skills. [Strongly Disagree - Strongly Agree]	Construction Training Motivation (CTM)	19	Likert 5-point	1) I am willing to exert considerable effort in training in order to improve my construction-related skills. [Strongly Disagree - Strongly Agree]
Attitude Toward Education	3	Likert 7-point	1) In general I value education. [Strongly Disagree - Strongly Agree]	Attitude Toward Construction Training (ATCT)	14	Likert 5-point	1) In general I value construction training. [Strongly Disagree - Strongly Agree]
Attitude Toward Training Utility	5	Likert 7-point	1) I think the best way to learn something new is by trial and error on the job, as opposed to attending a formal training program. [Strongly Disagree - Strongly Agree]				1) I think the best way to learn construction skills is by trial and error on the job, as opposed to attending construction-related training. [Strongly Disagree - Strongly Agree]
Work Locus of Control	16	Likert 6-point	1) Most people are capable of doing their jobs well if they make the effort. [Strongly Disagree - Strongly Agree]	Training Locus of Control (TLOC)	17	Likert 5-point	1) I am capable of doing well in construction training if I make the effort. [Strongly Disagree - Strongly Agree]
Perceived Behavioral Control	4	Bipolar Adjective 7-point	1) For me to attend the meetings of this class on a regular basis is: [Extremely Difficult - Extremely Easy]	Construction Training Perceived Behavioral Control (CTPBC)	8	Bipolar Adjective 5-point	1) For me to attend a construction training program on a regular basis is: [Extremely difficult - Extremely easy] 2) For me to successfully complete a construction training program is: [Extremely Difficult - Extremely Easy]
Attitudes	4	Bipolar Adjective 7-point	1) For me to attend the meetings of this class on a regular basis is: [Extremely Valuable - Extremely Worthless]	Construction Training Value Attitudes (CTVA)	6	Bipolar Adjective 5-point	1) For me to attend the meetings of a construction training program is [Extremely Valuable - Extremely Worthless] 2) For me to complete a construction-related training is [Extremely Valuable - Extremely Worthless]
Subjective Norms	4	Bipolar Adjective 7-point	1) Most people who are important to me think that [I Should Not - I Should] attend the meetings of this class on a regular basis	Construction Training Norms (CTN)	8	Bipolar Adjective 5-point	1) Most people who are important to me think that [I Should - I Should Not] attend construction-related training. 2) Most people who are important to me think that [I Should - I Should Not] complete a construction-related training program.
Intentions	3	Bipolar Adjective 7-point	1) I will make an effort to attend the meetings of this class on a regular basis. [I Definitely Will - I Definitely Will Not]	Construction Training Intentions (CTI)	6	Bipolar Adjective 5-point	1) I will make the effort to attend construction training sessions on a regular basis: [I Definitely Will - I Definitely Will Not] 2) I make the effort to successfully complete a construction training program [I Definitely Will - I Definitely Will Not]
Total	71				98		

Existing Construct Adaptation

Construction Training Self-Efficacy. Sixteen items from Noe and Wilk's (1993) TSE questionnaire were selected for adaptation to the construction training domain (e.g., "When faced with an unfamiliar problem during training, I expected to be able to solve it" was changed to "When faced with an unfamiliar problem during construction training, I expected to be able to solve it"). Notably, 4 of the original TSE questions were used to generate 2 new items each; 1 item assessing respondent efficacy toward training performance, and 1 item assessing efficacy toward training completion. The adapted CTSE pilot instrument contained 20 items. Respondents indicated their agreement with each statement on a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5) yielding aggregate CTSE scores ranging from 20 – 100 points. Higher scores indicate high perceived self-efficacy toward construction Training (See Appendix A for original TSE and adapted CTSE items).

Construction Training Motivation. Sixteen item items from Noe and Wilk's (1993) Motivation to Train questionnaire were adapted to the domain of the construction training (e.g., "When I'm involved in training sessions and I can't understand something, I get so frustrated I stop trying to learn" was changed to "If I'm involved in construction training sessions and I can't understand something I get so frustrated that I stop trying to learn" and "If I'm involved in construction training sessions and I can't understand something, I get so frustrated that I quit"). Three of the original MT survey items were used to generate 2 new items each; 1 item assessing respondent motivation regarding training performance and 1 item assessing motivation regarding successful training completion. The adapted CTM instrument contained 19 items. Respondents reported their level of agreement with each statement on a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5) yielding aggregate scores ranging from 19 – 95. Higher scores indicate

respondent's perception of higher motivation in construction training (See Appendix A for original MT and adapted CTM scales).

Attitude Toward Construction Training. The Attitude Toward Construction Training (ATCT) construct employed in the CTAIS was adapted from a combination of items from Ford and Noe's (1987) Attitude Toward Training Utility (ATTU) and Noe's (2011) Attitude Toward Education (ATE) scales (part of Noe's TAI). Three items were selected from Noe's ATE and 5 items from Ford and Noe's ATTU scale for adaptation (e.g., "I think the best way to learn something new is by trial and error on the job, as opposed to attending a formal training program." was changed to "I think the best way to learn construction skills is by trial and error on the job, as opposed to attending a construction-related training program."). Two of the original ATE items were used to produce 3 new items each; 1 item was created to assess respondent general attitudes toward education, general attitudes toward training, and attitudes toward construction training. In addition, 2 of the original ATTU items were used to generate 2 new items each; 1 item assessing perception of the utility of construction training and 1 item assessing perception of the values of devoting time to construction training. The adapted ATCT instrument contained 14 items. Respondents indicated their level of agreement with each statement on a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5) yielding scores ranging from 14 – 70. Higher scores indicate respondent's perception of more favorable ATCT. Ford and Noe's ATTU utilized a 7-point Likert scale. The survey, however, employed a 5-point scale in the adapted ATCT items for consistency among constructs measured (See Appendix A for original ATE and ATTU scales as well as the adapted ATCT scales).

Training Locus of Control. Spector's (1988) WLOC questionnaire was adapted for use in the instrument to assess participant TLOC. The researcher selected 16 items from the existing

instrument for adaptation to the construction training domain (e.g., "Most people are capable of doing their jobs well if they make the effort." was changed to "Most people are capable of successfully completing training if they make the effort."). One of the original WLOC items were used to generate 2 new items; 1 item assessing perception of control over attending training and 1 item assessing perception of control over successful training completion. The adapted TLOC scale contained 17 items. Respondents identified their agreement with each statement on a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5) yielding aggregate scores ranging from 17 – 85. Lower scores indicate respondent's perception of internal TLOC, while higher scores indicate respondent perception of external TLOC. The original WLOC instrument employed a 6-point Likert scale. However, the TLOC employed a 5-point Likert scale for consistency among constructs measured (See Appendix A for original WLOC and adapted TLOC scales).

Theory of Planned Behavior. Ajzen's (n.d.-b) Theory of Planned Behavior (TPB) Class Attendance Opinion Survey was adapted for use in the instrument. Four subscales were created to measure Construction Training Perceived Behavioral Control (CTPBC), Construction Training Value Attitudes (CTVA), Construction Training Norms (CTN), and Construction training Intention (CTI). Fifteen items were selected for adaption to the domain of the construction training; 4 items assessing CTPBC, 4 items assessing CTVA, 4 items assessing CTN, and 3 item assessing CTI. Thirteen TPB survey items was used to create 2 new items each; 1 item assessing regular attendance of training sessions and 1 item assessing successful completion of training (e.g., Perceived Behavioral Control; "For me to attend the meetings of this class on a regular basis is [extremely difficult - extremely easy]" was adapted to "For me to attend the meetings of a construction training program on a regular basis is [extremely difficult -

extremely easy]" and "For me to successfully complete a construction training program is [extremely difficult - extremely easy]"). The adapted instrument contained 28 items distributed across four subscales (8 CTPBC items, 6 CTVA, 8 CTN, and 6 CTI items). Participants indicated their responses to each statement on a 5-point bipolar adjective scale (e.g., extremely difficult 1 2 3 4 5 extremely easy) yielding an aggregate scores ranging from 28 – 140. The original instrument employed a 7-point bipolar adjective scale. However, the researcher employed a 5-point bipolar adjective scale for consistency among measured constructs (See Appendix A for original TPB survey and adapted CTPBC, CTVA, CTN, and CTI items)

Survey Item Distribution

Survey items for each construct were randomly distributed throughout the instrument to prevent item responses from influencing one another (Amedeo, Golledge, & Stimson, 2008). A survey item naming procedure was created to ensure consistency in grouping construct item before and after random distribution within the survey (e.g., Construction Training Self-Efficacy Item 1 = CTSE1). Item naming procedure was consistent with the variable naming structure used in SPSS 21 statistical software.

Demographic Survey Items

Demographic information including age, gender, college major, and current grade level were asked. In addition, participant construction experience was reported through several survey items. Construction management internship experience data were captured as the number of internship experiences and total duration of internships. Respondent's level of participation in construction management student competitions was reported as the total number of competition experiences. The amount of hands-on and management-based construction experience (years) was separated from internship experience in the questionnaire (e.g., Aside from internships, how

much construction management experience do you have?). Hands-on and management-based construction experience was defined in the instrument (e.g., In this study "hands-on construction experience" is considered labor-related tasks such as, installing roofing materials, cleaning up the site, assisting in the installation of brick, pouring concrete, placing reinforcing, and so on." and "In this study "management experience" is considered field or [please note a typographical discrepancy, "of" in place of "or" exists in the CTAIS found in Appendix D. The researcher recommends use of "or"] office management tasks, such as submittal/shop drawing review, writing requests for information (RFIs), preparing cost budgets, preparing or updating schedules, and so on"). Demographic information was used to characterize the sample and investigate how responses varied with demographic parameters. See Appendix D for the demographic items included in the instrument.

Study Participants

The instrument was administered to a convenience sample of construction management students at Colorado State University (CSU) and the University of Nebraska Kearney (UNK). Participants were enrolled in bachelor's degree-seeking programs intended to prepare students for management careers in the construction industry.

The sample at CSU consisted of first-, second-, third-, fourth-year undergraduate and graduate students enrolled in construction management courses. The instrument was administered in the following courses: Introduction to Construction Management (CON 101), Construction Materials and Methods (CON 151), Construction Estimating I (CON 265), Construction Estimating II (CON 365), Construction Scheduling (CON 461), and Construction Management Professional Practice (CON 465). Enrollment in these courses was controlled by prerequisite or corequisite course requirements. Using prerequisite/corequisite controlled courses

minimized the risk of the same students completing the instrument multiple times. The potential sample at CSU was 418 construction management and interior design students. Sample size by construction management course and university is depicted in Table 3.

The potential sample at UNK consisted of first-, second-, third-, and fourth-year undergraduate students enrolled in the construction management bachelor's degree courses. Surveys were administered in the following courses: Engineering Graphic Design (ITEC 120), Technology Today (ITEC 130), Mechanical and Electrical Systems (ITEC 341), Construction Scheduling (ITEC 370), and Leadership in Business Technology (ITEC 408). Due to smaller size of UNK's program, courses are offered in the spring or fall semester reducing the likelihood of students completing the questionnaire multiple times. Several of the courses surveyed were controlled by prerequisite requirements. As a precaution, students were asked not to complete the survey if taken previously. The potential sample at UNK was 127 students; the combined potential sample at UNK and CSU was 545 students.

Data Collection

The administration of the instrument occurred in two phases. Human subjects approval for this study was granted by the Institutional Review Board on February 20, 2013 for phase one and April 3, 2013 for phase two. Copies of the IRB approval documents can be found in Appendix B. Phase-one and phase-two survey administration was separated by reliability and validity testing performed on the initial pool of survey items. Phase one utilized the 98-item instrument found in Appendix D. Phase two utilized the survey items retained after reliability and validity analysis was conducted. The goal of phase one was to reduce the instrument from 98 to approximately 40 items.

The total potential sample (n = 545) was divided into two groups. The phase-one instrument was administered to 333 potential participants distributed across all courses surveyed at CSU and UNK. The phase-two validated instrument was administered to 212 potential participants at CSU. Distribution of the potential sample by university, course designation, and data collection phase can be found in table 3.

Table 3. Potential Sample by University, Course, and Data Collection Phase

University	Course	Phase One (n)	Phase-Two (n)	Total (n)
CSU	CON 101	37	36	73
CSU	CON 151	66	32	98
CSU	CON 265	26	29	55
CSU	CON 365	28	29	57
CSU	CON 461	27	62	89
CSU	CON 465	22	24	46
UNK	ITEC 120	28	-	28
UNK	ITEC 130	30	-	30
UNK	ITEC 341	24	-	24
UNK	ITEC 370	25	-	25
UNK	ITEC 408	20	-	20
Totals	-	333	212	545

The instrument was administered at the beginning or end of a class session in each course. Course instructors were asked to leave the classrooms during survey administration. A verbal script (see Appendix C) was used to introduce the survey, describe the study, and inform participant of the voluntary nature of participation. The researcher attended CON 101, 151, 265, 461, and 465 at CSU to administer a hard copy of the survey to each voluntary participant. The researcher was the instructor of CON 365 so the survey was administered by a research assistant to ensure that participants were not influenced by the instructor's presence. At UNK the collaborating professor administered hard copies of the survey. Completed survey responses were collected by the researcher at CSU and by the administering professor at UNK. Surveys collected at UNK were mailed to CSU for analysis.

Completion of the survey was incentivized. Each participant was given the chance to win 1 of 10 Amazon.com gift cards valued at $20 each. The number of gift cards distributed at each institution was determined based on the respective portion of the potential sample at each institution and by survey phase. For example, 37.8% of the potential phase-one sample (206/545) was at CSU, therefore 40.0% (4/10) of the gift cards were distributed to that group. In total, 4 gift cards were distributed at CSU during phase one; 2 gift cards were distributed at UNK during phase one; and 4 gift cards distributed at CSU during phase two.

To be eligible for the gift card drawings, respondents voluntarily provided contact information on a separate note card. Contact information was limited to the participants email addresses. Note cards containing email addresses were separated from the survey responses immediately upon collection. Note cards were used for the gift card drawing process only and were shredded immediately after the drawing and confirmation of gift cards receipt.

Scantron® survey response sheets were numbered sequentially following collection. Survey response data (response format A-E) were compiled in Microsoft Excel by the Colorado State University Testing Center. The Microsoft Excel data file was transformed from alphanumeric to numeric data (A = 1, B = 2, etc.). Numeric survey response data were imported into SPSS 21 statistical software for analysis.

Quantitative Analysis

Individual responses were screened and cleaned for missing values and data outside the anticipated range of the 5-point Likert scale. Descriptive statistics (mean, standard deviation, skewness, and kurtosis) were calculated for each subscale.

Adapted Subscale Item Reduction Procedures

The initial step in survey item reduction was the identification of item clusters within the instrument subscales (Pett, Lackey, & Sullivan, 2003). Evidence of item clustering was initially gathered through subscale inter-item correlation matrices (e.g., a separate correlation matrix was produced for the 20-item CTSE subscale, the 17-item TLOC scale, etc.) Highly correlated ($r \geq 0.80$) items within each subscale were considered for removal. According to Pett et al. (2003), items that are too highly correlated ($r \geq 0.80$) introduce problems of multicolinearity and item redundancy. One item was retained in the case that highly correlated subscale items were determined to be within the same theoretical framework. Also, minimally correlated ($r \leq 0.40$), subscale items are unlikely to share common variance and are unlikely to load on the same factor (Pett et al., 2003). It was noted that some researchers recommend a minimum inter-item correlation of $r \leq 0.30$ for initial investigation of psychological constructs (Field, 2009). The more conservative recommendation of Pett et al. ($r \leq 0.40$) was used as the initial benchmark of low inter-item correlation. Items with low inter-item correlations within each subscale were considered for removal.

Eigenvalues were calculated for the subscale items which demonstrated acceptable inter-item correlations ($0.40 < r < 0.80$). Eigenvalue loadings ≥ 0.40 on a single factor were used as the criterion for unidimensionality of the subscale. Survey items with eigenvalues ≥ 0.40 on multiples factors were considered for removal. Cronbach's alpha (CBA) reliability coefficients were calculated for retained item in the adapted subscales to evaluate internal consistency (Pett et al., 2003). CBAs of 0.70 are considered acceptable (Field, 2009) and were targeted as a benchmark in this investigation.

Exploratory Factor Analysis

The survey items retained after inter-item correlation and eigenvalue analysis comprised the adapted subscales included in the Exploratory Factor Analysis (EFA). The Kaiser-Meyer-Olkin (KMO) test was applied and a KMO statistic ≥ 0.60 was used as a threshold for sampling adequacy (Kaiser, 1974 as cited in Pett et al., 2003). The EFA was conducted with all retained items to identify an initial factor structure. Total eigenvalues ≥ 1.0 were used as the initial acceptance criterion for factor extraction in accordance with the Kaiser-Guttmen rule (Comrey & Lee, 1992). The number of factors was also investigated using the Scree Plot method (Cattell, 1966).

Principal Component Analysis was employed and the Varimax rotated factor solution was used to identify the emergent factors. Eigenvalues ≥ 0.40 on multiple factors were the initial criterion for survey item removal as suggested by Pett et al., (2003). Items with factor loading ≥ 0.40 on a single component were grouped for analysis. Inter-item correlation matrices were produced for each emergent factor and the appropriateness of inter-item correlations ($0.40 < r < 0.80$) was investigated. Once inter-item correlations were confirmed, the wording of survey items within each factor was investigated to determine the existence of a congruent theoretical framework. Initial consistency reliability statistics (CBA) were calculated for items retained in each emergent factor. CBAs were also calculated for each emergent factor if individual survey items were deleted. Survey items were removed if the factor's reliability coefficient was higher when that item was deleted. CBA statistics ≥ 0.70 were targeted for each emergent factors and overall CTAIS.

Validity Analysis

Support for face validity was gained though comparison of the characteristics and associations among emergent factors with previous research findings. In general, evidence for face validity was gained when emergent factors mirrored the characteristics of the original, previously validated, constructs. For example, to provide evidence for face validity it was expected that WLOC data would group at two distinct points, indicating participant perception of internal versus external LOC. The paradigm that LOC operates on a continuum from internal to external LOC is supported by previous research (Ajzen, 2006; Spector, 1988).

Construct validity within the instrument can be gained though the results of the EFA. Since the initial constructs had been validated through previous research, it was expected that the adapted subscale items would load in a factor structure that mirrored the original constructs. That is, TLOC items would be expected to load on the same factor. The emergent factors would be expected to demonstrate a coherent theoretical framework similar to the original, previously validated, constructs. In addition, it was anticipated that the adapted CTSE items would load on a separate and distinct construct from CTM (and other adapted constructs) as evident in previous research (Colquitt et al., 2000).

Hypotheses regarding the relationships between constructs were developed based on the review of literature to investigate convergent construct validity of the emergent factors of the CTAIS. This approach to construct validity was appropriate in the current study because previous occupational training research has reported associations among the constructs adapted of use in the CTAIS. Subscale correlation testing between emergent factors was completed. Findings in agreement with the hypotheses provided support, albeit indirectly, for convergent construct validity of the CTAIS (Patton, 2007).

Based on the review of literature it was anticipated that internal WLOC would be correlated with high perception of CTSE and that external WLOC would be positively correlated with low CTSE. The existence of such correlation between WLOC and CTSE was supported by LOC characteristics demonstrated in the literature; specifically, internal LOC is the foundation for one's expectation of task-specific self-efficacy (Phillips & Gully, 1997). Further, and in line the findings of Ng et al. (2006), one would expect that internal LOC would be positively associated with one's motivation to learn and motivation to work. Significant and positive association between internal WLOC and high CTM provide additional support for face validity.

Convergent Construction Validity Hypotheses

Construction Training Self-Efficacy and Training Locus of Control. Review of occupational and training research (Chiaburu & Marinova, 2005; Colquitt et al., 2000; Phillips & Gully, 1997) indicated that self-efficacy is negatively correlated with external LOC. The following hypothesis was generated to test the relationship between CTSE and TLOC in the CTAIS:

H_0: Perceived Construction Training Self-Efficacy (CTSE) will be negatively correlated with external Training Locus of Control (TLOC).

H_1: Perceived Construction Training Self-Efficacy (CTSE) will be positively correlated with external Training Locus of Control (TLOC).

Construction Training Self-Efficacy and Training Motivation Attitudes. The occupational and training research (Chiaburu & Marinova, 2005; Colquitt et al., 2000; Phillips & Gully, 1997) indicated that high perceived training self-efficacy and high levels of motivation to train were

positively correlated. The following hypothesis was developed to test the relationship between CTSE and TMA in the CTAIS:

H_0: Perceived Construction Training Self-Efficacy (CTSE) will be positively correlated with favorable Training Motivation Attitudes.

H_1: Perceived Construction Training Self-Efficacy (CTSE) will be negatively correlated favorable Training Motivation Attitudes.

Training Motivation Attitudes and Training Locus of Control. Occupational and training research (Ng et al., 2006) showed that favorable TMA and external TLOC were negatively correlated. The following hypothesis was developed to test the relationship between TMA and TLOC in the CTAIS:

H_0: Favorable Training Motivation Attitudes will be negatively correlated with external Training Locus of Control.

H_1: Favorable Training Motivation Attitudes will be positively correlated with external Training Locus of Control.

Addressing Research Question Four

The final research question addressed the difference in perception of CTSE between participants who reported having construction management experience and participants who reported having no construction management experience. The independent variable is construction management experience. Responses by years of experience in the CTAIS were aggregated into a dichotomous (experience/no experience) variable to examine mean comparisons and answer the research question. The response data from the validated phase-two

questionnaire were used in this analysis. The null and alternative hypothesis for research question four follow:

H_0: $\mu_{\text{students with mgt. exp.}} = \mu_{\text{students without mgt. exp.}}$ There is no difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no management construction experience.

H_1: $\mu_{\text{students with mgt. exp.}} \neq \mu_{\text{students without mgt. exp.}}$ There is a difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no construction management experience.

Analysis Procedures

In answering research question four, an independent samples *t*-test was performed to measure and compare aggregate mean CTSE scores of the group reporting construction management experience with the group reporting no construction management experience. Bandura (1977, 1997) and Pajares (2002b) indicate that mastery experience is the most influential of the four factors contributing to one's self-efficacy. Research indicates a significantly increased in perception of domain level self-efficacy in participants who possess domain specific experience (Prieto & Altmaier, 1994).

Conclusion

The objective of the study was to develop and validate a reliable survey instrument: The Construction Training Attitudes and Intentions Scale (CTAIS). The data analysis techniques and procedures described in this chapter were employed to accomplish this objective. Accomplishment of the study objective was based on the following criteria; 1) evidence of sufficiently high (CBA $\geq$ 0.70) internal consistency reliability coefficients for each emergent

factor and the instrument, 2) emergent factor characteristic and correlation which mirror those found in the literature, and 3) a factor structure and theoretical framework that is similar to, and supported by, previous construct research. Finally, the validated instrument was administered during phase two to investigate if mean CTSE scores were different for participants based on whether or not they reported construction experience.

CHAPTER 4: FINDINGS

The purpose of the study was to identify the appropriate constructs to be included in an instrument to predict performance in, attrition from, and completion of construction skills training. The goal of the study was to develop a reliable and valid survey that measures these constructs within the domain of construction training. This survey is called the Construction Training Attitudes and Intentions Scale (CTAIS) and was developed through two phases. Phase one utilized a 98-item instrument (pre) adapted for use within the construction training domain as described in chapter three. In total, 54 items were removed during phase one, yielding the 44-item CTAIS (post) that was utilized in phase 2. The pre- and post-reduction CTAIS questionnaires and the survey items removed can be found in tables in Appendices D and E, respectively.

This chapter provides description of the statistical procedures, findings, and item reduction in phase one. Reliability coefficients are reported for each subscale prior to conducting Exploratory Factor Analysis (EFA). Next, the item reduction and EFA procedures and results are described. The four factors which emerged from EFA were discussed and reliability coefficients were provided for each factor. Emergent factor reliability testing addressed research question two. To address research question three, the validity of the 44-item CTAIS scale was discussed. Next administration of the validated phase-two CTAIS as well as the analysis and findings were described to address research question four. Finally, supplemental analyses were performed to gain additional insights regarding the characteristics of the sample.

Phase One Sample

During the spring semester of 2013, 330 students enrolled in construction management classes at Colorado State University (CSU, 203) and the University of Nebraska Kearney (UNK, 127) were invited to respond to the 98-item, phase one, CTAIS questionnaire (Appendix D). Of the students who were invited to participate, 247 (161 CSU, 86 UNK) responded with usable surveys yielding a response rate of 74.8%. The high response rate was likely due to in-person invitation and distribution of the surveys as well as the allocation of class time for completion. Participants were given the opportunity to be entered into a drawing to win one of ten $20 amazon.com gift cards. Financial incentive have been shown to increase survey response rates and were recommended by O'Connor (2011).

Table 4 provides a detailed breakdown of response frequency by the demographic variables. The profile of the respondents was 82.7% (200) male. Of the college majors, 180 (74.1%) were construction management. For age, 213 (87.8%) reported being between 18 and 24 years. Grade level was fairly evenly distributed, 57 (23.5%) of the respondents were freshmen, 50 (20.6%) sophomores, 61 (25.1%) juniors, 73 (30.0%) seniors, and 2 (0.8%) graduate students. Regarding participation in construction management competitions, 201 (83.8%) had not participated and 168 (69.1%) respondents had not participated in a construction management internship.

Construction field experience was divided into hands-on and management experience. Hands-on experience was defined as "labor related tasks, such as, installing roofing materials, cleaning up the site, assisting in the installation of brick, pouring concrete, placing reinforcing, and so on" in the questionnaire. For hands-on experience, 105 students (43.3%) reported less than one year. Construction management experience was defined as "field or office

Table 4. Phase One Demographic Characteristics of Participants

Characteristic	n	%
Gender		
Female	41	17.3
Male	200	82.7
College Major		
Construction management	180	74.1
Other/dual major	39	16.0
Interior design	22	9.1
Undeclared	2	0.8
Age at time of survey (years)		
17 year and younger	3	1.2
18-24	213	87.8
25-30	20	8.2
31-40	6	2.4
41 or over	1	0.4
Grade level at time of survey		
Freshman	57	23.5
Sophomore	50	20.6
Junior	61	25.1
Senior	73	30.0
Graduate	2	0.8
Participation in construction management competitions		
0	201	83.8
1	26	10.8
2	9	3.7
3	1	0.4
More than 3	3	1.3
Participation in construction management internships		
0	168	69.1
1	48	19.8
2	18	7.4
3	7	2.9
More than 3	2	0.8
Hands-on construction experience		
None	47	19.4
Less than 1 year	58	23.9
Between 1 and 2 years	50	20.7
Between 2 and 3 years	21	8.7
More than 3 years	66	27.3
Construction management experience		
None	98	40.3
Less than 1 year	73	30.0
Between 1 and 2 years	32	13.2
Between 2 and 3 years	14	5.8
More than 3 years	26	10.7

management tasks, such as, submittal/shop drawing review, writing requests for information (RFIs), preparing cost budgets, preparing or updating schedules, and so on" in the questionnaire. For construction management experience 171 students (70.3%) reported less than one year.

Subscale Item Reduction

The phase-one questionnaire was divided into its subscales for initial analysis and item reduction. The first step in subscale item reduction was the identification of items with low inter-item correlations. Subscale items with correlations ≤ 0.40 are unlikely to share common variance with other items in the same construct and may load on different factors (Pett et al., 2003). Items exhibiting low inter-item correlations ($r \leq 0.40$) were investigated for removal. The second step in subscale item reduction was the identification of items with high inter-items correlation ($r \geq 0.80$). While high inter-item correlations are expected between survey items relating to the same construct (Field, 2009), items that are too highly correlated ($r \geq 0.80$) introduce multicolinearity and redundancy (Field, 2009; Pett et al., 2003). In the case of highly correlated items both items were investigated prior to removal. One item was retained when highly correlated subscale items were determined to measure the same construct. Finally factor loadings (eigenvalues) were calculated for the retained subscale items to determine the unidimensionality of each subscale. The following section describes the item reduction procedures by subscale. Subscale correlation matrices can be found in Appendix F.

Construction Training Self-Efficacy. A two-tailed Pearson correlation matrix was developed for the 20-item Construction Training Self-Efficacy (CTSE) scale; *p* was set at 0.01. Two CTSE items (10 and 12) exhibited low inter-item correlations, these items were removed from the subscale. A correlation matrix was developed for the 18 retained items, inter-item correlations of $r = 0.36 - 0.71$ were observed. Factor loadings were calculated for the remaining 18 CTSE

items. CTSE items 8 and 17 loaded on multiple factors with eigenvalues over 0.40. CTSE item 8 loaded with eigenvalues of 0.76 on the first component and 0.41 on the second component. CTSE item 17 loaded with eigenvalues of 0.71 on the first component and 0.42 on the second component. Due to the relative difference in eigenvalues both items were retained. The 18-items of the retained CTSE subscale loaded with eigenvalues of 0.64 - 0.83 on a single factor.

Construction Training Motivation. A two-tailed Pearson correlation matrix was developed for the 19-item Construction Training Motivation (CTM) scale; *p* was set at 0.01. Six CTM items (2, 3, 4, 10, 11, and 12) exhibited low inter-item correlations and were removed. Item 1 and 5 were highly correlated (r = 0.83), and similar item wording suggest redundancy. Item 5 was retained because of its higher inter-item correlation relative to item 1. A correlation matrix was developed for the 12 retained items for which inter-item correlations of r = 0.40 - 0.80 were observed. Factor loadings were calculated for the remaining 12 CTM subscale items. The EFA indicated that CTM items 9, 17, and 18 loaded on multiple factors with similar eigenvalues over 0.40; these items were removed from the subscale. The 9-items in the retained CTM scale demonstrated inter-item correlation of r = 0.43 - 0.72 and eigenvalues of 0.67 - 0.88 on a single factor.

Training Locus of Control. A two-tailed Pearson correlation matrix was developed for the 17-item Training Locus of Control (TLOC) scale; *p* was set at 0.01. Ten TLOC items (1, 2, 3, 4, 8, 11, 12, 13, 15, and 16) exhibited low inter-item correlations; these items were removed. A correlation matrix was developed for the seven retained items, inter-item correlations of r = 0.36 - 0.51 were observed. Factor loadings were calculated for the remaining 7 TLOC subscale items. Eigenvalues of 0.71 - 0.77 were observed on a single factor.

Attitude Toward Construction Training. A two-tailed Pearson correlation matrix was developed for the 14-item Attitude Toward Construction Training (ATCT) scale; *p* was set at 0.01. Five ATCT items (4, 5, 6, 7 and 12) exhibited low inter-item correlations and were removed from the subscale. A correlation matrix was developed for the 9 retained items, inter-item correlations between r = 0.30 and 0.79 were observed for retained items. Correlation between ATCT item 14 and three other items (1, 2, and 11) were low ($0.31 < r < 0.36$). Review of item 14 revealed the wording "opportunities to practice skills", this item was removed as it appeared to be outside theoretical framework of ATCT. It was noted that ATCT items 9 and 10 were highly correlated (0.79), investigation of the item wording revealed item 9 addressed respondent attitude toward construction training utility and item 10 addressed respondent attitude toward "relevance of skills one hopes to develop". Item 10 was removed because it addressed future skills to be developed while item 9 addressed present attitudes toward construction training. Item 8 and 9 contained similar wording (i.e., Item 8 "Construction training programs are useful to me" and Item 9 "Construction training programs are useful for my development"). These items were correlated (r = 0.64) and item 8 was removed to reduce the total number of survey items. The 6-item ATCT scale exhibited inter-item correlations of 0.41 - 0.74 and eigenvalues of 0.71 - 0.86 on a single factor.

Perceived Behavioral Control. A two-tailed Pearson correlation matrix was developed for the 8-item Perceived Behavioral Control (PTB) scale; *p* was set at 0.01. Three PTB items (1, 2, and 3) exhibited low inter-item correlations; these items were removed from the subscale. A correlation matrix was developed for the 5 retained items, inter-item correlations of r = 0.30 - 0.65 were observed. While 8 of the 10 possible inter-item correlations were below the $r \geq 0.40$ benchmark (Pett et al., 2003), an initial benchmark of $r \geq 0.30$ is permissible according to Field

(2009) for initial evaluation of a psychological construct. The inter-item correlation benchmark of $r \geq .030$ was used here to carry some of the PBC items on to the EFA so there factor loadings could be investigated prior to item removal. Factor loadings were calculated for the 5-item PBC subscale indicating eigenvalues of 0.64 - 0.78 on a single factor.

Construction Training Intentions. A two-tailed Pearson correlation matrix was developed for the 6-item Construction Training Intentions (CTI) scale; *p* was set at 0.01. Inter-item correlations of r = 0.46 - 0.74 were observed for the 6 items. All CTI subscale items were retained. Factor loadings were calculated for the 6-item CTI subscale indicating eigenvalues of 0.77 - 0.84 on a single factor.

Construction Training Norms. A two-tailed Pearson correlation matrix was developed for the 8-item Construction Training Norms (CTN) scale; *p* was set at 0.01. CTN items 1 and 2 were highly correlated (r = 0.79). Item 2 addressed training completion while item 1 addressed training session attendance. Since training completion is of greater importance then class attendance in future research, item 2 was retained. Factor loadings were calculated for the remaining seven CTN items, items 3 and 4 loaded on two factors with eigenvalues of 0.54 and 0.62 and 0.55 and 0.64, respectively; item 3 and 4 were removed base on similar loadings on two factors. The 5-item CTN scale demonstrated inter-item correlations of r = 0.34 - 0.69 and eigenvalues of 0.69 - 0.83 on a single factor.

Construction Training Value Attitudes. A two-tailed Pearson correlation matrix was developed for the 6-item Construction Training Value Attitudes (CTVA) scale; *p* was set at 0.01. Two CTVA items (1 and 6) exhibited low inter-item correlations and were removed from the subscale. A correlation matrix was developed for the 4 retained items; inter-item correlations of

r = 0.47- 0.67 were observed. Factor loadings were calculated for the 4 remaining CTVA items, eigenvalues of 0.64 - 0.83 on a single factor were observed.

Adapted Scale Reliability Analysis Prior to EFA

The subscale analysis resulted in removal of 38 items, leaving 60-item CTAIS for the EFA. Internal consistency reliability coefficients, Cronbach's alphas (CBA), were calculated for each subscale. High CBAs provide evidence of internal consistency reliability in the adapted construct (Pett et al., 2003). CBA levels of 0.70 were targeted for instrument subscales. Alpha levels of 0.70 - 0.80 are considered acceptable according to Field (2009). All retained subscales achieved CBAs above the 0.70 benchmark. The lowest CBA, 0.77, was observed in the PBC scale. The highest CBA, 0.95, was observed in the CTSE scale. A CBA of 0.87 was observed for the 60-item CTAIS. Table 5 provides CBAs for each subscale and the CTAIS before and after initial item reduction procedures.

Table 5. Retained Subscale Items and Internal Consistency Reliability Coefficients

Scale	Prior to Item Reduction		After Item Reduction	
	Items (N)	α	Items (N)	α
Construction Training Self-Efficacy (CTSE)	20	0.95	18	0.95
Construction Training Motivation (CTM)	19	0.83	9	0.94
Construction Training Intentions (CTI)	6	0.91	6	0.91
Attitude Toward Construction Training (ATCT)	14	0.61	6	0.87
Construction Training Value Attitudes (CTVA)	6	0.84	4	0.84
Training Locus of Control (TLOC)	17	0.62	7	0.83
Construction Training Norms (CTN)	8	0.86	5	0.82
Perceived Behavioral Control (PBC)	8	0.28	5	0.77
Construction Training Attitudes and Intention (CTAIS)	98	0.87	60	0.87

Sampling Adequacy

Since the CTAIS was developed through the adaptation of measures to the domain of construction training, the instrument was analyzed using Exploratory Factor Analysis (EFA). The Kaiser-Meyer-Olkin (KMO) test was performed to ensure adequate sample size (n = 247) for EFA. The KMO test yielded a score 0.94 for the 60 retrained CATIS items. According to Field (2009), a KMO statistics over 0.90 is considered "superb" evidence for sample adequacy when performing EFA.

Factor Identification Using Retained Survey Items

According to Pett et al. (2003, p. 167), "The decision as to the number of factors to be retained [in an instrument] should be based on an artful combination of the outcomes obtained from statistical indicators, the factors' theoretical coherence, a desire for simplicity, and the original goals of the factor analysis project." The 60 retained CTAIS items were included in the factor identification procedure. The initial step was the development of the factor matrix (Appendix F). The Varimax rotated factor solution was used in determining the factor structure. According to Pett et al. (2003), an unrotated factor solution rarely provides meaningful and understandable item clusters. Additionally, unrotated factor solutions often indicate a general factor which may be a statistical artifact. For these reasons, a rotated factor solution was used.

Ten factors emerged in the rotated factor solution using total eigenvalue $\geq$ 1.00 as a threshold for initial factor identification (Pett et al., 2003). Seventeen items loaded with eigenvalues $\geq$ 0 .40 on two factors. Seven of the seventeen items with high and similar eigenvalues (e.g., loadings within 0.10 of one another) were removed (i.e., item CTSE 08 loaded at 0.50 on factor 3 and 0.58 of factor 4). Four of the seventeen items loaded with eigenvalues above 0.62 on factors that contained eigenvalue totals $\leq$ 1.50; these items were removed. The

remaining 6 items loaded on two factors with eigenvalues that differed by more than 0.10. These 6 items were initially retained in the factor with the higher loading for investigation of their theoretical fit within the emergent factors (i.e., CTSE 01 loaded at 0.49 on factor 2 and 0.60 on factor 3). Overall, eleven of the seventeen dual loading items were removed and 6 were retained.

A second EFA was performed on the remaining 49 items; 7 factors with eigenvalues $\geq$ 1.00 were identified. No items loaded on factor six or seven with eigenvalues $\geq$ 0.40 giving a five factor model. Seven of the 49 items loaded with eigenvalues $\geq$ 0.40 on two factors. Three of the items (ATCT 02, ATCT 11, and CTM 08) loaded with eigenvalues between 0.57 and 0.63 on factor five. Investigation of the wording of the three items loading on factor five indicated no coherent theoretical framework. In addition, ATCT 11 and CTM 08 loaded on factor 3 with eigenvalue of 0.42 and 0.44; therefore these three items were removed leaving 4 dual loading items. All four of the remaining dual loading items originated from the CTSE subscale, all four items loaded on factor 2 (eigenvalues between 0.53 and 0.67) and 3 (eigenvalues between 0.41 and 0.46). Investigation of factor two indicated that all other items loading on factor 2 were from the CTSE scale. The wording of these items was examined and determined to be congruent with the theoretical framework of self-efficacy within construction training; (e.g., "My past experience in accomplishments increase my confidence that I will be able to complete a construction training program"). The four CTSE items were retained in factor 2. After this step in the EFA, 46 survey items remained in the CTAIS.

A final EFA was performed and factor loadings were calculated for the remaining 46 CTAIS items to confirm the factor structure. The factor matrix indicated that item CTN 08 loaded on factors 1 and 5 with eigenvalues of 0.68 and 0.53, respectively. CTN 08 was removed yielding a 45 item CATIS.

Factor Identification and Reliability

The rotated factor matrix (Appendix F) contained 4 emergent factors. Factors 1 contained 14 items with eigenvalues of 0.69 - 0.82. All item within factor 1 were adapted from Ajzens' (Ajzen, n.d.-b) theory of planned behavior questionnaire. For internal consistency, factor 1; hereafter, Planned Training Behavior (PTB), achieved a CBA of 0.94. Factor 2 contained 14 items with factor loadings of 0.56 - 0.81. All items in factor 2 were retained from the adapted CTSE subscale, factor 2, Hereafter CTSE, achieved a CBA of 0.94. Factor 3 contained 10 items (4 items from the ATCT subscale and 6 items from the CTM subscale) with factor loading of 0.58 - 0.77. A CBA of 0.940 were calculated for the 10 items in factor three; hereafter Training Motivation Attitudes (TMA). Observation of the item reliabilities indicated that the CBA of TMA would be higher (0.942) if ATCT 01 was removed. Removal of ATCT 01 yielded a 9-item TMA subscale and a 44-item CTAIS. Factor 4; hereafter TLOC, contained 7 items from the adapted TLOC subscale and demonstrated factor loadings of 0.60 - 0.74 and a CBA of 0.83. The 44-item CTAIS achieved internal consistency of $\alpha = 0.93$. See table 6 for item and subscale reliabilities and alphas, if items were deleted.

Answering the Research Questions

Research Question Two: Research question two addressed the CTAIS' reliability. Based on the analysis performed, research question two can be answered. This question is answered by the high internal consistency reliability of $\alpha = 0.93$ for the 44 items CTAIS. The four factors explain 60.51% of the variance as shown in table 7. Factor 1 through 4 yielded high CBAs ranging from 0.94 to 0.83. Therefore, the conclusion is that the CTAIS and its subscales are internally consistent.

Table 6. Item Total Statistics

	Item-Total Statistics			
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Factor 1 Planned Training Behavior, N = 14, α = 0.943				
CTI 03	23.49	82.81	0.798	0.936
CTI 04	23.71	84.97	0.801	0.936
CTI 06	23.71	84.37	0.786	0.937
CTI 05	23.47	82.48	0.769	0.937
CTVA 04	23.59	84.60	0.762	0.937
CTVA 03	23.45	85.38	0.734	0.938
CTI 01	23.39	83.35	0.729	0.938
CTVA 02	23.58	84.63	0.706	0.939
CTI 02	23.72	85.75	0.685	0.939
CTVA 05	23.03	85.81	0.669	0.940
CTN 01	23.49	84.74	0.661	0.940
CTN 05	23.27	83.42	0.666	0.940
CTN 07	23.71	87.44	0.620	0.941
CTN 06	23.57	85.92	0.624	0.941
Factor 2 Construction Training Self-Efficacy, N = 14, α = 0.941				
CTSE 13	52.71	62.66	0.818	0.934
CTSE 03	52.44	63.18	0.795	0.935
CTSE 01	52.56	64.00	0.774	0.936
CTSE 06	52.37	63.81	0.739	0.936
CTSE 15	52.79	63.53	0.736	0.936
CTSE 02	52.54	64.24	0.716	0.937
CTSE 17	52.76	64.44	0.698	0.938
CTSE 09	52.33	64.26	0.693	0.938
CTSE 14	52.91	63.66	0.693	0.938
CTSE 04	52.30	64.29	0.681	0.938
CTSE 11	52.89	64.90	0.668	0.938
CTSE 18	52.52	63.15	0.675	0.939
CTSE 07	52.89	64.55	0.643	0.939
CTSE 05	52.75	65.93	0.606	0.940
Factor 3 Training Motivation Attitude, N = 9, α = 0.942				
CTM 05	32.97	29.13	0.861	0.931
ATCT 09	32.93	29.52	0.828	0.933
ATCT 03	32.91	29.90	0.806	0.934
CTM 15	32.77	30.30	0.790	0.935
CTM 19	33.05	29.92	0.772	0.936
CTM 14	33.11	30.13	0.750	0.937
CTM 06	32.66	30.27	0.749	0.937
ATCT 13	32.80	30.45	0.724	0.938
CTM 16	33.27	29.07	0.731	0.939
Factor 4 Training Locus of Control, N = 7, α = 0.829				
TLOC 05	13.12	14.79	0.636	0.797
TLOC 10	12.44	14.03	0.610	0.800
TLOC 14	12.93	14.96	0.590	0.804
TLOC 17	13.00	14.52	0.580	0.805
TLOC 07	12.38	14.59	0.566	0.807
TLOC 06	12.69	15.04	0.529	0.813
TLOC 09	12.84	15.09	0.523	0.814

Table 7. Eigenvalues and Percentages of Total Variance Explained for Four Factors and CTAIS

	Extracted Sum of Squared Loadings		
Factor	Total Eigenvalues	% of Variance	Cumulative %
1 Planned Training Behavior (PTB)	15.69	35.66	35.66
2 Construction Training Self-Efficacy (CTSE)	6.21	14.11	49.77
3 Training Motivation Attitudes (TMA)	2.87	6.52	56.29
4 Training Locus of Control (TLOC)	1.85	4.21	60.51

Research Question Three: Research question three asked whether the CTAIS is valid. Validity has several broadly defined aspects (e.g., criterion-related, content, and construct), which can be determined by different methods; but in general validity is the extent to which an instrument measures the trait or construct it is intended to measure (Field, 2009). Empirically validity can be determined by making planned comparisons between the measure and an established criterion (e.g., predictive and concurrent criterion-related validity). In this analysis criterion-related validity was not appropriate because the CTAIS was not used to predict a future outcome, nor was the CTAIS administered in addition to another previously validated measure for comparison (Patton, 2007). Content validity is a judgment of whether the content of an instrument measure is appropriate and/or if the measure is valid on its face (e.g., content and face validity, respectively). Content validity is often used in achievement tests that measure how well or poorly someone performs based on their responses to content-based items (Patton, 2007); content validity of this type is not appropriate because the CATIS is not an achievement test. Judgments can be made regarding face validity, and the "judgmental" aspect of validity is discussed as a portion of construct validity in the CTAIS. According the Patton (2007, p. 69), construct validity is the combination of judgmental and empirical validity where the "researchers hypothesize about how the construct that the instrument is designed to measure should affect or relate to other variables". To investigate construct validity of the CTAIS subscale, hypotheses

regarding the relationships between constructs were developed based on the review of literature. This approach to construct validity was appropriate in the current study because previous occupational training research reported associations among the constructs adapted for use in the CTAIS. Subscale correlation testing between emergent factors was completed. Findings in agreement with the hypotheses provided support, albeit indirectly, for convergent construct validity of the CTAIS (Patton, 2007).

Face and Convergent Construct Validity

For face validity, the four factors which emerged from EFA loaded on the separate and distinct constructs from which they were adapted. All items loading on PTB were adapted from Ajzen's (n.d.-b) theory of planned behavior questionnaire, all items loading on CTSE and TMA were adapted from Noe's (2011) Training Self-Efficacy and Training Motivation Scale respectively, and all items loading on TLOC were adapted from Spector's (1988) Work Locus of Control Scale. CTSE and TMA emerged in accordance with the findings of Colquitt et al. (2000). Distinct construct separation between PTB and CTSE, as well as PTB and TLOC, was observed. These finding are supported by, and consistent with, the work of Ajzen (2006). Factor loadings consistent with the literature provided support of face validity in the CTAIS.

Construction Training Self-Efficacy and Training Locus of Control. Convergent construct validity is evidence that constructs, which have been found to be related in the literature, are in fact related. Review of occupational and training research (Chiaburu & Marinova, 2005; Colquitt et al., 2000; Phillips & Gully, 1997) indicated that high perceived self-efficacy is negatively correlated with external LOC. The following hypothesis, based on the literature, was developed and tested to examine the relationship between CTSE and TLOC in the CTAIS:

H_0: Perceived Construction Training Self-Efficacy (CTSE) will be negatively correlated with external Training Locus of Control (TLOC).

H_1: Perceived Construction Training Self-Efficacy (CTSE) will be positively correlated with external Training Locus of Control (TLOC).

High perceptive CTSE and external TLOC were significantly, and negatively, correlated ($r = -0.37$, $p < 0.01$). Therefore the null hypothesis, H_1, was rejected providing evidence of convergent construct validity for CTSE and TLOC factors within the CTAIS.

Construction Training Self-Efficacy and Training Motivation Attitudes. The occupational and training research (Chiaburu & Marinova, 2005; Colquitt et al., 2000; Phillips & Gully, 1997) indicated that high perceived training self-efficacy and high levels of motivation to train were positively correlated. The following hypothesis, based on the review of literature, was developed and tested to examine the relationship between CTSE and TMA in the CTAIS:

H_0: Perceived Construction Training Self-Efficacy (CTSE) will be positively correlated with favorable Training Motivation Attitudes.

H_1: Perceived Construction Training Self-Efficacy (CTSE) will be negatively correlated favorable Training Motivation Attitudes.

High perceived CTSE and favorable TMA were significantly, and positively, correlated ($r = 0.71$, $p < 0.01$). Therefore the null hypothesis, H_1, was rejected providing evidence of convergent construct validity for the CTSE and TMA factors within the CTAIS.

Training Motivation Attitudes and Training Locus of Control: Lastly, occupational and training research (Ng et al., 2006) showed that favorable TMA and external LOC were negatively correlated. The following hypothesis, based on the review of literature, was developed and tested to examine the relationship between TMA and TLOC in the CTAIS:

H_0: Favorable Training Motivation Attitudes will be negatively correlated with external Training Locus of Control.

H_1: Favorable Training Motivation Attitudes will be positively correlated with external Training Locus of Control.

Favorable TMA and external TLOC were, significantly, negatively correlated ($r = -0.39$, $p < 0.01$). Therefore the null hypothesis was rejected providing evidence of convergent validity for the TMA and TLOC factors within the CTAIS.

Given the observed factor structure resulting from EFA and inter-factor correlations between the emergent factors (Table 8), evidence has been provided to support face and concurrent construct validity of the CTAIS.

Table 8. Emergent Factor Correlation Matrix, N = 238

Factor	1	2	3	4	M	SD
1 Planned Training Behavior	1				4.19	0.706
2 Construction Training Self-Efficacy	.283	1			4.05	0.614
3 Training Motivation Attitude	.514	.711	1		4.12	0.681
4 Training Locus of Control (External)	-.219	-.373	-.394	1	2.13	0.630

Note: All correlations are significant at the 0.01 level (2-tailed).

Phase Two

Survey Administration: The 44-item CTIAS was administered during the spring semester of 2013 to students enrolled in construction management classes at CSU. As described in chapter three, the students who responded to the phase-two instrument were different than those who responded to the phase-one instrument. In total, 212 students were invited to respond. Of the students who were invited to participate, 174 usable surveys were returned, yielding a response rate of 82.1%.

Sample: Table 9 provides a breakdown of response frequencies by demographic characteristics for the Phase 2 sample, Phase 1 demographic data are provided for comparison but not discussed. Of the respondents 84.4% (146) were males. Regarding college majors, 88.9% (153) were construction management. For age, 78.6% (136) reported being between 18 and 24 years. Grade level was fairly evenly distributed; 19.1% (33) freshmen, 19.1% sophomores (33), 21.9 % (38) juniors, 36.4% (63) seniors, and 3.5% (6) graduate students. Regarding participation in construction management competitions 80.9% (140) had not participated, and 65.2% (112) of respondents had not participated in a construction management internship.

Construction field experiences were divided into internships, hands-on, and management experience. Verbiage was modified in the phase two questionnaire to separate construction experience from internship experience (e.g., "Aside from internships, how much hands-on construction experience do you have?"). For internship experience, 59.9% (103) of respondents indicated no internships experience. Hands-on experience was defined as "labor related tasks, such as, installing roofing materials, cleaning up the site, assisting in the installation of brick, pouring concrete, placing reinforcing, and so on" in the questionnaire. For hands-on construction experience, 41.2% (88) of respondents reported one year or less. Management experience was defined as "field or office management tasks, such as, submittal/shop drawing review, writing requests for information (RFIs), preparing cost budgets, preparing or updating schedules, and so on" in the questionnaire. For construction management experience, 78.5% (135) of respondents indicated one year or less, 8.7% (15) reported between one and two years, 2.9% (5) indicated between two and three years, and 9.9% (17) reported three or more years.

Table 9. Phase One and Phase Two Demographic Characteristics of Participants

Characteristic	Phase One n	Phase One %	Phase Two n	Phase Two %
Gender				
Female	41	17.3	27	15.6
Male	200	82.7	146	84.4
College Major				
Construction Management	180	74.1	153	88.9
Other/Dual Major	39	16.0	3	1.8
Interior Design	22	9.1	14	8.1
Undeclared	2	0.8	1	1.2
Age at time of survey (years)				
Under 17	3	1.2	5	2.9
18-24	213	87.8	136	78.6
25-30	20	8.2	21	12.1
31-40	6	2.4	7	4.1
41 or over	1	0.4	4	2.3
Grade level at time of survey				
Freshman	57	23.5	33	19.1
Sophomore	50	20.6	33	19.1
Junior	61	25.1	38	21.9
Senior	73	30.0	63	36.4
Graduate	2	0.8	6	3.5
Participation in Construction Management Competitions				
0	201	83.8	140	80.9
1	26	10.8	17	9.8
2	9	3.7	10	5.8
3	1	0.4	2	1.2
More than 3	3	1.3	4	2.3
Participation in Construction Management Internships				
0	168	69.1	112	65.2
1	48	19.8	40	23.3
2	18	7.4	14	8.1
3	7	2.9	3	1.7
More than 3	2	0.8	3	1.7
Combined Duration of Construction Management Internships (months) (phase 2 only)				
none	-	-	103	60.2
0-3	-	-	21	12.3
3-6	-	-	16	9.4
6-9	-	-	12	7.0
More than 9	-	-	19	11.1
Hands-on Construction Experience				
None	47	19.4	27	15.7
Less than 1 year	58	23.9	61	35.5
Between 1 and 2 years	50	20.7	25	14.5
Between 2 and 3 years	21	8.7	13	7.6
More than 3 years	66	27.3	46	26.7
Construction Management Experience				
Less than 1 year	98	40.3	83	48.3
Between 1 and 2 years	73	30.0	52	30.2
Between 2 and 3 years	32	13.2	15	8.7
More than 3 years	14	5.8	5	2.9
More than 3	26	10.7	17	9.9

Phase Two CTAIS and Subscale Reliability

Internal consistency reliabilities were calculated for the CTAIS as well as the CTSE, PTB, TMA and TLOC subscales using the phase-two data. The 44-item CTAIS achieved a CBA of 0.90. The 14-item CTSE, 14-item PTB, 9-item TMA, and 7-item TLOC subscales achieved CBAs of 0.95, 0.91, 0.93, and 0.83, respectively.

Answering Research Question Four

Research question four asked whether there was a significant difference in perceived CTSE in the participants who report having construction management experience and those who report having no construction management experience. The null and alternative hypotheses are as follows:

> H_0: $\mu_{\text{students with mgt. exp.}} = \mu_{\text{students without mgt. exp.}}$ There is no difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no construction management experience.
>
> H_1: $\mu_{\text{students with mgt. exp.}} \neq \mu_{\text{students without mgt. exp.}}$ There is a difference in perceived construction training self-efficacy (CTSE) between participants who report having construction management experience and participants who report having no construction management experience.

Research question four was initially addressed through an independent samples *t* test. To accomplish the initial analysis the 5-point response data (year of experience) were aggregated as a dichotomous (experience/no experience) variable using SPSS 21 statistical software. Mean CTSE score of respondents reporting having experience (n = 89) were compared with those reporting having no experience (n = 83). Mean CTSE scores of participants reporting no construction management experience and participants reporting construction experience were negatively skewed (-1.21 and -2.90, respectively). Observation of the two-tailed independent

samples t-test (Table 10) revealed that the assumption of equal variances was violated (F = 0.578, p = .578). It was noted, however, that independent samples *t* test are robust to violation of the assumption of normality and equal variance when sample sizes are similar (Boneau, 1960; Box, 1953; Zimmerman, 1987). No significant difference in CTSE by construction management experience was observed, t (158.48) = 0.34, p = 0.74. The results indicated that mean CTSE score of the group reporting no construction management experience (M = 4.30, SD = 0.52) was 0.03 points less on a 5-point scale than the CTSE score of the group reporting construction management experience (M = 4.33, SD = 0.72).

Table 10. Independent Samples t Test Results for Construction Training Self-Efficacy (CTSE) by Construction Management Experience

Variable	N	M	SD	t[a]	df[a]	p
CTSE				.336*	158.48*	.737
No CM Exp.	83	4.30	0.52			
Yes CM Exp.	89	4.33	0.72			

[a]*t* and *df* were adjusted due to unequal variances

One-way ANOVA (Table 11) was conducted to investigate CTSE by level of construction management experience. Respondents reported their level of experience in years on a 5-category scale (No experience, less than 1 year, between 1 and 2 years, between 2 and 3 years, and more than 3 years). No significant differences were observed (p = 0.22). Post hoc comparisons were inappropriate in the analysis due to the non-significant omnibus F level observed through the ANOVA (Field, 2009; Morgan, Leech, Gloeckner, & Barrett, 2007).

Table 11. One-Way ANOVA Results for Construction Training Self-Efficacy (CTSE) by Construction Management Experience

Variable	df	SS	MS	F	p
CTSE					
Between Groups	4	2.28	0.57	1.44	0.22
Within Groups	165	65.03	0.39		
Total	169	67.31			

The results of the *t* test and ANOVA answer research question four. The null hypothesis was retained due to no significant differences in mean CTSE observed between students reporting having construction management experience and those reporting no construction management experience on each the dichotomous (experience/no experience) and multi-level variables.

Supplemental Data Analysis

Supplemental analysis was conducted using the phase two data. PTB, CTSE, TMA, and TLOC means were compared by the demographic attribute variables. Specifically, *t* tests were conducted for dichotomous response data; gender, age (24 years and under/25 year and older) participation in construction management competitions (none/1 or more), and participation in construction management internships (none/1 or more). ANOVAs were completed using variable with multiple response categories; age, year in school, number of construction management competitions experiences, number of construction management internships experiences, and years of hands-on construction experience). Supplemental findings are presented below.

Construction Management Experience: Supplemental analysis was completed for PTB, MTA, and TLOC as they were not addressed in research question four. As with CTSE, the dichotomous variable was used for t-test (experience/no experienced) analysis and ANOVA was completed for the 5 category response data. Observation of the two-tailed independent samples t-test (Table 12) revealed no significant difference in PTB, TMA, or TLOC by construction management experience (having construction management experience and no construction management experience).

One-way ANOVA (Table 13) was conducted to investigate PTB, MTA, and TLOC by level of construction management experience. Respondents reported their level of experience in years on a 5-point scale (No experience, 0-1 year, 1-2 years, 2-3 years, and more than 3 years). No significant differences were observed (p = 0.30 - 0.86).

Table 12. Independent Samples t Test Results for Mean Planned Training Behavior (PTB), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Construction Management Experience

Variable	N	M	SD	t[a]	df[a]	p
PTB				1.46	165.64	0.146
Exp.	87	4.54	0.52			
No Exp.	81	4.42	0.51			
TMA				0.31	164.36	0.758
Exp.	89	4.34	0.73			
No Exp.	81	4.37	0.57			
TLOC				0.50	0.88	0.381
Exp.	89	2.04	0.75			
No Exp.	82	1.95	0.58			

[a] *t* and *df* were adjusted because variances were not equal

Table 13. One-Way ANOVA Results for Planned Training Behavior (PTB), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC) by Construction Management Experience

Variable	df	SS	MS	F	p
PTB					
Between Groups	4	1.30	0.33	1.24	0.30
Within Groups	163	42.92	0.26		
Total	167	44.23			
TMA					
Between Groups	4	0.56	0.14	0.32	0.86
Within Groups	165	71.55	0.43		
Total	169	72.11			
TLOC					
Between Groups	4	2.07	0.52	1.16	0.33
Within Groups	166	74.39	0.45		
Total	170	76.46			

Gender: The *t* tests of mean CTSE, PTB, TMA, and TLOC by gender are displayed in Table 14. Significant differences in mean CTSE, PTB, and TMA were observed; p = 0.008, < 0.001, and 0.032, respectively. The mean CTSE, PTB, and TMA of males were 0.34, 0.39, and 0.30 points higher, respectively, than females. Medium to large effect sizes according to Cohen (1988, as

cited in Morgan et al., 2007) were observed, 0.57, 0.70, and 0.47, respectively for CTSE, PTB and TMA. The confidence intervals (95%) for means CTSE, PTB, and MTA are displayed in Table 14.

Table 14. Independent Samples t Tests Results for Construction Training Self-Efficacy (CTSE), Planned Training Behavior (PTB), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Gender

Variable		N	M [95% CI]	SD	t	df	p
CTSE					2.82[a]	39.20[a]	.008
	Female	27	4.04 [3.80, 4.26][b]	0.56			
	Male	144	4.38 [4.28, 4.48][b]	0.63			
PTB					3.76	167.00	.000
	Female	26	4.14 [3.89, 4.39] [b]	0.62			
	Male	143	4.53 [4.46, 4.62] [b]	0.49			
TMA					2.23[a]	36.60[a]	.032
	Female	27	4.10 [3.85, 4.35] [b]	0.64			
	Male	144	4.40 [4.26, 4.51] [b]	0.64			
TLOC					0.06[a]	37.32[a]	.953
	Female	26	2.00	0.60			
	Male	146	1.99	0.68			

[a] *t* and *df* were adjusted due to unequal variances
[b] Confidence intervals provided when mean differences were significant at $\leq$ 0.05 level

Construction Management Competitions: Participation in construction management competitions was aggregated as a dichotomous (Yes/No) variable for initial analysis. The t-test results (Table 15) revealed no significant differences in mean CTSE, PTB, TMA, and TLOC by construction management competition participation.

ANOVA was completed for each subscale. The independent variable was the number of construction management competition experiences. Respondents reported the number (0, 1, 2, 3, and more than 3) of construction management competition experiences. The ANOVA results (Table 16) indicated non-significant omnibus F statistics for mean CTSE, PTB, TMA, and TLOC when grouped by the number of construction management competition experiences.

Table 15. Independent Samples t Test Results for Mean Construction Training Self-Efficacy (CTSE), Planned Training Behavior (PTB), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Construction Management Competition Participation

Variable		N	M	SD	t	df	p
CTSE					1.58[a]	50.41[a]	0.121
	Yes	32	4.46	0.57			
	No	139	4.28	0.64			
PTB					1.31	167.00	0.260
	Yes	33	4.39	0.62			
	No	136	4.50	0.49			
TMA					0.91[a]	50.67[a]	0.367
	Yes	33	4.44	0.62			
	No	138	4.33	0.66			
TLOC					1.33[a]	56.72[a]	0.190
	Yes	33	1.87	0.57			
	No	139	2.02	0.69			

[a]*t* and *df* were adjusted because variances were not equal

Table 16. One-Way ANOVA Results for Planned Training Behavior (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Number of Construction Management Competitions

Variable	df	SS	MS	F	p
PTB					
Between Groups	4	2.20	0.55	2.14	0.078
Within Groups	164	42.09	0.26		
Total	168	44.30			
CTSE					
Between Groups	4	2.01	0.50	1.28	0.281
Within Groups	166	65.44	0.39		
Total	170	67.46			
TMA					
Between Groups	4	1.64	0.41	0.97	0.429
Within Groups	166	70.52	0.42		
Total	170	72.17			
TLOC					
Between Groups	4	1.24	0.31	0.69	0.603
Within Groups	167	75.25	0.45		
Total	171	76.48			

Participation in Construction Management Internships: Participation in construction management internships was aggregated as a dichotomous variable (Yes/No) after collection. The *t* test results (Table 17) revealed no significant differences in mean CTSE, PTB, TMA, and TLOC by construction management internship participation.

ANOVAs were completed for means CTSE, PTB, TMA, and TLOC by the number of construction management internship experiences (none, 1, 2, 3, more than 3). The results of the ANOVA (Table 18) yielded no significant omnibus F statistics in mean differences in CTSE, PTB, TMA, and TLOC by number of construction management internships experiences.

Table 17. Independent Samples t Test Results for Mean Construction Training Self-Efficacy (CTSE), Planned Training Behavior (PTB), Training Motivation Attitude (TMA), and Train Locus of Control (TLOC) by Construction Management Internship Participation

Variable		*N*	*M*	*SD*	*t*	*df*	*p*
CTSE					1.43*	94.82*	0.157
	Yes	61	4.42	0.76			
	No	110	4.25	0.54			
PTB					0.74*	106.63*	0.463
	Yes	59	4.52	0.56			
	No	110	4.46	0.46			
TMA					0.64*	112.92*	0.521
	Yes	60	4.40	0.67			
	No	111	4.33	0.63			
TLOC					0.16	170.00	0.870
	Yes	61	2.00	0.82			
	No	111	1.99	0.57			

**t* and *df* were adjusted because variances were not equal

Table 18. One-Way ANOVA Results for Perceived Behavioral Control (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Number of Internship Experiences

Variable		df	SS	MS	F	p
PTB						
	Between Groups	4	1.70	0.42	1.63	0.17
	Within Groups	164	42.60	0.26		
	Total	168	44.30			
CTSE						
	Between Groups	4	2.78	0.70	1.79	0.13
	Within Groups	166	64.67	0.39		
	Total	170	67.46			
TMA						
	Between Groups	4	3.18	0.80	1.91	0.11
	Within Groups	166	68.98	0.42		
	Total	170	72.17			
TLOC						
	Between Groups	4	0.49	0.12	0.27	0.90
	Within Groups	167	76.00	0.46		
	Total	171	76.48			

Year in School: ANOVA was conducted to investigate differences in mean CTSE, PTB, TMA and TLOC by the respondent's year in school. Participants reported their year in school

(freshmen, sophomore, junior, and senior) in the CTIAS. The ANOVA results (Table 19) revealed no significant omnibus F for mean comparisons in CTSE, TMA, and TLOC by year in school. A significant difference in mean PTB was observed by year in school ($F(2,164) = 2.47$, $p = 0.047$). Observation of the Levene's test revealed that the PTB data were in violation of the assumption of homogeneity of variance ($p = 0.03$). When the assumption of equal variance is violated, the Games-Howell post hoc test is acceptable (Morgan et al., 2007). No significant differences in mean PTB by year in school were identified through the post hoc analysis.

Table 19. One-Way ANOVA Results for Planned Training Behavior (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC) by Year in School

Variable	df	SS	MS	F	p
PTB					
Between Groups	4	2.52	0.63	2.47	0.05
Within Groups	164	41.78	0.25		
Total	168	44.30			
CTSE					
Between Groups	4	1.56	0.39	0.98	0.42
Within Groups	166	65.90	0.40		
Total	170	67.46			
TMA					
Between Groups	4	0.38	0.09	0.22	0.93
Within Groups	166	71.79	0.43		
Total	170	72.17			
TLOC					
Between Groups	4	0.37	0.09	0.20	0.94
Within Groups	167	76.12	0.46		
Total	171	76.48			

Age: ANOVA was conducted to investigate differences in mean CTSE, PTB, TMA and TLOC by respondent age. Participants reported their age in range of years (17 or younger, 18-24, 25-30, 31-40, and over 40) in the CTIAS. The ANOVA results (Table 20) indicated no significant omnibus F in mean TMA and TLOC by respondent age. A significant difference in mean CTSE ($F(4,166) = 3.19$, $p = 0.02$) and PTB ($F(4,166) = 3.67$, $p = 0.01$) was observed by participant age. Observation of the Levene's test revealed that the CTSE and PTB data were not in violation of the assumption of homogeneity of variance ($p = 0.20$ and 0.33, respectively). When the

assumption of equal variance is met, the Tukey HSD test is acceptable (Morgan et al., 2007). Post-hoc analysis conducted for PTB and CTSE yielded significant difference between the participant reporting 17 years of age or younger and those reporting 18-24 years of age ($p < 0.01$ and $p = 0.02$, respectively) and 31-40 years of age ($p = 0.02$ and 0.01, respectively).

Table 20. One-Way ANOVA Results for Planned Training Behavior (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC) by Age

		df	SS	MS	F	p
PTB						
	Between Groups	4	3.64	0.91	3.67	0.01
	Within Groups	164	40.66	0.25		
	Total	168	44.30			
CTSE						
	Between Groups	4	4.81	1.20	3.19	0.02
	Within Groups	166	62.65	0.38		
	Total	170	67.46			
TMA						
	Between Groups	4	3.59	0.90	2.17	0.07
	Within Groups	166	68.57	0.41		
	Total	170	72.17			
TLOC						
	Between Groups	4	3.19	0.80	1.82	0.13
	Within Groups	167	73.29	0.44		
	Total	171	76.48			

Post-hoc comparisons were made using small and unbalanced sample sizes (See Table 9). In addition the significant differences in mean PTB and CTSE were observed between participants who reported ages of 17 years or younger ($M = 3.64[2.34, 4.95]$ and $M = 3.47[2.14, 4.80]$, respectively) and those 18-24 ($M = 4.51[4.43, 4.60]$ and $M = 4.34\ [4.23, 4.44]$, respectively), and 31-40 ($M = 4.67[4.32, 5.03]$ and $M = 4.66[4.40, 4.93]$, respectively). No significant difference was observed between participants who reported ages of 17 years or younger and those 25-30 years of age. Significant difference in mean PTB and CTSE skipped the mid-age range (25-30). Higher observed CTSE levels for older respondents were inconsistent with the literature (Maurer, 2001). Inconsistent significant mean differences observed and the small and unbalanced sample sizes of several groups used in the post-hoc analysis caused

concern regarding interpretation of the results. Small and unbalanced sample sizes make it difficult to detect violation of assumptions and reduce statistical power of ANOVA (Bolt, Beranek, & Newman, 1997). Significant overlaps were observed in the 95% confidence intervals for mean CTSE and PTB by age. Therefore, it was concluded that the significant difference identified in mean CTSE and PTB should be regarded as statistical artifacts in the current study.

The data were divided into two groups using 24 years of age as the breakpoint, which was selected based on the observation of high attrition rates in young adult construction training programs (Bilginsoy, 2003; Ginsburg et al., 2000; Sabates, 2008; Texas Workforce Commission, 2001) and the definition of young adults in training, 16-18 and 19-24 years, used by the U.S. Department of Labor (2009). In addition, students over the age of 24 years are considered "non-traditional" according to the United States Department of Education (n.d.). No significant mean differences in CTSE, PTB, TMA, or TLOC was observed in the *t* test results (Table 21) comparing respondents under 24 year of age (n = 137-140) and those reporting ages of 25 years and over (n = 32).

Table 21. Independent Samples t Test Results for Mean Construction Training Self-Efficacy (CTSE) and Planned Training Behavior (PTB) by Age

Variable	*N*	*M*	*SD*	*t* [a]	*df* [a]	*p*
CTSE				0.26	45.07	0.798
24 Year and Under	139	4.31	0.63			
25 Years and Over	32	4.34	0.65			
PTB				0.73	53.17	0.469
24 Year and Under	137	4.49	0.53			
25 Years and Over	32	4.42	0.48			
TMA				0.72	42.64	0.479
24 Year and Under	139	4.37	0.63			
25 Years and Over	32	4.27	0.72			
TLOC				1.46	46.66	0.151
24 Year and Under	140	2.03	0.67			
25 Years and Over	32	1.84	0.66			

[a] *t* and *df* were adjusted because variances were not equal

Hands-On Construction Experience: To accomplish the initial analysis the 5 category experience data were aggregated into a dichotomous (experience/no experience) data using SPSS

21 statistical software. Observation of the two-tailed independent samples t-test (Table 22) revealed that the assumption of equal variances was violated for CTSE, PTB, TMA, and TLOC ($p = 0.16$, 0.32, 0.44, and 0.51, respectively). It was noted that independent samples *t* test are robust to violation of the assumptions of normality and equal variance (Boneau, 1960; Box, 1953; Zimmerman, 1987). No significant differences in mean MTA and TLOC by hand-on construction experience were observed. Significant difference in CTSE and PTB were observed ($p = 0.02$ and 0.03, respectively). The results indicated that mean CTSE scores of the group reporting hands-on experience was 0.34 points higher than that of the group reporting no hands-on experience. For PTB, the results indicated that the mean PTB score of the group reporting hands-on experience was 0.29 points higher than that of the group reporting no hands-on experience. Medium effect sizes (0.54 and 0.53) according to Cohen (1988, as cited in Morgan et al., 2007) were observed in CTSE and PTB, respectively.

ANOVAs were conducted to investigate differences in mean PTB, CTSE, TMA and TLOC. The independent variable was the respondent's reported level of hands-on construction experience. Participants reported the duration of hands-on construction experience in years (None, 0-1 year, 1-2 years, 2-3 years, more than 3 years). Investigation of the results of the ANOVA (Table 23) indicated no significant omnibus F for mean TLOC, TMA, and CTSE by level of hands-on experience. A significant difference in mean PTB was observed ($p = 0.03$). The Levene's test revealed that the PTB data were in violation of the assumption of homogeneity of variance ($p = 0.03$). A Games-Howell post hoc conducted for PTB identified significant difference ($p < 0.01$) between the participants reporting no hands-on experience ($M = 4.23$[4.00, 4.46]) and those reporting 2-3 years ($M = 4.74$[4.63, 4.85]). A significant mean difference ($p =$

0.03) was also observed between the group with 2-3 years (M = 4.74[4.63, 4.85]) and more than 3 years of hands-on experience (M = 4.46[4.30, 4.62]).

Table 22. Independent Samples t Test Results for Construction Training Self-Efficacy (CTSE), Perceived Behavioral Control (PTB), Training Motivation Attitude (TMA), and Training Locus of Control (TLOC) by Hands-on Construction Experience

Variable		N	M[95% CI]	SD	t[a]	df[a]	p
CTSE					2.45	35.21	0.019
	Yes	143	4.37[4.27, 4.47][b]	0.65			
	No	27	4.04[3.78, 4.30][b]	0.6			
PTB					2.33	31.44	0.027
	Yes	142	4.52[4.44, 4.61][b]	0.48			
	No	26	4.23[3.99, 4.48][b]	0.60			
TMA					1.45	32.84	0.157
	Yes	144	4.39	0.64			
	No	26	4.17	0.71			
TLOC					1.42	34.50	0.240
	Yes	145	1.97	0.67			
	No	26	2.14	0.67			

[a] *t* and *df* were adjusted because variances were not equal
[b] Confidence intervals provided when mean differences were significant at $\leq$ 0.05 level

Table 23: One-Way ANOVA Results for Planned Training Behavior (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC) by Hands-On Experience

Variable		df	SS	MS	F	p
PTB						
	Between Groups	4	2.72	0.68	2.67	0.034
	Within Groups	163	41.50	0.25		
	Total	167	44.23			
CTSE						
	Between Groups	4	3.62	0.90	2.34	0.057
	Within Groups	165	63.69	0.39		
	Total	169	67.31			
TMA						
	Between Groups	4	1.88	0.47	1.11	0.355
	Within Groups	165	70.22	0.43		
	Total	169	72.11			
TLOC						
	Between Groups	4	0.99	0.25	0.54	0.705
	Within Groups	166	75.47	0.45		
	Total	170	76.46			

Conclusion

Ultimately, the goal of the research was to develop a reliable and valid construction training domain level instrument that can be used by training practitioners to measure the constructs shown in the literature to predict enrollees' performance, completion, and attrition in occupation and educational settings. The instrument is called the Construction Training Attitudes and Intentions Scale (CTAIS). The initial 98 items, adapted from existing constructs, were reduced to 44 items through inter-item correlation and factor analysis. The 44 CTAIS items loaded on four distinct factors; PTB, CTSE, TMA, TLOC. The PBS, CTSE, MTA, and TLOC were shown to be reliable with CBAs of 0.95, 0.91, 0.93, and 0.83, respectively. The 44-items CTAIS was shown to be reliable with CBAs of 0.87 and 0.90 in phase one and phase two, respectively. For face validity, the factors which emerged in the CTAIS mirrored those from which they were adapted (e.g., Factor 2, CTSE, emerged from and only contained items adapted from Noe's (2011) training self-efficacy scale). For convergent construct validity, the correlations between emergent factors (Table 8) mirrored those found in previous research (e.g., high levels of perceived CTSE was significantly negatively correlated with external TLOC, which was found by Chiaburu and Marinova, (2005), Colquitt et al. (2000), and Phillips and Gully (1997) in occupational training research).

No significant difference is CTSE was observed when analyzed by respondent's level of construction management experience (research question four). However, several significant differences in PTB, CTSE, and TMA were observed in the supplemental analysis. Significant differences were observed in means PTB, CTSE, and TMA ($p < 0.001$, $p = 0.008$, and 0.032, respectively) by gender and in mean PTB and CTSE ($p = 0.027$ and 0.019, respectively) by hands-on construction experience (dichotomous, experiences/no experience). ANOVA revealed significant differences in mean PTB ($p = 0.03$) by level of hands on experience. Post hoc analysis

identified significant differences in the mean PTB for respondents with no hands-on construction experience and those reporting more than 3 years of hand-on construction experience. No significant differences in TLOC were found. The practical significance of these findings is addressed in the next chapter.

CHAPTER 5: DISCUSSION

The following chapter provides a summary of the study, the significant findings, and conclusions drawn from the data presented in chapter 4. Discussion of the study significance, its limitations, implications, and recommendation for the field is given. Areas of further research are also addressed.

Study Summary

A review of the literature revealed that young adults (ages 15-24) are three times more likely to be unemployed than older adults (International Labour Organization, 2012), and employment opportunities are limited, particularly for young men (Haveman et al., 2012). Construction is a sector of the economy which holds potential to employ trained individuals in new building erection as well as remodeling, renovation, and maintenance of existing infrastructure. While the construction industry represents 4.7% of the total national employment, it was responsible for more than 40% of the new jobs between 2007 and 2011, double that of any other industry (Smith et al., 2012). Recognition of the unemployment situation of young adults and the availability of job opportunities in construction has led to the development of construction employment skills training programs that target this group.

Despite private and federal funding initiatives to encourage participation, young adult employment training programs experience significant challenges in participant retention (Ginsburg et al., 2000; Sabates, 2008). The U.S. Department of Labor's (2011) audit of the Employment and Training Administration's Youthbuild training program documented an attrition rate of 47.9% in 2010. Similarly, the Texas Workforce Commission (2001) reported that the Texas Job Corps training program's non-completion rate was over 65% in 2000.

Ginsburg et al. (2000, p. 1), succinctly addresses the vulnerability of young adults to training dropout as follows:

> It is clear that disenfranchised youth – whether through socioeconomic or more personal circumstances – are at greatest risk for [training] dropout. Within this cohort, those youth with negative life experiences, a lack of positive influential role models, low self-esteem, and an external locus of control (feeling that one's life is out of one's hands) are more attrition prone.

The initial focus of the study was to identify, through the review of literature, the appropriate constructs to be included in an instrument to predict construction training performance, completion, and attrition. No existing instrument adapted for use within the domain of construction training could be found. Existing instruments intended for predicting training performance were generally administered to currently employed individuals participating in various forms of occupational training (Creed et al., 2001; Gist et al., 1989; Sitzmann et al., 2010). Little investigative attention has been given to unemployed and underemployed individuals.

The purpose of this study was to develop, through the adaptation of existing measures, a reliable and valid instrument for measuring constructs that influence performance in, attrition from, and completion of construction training. Combining various constructs from multiple scales within one instrument and adapting survey items to construction domain level training necessitated instrument piloting and validation. The outcome of the research was the Construction Training Attitudes and Intentions Scale (CTAIS). The CTAIS and its emergent factors, Planned Training Behavior (PTB), Construction Training Self-Efficacy (CTSE), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC), were shown to be internally consistent. Evidence for face and convergent construct validity of the CTAIS was presented in the previous chapter and is summarized in the following pages.

Construct Identification and Selection

The existing constructs selected for inclusion in the instrument originated in Bandura's social cognitive and self-efficacy theories (Bandura, 1977, 1982, 1997) as well as Ajzen's (1991) theory of planned behavior. Also essential in construct selection was Noe and colleagues (Ford & Noe, 1987; Noe & Schmitt, 1986; Noe & Wilk, 1993) development of an integrative theory of training motivation and Spector's (1988) work regarding perception of control in occupational settings. The identified constructs (Bandura; Spector; and Noe et al.) were intended to measure participant performance expectation (self-efficacy), perception of control (locus of control), and motivation in the occupational training domain. Ajzen's instrument used to predict class attendance within the university educational domain (e.g., perceived behavior control, subjective norms, attitudes, and behavioral intentions) was also selected for adaptation. The resulting CTAIS, prior to item reduction and exploratory factor analysis (EFA), included 98 items distributed across eight subscales intended to measure respondent's perceptions of the 1) Training Self-Efficacy (CTSE); 2) Training Motivation (CTM); 3) Training Locus of Control (TLOC); 4) Attitude Toward Training (ATCT); 5) Perceived Behavioral Control (PBC); 6) Training Value Attitudes (TVA); 7) Training Norms (CTN); and 8) Training Intentions (CTI) within the construction training domain.

Phase One Survey Item Reduction

The CTAIS was developed and administered in two phases. The scope of phase one was item reduction, reliability, and validity analysis. College students (N = 247) enrolled in construction management classes at Colorado State University (CSU) and the University of Nebraska Kearney (UNK) completed the CTAIS during phase one. In total, 54 items were removed from the 98-item CTAIS, yielding a 44-item instrument.

The initial steps in item reduction were completed independently for each subscale. Subscale inter-item correlations and factor loading matrices were produced and evaluated. Inter-items correlations, $0.40 \leq r \leq 0.80$, and eigenvalues ≥ 0.40 loading on a single factor (Field, 2009; Pett et al., 2003) were used as benchmarks to retain items. In total, 38 of the 98 CTAIS items were removed using this procedure yielding 60 items.

The 60 items retained after subscale analysis were subjected to EFA. The Kaiser-Meyer-Olkin (KMO) test was completed to ensure adequate sample size (N = 247) for EFA. The KMO score was 0.94 and values greater than 0.90 are considered "superb" according to Field (2009). Items with eigenvalues ≤ 0.40 on any factor and items that loaded on multiple factors with eigenvalues ≥ 0.40 (Pett et al., 2003) were investigated for removal. As recommended by Pett et al. (2003), the theoretical coherence of the emergent factors and the wording of individual items within each factor were considered in addition to the statistical benchmarks used during item reduction procedures (see chapter 4). In total, 15 items were removed through EFA yielding 45 CTAIS items distributed across four emergent factors.

Cronbach's alpha (CBA) was calculated to evaluate the internal consistency of each emergent factor. Each factor's CBA was recalculated and analyzed if each item loading on that factor was deleted. It was noted that CBA of factor 3 was slightly higher if one of its items (ATCT 01) was deleted; deleting ATCT 01 yielded the 44-item CTAIS. The CBAs for factors 1, 2, 3, and 4, and the 44-item CTAIS were 0.943, 0.942, 0.941, 0.829 and 0.926, respectively. The four emergent factors explained 60.51% of the total variance in participant responses. Appendix E summarizes item removal in each step of the phase-one item reduction process. Appendix F provides the inter-item correlation matrices and factor loading tables.

Emergent Factor Structure Naming

The 44 CTAIS items loaded on four district factors, each factor contained items loading with eigenvalues ≥ 0.56. Factor 1, Planned Training Behavior (PTB), contained 14 items adapted from Ajzen's (n.d.-a) theory of planned behavior questionnaire. PTB items loaded with eigenvalues of 0.65 to 0.82. Factor 2, Construction Training Self-Efficacy (CTSE), contained 14 items adapted from Noe's (2011) training self-efficacy scale. CTSE items loaded with eigenvalues of 0.56 to 0.81. Factor 3, Training Motivation Attitudes (TMA), contained 9 items from Noe's (2011) Attitudes Toward Training (3 items) and Training Motivation (6 items) scales. TMA items loaded with eigenvalues of 0.63 to 0.77. Factor 4, Training Locus of Control (TLOC), contained 7 items adapted from Spector's (1988) Work Locus of Control Scale. TLOC items loaded with eigenvalues of 0.60 to 0.74. Observation of the factor loading structure resultant from EFA revealed that all items loaded on the constructs from which they were adapted (e.g., all item in the adapted CTSE factor originated from Noe's (2011) Training Self-Efficacy scale). Adapted item groupings on expected constructs provided initial evidence of face validity. The rotated factor matrix for the 44-item CTAIS can be found in Appendix F.

Discussion of Perceived Behavioral Control

All of items adapted from Ajzen's theory of planned behavior questionnaire for directly measuring perceived behavioral control (PBC) were removed from the instrument during phase one. Specifically, 5 of the 8 PBC items were retained during the subscale analysis in light of inter-item correlations observed below the 0.40 benchmark. In this case, the correlation benchmark of $r \geq 0.30$ suggested by Field (2009) for psychological constructs was used to remove 3 and retain 5 PBC items for EFA. EFA revealed that the 5 retained PBC items had

factor loadings $\geq$ 0.40 on multiple factors. Therefore, these 5 PBC items were also removed from the CTAIS leaving no PBC items included in the final instrument.

Ajzen's (1991) theory of planned behavior proposes that the constructs of attitude, subjective norms, and direct measures of PBC are antecedents to behavioral intentions, which ultimately determine one's behavior. In the literature, it is shown that direct measures of PBC can stand alone empirically as a behavioral predictor (Ajzen, 2006; Armitage & Conner, 2001). In this study, only the PTB items measuring participant's perception of attitude, norms, and intentions toward construction training were retained after phase-one item reduction.

Removal of all items intended to directly measure PBC may limit the predictive power of the CTAIS with regard to construction training behaviors. However, the purpose of this study was to develop a reliable and valid instrument useful in predicting trainee behavior. Inclusion of PBC items reduced the instrument's internal consistency and, therefore, their removal was consistent with the study objective. Moreover, since this study did not contain behavior or training performance criteria, analysis and determination of the predictive value of PBC items (and other variables) were not possible. Inclusion of PBC items when administering the CTAIS in future studies which contain behavior or performance metrics would allow for assessment of the predictive power on the PTB subscale with and without the PBC items. This clearly indicates an area of further research.

Phase Two Analysis

The 44-item CTAIS was administered among a separate and different sample of college students during phase two. In total, 174 usable surveys were received from students enrolled in construction management classes at CSU. Data were used to calculate internal consistency reliability coefficients and provide evidence of face and convergent construct validity.

Comparison of mean CTSE scores of respondents reporting construction management experience (dichotomous-experience/no experience) was completed to answer research question four. No significance difference in CTSE by construction management experience was identified.

Inclusion of demographic items in the CTAIS beyond construction experience (e.g., gender, age, years of hands-on construction experience, etc.) allowed for supplementary analysis. Supplemental analysis included comparison of mean PTB, CTSE, TMA and TLOC by respondent attribute variables. Specifically, t tests were conducted for dichotomous response and recoded data: gender, age (24 years and under/25 year and older), participation in construction management competitions (none/1 or more), and participation in construction management internships (none/1 or more). ANOVAs were completed using variables with multiple response categories/level; age, year in school, number of construction management competitions experiences, number of construction management internships experiences, years of construction management experience, and years of hands-on construction experience. See table 9 for response categories/levels of demographic survey items.

Reliability and Validity

Internal consistency reliability coefficient, CBA, were calculated for the CTAIS as well as the CTSE, PTB, TMA and TLOC subscales using phase-two data. The 44-item CTAIS achieved a CBA of 0.90. The 14-item PTB, 14-item CTSE, 9-item TMA, and 7-item TLOC subscales achieved CBAs of 0.91, 0.95, 0.93, and 0.83, respectively.

The CTAIS factor structure and inter-factor correlations were used to evaluate face and convergent construct validity. Associational research questions and hypotheses were developed based on the review of literature. Correlations between CTAIS factors were calculated and

compared with correlations observed between the constructs in the literature. Associational hypotheses were tested using the phase-two data.

For convergent construct validity, the correlations between emergent factors mirrored those found in the literature. For example, there was a significant inverse correlation between perceived CTSE and external TLOC. Similar relationship has been found between self-efficacy and locus of control in occupational research (Chiaburu & Marinova, 2005; Colquitt et al., 2000; Phillips & Gully, 1997). Associations between MTA and CTSE, as well as MTA and TLOC, were supported in the literature (see chapter 4). The results of the associational hypothesis testing provided support, albeit indirect (2007), for the convergent construct validity of the CTAIS. Correlations between the emergent factors can be found in Table 24.

Table 24. Phase Two Emergent Factor Correlation Matrix

Factor	1	2	3	4	N	M	SD
1 Planned Training Behavior	1				170	4.47	.512
2 Construction Training Self-Efficacy	.275[a]	1			172	4.31	.628
3 Training Motivation Attitudes	.379[a]	.847[a]	1		174	4.35	.649
4 Training Locus of Control	-.165[b]	-.552[a]	-.518[a]	1	174	1.99	.668

[a]Correlations are significant at the 0.01 level (2-tailed)
[b]Correlations are significant at the 0.05 level (2-tailed)

A limitation of the study was an inability to empirically determine the criterion-related validity of the CTAIS. According to Patton (2007), empirical validity is determined by making planned comparisons between the measure of interest and an established criterion (e.g., predictive and concurrent criterion-related validity). In this study, criterion-related validity was not appropriate because the CTAIS was not used to predict an outcome, nor was a previously validated measure available for comparison. Study limitations, however, can be used to direct

future research endeavors. Empirical validation of the CTAIS is discussed further in the following sections of this chapter (see Study Limitation and Further Research).

Findings

In answering research question four, no significant difference in mean CTSE was observed when respondents were grouped by construction management experience (dichotomous-experiences/no experience). Supplemental analysis revealed several significant differences in PTB, CTSE, and TMA. No significant differences in TLOC were identified in the supplemental analysis.

The supplemental analysis was completed using the demographic items as independent variables. The t test results revealed significant differences in mean PTB, CTSE, and TMA ($p < 0.001$, $p = 0.008$, and 0.032, respectively) by gender and in mean PTB and CTSE ($p = 0.027$ and 0.019, respectively) by hands-on construction experience (dichotomous, experiences/no experience). ANOVA yielded significant differences in mean PTB and CTSE by age ($p < 0.001$ and $p = 0.01$, respectively) and mean PTB by level of hands-on experience ($p = 0.03$). Post-hoc analysis revealed significant differences in mean PTB and CTSE. However, it was noted that these differences were considered statistical artifacts due to the small and unbalanced sample sizes and substantially overlapping confidence intervals around the means. Significant differences in mean CTSE were observed between respondents reporting no hands-on construction experience and those reporting 2-3 years ($p < 0.01$), as well as between respondents reporting 2-3 years and those reporting more than 3 years of hands-on construction experience ($p = 0.03$).

Supplemental Analysis

Several significant differences were observed in the supplemental analysis. Most interesting were the significant differences in respondent mean CTSE, PTB, and TMA by gender. With regard to motivation and self-efficacy within social cognitive theory, Bussey and Bandura (1999) contend that environmental factors, other than gender, are at work in creating motivational and self-regulatory differences between individuals. However, in male-dominated fields "a masculine orientation is associated with confidence and achievement because masculine self-perceptions are imbued with the notion that success in these areas is a masculine imperative" (Pajares, 2002a, p. 122). Construction management is viewed as a male-dominated profession (Fielden, Davidson, Gale, & Davey, 2000, 2001; Gale, 1994) and the finding of this study indicate that female participant perception of CTSE, TMA, and PTB were significantly lower than their male counterparts ($p < 0.001$, $p = 0.008$, $p = 0.032$, respectively).

These results suggest that female respondents were less motivated to attend construction training sessions and less confident in their ability to successfully perform and complete construction training. With regard of PTB, female respondents reported that completing construction training was outside their perceived norms. That is, female's level of agreement was significantly lower than males on items such as "most people whose opinions I value would approve of my participation in construction training" (1 = strongly disagree, 5 = strongly agree). In addition, female participants reported lower levels of intentionality to attend and complete training, as well as lower level of perceived value of training. With regard to practical significance, medium-to-large effect sizes according to Cohen (1988, as cited in Morgan et al., 2007) were observed for CTSE, PTB, and TMA (0.56, 0.70, 0.47, respectively) by gender.

The t test results indicated a significant difference ($p = 0.03$) in mean levels of respondent PTB between respondents who reported having hands-on construction experience with those

who reported having no hands-on construction experience. While no previous research was found to support or refute this finding, it exposes an interesting area of inquiry regarding planned behavior and past experience. Within the construction industry, the frequency of student participation in family-owned businesses may be high. Those respondents within families who own construction businesses may be more likely to work, and at younger ages, in a hand-on setting. One might also hypothesize that students with family members in the construction industry would report higher level of acceptance, and perhaps expectations, that the respondent would pursuit construction training. High levels of acceptance and expectation should translate to high levels of agreement with PTB items. In future studies a survey item assessing the participant's family involvement in construction should be considered.

The t test results identified a significant difference ($p = 0.02$) in mean level of perceived CTSE by hands-on experience. Social cognitive theory posits that mastery experience within the domain of interest has the greatest influences on one's level of perceived self-efficacy (Bandura, 1986, 1997; Pajares, 2002b). In the current study, respondents with hands-on construction experience did report significantly higher levels of perceived CTSE. However, this finding should be considered with caution, because there is no quantitative definition for what constitutes "mastery experience" in the current context. An indicator of time spent in the construction field gaining hands-on experience provides no information on "mastery" of a skill or skills. In future studies the development and inclusion of task-specific mastery metrics, appropriate for the training would be helpful in determining the congruence of the findings with Bandura's social cognitive and self-efficacy theories. It was noted that ANOVA indicated mean level of perceived CTSE was nearly statistically significant ($p = 0.057$) when analyzed by hands-on experience.

Significant differences in mean PTB and CTSE by age were observed in the ANOVA. However, investigation of the groups reveals areas of concern. Small sample sizes were noted for respondents reporting ages of 17 years or younger (n = 5), 31-40 years (n = 7), over 40 years (n = 4). The significant differences in mean PTB were observed between participants who reported an age of 17 years of age or younger and those 31-40 years of age. Significant differences in mean CTSE were observed between participants who reported an age of 17 years or younger and those 18-24, and those 31-40, while no significant difference was observed with those reporting 25-30 years of age. It is noted that these ANOVA results should be considered with caution since CTSE differences were not observed between those 17 years and younger and those 25-30 year of age and because the PTB and CTSE comparison are made with small and unbalanced group sizes. Small and unbalanced sample sizes make it difficult to detect assumption violations and reduce statistical power in ANOVA (Bolt et al., 1997). Future studies with larger sample sizes of participants 17 years of age and younger and those over 30 years are required to draw meaningful conclusions in this context.

Additional analysis was performed to inform the significant, yet inconsistent, mean differences observed in the ANOVA post hoc using small and unbalanced sample sizes. To this end, the data were divided into two groups using 24 years of age as the breakpoint, This age was selected as a breakpoint based on high attrition rates observed in young-adult construction training programs (Bilginsoy, 2003; Ginsburg et al., 2000; Sabates, 2008; Texas Workforce Commission, 2001) and the definition of young adults, 16-18 and 19-24 years, used by the U.S. Department of Labor (2009). Moreover, ages between 16-24 years are employed as inclusion criteria in federally funded young-adult training programs. In addition, within the educational domain, students over the 25 years of age or older are considered “non-traditional” (United

States Department of Education, n.d.). No significant mean differences in CTSE or PTB were observed in the *t* test results comparing respondents under 24 years of age (n = 137) and those reporting ages of 25 years or older (n = 32).

Training programs target young adults due to their higher likelihood of being unemployed than older adults (Haveman et al., 2012) and because those reporting joblessness for the entire year are low-income, disadvantaged, and out-of-school young adults who are most in need of employment (Sum et al., 2011). With regard to training, young adult trainee commitment, attitude, motivation, and confidence were shown to be of great importance in determining whether young adults complete or drop out (Ginsburg et al., 2000; Weigensberg et al., 2012). In this study, no significant differences in CTSE, TMA, TLOC and PTB were identified between young adults (age $\leq$ 24 years) and adults (age $\geq$ 25 years). This suggests the factors of the CTAIS, which encompass attitude, motivation, and confidence, may be of great importance in determining drop out behavior from training for young adults and adult trainee.

Sample

The study sample was composed of college students (N = 421) enrolled in construction management classes at CSU and UNK. The target population for the CTAIS is unemployed individuals participating in construction employment training. The sample and target populations differ in several ways. For instance, the study respondents were currently enrolled in a four-year construction education program, which is a form of construction training. In contrast, the target population may be enrolling in construction training for the first time without prior knowledge or experience. Extrapolating the findings, of research question four and the supplemental analysis, to the target population is not recommended and was not the intent of the study.

The purpose of the study was to determine the reliability and validity of the CTAIS. The sample was adequate to accomplish that objective. Inference to other target groups is not recommended. While the constructs of general self-efficacy and work locus of control are shown to be universal across cultures and groups (Luszczynska, Scholz, & Schwarzer, 2005; Scholz, Gutiérrez Doña, Sud, & Schwarzer, 2002; Spector, Cooper, Sanchez, & O'Driscoll, 2002), no claim was found in the literature for the universality of motivation or planned behavior. The factors, CTSE, PTB, TMA, and TLOC, included in the instrument are construction training domain specific and can be applied to any construction training population. In the study correlations between factors were found to be congruent with previous research. However, instrument validation is a continuous and on-going process (Beattie, Pinto, Nelson, & Nelson, 2002). Multiple administrations of the CTAIS, in multiple populations, are needed to provide additional support for validity. For the target population, validity of the CTAIS would be strengthened through multiple and continued administration of the CTAIS within samples of unemployed individuals participating in construction training. Continued administration of the CTAIS represents opportunities of further research.

Significance of the Study

Identification of participant characteristics that contribute to attrition and performance in construction training can be used to assist training organizations in programmatic decision-making. The instrument developed and validated through this study allows training organizations to quantitatively measure and evaluate individual trainee characteristics and make informed decisions, at the individual level, about appropriate training interventions.

While, it is clear that further research is required to determine its predictive value, the CTAIS can be used as a metric for trainee perceptions of PTB, CTSE, TMA, and TLOC. Pre-

training identification of participant characteristics allow practitioners to better serve trainees and more effectively allocate scarce training resources. For example, the CTAIS can be used as a quantitative metric to identify trainees with low perceived CTSE for the purpose of providing additional efficacy-building services to these participants. Eden and Aviram (1993) have shown that an individual's confidence level can be elevated through self-efficacy boosting interventions, which presumably increase a participant's likelihood of successful training completion. On the other hand, trainees with high levels for CTSE may not require additional pre-training confidence-building interventions and these training resources (staff, funding, etc.) could be allocated elsewhere to maximize training effectiveness based on participant need. Ginsberg et al. (2000, p. 159) succinctly address this point: "by initially targeting supportive aspects of the program to the individual, the program stands a better chance of keeping the individual involved (increasing retention), in affecting long-term change in the participant, and in increasing employment prospects."

Weigenberg et al. (2012) report that training practitioners desire to gain a more complete picture of each participant's individual characteristics [beyond gaining a job] to gauge individual training successes. The CTAIS provides training organizations with a quantitative measure that can be used to compare CTSE, TMA, PTB and TLOC scores before, during, and after training interventions. Changes in CTSE, TMA, PTB and TLOC during training can be used to gauge training successes. For instance, the literature demonstrates that effective confidence-building interventions can boost participant self-efficacy in employment contexts (Eden & Aviram, 1993) and that an efficacious person is more likely to persist in searching for employment in the face of adversity and setbacks (Creed et al., 2001). Therefore, increases in trainee CTSE may constitute

success in some training programs. Administration of the CTAIS before, during, and after training can allow practitioners to quantitatively evaluate these training outcomes.

Some training programs measure participant self-efficacy, motivation, and other characteristics pre-training (Weigensberg et al., 2012). However, these are often measured at the general level and comparison between the characteristic and training outcomes are not reported. According the Pajares (1996), the use of general psychological measures, such as self-efficacy, to predict behavior or expectations have often been unsuccessful due to the lack of domain or task specificity. Ginsburg et al. (2000, p. 2) identify that no training assessment report has produced a highly predictive attrition model based on easily measured characteristics and "…this suggests that unmeasured factors [in their study] such as attitude, motivation, personal program experience, or events that occur outside of the program, are the key, but incalculable, factors that affect length of stay". The CTAIS provides practitioners with a construction training domain level measure of CTSE, PTB, TMA, and TLOC. Increasing the specificity of the measure is expected to increased predictive power (Bandura, 1997; Schwarzer et al., 1997). Determination of the predictive power of the CTAIS was beyond the scope of this study but represents a predominant focus of further research.

Limitations

Study results likely reflect the nature of the sample. The study sample was composed of college students who were currently enrolled in construction management classes at CSU and UNK. At the point of data collection the study participants had made the decision to begin construction training by voluntarily enrolling in construction management classes. Additionally, students in higher-level classes possess construction knowledge and potentially have a history of successful construction training performance (e.g., a track record of successful course

completion). In contrast, the target population may not possess previous knowledge of construction practices or a history of success in previous training or construction experiences. Previous successes and knowledge in the construction domain likely influence CTAIS responses. One can only speculate what the result may be if the CTAIS was administered within sample of unemployed individual participating in construction training without the benefit of a track record of successful training completion or previous construction knowledge and experience.

The size of the sample limited the conclusions which could be drawn from the ANOVA analysis. Specifically, the ANOVA results for the supplemental analysis were hindered by the small subsample sizes obtained in the phase-two sample (n = 174). This limited interpretation of the findings (Kao & Green, 2008). The substantially overlapping confident intervals observed in the ANOVA indicate that the findings should be considered with caution; confirmatory studies with larger samples are warranted.

The second study limitation was the lack on established performance criteria by which to establish the predictive value of the CTAIS. The study focus was to determine the reliability and validity of a construction domain level instrument using the constructs shown in the literature to predict behavior. Since the study was not structured to allowed comparison of respondent CTAIS responses with established training performance measures, investigation of the predictive value of the CTAIS was not feasible. Hence, research is necessary to determine the relationships between the CTAIS data and construction training performance, completion, and attrition.

The inability to establish criterion-related validity represents the third study limitation. The questionnaire did not include previous validated construct or training performance metrics, only the adapted constructs of the CTAIS. Therefore, comparison between establish criteria and CTAIS responses was not possible. While support for face and convergent construct validity was

shown, criterion-related validity testing is impossible without comparing survey response with established performance metrics (Patton, 2007). Instrument validation is, however, an ongoing process and one cannot expect to develop a valid instrument through a single study (Beattie et al., 2002; Norbeck, 1985; Yang, 2003). Study limitations associated with criterion-related validity should be addressed in future instrument validation procedures. Ongoing instrument validation is a topic of further research.

A fourth limitation arises from the solely quantitative nature of the instrument development process. Since the CTAIS was developed through the adaptation of existing valid measures, the instrument was not subjected to expert panel review prior to administration. While the 44-item CTAIS and its factors PTB, CTSE, TMA, and TLOC were shown to be highly internally consistent ($\alpha = 0.90$, 0.91, 0.95, 0.93, and 0.83, respectively) within the study sample, the inclusion of a construction training expert review could be beneficial. Practitioners who administer construction training to unemployed individuals may provide insights regarding the factors contributing to performance, completion, and attrition from construction training outside of PTB, CTSE, TMA, and TLOC. In addition, gaining open-ended responses from participants in the target population would be helpful in determining the salient factors and constructs for inclusion in the CTAIS to better assess and predict trainee outcomes (Benson & Clark, 1982; Pett et al., 2003). A mixed method approach, where qualitative responses are used to inform the quantitative data gathered via the CTAIS, is suggested because it can provide richer data and explanations than a solely quantitative or qualitative study (Creswell, 2009).

Finally, the assumed usefulness of the CTAIS within the construction training domain needs to be verified by construction training practitioners. Given this, an expert panel review and future research could be conducted to answer the research question: Does the CTAIS inform

programmatic decision making in construction training for the unemployed? Answering this research question would provide insight regarding the usefulness of the CTAIS from the practitioner's perspective. Lastly, additional demographic questions could be added to allow for additional study sample-specific analysis. Selection of demographic variables for inclusion would best be determined through a review of literature, expert panel review, and target population interviews. Additional population-specific demographic variables could allow for additional conclusions to be drawn from the data.

Recommendations for Field Application of the CTAIS

The CTAIS was developed to provide training practitioners with a construction training domain level instrument useful in measuring constructs shown in research to predict behavior. The 44-item CTAIS has several potential uses:1) a pre-training measure of participant characteristics to align trainee needs and training provider services; 2) a tool to assess trainee characteristics at multiple points during training interventions; 3) a data source useful to determine changes in participation characteristics (gain scores) pre and post training intervention; and 4) a metric by which to investigate differences in CTSE, PTB, TMA, and TLOC by respondent attribute variables to better align training provider services with target population needs. With these options in mind, the following recommendations are offered for using the CTAIS.

Use of Demographic Data. Demographic data from the CTAIS should be used with caution. Since construction is a male-dominated field (Fielden et al., 2000, 2001; Gale, 1994), practitioners should be careful that demographic data, such as gender, does not allow one to connect CTAIS responses to individual participants. While the addition of sample-specific demographic items may lead to interesting findings, this should be considered with caution and

the appropriateness and relevance of the demographic data should be evaluated for each situation in which the CTAIS is administered

Mode of delivery. The CTAIS can be administered in multiple formats. While either paper or electronic delivery is acceptable, those administering the survey must consider the situations and abilities of the respondents. Since construction training for the unemployed may involve some participants deficient in basis skills (Haveman et al., 2012), practitioners may consider alternate forms of survey administration including reading the questions aloud, or providing audible prompts to elicit trainee responses. Practitioners may consider onsite paper survey completion over offsite electronic options when it is determined that computer or Internet access is a barrier to CTAIS completion.

Aside from participant characteristics, the method of delivery should be evaluated based on several factors including the desired number of participants, the importance of timely responses, and the cost of administering the survey. Hardcopy mailed surveys generally provide better response rates then emailed surveys (Shih & Fan, 2009) and providing incentive for survey completion are shown to increase response rates (O'Connor, 2011); however, these may increase the cost of data collection.

Use of the Results. The CTAIS is designed to assist training practitioners in quantitative measurement of the psychological characteristics shown in previous research to predict training behaviors. The intended purpose of the CTAIS is that the instrument be used in a manner that positively serves trainees. CTAIS response data can be used to align training provider services with individual needs. Better alignment of trainee needs and training services through interpretation of CTAIS results is intended to increase trainee performance and completion rates and decrease attrition.

Factor Benchmark Scores. Establishing CTAIS benchmark scores to determine which trainees receive training services should be approached with caution. The CTAIS is not intended to exclude trainees from accessing training service, but rather, to identify trainees who need additional services to increase the likelihood of training completion. That is, CTAIS scores should not be used as criteria by which to select those most likely to successfully complete training or exclude those least likely to complete the training. Finally, it is not recommended that CTAIS scores be used as a sole indicator to determine an individual's training service program. The CTAIS is one tool which addresses four distinct factors. Other factors including participant situations external to the training (Ginsburg et al., 2000) should be considered when making decision regarding training services provided.

Likert Scale. The CTAIS measures four distinct factors (PTB, CTSE, TMA, and TLOC) on a 5-point Likert scale having a range of agreement (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Other Likert scale formats can be considered. The total score of the CTAIS is not important as the instrument is designed to measure four distinct factors. Each factor shown in the literature to predict behavior was adapted to construction training domain, and therefore the CTAIS should only be administered to construction training participants. Individual factor scores can be calculated by totaling the responses to each item in the factor and dividing the total by the number of items in the factor. If the 5-point Likert scale is used, an overall factor score will range from 1-5. High factors scores (i.e., closer to 5) indicate a perceived intention to perform well in and complete training (PTB), high perceived self-efficacy toward construction training (CTSE), favorable attitudes and a high level of training motivation (TMA), and internal locus of control (TLOC).

Further Research

The structure of the study and the items included in the CTAIS did not allow for empirical comparison of participant responses with established physiological metrics. Therefore, investigation of criterion-related validity was not possible. Administration of the CTAIS in conjunction with established and previously validated construct measures represents an area of further research and a next step in CTAIS validation. An exemplary study might include the administration of the CTAIS in conjunction with Noe's (2011) training self-efficacy and training motivation scales. Correlation between the validated scales and the CTAIS factors would allow observations and discussion of criterion-related validity. Continued validation should be objective in all instrument development because validation is a continuous process and is rarely accomplished through one study (Beattie et al., 2002; Norbeck, 1985; Yang, 2003). The CTAIS should be administered continually, and in different samples, in order to provide evidence for the broad reliability and validity of the instrument across different samples and training programs.

Investigating the predictive value of the CTAIS is a prime topic for future research. Pre-training administration of the instrument and comparison of the CTAIS scores of trainees who complete or fail to complete the training would illuminate its predictive value regarding training completion and attrition. For training performance, future research may include administration of the CTAIS in conjunction with an established construction-related certification test. Caution should be used when implementing existing training performance tests and one should be sure that the performance test used for comparison is valid (e.g., that the certification tests measure participant performance within the domain of the training). Invalid performance metrics may undermine the predictive value of the CTAIS because a participant may be highly efficacious regarding construction training, however, if the performance test is not aligned with the training content one cannot expect valid scores. As an example, the CTAIS could be administrated at the

beginning of an electrician certification training which contains a performance metric (i.e., the electrician certification test score). Investigation of the correlation between CTAIS scores and electrician certification test scores would provide insight into the CTAIS' predictive value regarding training performance within that sample.

The observed significant differences in mean PTB, CTSE, and TMA by gender suggest that further research regarding female participation in construction training is warranted. The construction industry has a poor reputation regarding female inclusion while suffering from a lack of skilled labor (Brummett & Nobe, 2009; Moir, Thomson, & Kelleher, 2011). Only 12.7% of all construction worker are female according to the United States Department of Labor's Bureau of Labor Statistics (2013). Schleifer (2002) posits that women have not been welcomed into construction trades, even though they represent the largest untapped source of skilled and trainable labor available to the construction industry. It is for these reasons that more effective training and inclusion of females are paramount. The CTAIS should be administered in different samples to confirm the observed differences in CTSE, PTB, and TMA by gender. Understanding the scores of female participants represents a specific area of further investigative inquiry.

Due to the complexity of human behavior and potential for extraneous variables to influence participant performance and decisions to withdraw from training, research should consider augmenting this quantitative approach with qualitative data collection. A mixed method design has potential to provide insight into participants' reasons for poor performance or training drop out. While practical barriers may exist to gathering data from training dropouts (e.g., participant may not inform researcher they are dropping out), any explanation of participant motivation to withdraw from training would shed light on the connection, or lack of connection, between training outcomes and an individual's levels of PTB, CTSE, TMA and

TLOC. Potential mixed-method designs include a sequential explanatory approach where participants are queried post-training regarding the factors which contributed to their reasons for participation and program performance, completion, or attrition. The salient factors which emerge through qualitative analysis could be compared with the four factor structure of the CTAIS. Qualitative data could provide a richer understanding of the factors contributing to trainee outcomes and help training practitioners assess the appropriateness of using the CTIAS within individual training programs.

Conclusion

In conclusion, a construction training domain level instrument, the Construction Training Attitudes and Intentions Scale (CTAIS), was developed through adapting existing measures shown in the literature to predict behavior in occupational and educational settings. The purpose of the study's first phase was to reduce the number of items (N = 98) in the questionnaire though analysis of the inter-item correlations and Exploratory Factor Analysis (EFA). Phase-one item reduction resulted in a 44-item CTAIS composed on four emergent factors; Planned Training Behavior (PTB), Construction Training Self-efficacy (CTSE), Training Motivation Attitudes (TMA), and Training Locus of Control (TLOC). The CTAIS ($\alpha = 0.82$) and each of its four factors were shown to be internally consistent ($\alpha = 0.82$ to 0.91) in phase one. Evidence of convergent construct validity was identified through CTAIS factor correlations that were supported in the literature. The 44-item instrument was administered in the second phase of the study. Similar internal consistency reliability coefficients (CTAIS, $\alpha = 0.90$; PTB, CTSE, TMA, and TLOC, $\alpha = 0.95$, 0.94, 0.91, and 0.83 respectively) and factor correlations were confirmed in phase two. ANOVAs and t tests were completed using the phase-two data to investigate mean differences in respondent perceptions of each factor by attribute variables.

Training practitioners (Ginsburg et al., 2000; Weigensberg et al., 2012) have identified that confidence, motivation, and attitude are critical factors in determining participant propensity for attrition from training. The CTAIS allows training practitioners to quantitatively measure trainee perceptions of PTB, CTSE, TMA, and TLOC within the construction training domain. CTAIS data can be used to help inform participant characteristics and align training services with individual trainee needs to increase trainee performance and decrease attrition. The CTAIS provides quantitative data on four factors and the instrument can be used as one metric incorporated among several administered by training organizations to evaluate participants and determine and adapt an appropriate program of trainee services.

An important finding of this study was the significant gender differences in PTB, CTSE, and TMA. Females were found to be less efficacious, less motivated, and to express lower levels of intention to successfully complete construction training than their male counterparts. This finding raises several questions for construction training practitioners and educators in light of the construction industry's male majority (Fielden et al., 2000, 2001; Gale, 1994) and unwelcoming nature to females (Schleifer, 2002), as well as its lack of skilled labor (Brummett & Nobe, 2009; Moir et al., 2011). It stands to reason that lower confidence and motivation as well as weaker intentions to complete construction training pose additional barriers to female inclusion in the construction industry. This finding should be continually reassessed through further research within varied samples. The CTAIS can be used to assess the CTAIS factors pre-training which allows training practitioners to proactively address these concerns among female participants before, during, and after training interventions.

This study represents the initial development of the CTAIS. Predominate areas of further research include determining the instrument predictive value in varied samples and continued

instrument validation within groups of individuals seeking construction training. The CTAIS allow quantitative data to be quickly and easily obtained. The instrument is intended to provide practitioners with one data source that can be evaluated, hopefully as part of a more comprehensive and robust system, for providing appropriate training services to individual trainees. Is it the sincere hope of the researcher that the CTAIS can be used as a tool to better serve trainees by allowing practitioners to effectively align participant needs with training provider services. The ultimate goal was to provide data that are helpful in reducing construction training program attrition so that trainees can gain skills that are helpful in finding fulfilling and sustainable employment.

REFERENCES

Ajzen, I. (1985). *From intentions to actions: A theory of planned behavior*. Berlin, DE: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52*(1), 27-58.

Ajzen, I. (2006). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32*(4), 665-683.

Ajzen, I. (n.d.-a). *Constructing a theory of planned behavior questionair*e. Retreived January, 5, 2013 from http://people.umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I. (n.d.-b). *Sample theory of planned behavior (TPB) questionnaire*. Retreived January, 5, 2013 from http://people.umass.edu/aizen/pdf/tpb.questionnaire.pdf

Ajzen, I. (n.d.-c). *Theory of planned behavior (TPB): Frequently asked questions*. Retreived January, 5, 2013 from http://people.umass.edu/aizen/faq.html

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ. Prentice-Hall.

Altmann, H., & Arambasich, L. (1982). A study of locus of control with adult students. *Canadian Journal of Counselling and Psychotherapy, 16*(2), 97-101.

Amedeo, D., Golledge, R. G., & Stimson, R. J. (2008). *Person-environment-behavior research: investigating activities and experiences in spaces and environments*. New York, NY: Guilford Press.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471-499. doi: 10.1348/014466601164939

Associated General Contractors of America. (2012). *Construction employment increases in 171 out of 337 metro areas between February 2011 & 2012 as private sector demand for construction increases*. Retrieved May 9, 2012, from http://www.agc.org/cs/news_media/press_room/press_release?pressrelease.id=1063

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. doi: 10.1037/0033-295x.84.2.191

Bandura, A. (1978). The self-system in reciprocal determinism. *American Psychologist, 33*(4), 343-358.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122-147. doi: 10.1037/0003-066x.37.2.122

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy the exercise of control*. New York, NY: W.H. Freeman.

Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science, 9*(3), 75-78.

Barrick, M. R., Mount, M. K., & Li, N. (2013). The theory of purposeful work behavior: The role of personality, higher-order goals, and job characteristics. *Academy of Management Review, 38*(1), 132-153.

Beattie, P. F., Pinto, M. B., Nelson, M. K., & Nelson, R. (2002). Patient satisfaction with outpatient physical therapy: Instrument validation. *Physical Therapy, 82*(6), 557-565.

Benson, J., & Clark, F. (1982). A guide for instrument development and validation. *The American Journal of Occupational Therapy, 36*(12), 789-800.

Bilginsoy, C. (2003). The hazards of training: Attrition and retention in construction industry apprenticeship programs. *Industrial and Labor Relations Review, 57*(1), 54-67.

Blau, G. (1993). Testing the relationship of locus of control to different performance dimensions. *Journal of Occupational and Organizational Psychology, 66*(2), 125-138.

Bolt, R., Beranek, L., & Newman, R. (1997). *PROPHET StatGuide: Do your data violate one-way ANOVA assumptions?*. Retrieved May 30, 2013 from http://www.basic.northwestern.edu/statguidefiles/oneway_anova_ass_viol.html#Special%20problems%20with%20small%20sample%20sizes

Boneau, C. A. (1960). The effects of violations of assumptions underlying the t test. *Psychological Bulletin, 57*(1), 49-64. doi: 10.1037/h0041412

Box, G. E. P. (1953). Non-normality and tests on variances. *Biometrika, 40*(3), 318-335.

Brummett, J., & Nobe, M. C. (2009). *Surveying methods for bilingual construction workers.* Paper presented at the Construction Research Congress 2009. Building a Sustainable Future Conference. April 5-7, 2009. Seattle, WA. doi: 10.1061/41020(339)17

Bryan, A. D., & Rocheleau, C. A. (2002). Predicting aerobic versus resistance exercise using the theory of planned behavior. *American Journal of Health Behavior, 26*(2), 83-94.

Bullock-Yowell, E., Andrews, L., & Buzzetta, M. E. (2011). Explaining career decision-making self-efficacy: Personality, cognitions, and cultural mistrust. *The Career Development Quarterly, 59*(5), 400-411. doi: 10.1002/j.2161-0045.2011.tb00967.x

Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review, 106*(4), 676-713. doi: 10.1037/0033-295X.106.4.676

Caliendo, M., Cobb-Clark, D. A., & Uhlendorff, A. (2010). *Locus of control and job search strategies: Cognitive and noncognitive skills in the labor market*. Retreived June 2, 2013 from http://hdl.handle.net/10419/37422

Caprara, G. V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A longitudinal study. *British Journal of Educational Psychology, 81*(1), 78-96. doi: 10.1348/2044-8279.002004

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*(2), 245-276.

Chen, G., Gully, S., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods, 4*(1), 62-83. doi: 10.1177/109442810141004

Chen, G., Gully, S., & Eden, D. (2004). General self-efficacy and self-esteem: Toward theoretical and empirical distinction between correlated self-evaluations. *Journal of Organizational Behavior, 25*(3), 375-395.

Chiaburu, D., & Lindsay, D. (2008). Can do or will do? The importance of self-efficacy and instrumentality for training transfer. *Human Resource Development International, 11*(2), 199-206. doi: 10.1080/13678860801933004

Chiaburu, D., & Marinova, S. (2005). What predicts skill transfer? An exploratory study of goal orientation, training self-efficacy and organizational supports. *International Journal of Training and Development, 9*(2), 110-123. doi: 10.1111/j.1468-2419.2005.00225.x

Christian, J., & Abrams, D. (2004). A tale of two cities: Predicting homeless people's uptake of outreach programs in London and New York. *Basic and Applied Social Psychology, 26*(2-3), 169-182. doi: 10.1080/01973533.2004.9646403

Colquitt, J., LePine, J., & Noe, R. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*(5), 678-707. doi: 10.1037/0021-9010.85.5.678

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis*. Hillsdale, NJ: Lawrence Erlbaum.

Cooper, C. L., & Pervin, L. A. (1998). *Personality*. New York, NY: Routledge.

Cordano, M., & Frieze, I. H. (2000). Pollution reduction preferences of US environmental managers: Applying Ajzen's theory of planned behavior. *Academy of Management Journal, 43*(4), 627-641.

Creed, P., Bloxsome, T., & Johnston, K. (2001). Self-esteem and self-efficacy outcomes for unemployed individuals attending occupational skills training programs. *Community, Work & Family, 4*(3), 285-303. doi: 10.1080/01405110120089350

Creswell, J. (2009). *Research design: Qualitative, quantitative and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Crowe, J., Levine, R., & Sanchez, J. (2009). *Pathways to green jobs: An analysis of the opportunities and obstacles in the green jobs market for Boston's Chinese community*. Retrieved June 6, 2012 from http://ase.tufts.edu/uep/Degrees/field_project_reports/2009/Team_3_Final_Report.pdf

Cvetanovski, J., & Jex, S. M. (1994). Locus of control of unemployed people and its relationship to psychological and physical well-being. *Work & Stress, 8*(1), 60-67.

Davis, L. E., Ajzen, I., Saunders, J., & Williams, T. (2002). The decision of African American students to complete high school: An application of the theory of planned behavior. *Journal of Educational Psychology, 94*(4), 810-819.

De Koning, J. (2007). Is the changing pattern in the use of active labour market policies consistent with what evaluations tell us about their relative performance? In J. De Koning (Ed.), *The Evaluation of Active Labour Market Policies: Measures, Public-Private Partnership and Benchmarking* (pp. 23-45). Northampton, MA: Edward Elgar Publishing.

Dean, R., Farrell, J., Kelley, M., Taylor, M., & Rhodes, R. (2007). Testing the efficacy of the theory of planned behavior to explain strength training in older adults. *Journal of Aging and Physical Activity, 15*(1), 1-12.

Denver Regional Transportation District. (2012). *Workforce initiative now*. Retrieved June 6, 2012 from http://www.rtd-denver.com/WIN.shtml

Eagle, M. N. (2011). Theories of motivation. In G. Gabbard, B. Litowitz & P. Williams (Eds.), *Textbook of Psychoanalysis* (2nd ed.) (pp. 39-52). Arlington, VA: American Psychiatric Publishing.

Eden, D., & Aviram, A. (1993). Self-efficacy training to speed reemployment: Helping people to help themselves. *Journal of Applied Psychology, 78*(3), 352-360. doi: 10.1037/0021-9010.78.3.352

Eden, D., & Kinnar, J. (1991). Modeling Galatea: Boosting self-efficacy to increase volunteering. *Journal of Applied Psychology, 76*(6), 770-780. doi: 10.1037/0021-9010.76.6.770

Eng, J., & Martin-Ginis, K. (2007). Using the theory of planned behavior to predict leisure time physical activity among people with chronic kidney disease. *Rehabilitation Psychology, 52*(4), 435-442. doi: 10.1037/0090-5550.52.4.435

Felland, L., Cunningham, P., Cohen, G., November, E., & Quinn, B. (2010). The economic recession: Early impacts on health care safety net providers. *Center for Studying Health System Change Research Brief* , Vol. 15, 1-8.

Field, A. (2009). *Discovering statistic using SPSS* (3rd ed.). London, UK: Sage.

Fielden, S. L., Davidson, M. J., Gale, A. W., & Davey, C. L. (2000). Women in construction: The untapped resource. *Construction Management & Economics, 18*(1), 113-121. doi: 10.1080/014461900371004

Fielden, S. L., Davidson, M. J., Gale, A. W., & Davey, C. L. (2001). Women, equality and construction. *Journal of Management Development, 20*(4), 293-305.

Ford, J. K., & Noe, R. (1987). Self-assessed training needs: The effects of attitudes toward training, managerial level, and function. *Personnel Psychology, 40*(1), 39-53.

Fox, S., & Spector, P. E. (2010). Instrumental counterproductive work behavior and the theory of planned behavior: A "cold cognitive" approach to complement "hot affective" theories of CWB. In Neider, L. L. & Schriesheim, C. A. (Ed.) *The "dark" side of management* (pp. 93-114). Scottsdale, AZ: Information Age.

Gale, A. W. (1994). Women in non-traditional occupations: The construction industry. *Women in Management Review, 9*(2), 3-14.

Gilson, T. A., Chow, G. M., & Feltz, D. L. (2012). Self-efficacy and athletic squat performance: Positive or negative influences at the within- and between-levels of analysis. *Journal of Applied Social Psychology, 42*(6), 1467-1485. doi: 10.1111/j.1559-1816.2012.00908.x

Ginsburg, K. R., Forke, C. M., Kinsman, S. B., Fleegler, E., Grimes, E. K., Rosenbloom, T., . . . Gibbs, K. P. (2000). *Retention in the United States Job Corps: Analysis and recommendations: The Children's Hospital of Philadelphia Craig-Dalsimer Division of Adolescent Medicine, A report submitted to the United States Department of Labor*. Retreived June 6, 2012 from http://wdr.doleta.gov/opr/fulltext/00-jobcorps.pdf.

Gist, M. E., & Mitchell, T. R. (1992). Self-Efficacy: A theoretical analysis of its determinants and malleability. *The Academy of Management Review, 17*(2), 183-211.

Gist, M. E., Schwoerer, C., & Rosen, B. (1989). Effects of alternative training methods on self-efficacy and performance in computer software training. *Journal of Applied Psychology, 74*(6), 884-891. doi: 10.1037/0021-9010.74.6.884

Groves, M. O. (2005). How important is your personality? Labor market returns to personality for women in the US and UK. *Journal of Economic Psychology, 26*(6), 827-841.

Gurin, P., Gurin, G., Lao, R. C., & Beattie, M. (1969). Internal-external control in the motivational dynamics of Negro youth. *Journal of Social Issues, 25*(3), 29-53.

Harris, E., Lum, J., Rose, V., Morrow, M., Comino, E., & Harris, M. (2002). Are CBT interventions effective with disadvantaged job-seekers who are long-term unemployed? *Psychology, Health, & Medicine, 7*(4), 401-410. doi: 10.1080/1354850021000015221

Haveman, R., Heinrich, C., & Smeeding, T. (2012). Policy responses to the recent poor performance of the U.S. labor market. *Journal of Policy Analysis and Management, 31*(1), 177-186. doi: 10.1002/pam.20624

Heinrich, C., & Holzer, H. (2011). Improving education and employment for disadvantaged young men: Proven and promising strategies. *The ANNALS of the American Academy of Political and Social Science, 635*(1), 163-191. doi: 10.1177/0002716210391968

Hemphill, T., & Perry, M. (2012, 2-27-12). *U.S. manufacturing and the skills crisis*. *The Wall Street Journal*. Retreived June, 10, 2012 from http://online.wsj.com/article/SB1000 1424052970204880404577230870671588412.html

Holladay, C., & Quiñones, M. (2003). Practice variability and transfer of training: The role of self-efficacy generality. *Journal of Applied Psychology, 88*(6), 1094-1103. doi: 10.1037/0021-9010.88.6.1094

Holton, E. F. (2005). Holton's evaluation model: New evidence and construct elaborations. *Advances in Developing Human Resources, 7*(1), 37-54.

Huang, J. L., & Ford, J. K. (2012). Driving locus of control and driving behaviors: Inducing change through driver training. *Transportation Research Part F: Traffic Psychology and Behaviour, 15*(3), 358-368.

International Labour Organization. (2012). *Global employment trends 2012*. Retrieved May 11, 2012 from http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/ @publ/documents/publication/wcms_171571.pdf

International Monetary Fund & International Labour Organization. (2010). T*he challenges of growth, employment and social cohesion*. Retrieved March 3, 2012 from http://www.osloconference2010.org/discussionpaper.pdf

Jenkins, S., Brandolini, A., Micklewright, J., & Nolan, B. (2011). *The great recession and the distribution of household income*. In J. Thompson & T. Smeeding (Eds.), Inequality in the Great Recession: The case of the United States: Political Economy Research Institute. Retrieved July 10, 2012 from http://www.peri.umass.edu/fileadmin/pdf/working _papers/working_ papers_251-300/WP271.pdf.

Jones, L., & Page, D. (1987). Theories of motivation. *Education+Training, 29*(3), 12-16.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits - self-esteem, generalized self-efficacy, locus of control, and emotional stability - with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology, 86*(1), 80-92. doi: 10.1037/0021-9010.86.1.80

Judge, T. A., Jackson, C., Shaw, J., Scott, B., & Rich, B. (2007). Self-efficacy and work-related performance: The integral role of individual differences. *Journal of Applied Psychology, 92*(1), 107-127. doi: 10.1037/0021-9010.92.1.107

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*(1), 31-36.

Kalamas, M., Cleveland, M., & Laroche, M. (2013). Pro-environmental behaviors for thee but not for me: Green giants, green Gods, and external environmental locus of control. *Journal of Business Research,* Retreived April 4, 2013 from http://dx.doi.org/10.1016/j.jbusres. 2013.03.007

Kao, L. S., & Green, C. E. (2008). Analysis of variance: Is there a difference in means and what does it mean? *Journal of Surgical Research, 144*(1), 158-170.

Karl, K. A., O'Leary-Kelly, A. M., & Martocchio, J. J. (1993). The impact of feedback and self-efficacy on performance in training. *Journal of Organizational Behavior, 14*(4), 379-394.

King, C. (2004). The effectiveness of publicly financed training in the United States: Implications for WIA and related programs. In C. O'Leary, R. Straits & S. Wandner (Eds.), *Job Training Policy in the United States* (pp. 57-100). Kalamazoo, MI: W.E. Upjohn Institute.

Koen, J., Klehe, U.-C., Van Vianen, A. E. M., Zikic, J., & Nauta, A. (2010). Job-search strategies and reemployment quality: The impact of career adaptability. *Journal of Vocational Behavior, 77*(1), 126-139. doi: 10.1016/j.jvb.2010.02.004

Latham, G. P. (1988). Human resource training and development. *Annual Review of Psychology, 39*(1), 545-582.

Levenson, H. (Ed.). (1981). *Differentiating Among Internality, Powerful Others, and Chance: Research with the Locus of Control Construct* (Vol. 1). New York, NY: Acedemic Press.

Lichtenburg, J. (1989). *Psychoanalysis and Motivation*. Hillsdale, NJ: Analytic Press.

Los Angeles Alliance for a New Economy. (2011). *Moving LA forward: Promoting construction careers at Metro*. Retrieved June 6, 2012 from http://www.laane.org/whats-new/2011/08/31/moving-la-forward/

Luszczynska, A., Scholz, U., & Schwarzer, R. (2005). The general self-efficacy scale: Multicultural validation studies. *The Journal of Psychology, 139*(5), 439-457.

Marks, L. I. (1998). Deconstructing locus of control: Implications for practitioners. *Journal of Counseling & Development, 76*(3), 251-260.

Martocchio, J. J., & Judge, T. A. (1997). Relationship between conscientiousness and learning in employee training: Mediating influences of self-deception and self-efficacy. *Journal of Applied Psychology, 82*(5), 764-773. doi: 10.1037/0021-9010.82.5.764

Mathieu, J., & Martineau, J. (1993). Individual and situational influences on the development of self-efficacy: Implications for training effectiveness. *Personnel Psychology, 46*(1), 125-147.

Mathieu, J., Tannenbaum, S., & Salas, E. (1992). Influences of individual and situational characteristics on measures of training effectiveness. *The Academy of Management Journal, 35*(4), 828-847.

Maurer, T. J. (2001). Career-relevant learning and development, worker age, and beliefs about self-efficacy for development. *Journal of Management, 27*(2), 123-140. doi: 10.1177/014920630102700201

McCormick, M. J. (2001). Self-efficacy and leadership effectiveness: Applying social cognitive theory to leadership. *Journal of Leadership & Organizational Studies, 8*(1), 22-33. doi: 10.1177/107179190100800102

McLaughlin, J., Trubskyy, M., & Sum, A. (2011). Underemployment problems experienced by workers dislocated from their jobs between 2007 and 2009. *Center for Labor Market Studies*. Boston, MA: Northeastern University.

Miles, E., & Maurer, T. (2012). Advancing validity of self-efficacy in negotiation through focusing at the domain level. *Journal of Occupational and Organizational Psychology, 85*(1), 23-41. doi: 10.1348/096317910x531744

Moir, S., Thomson, M., & Kelleher, C. (2011). *Unfinished business: Building equality for women in the construction trades*. Labor Resource Center, College of Public and Community Service, and the Center for Women in Politics & Public Policy, McCormack Graduate School of Policy and Global Studies. Retrieved June 5, 2013 from http://scholarworks.umb.edu/lrc_pubs/5

Morgan, G., Leech, N., Gloeckner, G., & Barrett, K. (2007). *SPSS for introductory statistics: Use and interpretation* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.

Ng, T., Sorensen, K., & Eby, L. (2006). Locus of control at work: A meta-analysis. *Journal of Organizational Behavior, 27*(8), 1057-1087.

Noe, R. A. (1986). Trainees' attributes and attitudes: Neglected influences on training effectiveness. *The Academy of Management Review, 11*(4), 736-749.

Noe, R. A. (2011, 6/15/2011). [Personal Communication, Training Attitude Survey].

Noe, R. A., & Schmitt, N. (1986). The influence of trainee attitudes on training effectiveness: Test of a model. *Personnel Psychology, 39*(3), 497-523.

Noe, R. A., & Wilk, S. L. (1993). Investigation of the factors that influence employees' participation in development activities. *Journal of Applied Psychology, 78*(2), 291-302. doi: 10.1037/0021-9010.78.2.291

Norbeck, J. S. (1985). What constitutes a publishable report of instrument development? *Nursing Research, 34*(6), 380-382.

O'Brien, G. E., & Kabanoff, B. (1979). Comparison of unemployed and employed workers on work values, locus of control and health variables. *Australian Psychologist, 14*(2), 143-154.

O'Connor, M. (2011). The challenge of recruiting control groups: An experiment of different recruitment models in the control group of a clinical psychological postal survey. *Quality & Quantity, 45*(4), 743-750. doi: 10.1007/s11135-010-9423-8

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543-578. doi: 10.3102/00346543066004543

Pajares, F. (2002a). Gender and perceived self-efficacy in self-regulated learning. *Theory into Practice, 41*(2), 116-125. doi: 10.2307/1477463

Pajares, F. (2002b). *Overview of social cognitive theory and of self-efficacy*. Retrieved May 5, 2011 from http://www.emory.edu/EDUCATION/mfp/eff.html

Pajares, F., & Usher, E. (2008). *Self-efficacy, motivation, and acheivment in schools from a perspective of reciprocal determinism* (Vol. 15). (pp 391-423) Bingley, UK: Emerald Group Publications.

Patton, M. L. (2007). *Understanding research methods: An overview of the essentials* (6th ed.). Glendale, CA: Pyrczak.

Perkins, K. A., Parzynski, C., Mercincavage, M., Conklin, C. A., & Fonte, C. A. (2012). Is self-efficacy for smoking abstinence a cause of, or a reflection on, smoking behavior change? *Experimental and Clinical Psychopharmacology, 20*(1), 56-62. doi: 10.1037/a0025482

Perry, J. L. (2000). Bringing society in: Toward a theory of public-service motivation. *Journal of Public Administration Research and Theory, 10*(2), 471-488.

Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. Thousand Oaks, CA. Sage.

Phares, E. J. (1976). *Locus of control in personality*. Morristown, NJ. General Learning Press.

Phillips, J. M., & Gully, S. M. (1997). Role of goal orientation, ability, need for achievement, and locus of control in the self-efficacy and goal-setting process. *Journal of Applied Psychology, 82*(5), 792-802. doi: 10.1037/0021-9010.82.5.792

Pratt, M. K. (2002, September 9th). Certain stereotypes die hard in the construction industry. *Boston Business Journal*. Retrieved June 10, 2013 from http://www.bizjournals.com/boston/stories/2002/09/09/focus4.html?page=all

Prieto, L. R., & Altmaier, E. M. (1994). The relationship of prior training and previous teaching experience to self-efficacy among graduate teaching assistants. *Research in Higher Education, 35*(4), 481-497. doi: 10.2307/40196137

Rainey, H. G. (2009). *Understanding and managing public organizations.* San Francisco, CA. Jossey-Bass.

Richardson, A., Field, T., Newton, R., & Bendell, D. (2012). Locus of control and prenatal depression. *Infant Behavior and Development, 35*(4), 662-668.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*(1), 1-28.

Rotter, J. B. (1990). Internal versus external control of reinforcement. *American Psychologist, 45*(4), 489-493.

Ruthankoon, R., & Ogunlana, S. O. (2003). Testing Herzberg's two-factor theory in the Thai construction industry. *Engineering, Construction and Architectural Management, 10*(5), 333-341.

Sabates, R. (2008). *The impact of lifelong learning on poverty reduction*. National Institute of Adult Continuing Education, Retrieved June 22, 2012 from http://www.cwic.org/ Portals/0/Resources/InsideTheBlackBox.pdf.

Saks, A. M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationship between training and newcomer adjustment. *Journal of Applied Psychology, 80*(2), 211-225. doi: 10.1037/0021-9010.80.2.211

Sanders, M., & Woolley, M. (2005). The relationship between maternal self-efficacy and parenting practices: Implications for parent training. *Child: Care, Health and Development, 31*(1), 65-73. doi: 10.1111/j.1365-2214.2005.00487.x

Schleifer, T. (2002). Degenerating image of the construction industry. *Practice Periodical on Structural Design and Construction, 7*(3), 99-102. doi:10.1061/(ASCE)1084-0680(2002)7:3(99)

Scholz, U., Gutiérrez Doña, B., Sud, S., & Schwarzer, R. (2002). Is general self-efficacy a universal construct? *European Journal of Psychological Assessment, 18*(3), 242-251.

Schwarzer, R., Bäßler, J., Kwiatek, P., Schröder, K., & Zhang, J. X. (1997). The assessment of optimistic self-beliefs: Comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology: An International Review, 46*(1), 69-88. doi: 10.1111/j.1464-0597.1997.tb01096.x

Semykina, A., & Linz, S. J. (2007). Gender differences in personality and earnings: Evidence from Russia. *Journal of Economic Psychology, 28*(3), 387-410.

Shih, T.-H., & Fan, X. (2009). Comparing response rates in e-mail and paper surveys: A meta-analysis. *Educational Research Review, 4*(1), 26-40. doi: 10.1016/j.edurev.2008.01.003

Shrauger, J. S., & Schohn, M. (1995). Self-confidence in college students: Conceptualization, measurement, and behavioral implications. *Assessment, 2*(3), 255-278. doi: 10.1177/1073191195002003006

Simon, A. I. (2013, April 10th-13th). *Children's perception of women in construction.* Paper presented at the 49th Associated Schools of Construction Annual International Conference, San Luis Obispo, CA.

Sitzmann, T., Ely, K., Bell, B., & Bauer, K. (2010). The effects of technical difficulties on learning and attrition during online training. *Journal of Experimental Psychology: Applied, 16*(3), 281-292. doi: 10.1037/a0019968

Smith, S., Faberman, R., & Haltiwanger, J. (2012). Recruiting intensity during and after the Great Recession: National and industry evidence. *National Bureau of Ecomonic Recovery.* Retrieved June 4, 2012 from http://www.nber.org/papers/w17782.pdf?new_ window=1

Spector, P. E. (1982). Behavior in organizations as a function of employee's locus of control. *Psychological Bulletin, 91*(3), 482-497. doi: 10.1037/0033-2909.91.3.482

Spector, P. E. (1988). Development of the work locus of control scale. *Journal of Occupational Psychology, 61*(4), 335-340. doi: 10.1111/j.2044-8325.1988.tb00470.x

Spector, P. E. (2011). The relationship of personality to counterproductive work behavior (CWB): An integration of perspectives. *Human Resource Management Review, 21*(4), 342-352.

Spector, P. E., Cooper, C. L., Sanchez, J. I., & O'Driscoll, M. (2002). Locus of control and well-being at work: How generalizable are Western findings? *The Academy of Management Journal, 45*(2), 453-466. doi: 10.2307/3069359

Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. *Psychological Bulletin, 124*(2), 240-261. doi: 10.1037/0033-2909.124.2.240

Stevens, C. K., & Gist, M. E. (1997). Effects of self-efficacy and goal-orientation training on negotiation skill maintenance: What are the mechanisms? *Personnel Psychology, 50*(4), 955-978.

Stone, T. H. (2009). Using the theory of planned behavior and cheating justifications to predict academic misconduct. *Career Development International, 14*(3), 221-241.

Sum, A., Khatiwada, I., McLaughlin, J., & Palma, S. (2011). No country for young men: Deteriorating labor market prospects for low-skilled men in the United States. *The ANNALS of the American Academy of Political and Social Science, 635*(1), 24-55. doi: 10.1177/0002716210393694

Tabassi, A. A., & Bakar, A. H. A. (2008). Training, motivation, and performance: The case of human resource management in construction projects in Mashhad, Iran. *International Journal of Project Management, 27*(5), 471-480.

Tannenbaum, S. I., Mathieu, J. E., Salas, E., & Cannon-Bowers, J. A. (1991). Meeting trainees' expectations: The influence of training fulfillment on the development of commitment, self-efficacy, and motivation. *Journal of Applied Psychology, 76*(6), 759-769. doi: 10.1037/0021-9010.76.6.759

Tannenbaum, S. I., & Yukl, G. (1992). Training and development in work organizations. *Annual Review of Psychology, 43*(1), 399-441.

Texas Workforce Commission. (2001). *2000-2001 Job Corps.* Retrieved June 27, 2012 from http://www.lmci.state.tx.us/researchers/Automated/Downloads/FinalReport00-01/FinRprt%20Chap%2013.pdf

Tiggemann, M. & Winefield, A. (1984). The effects of unemployment on the mood, self-esteem, locus of control, and depressive affect of school-leavers. *Journal of Occupational Psychology, 57*(1), 33-42.

Tracey, J. B., Hinkin, T. R., Tannenbaum, S., & Mathieu, J. E. (2001). The influence of individual characteristics and the work environment on varying levels of training outcomes. *Human Resource Development Quarterly, 12*(1), 5-23.

United States Congress. (2009). *American Recovery and Reinvestment Act*. Retrieved June 12, 2012 from http://www.gpo.gov/fdsys/pkg/BILLS-111hr1enr/pdf/BILLS-111hr1enr.pdf

United States Congress Joint Ecomnomic Committee. (2010). *Understanding the economy: Unemployment among young workers*. Retrieved May 10, 2012 from www.jec.senate.gov/public/?a=Files.Serve&File_id=adaef80b-d1f3-479c-97e7-727f4c0d9ce6

United States Department of Education. (n.d.). *Nontraditional undergraduates: Definitions and data*. Retrieved May 29, 2013, from http://nces.ed.gov/pubs/web/97578e.asp

United States Department of Labor. (2007). *Employment and Training Administration's five-year pilot, demonstration and evaluation strategic plan for 2007-2012*. Retrieved June 3, 2012 from http://wdr.doleta.gov/research/FullText_Documents/ETA%20Five-Year%20Research%20Plan.pdf.

United States Department of Labor. (2009). *Preparing youth for the future: The literacy of America's young adults*. Retrieved June 3, 2012 from wdr.doleta.gov/research/FullText_Documents/Preparing_Youth_for_the_Future_The_Literacy_of_Americas_Young_Adults.pdf.

United States Department of Labor. (2010). *Displaced workers summary: Work displacement 2007-2009*. Retrieved May 31, 2012 from http://www.bls.gov/news.release/disp.nr0.htm

United States Department of Labor. (2011). *Recovery Act: ETA needs to strengthen management controls to meet Youthbuild program objectives*. Retrieved June 23, 2012 from http://www.oig.dol.gov/public/reports/oa/2011/18-11-001-03-001.pdf

United States Department on Labor, Bureau of Labor Statistics. (2013). *The employment situation - April 2013*. Retrieved June 7, 2012, from http://www.bls.gov/news.release/empsit.t21.htm

United States Government Accountability Office. (2011). *Employment and training programs: Oppertunities exist for improving efficiency. Testimony before the United States House of Representatives.* Retrieved June, 6, 2012, from http://www.gao.gov/assets/130/125957.pdf

Van Eerde, W., & Thierry, H. (1996). Vroom's expectancy models and work-related criteria: A meta-analysis. *Journal of Applied Psychology, 81*, 575-586.

Vroom, V. H. (1964). *Work and motivation.* New York, NY: Wiley.

Wanberg, C. R. (2011). The individual experience of unemployment. *Annual Review of Psychology, 63*(1), 369-396. doi: 10.1146/annurev-psych-120710-100500

Webster, J., & Marrocchio, J. (1993). Turning work into play: Implications for microcomputer software training. *Journal of Management, 19*(1), 127-146.

Weigensberg, E., Schlecht, C., Laken, F., Goerge, R., Stagner, M., Ballard, P., & DeCoursey, J. (2012). *Inside the black box: What makes workforce development programs successful?* Chicago, IL: Chapin Hall at the University of Chicago, Retrieved June 22, 2012, from http://www.cwic.org/Portals/0/Resources/InsideTheBlackBox.pdf.

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71*(1), 3-25. doi: 10.1037/0022-0663.71.1.3

Wenzel, S. L. (1993). Gender, ethnic group, and homelessness as predictors of locus of control among job training participants. *Journal of Social Psychology, 133*(4), 495-505.

Wiethoff, C. (2004). Motivation to learn and diversity training: Application of the theory of planned behavior. *Human Resource Development Quarterly, 15*(3), 263-278. doi: 10.1002/hrdq.1103

Yang, B. (2003). Identifying valid and reliable measures for dimensions of a learning culture. *Advances in Developing Human Resources, 5*(2), 152-162. doi: 10.1177/1523422303005002003

Zimmerman, B. (1996). *Measuring and mismeasuring academic self-efficacy: Dimensions, problems, and misconceptions*. Paper presented at the Symposium presented at the Annual Meeting of the American Educational Research Association, New York, NY.

Zimmerman, D. W. (1987). Comparative power of Student t test and Mann-Whitney u test for unequal sample sizes and variances. *The Journal of Experimental Education, 55*(3), 171-174.

APPENDIX A: SURVEY ITEM ADAPTATION

Table 25. Training Self-Efficacy and Adapted Construction Training Self-Efficacy Scale

Existing Construct		Original Item	Adapted Construct		Adapted Item
Training Self-Efficacy	1	My past experiences and accomplishments increase my confidence that I will be able to perform successfully in my job.	Construction Training Self-Efficacy	1	My past experiences and accomplishments increase my confidence that I will be able to perform well in construction training.
				2	My past experiences and accomplishments increase my confidence that I will be able to successfully complete a construction training program.
	3	My job is within the scope of my abilities		3	Construction training is within the scope of my abilities
				4	Successfully completing a construction training program is within the scope of my abilities
	4	In general, I am usually a good judge of my own capabilities.		5	I am usually a good judge of my own capabilities.
	5	In general, other people that know me well perceive me as being a capable person		6	Other people that know me well perceive me as being a capable person
	6	My estimates of how well I can deal with a new situation are not usually very accurate		7	My estimates of how well I can deal with a new situation are usually very accurate
	7	I expect to be able to do things that need to be done with future events		8	I expect to be able to do things that need to be done in a construction training program
				9	I expect to be able to do things that need to be done to successfully complete a construction training program
	9	When I tackle a problem I usually can't tell in advance how well I will do at it.		10	When I participate in training I usually can tell in advance how well I will do at it.
	10	If I had a job which involved many different tasks, some easy and some difficult, I would probably do very well at almost all of them		11	If I take construciton training which involved many different tasks, some easy and some difficult, I would probably do very well at almost all of them.
	11	When I take training courses in unfamiliar areas. I expect to be able to do well at them.		12	If I participate in construction training in an unfamiliar area, I expect to be able to do well.
				13	If I take construction training in an unfamiliar area, I expect to be able to successfully complete the trainging program.
	12	If I were offered a job in a field which I didn't know much about, I think I could learn to do the job well.		14	If I were asked to take training in an area of construction which I didn't know much about, I could do well in the trainging
				15	If I were asked to take training in an area of construction which I didn't know much about, I could successfully complete the training program.
	13	I can generally do the work necessary to accomplish my goals in training courses or seminars.		16	I can generally do the work necessary to accomplish my goals in training courses or seminars.
	14	When faced with an unfamiliar problem in a training session, I expect to be able to solve it.		17	When faced with an unfamiliar problem in a construction training session, I expect to be able to solve it.
	15	I am confident that I can do well in training courses that deal with things (e.g., tool operation, using tools or body to move objects).		18	I am confident that I can do well in construction training that deal with things (e.g., tool operation, using tools or body to move objects).
	16	I am confident that I can do well in training courses that deal with information (e.g., facts, concepts, or ideas).		19	I am confident that I can do well in construction training that deal with information (e.g., facts, concepts, or ideas).
	17	I am confident that I can do well in training courses that deal with people skills (e.g., teamwork, supervision, coaching, negotiating).		20	I am confident that I can do well in construction training that deal with people skills (e.g., teamwork, supervision, coaching, negotiating).

Table 26. Motivation to Train and Adapted Construction Training Motivation Scale

Existing Construct		Original Item	Adapted Construct		Adapted Item
Motivation to Train	1	I try to learn as much as I can from training programs.	Construction Training Motivatin	1	I try to learn as much as I can from construction training programs.
	2	I believe I tend to learn more from training programs than most people		2	I believe I would learn more from construction training programs than most people
	3	When I'm involved in training sessions and I can't understand something I get so frustrated I stop trying to learn		3	If I'm involved in a construction training session and I can't understand something I get so frustrated I stop trying to learn
				4	If I'm involved in construction training session and I can't understand something I get so frustrated that I quit
	4	I am usually motivated to learn the skills emphasized in training programs.		5	I am motivated to learn the skills taugh in construction training programs.
	5	I would like to improve my skills		6	I would like to improve my construction-realated skills
	6	I am willing to exert considerable effort in training programs in order to improve my skills.		7	I am willing to exert considerable effort in training programs in order to improve my construction-related skills.
	7	I believe I can improve my skills by participating in training programs.		8	I believe I can improve my construction-related skills by participating in training programs.
	8	I believe I can learn the material presented in most training programs.		9	I believe I can learn the material presented in most construction training programs.
	9	My present job performance satisfies my personal expectations and goals.		10	My performance in training satisfies my personal expectations and goals.
	10	Participation in training programs is of little use to me because I have all the knowledge and skill I need to successfully perform my job.		11	Participation in construction training programs is of little use to me because I have all the knowledge and skills I need to successfully perform a job
				12	Participation in construction training programs is of little use to me because I have all the knowledge and skills I need to successfully perform a construction-related job
	11	I am willing to invest effort to improve skills and competencies related to my current job		13	I am willing to invest effort to improve my construction-related skills and competencies
	12	I am willing to invest effort to improve skills and competencies just for the sake of learning.		14	I am willing to invest effort to improve construction-realted skills and competencies just for the sake of learning.
	13	I am willing to invest effort to improve skills and competencies in order to prepare myself for a promotion.		15	I am willing to invest effort to improve my skills and competencies in order to prepare myself for construction-related job.
	14	Taking training courses and seminars is not a high priority for me.		16	Taking construction training courses is a high priority for me.
	15	I want to try and change habits and routines that interfere with my work effectiveness.		17	I want to try and change habits and routines that interfere with my ability to attend construction training.
				18	I want to try and change habits and routines that interfere with my ability to successfully complete construction training programs
	16	I am willing to invest effort on my personal time to develop technical skills related to my job.		19	I am willing to invest effort on my personal time to develop construction-related skills.

Table 27. Attitude Toward Training/Education and Adapted Attitudes Toward Construction Training Scale

Existing Construct	Original Item	Adapted Construct	Adapted Item
Attitude Toward Education	1 In general I value education	Attitude Toward Construction Training	1 In general, I value education
			2 In general, I value training
			3 I value construction-related training
	2 I am fearful of classroom situations		4 I am fearful of classroom situations
			5 I am fearful of attending training sessions
			6 I am fearful of attending construction-related training sessions
	3 I think the best way to learn something new is by trial and error on the job, as opposed to attending a formal training program.		7 I think the best way to learn construction skills is by trial and error on the job, as opposed to attending a construction-related training program.
Attitude Toward Training Utility	4 The training programs I have attended have been useful for my development		8 Construction training programs are useful to me
			9 Construction training programs are useful for my development
	5 Most of the material in training programs I have attended has been relevant to skills I had hoped to develop		10 Construction training programs are relevant to skills I had hoped to develop
	6 The time spent away from my job to attend training programs has been worthwhile		11 Time spent to attend construction training programs is worthwhile
			12 My time would be better spent looking for a job then attending construction training programs
	7 I have been able to apply to the job what I have learned in training		13 I will be able to apply what I have learned in construction training to a job
	8 I have opportunities to practice the skills emphasized in training on my job		14 I will have opportunities to practice the skills emphasized in construction training in the job I want.

Table 28. Work Locus of Control and Adapted Training Locus of Control Scales

Existing Construct		Original Item	Adapted Construct		Adapted Item
Work Locus of Control	1	A job is what you make of it.	Training Locus of Control	1	Training is what you make of it.
	2	On most jobs, people can pretty much accomplish whatever they set out to accomplish.		2	In consturction training, people can pretty much accomplish whatever they set out to accomplish.
	3	If you know what you want out of a job, you can find a job that gives it to you.		3	If you know what type of job you want, you can find a training program that helps you get that job.
	4	If employees are unhappy with a decision made by their boss, they should do something about it.		4	If traineer are unhappy with a decision made by their traineer, they should do something about it.
	5	Getting the job you want is mostly a matter of luck.		5	Successfully completing a construction training program is mostly a matter of luck.
				6	Having the opportunity to attend a construction training program is mostly a matter of luck.
	6	Making money is primarily a matter of good fortune.		7	Making money is primarily a matter of good fortune.
	7	Most people are capable of doing their jobs well if they make the effort.		8	Most people are capable of successfully completing training if they make the effort.
	8	In order to get a really good job, you need to have family members or friends in high places.		9	In order to get an opportunity to be in training, you need to have family members or friends in high places.
	9	Promotions are usually a matter of good fortune.		10	Getting a job is usually a matter of good fortune.
	10	When it comes to landing a really good job, who you know is more important than what you know.		11	When it comes to doing well in construction training, who you know is more important than what you know.
	11	Promotions are given to employees who perform well on the job.		12	Jobs are given to trainee who perform well in training.
	12	To make a lot of money you have to know the right people.		13	To make a lot of money you have to know the right people.
	13	It takes a lot of luck to be an outstanding employee on most jobs.		14	It takes a lot of luck to be an outstanding trainee in most training programs.
	14	People who perform their jobs well generally get rewarded.		15	People who perform well in trainging generally get rewarded.
	15	Most employees have more influence on their supervisors than they think they do.		16	Most trainees have more influence on their trainers than they think they do.
	16	The main difference between people who make a lot of money and people who make a little money is luck.		17	The main difference between people who make a lot of money and people who make a little money is luck.

Table 29.Theory of Planned Behavior and Adapted Scales

Existing Construct		Original Item	Adapted Construct		Adapted Item
Theory of Planned Behavior	*Peceived Behavioral Control*	1 For me to attend the meetings of this class on a regular basis is [extremely difficult - extremely easy]	**Theory of Planned Behavior**	*Construction Training Perceived Behavioral Control*	1 For me to attend the meetings of a construction training program on a regular basis is [extremely difficult - extremely easy]
					2 For me to successfully complete a construction training program is [extremely difficult - extremely easy]
		2 For me to attend the meetings of this class on a regular basis is [impossible - possible]			3 For me to attend the meeting of a construction training program on a regular basis is [impossible - possible]
					4 For me to successfully complete a construction training program is [impossible - possible]
		3 Whether or not I attend the meetings of this class on a regular basis is completely up to me [strongly disagree - strongly agree]			5 Whether or not I attend the meetings of a construction training program on a regular basis is completely up to me [strongly disagree - strongly agree]
					6 Whether or not I successfully complete a construction training program is completely up to me [strongly disagree - strongly agree]
		4 I am confident that if I wanted to I could attend the meetings of this class on a regular basis [definitely true -definitely false]			7 I am confident that, if I wanted to, I could attend the meetings of a construction training program on a regular basis [definitely true -definitely false]
					8 I am confident that if I wanted to I could successfully complete a construction training program [definitely true - definitely false]
	Attitudes	5 For me to attend the meetings of this class on a regular basis is [extremely good - extremely bad]		*Construction Training Value Attitudes*	1 For me to attend the meetings of a construction training program on a regular basis is [extremely good - extremely bad]
					2 For me to successfully complete this construction training is [extremely good - extremely bad]
		6 For me to attend the meetings of this class on a regular basis is [extremely valuable - extremely worthless]			3 For me to attend the meetings of a construction training program is [extremely valuable - extremely worthless]
					4 For me to complete a construction-realted trainign is [extremely valuable - extremely worthless]
		7 For me to attend the meetings of this class on a regular basis is [extremely pleasant - extremely unpleasant]			5 For me to attend the meeting of a construction training program is [extremely pleasant - extremely unpleasant]
		8 For me to attend the meetings of this class on a regular basis is [interesting - boring]			6 For me to attend the meeting of a construction training program is [interesting - boring]

Existing Construct		Original Item		Adapted Construct		Adapted Item	
Theory of Planned Behavior	*Subjective Norms*	9	Most people who are important to me think that [I should - I should not] attend the meetings of this class on a regular basis	Theory of Planned Behavior	*Construction Training Norms*	1	Most people who are important to me think that [I should - I should not] attend construction-related training.
						2	Most people who are important to me think that [I should - I should not] complete a construction-related training program.
		10	Most of the students in this class with whom I am acquainted attend meetings of this class on a regular basis [definitely true - definitely false]			3	Most of my peers would attend the meeting of a construction training program on a regular basis [definitely true - definitely false]
						4	Most of my peer would successfully complete a construction training program [definitely true - definitely false]
		11	It is expected of me that I attend the meetings of this class on a regular basis [definitely true - definitely false]			5	It is expected of me that I would attend the meetings of a construction training program on a regular basis [definitely true - definitely false]
						6	It is expected of me that I would successfully complete a construction training program [definitely true - definitely false]
		12	Most people whose opinions I value would approve of my attending the meetings of this class on a regular basis [strongly disagree - strongly agree]			7	Most people whose opinions I value would approve of my participating in a construction training program [strongly disagree - strongly agree]
						8	Most people whose opinions I value would approve of me completion a construction training program [strongly disagree - strongly agree]
	Intentions	13	I plan to attend the meetings of this class on a regular basis [extremely likely - extremely unlikely]		*Constrcution Training Intentions*	1	I plan to attend the meetings of this construction training program on a regular basis [extremely likely - extremely unlikely]
						2	I plan to successfully complete this construction training [extremely likely - extremely unlikely]
		14	I will make an effort to attend the meetings of this class on a regular basis [I definitely will - I definitely will not]			3	I would make an effort to attend the meetings of a construction training program on a regular basis [I definitely will - I definitely will not]
						4	I would make an effort to successfully complete a construction training program [I definitely will - I definitely will not]
		15	I intend to attend the meetings of this class on a regular basis [strongly agree - strongly disagree]			5	I intend to attend the meetings of a construction training program on a regular basis [strongly agree - strongly disagree]
						6	I intend to successfully complete this construction training program [strongly agree - strongly disagree]

APPENDIX B: HUMAN SUBJECTS APPROVAL

Colorado State University

Research Integrity & Compliance Review Office
Office of Vice President for Research
Fort Collins, CO 80523-2011
(970) 491-1553
FAX (970) 491-2293

Date: February 20, 2013

To: Gene Gloeckner, Education
Jonathan Elliott, Education/Construction Management

From: Janell Barker, IRB Coordinator

Re: Development of the Construction Training Attitudes and Intentions Scale

IRB ID: 027-14H **Review Date:** February 20, 2013

The Institutional Review Board (IRB) Coordinator has reviewed this project and has declared the study exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b)(2): Research involving the use of educational tests,….survey procedures, interview procedures or observation of public behavior, unless: a) **information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects.**

The IRB determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as proposed in the Exempt application**, including obtaining and documenting (signed) informed consent if stated in your application.
- **Any modification of this research should be submitted to the IRB Coordinator through an email prior to implementing any changes**, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB protocol will need to be submitted and approved before proceeding with data collection.
- **Please notify the IRB Coordinator if any problems or complaints of the research occur.**

Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB may make the determination of exemption**, even if you conduct a similar study in the future.

Colorado State University

Research Integrity & Compliance Review Office
Office of Vice President for Research
Fort Collins, CO 80523-2011
(970) 491-1553
FAX (970) 491-2293

DATE: April 3, 2013

TO: Gene Gloeckner, Education
Jonathan Elliot, Education/Construction Management

[redacted]

FROM: Janell Barker, IRB Coordinator
Research Integrity & Compliance Review Office

TITLE: Development of the Construction Training Attitudes and Intentions Scale

IRB ID: 027-14H **Review Date:** April 3, 2013

The Institutional Review Board (IRB) Coordinator has reviewed the modification of this project:

- to use the revised instrument for Phase II using the current approved recruitment/consent process

and has declared the study remains exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b)(2). The IRB determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as proposed in the IRB application**, including obtaining and documenting (signed) informed consent if stated in your application or if required by the IRB.
- **Any modification of this research should be submitted to the IRB through an email to the IRB Coordinator, prior to making any changes**, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.
- **Please notify the IRB if any problems or complaints of the research occur.**

Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB may make the determination of exemption**, even if you conduct a similar study in the future.

APPENDIX C: INFORMED CONSENT DOCUMENT

Colorado State University

Verbal Recruitment Script/Informed Consent

Good Morning/Afternoon,

I am here to invite you to participate in a study that investigates student intentions and attitudes regarding construction training and education. The study is entitled *Development of the Construction Training Attitudes and Intentions Scale*. The purpose of this study is to understand trainee and student attitudes, motivation, and confidence regarding construction training/education.

This study is being conducted in collaboration between Colorado State University (CSU) and the University of Nebraska Kearney (UNK). Construction and design students at CSU and UNK have been selected to participate in this study by completing a voluntary survey which will take approximately 15 minutes.

There are no known risks associated with this survey and the survey responses are anonymous. That means that your names or email address will not be recorded on the surveys or survey answer sheets. Your answers will never be linked to your personal information. The instructor of the course will not know who participated in the study and who did not. Your grade for this course is in no way linked to your participation in the study.

The summarized results of the study will be shared between the collaborating research teams at CSU and UNK. The intent of the researchers is to publish the survey results as part of a dissertation and articles. Publications will be made available for educational purposes. If you choose to participate, your personal information will NOT be included in the any published material or articles.

As a thank you for participating in the study, you may choose to be entered into a drawing to win 1 of 10 amazon.com gift cards valued at $20 each. If you would like to be included in the gift card drawing, please provide your email address on the note card provided. Email addresses will not be shared with anyone and will ONLY be used to randomly select gift card winners. Electronic gift cards will be distributed to selected winners via the email addresses provided. Completed email address note cards should be place in the envelope provided.

If you are willing to participate in the study, please complete the Scranton response sheet. As a reminder, please do not include any personal information (name, Student ID, etc.) on the surveys response sheets. Completed Scantron response sheets will be collected in a basket at the front of the room.

Are there any questions?

- **If you are willing to participate, please complete the attached survey.**
- **In not, please return the blank survey and note card to the researcher**

Thank you for your time, we appreciate your willingness to participate.

If you have questions about the study please contact:
Gene Gloeckner, Principal Investigator at 970-491-7661 or by email at gene.gloeckner@coloState.edu; or
Jon Elliott, Co-Principal Investigator, 970-491-1845 or by email at jon.elliott@colostate.edu

APPENDIX D: CTAIS QUESTIONNIARES

Phase One CTAIS (N = 98) and Demographic Items (N = 9)

Construction Training Attitudes and Intentions Survey

Directions: In this section, please select your level of agreement with each statement on the scale. **Please use a #2 pencil to record your response on the Scantron sheet provided.**

Please note that some of the questions are worded similarly, please read them carefully before indicating your response.

Remember that classroom-based construction education is ***construction training.***

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Participation in construction training is of little use to me because I have all the knowledge and skills I need to successfully perform a construction-related job.	A	B	C	D	E
2	I am willing to invest effort to improve my construction-related skills and competencies.	A	B	C	D	E
3	I believe I can learn the material presented in most construction training.	A	B	C	D	E
4	I am willing to exert considerable effort in training in order to improve my construction-related skills.	A	B	C	D	E
5	Jobs are given to trainees who perform well in training.	A	B	C	D	E
6	I expect to be able to accomplish the tasks necessary to successfully complete a construction training program.	A	B	C	D	E
7	In general, I value training.	A	B	C	D	E
8	I can generally do the work necessary to accomplish my goals in training courses or seminars.	A	B	C	D	E
9	I am fearful of classroom situations.	A	B	C	D	E
10	If I'm involved in a construction training session and I can't understand something I get so frustrated that I stop trying to learn.	A	B	C	D	E
11	If you know what type of job you want, you can find a training program that helps you get that job.	A	B	C	D	E
12	Time spent to attend construction training is worthwhile.	A	B	C	D	E
13	I am confident that I can do well in construction training that deals with people skills (e.g., teamwork, supervision, coaching, negotiating).	A	B	C	D	E
14	Having the opportunity to attend a construction training program is mostly a matter of luck.	A	B	C	D	E
15	I believe I can improve my construction-related skills by participating in training programs.	A	B	C	D	E
16	I expect to be able to do the things that need to be done in a construction training program.	A	B	C	D	E
17	I am confident that I can do well in construction training that deals with information (e.g., facts, concepts, or ideas).	A	B	C	D	E
18	If trainees are unhappy with a decision made by their trainer, they should do something about it.	A	B	C	D	E
19	Getting a job is usually a matter of good fortune.	A	B	C	D	E
20	My performance in training satisfies my personal expectations and goals.	A	B	C	D	E

SURVEY CONTINUTES ON NEXT PAGE

	Directions: In this section, please select your level of agreement with each statement on the scale. **PLEASE record your response on the Scantron sheet provided.**	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21	Successfully completing a construction training program is within the scope of my abilities.	A	B	C	D	E
22	The main difference between people who make a lot of money and people who make a little money is luck.	A	B	C	D	E
23	I think the best way to learn construction skills is by trial and error on the job, as opposed to attending a construction-related training.	A	B	C	D	E
24	I would like to improve my construction-related skills.	A	B	C	D	E
25	It takes a lot of luck to be an outstanding trainee in most training programs.	A	B	C	D	E
26	I value construction-related training.	A	B	C	D	E
27	I will be able to apply what I have learned in construction training to a job.	A	B	C	D	E
28	If I were asked to take training in an area of construction which I didn't know much about, I could do well in the training.	A	B	C	D	E
29	Construction training is within the scope of my abilities.	A	B	C	D	E
30	I am willing to invest effort to improve my skills and competencies in order to prepare myself for a construction-related job.	A	B	C	D	E
31	I am willing to use my personal time to develop construction-related skills.	A	B	C	D	E
32	Participation in construction training is of little use to me because I have all the knowledge and skills I need.	A	B	C	D	E
33	I am usually a good judge of my own capabilities.	A	B	C	D	E
34	I believe I learn more from construction training than most people.	A	B	C	D	E
35	Taking construction training courses is a high priority for me.	A	B	C	D	E
36	My past experiences and accomplishments increase my confidence that I will be able to successfully complete construction training.	A	B	C	D	E
37	Training is what you make of it.	A	B	C	D	E
38	Other people, that know me well, perceive me as being a capable person.	A	B	C	D	E
39	I want to try and change habits and routines that interfere with my ability to successfully complete construction training.	A	B	C	D	E
40	To make a lot of money you have to know the right people.	A	B	C	D	E

SURVEY CONTINUTES ON NEXT PAGE

	Directions: In this section, please select your level of agreement with each statement on the scale. **PLEASE record your response on the Scantron sheet provided.**	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
41	I am fearful of attending training sessions.	A	B	C	D	E
42	If a construction training involves many different tasks, some easy and some difficult, I would do very well at almost all of them.	A	B	C	D	E
43	To get an opportunity to be in training, I need to have family members or friends in high places.	A	B	C	D	E
44	If I participate in construction training in an unfamiliar area, I expect to be able to do well.	A	B	C	D	E
45	If I were asked to take training in an area of construction which I didn't know much about, I could successfully complete the training.	A	B	C	D	E
46	My past experiences and accomplishments increase my confidence that I will be able to perform well in construction training.	A	B	C	D	E
47	Construction training programs are useful to me.	A	B	C	D	E
48	My time would be better spent looking for a job then attending construction training.	A	B	C	D	E
49	Successfully completing a construction training is mostly a matter of luck.	A	B	C	D	E
50	Construction training is useful for my development.	A	B	C	D	E
51	I am confident that I can do well in construction training that deals with things (e.g., tool operation, using tools or body to move objects).	A	B	C	D	E
52	If I take construction training in an unfamiliar skill, I expect to be able to successfully complete the training program.	A	B	C	D	E
53	I will have opportunities to practice the skills emphasized in construction training in the job I want.	A	B	C	D	E
54	People who perform well in training generally get rewarded.	A	B	C	D	E
55	If I'm involved in a construction training session and I can't understand something I get so frustrated that I quit the training.	A	B	C	D	E
56	In general, I value education.	A	B	C	D	E
57	When I participate in training I usually can tell in advance how well I will do.	A	B	C	D	E
58	When faced with an unfamiliar problem in a construction training, I expect to be able to solve it.	A	B	C	D	E

SURVEY CONTINUTES ON NEXT PAGE

	Directions: In this section, please select your level of agreement with each statement on the scale. **PLEASE record your response on the Scantron sheet provided.**	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
59	Most trainees have more influence on their trainers than they think they do.	A	B	C	D	E
60	Construction training programs are relevant to skills I hope to develop.	A	B	C	D	E
61	When it comes to doing well in construction training, who you know is more important than what you know.	A	B	C	D	E
62	I am willing to invest effort to improve construction-related skills and competencies just for the sake of learning.	A	B	C	D	E
63	I want to try and change my habits and routines that interfere with my ability to attend construction training.	A	B	C	D	E
64	Making money is primarily a matter of being at the right place at the right time.	A	B	C	D	E
65	I am motivated to learn the skills taught in construction training.	A	B	C	D	E
66	I try to learn as much as I can from construction training.	A	B	C	D	E
67	My estimates of how well I can deal with a new situation are usually very accurate.	A	B	C	D	E
68	I am fearful of attending construction-related training sessions.	A	B	C	D	E
69	Most people are capable of successfully completing training if they make the effort.	A	B	C	D	E
70	In construction training, people can pretty much accomplish whatever they set out to accomplish.	A	B	C	D	E

Directions: In this section please select the response which best describes your feeling about each statement. **PLEASE record your response on the Scantron sheet provided.**

71	Most of my peers would attend the meetings of a construction training program on a regular basis:	Definitely True:	A	B	C	D	E	:Definitely False
72	Most of my peers would successfully complete a construction training program:	Definitely True:	A	B	C	D	E	:Definitely False
73	I am confident that, if I wanted to, I could successfully complete a construction training program:	Definitely True:	A	B	C	D	E	:Definitely False
74	It is expected that I attend the meetings of a construction training program on a regular basis:	Definitely True:	A	B	C	D	E	:Definitely False
75	I am confident that, if I wanted to, I could attend the meetings of a construction training program on a regular basis:	Definitely True:	A	B	C	D	E	:Definitely False
76	It is expected of me that I would successfully complete a construction training program:	Definitely True:	A	B	C	D	E	:Definitely False

SURVEY CONTINUTES ON NEXT PAGE

77	For me to successfully complete a construction training program is:	Extremely Difficult:	A	B	C	D	E	:Extremely Easy
78	For me to attend the meetings of a construction training program on a regular basis is:	Extremely Difficult:	A	B	C	D	E	:Extremely Easy
79	For me to attend the meetings of a construction training program on a regular basis is:	Extremely Good:	A	B	C	D	E	:Extremely Bad
80	For me to successfully complete construction training is:	Extremely Good:	A	B	C	D	E	:Extremely Bad
81	I will successfully complete this construction training:	Extremely Likely:	A	B	C	D	E	:Extremely Unlikely
82	I will attend the meetings of this construction training program on a regular basis:	Extremely Likely:	A	B	C	D	E	:Extremely Unlikely
83	For me to attend the meeting of a construction training program is:	Extremely Pleasant:	A	B	C	D	E	:Extremely Unpleasant
84	For me to attend the meetings of a construction training program is:	Extremely Valuable:	A	B	C	D	E	:Extremely Worthless
85	For me to complete a construction training is:	Extremely Valuable:	A	B	C	D	E	:Extremely Worthless
86	I would make an effort to successfully complete a construction training program:	I Definitely Would:	A	B	C	D	E	:I Definitely Would Not
87	I would make an effort to attend the meetings of a construction training program on a regular basis:	I Definitely Would:	A	B	C	D	E	:I Definitely Would Not
88	Most people who are important to me think that [I should - I should not] complete a construction training program.	I should:	A	B	C	D	E	:I Should not
89	Most people who are important to me think that [I should - I should not] attend construction training.	I should:	A	B	C	D	E	:I Should not
90	For me to attend the meeting of a construction training program on a regular basis is:	Impossible:	A	B	C	D	E	:Possible
91	For me to successfully complete a construction training program is:	Impossible:	A	B	C	D	E	:Possible
92	For me to attend the meetings of a construction training program is:	Interesting:	A	B	C	D	E	:Boring
93	I intend to successfully complete construction training:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
94	I intend to attend the meetings of a construction training program on a regular basis:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
95	Most people, whose opinions I value, would approve of me completing a construction training program:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
96	Whether I attend the meetings of a construction training program is completely up to me:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
97	Whether I successfully complete construction training is completely up to me:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
98	Most people whose opinions I value would approve of my participating in a construction training program:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree

SURVEY CONTINUTES ON NEXT PAGE

Directions: For the following questions, please select the response that best describes you:

99	What is your current year in school?	Freshman	Sophomore	Junior	Senior	Graduate
		A	B	C	D	E
100	What is your major?	Construction Mgt.	Interior Design	Undeclared	Other or Dual Major	Pre-C M (Colorado)
		A	B	C	D	E
101	What age range best describes you?	17 or younger	18-24	25-30	31-40	41 or older
		A	B	C	D	E
102	What is your gender?	Female	Male			
		A	B			
103	How much construction management experience do you have? **In this study "management experience" is considered field of office management tasks; such as submittal/shop drawing review, writing requests for information (RFIs), preparing cost budgets, preparing or updating schedules, and so on.*	None	0-1 year	1-2 year	2-3 year	3+ years
		A	B	C	D	E
104	How much hands-on construction experience do you have? **In this study "hands-on construction experience" is considered labor related tasks. Such as, installing roofing materials, cleaning up the site, assisting in the installation of brick, pouring concrete, placing reinforcing, and so on.*	None	0-1 year	1-2 year	2-3 year	3+ years
		A	B	C	D	E
105	How many construction management internships have you completed?	0	1	2	3	More than 3
		A	B	C	D	E
106	What was the total duration of all construction management internship experiences combined?	No internship experience	0-3 months	3-6 months	6-9 months	More than 9 months
		A	B	C	D	E
107	How many construction management competitions have you participated in?	0	1	2	3	More than 3
		A	B	C	D	E

Please turn in your survey responses to the researcher.
Thank you for your participation!

Phase Two CTAIS (N = 44) and Demographic Items (N = 9)

Construction Training Attitudes and Intentions Survey

Directions: In this section, please select your level of agreement with each statement on the scale.

Please use a #2 pencil to record your response on the Scantron sheet provided.

Remember that classroom-based construction education is construction training.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Successfully completing a construction training program is within the scope of my abilities	A	B	C	D	E
2	Other people that know me well perceive me as being a capable person	A	B	C	D	E
3	If I were asked to take training in an area of construction which I didn't know much about, I could successfully complete the training program.	A	B	C	D	E
4	I am willing to invest effort to improve construction-related skills and competencies just for the sake of learning.	A	B	C	D	E
5	Construction training is within the scope of my abilities	A	B	C	D	E
6	The main difference between people who make a lot of money and people who make a little money is luck.	A	B	C	D	E
7	Having the opportunity to attend a construction training program is mostly a matter of luck.	A	B	C	D	E
8	I can generally do the work necessary to accomplish my goals in training courses or seminars.	A	B	C	D	E
9	My past experiences and accomplishments increase my confidence that I will be able to perform well in construction training.	A	B	C	D	E
10	My past experiences and accomplishments increase my confidence that I will be able to successfully complete a construction training program.	A	B	C	D	E
11	Making money is primarily a matter of good fortune.	A	B	C	D	E
12	I am willing to invest effort on my personal time to develop construction-related skills.	A	B	C	D	E
13	Construction training programs are useful for my development.	A	B	C	D	E
14	My estimates of how well I can deal with a new situation are usually very accurate.	A	B	C	D	E
15	I expect to be able to do things that need to be done to successfully complete a construction training program.	A	B	C	D	E

Survey Continues On Next Page

	Directions: In this section, please select your level of agreement with each statement on the scale. **PLEASE record your response on the Scantron sheet provided.**	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16	I am willing to invest effort to improve my skills and competencies in order to prepare myself for a construction-related job.	A	B	C	D	E
17	It takes a lot of luck to be an outstanding trainee in most training programs.	A	B	C	D	E
18	If I were asked to take training in an area of construction which I didn't know much about, I could do well in the training	A	B	C	D	E
19	Taking construction training courses is a high priority for me.	A	B	C	D	E
20	I am motivated to learn the skills taught in construction training programs.	A	B	C	D	E
21	In order to get an opportunity to be in training, you need to have family members or friends in high places.	A	B	C	D	E
22	I am confident that I can do well in construction training that deals with things (e.g., tool operation, using tools or body to move objects).	A	B	C	D	E
23	I would like to improve my construction-related skills	A	B	C	D	E
24	Successfully completing a construction training program is mostly a matter of luck.	A	B	C	D	E
25	I will be able to apply what I have learned in construction training to a job.	A	B	C	D	E
26	If I take construction training in an unfamiliar area, I expect to be able to successfully complete the training program.	A	B	C	D	E
27	I value construction-related training.	A	B	C	D	E
28	Getting a job is usually a matter of good fortune.	A	B	C	D	E
29	I am usually a good judge of my own capabilities.	A	B	C	D	E
30	If I take construction training which involved many different tasks, some easy and some difficult, I would probably do very well at almost all of them.	A	B	C	D	E

Survey Continues On Next Page

Directions: In this section please select the response which best describes your feeling about each statement. **PLEASE record your response on the Scantron sheet provided.**

31	It is expected that I attend the meetings of a construction training program on a regular basis:	Definitely True:	A	B	C	D	E	:Definitely False
32	It is expected of me that I would successfully complete a construction training program:	Definitely True:	A	B	C	D	E	:Definitely False
33	For me to successfully complete construction training is:	Extremely Good:	A	B	C	D	E	:Extremely Bad
34	I will attend the meetings of this construction training program on a regular basis:	Extremely Likely:	A	B	C	D	E	:Extremely Unlikely
35	I will successfully complete this construction training:	Extremely Likely:	A	B	C	D	E	:Extremely Unlikely
36	For me to attend the meeting of a construction training program is:	Extremely Pleasant:	A	B	C	D	E	:Extremely Unpleasant
37	For me to attend the meetings of a construction training program is:	Extremely Valuable:	A	B	C	D	E	:Extremely Worthless
38	For me to complete a construction training is:	Extremely Valuable:	A	B	C	D	E	:Extremely Worthless
39	I would make an effort to successfully complete a construction training program:	I Definitely Will:	A	B	C	D	E	:I Definitely Will Not
40	I would make an effort to attend the meetings of a construction training program on a regular basis:	I Definitely Would:	A	B	C	D	E	:I Definitely Would Not
41	Most people who are important to me think that [I should - I should not] attend construction training.	I should:	A	B	C	D	E	:I Should not
42	I intend to attend the meetings of a construction training program on a regular basis:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
43	I intend to successfully complete construction training:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree
44	Most people whose opinions I value would approve of my participating in a construction training program:	Strongly Agree:	A	B	C	D	E	:Strongly Disagree

Survey Continues On Next Page

Directions: For the following questions, please select the response that best describes you:

45	What is your current year in school?	Freshman	Sophomore	Junior	Senior	Graduate
		A	B	C	D	E
46	What is your major?	Construction Mgt.	Interior Design	Undeclared	Dual Major	Other
		A	B	C	D	E
47	What age range best describes you?	17 or younger	18-24	25-30	31-40	41 or older
		A	B	C	D	E
48	What is your gender?	Female	Male			
		A	B			
49	How many construction management competitions have you participated in?	0	1	2	3	3 or more
		A	B	C	D	E
50	How many construction management internships have you completed?	0	1	2	3	3 or more
		A	B	C	D	E
51	What was the total duration of all construction management internship experiences **combined**?	No internships	0-3 months	3-6 months	6-9 months	9+ months
		A	B	C	D	E
52	Aside from internships, how much construction management experience do you have?	None	0-1 year	1-2 year	2-3 year	3+ years
		A	B	C	D	E
	**In this study "management experience" is considered field of office management tasks; such as submittal/shop drawing review, writing requests for information (RFIs), preparing cost budgets, preparing or updating schedules, and so on.*					
53	Aside from internships, how much hands-on construction experience do you have?	None	0-1 year	1-2 year	2-3 year	3+ years
		A	B	C	D	E
	**In this study "hands-on construction experience" is considered labor related tasks. Such as, installing roofing materials, cleaning up the site, assisting in the installation of brick, pouring concrete, placing reinforcing, and so on.*					

Thank you for your participation!
Please turn in your survey responses to the researcher.

APPENDIX E: SURVEY ITEM REMOVAL TABLE

Table 30. Phase One Survey Item Reduction Procedure

Phase 1 Instrument	Item Reduction Procedure					Phase 2 Instrument
Items (N = 98)	Subscale Inter-Item Correlation Items (N=60)	EFA Step One Items (N=49)	EFA Step Two Items (N=46)	EFA Step Three Items (N=45)	Emergent Factor α if items deleted Items (N=44)	Items (N=44)
CTSE01	CTSE01	CTSE01	CTSE01	CTSE01	CTSE01	CTSE01
CTSE02	CTSE02	CTSE02	CTSE02	CTSE02	CTSE02	CTSE02
CTSE03	CTSE03	CTSE03	CTSE03	CTSE03	CTSE03	CTSE03
CTSE04	CTSE04	CTSE04	CTSE04	CTSE04	CTSE04	CTSE04
CTSE05	CTSE05	CTSE05	CTSE05	CTSE05	CTSE05	CTSE05
CTSE06	CTSE06	CTSE06	CTSE06	CTSE06	CTSE06	CTSE06
CTSE07	CTSE07	CTSE07	CTSE07	CTSE07	CTSE07	CTSE07
CTSE08	CTSE08	-	-	-	-	-
CTSE09	CTSE09	CTSE09	CTSE09	CTSE09	CTSE09	CTSE09
CTSE10	-	-	-	-	-	-
CTSE11	CTSE11	CTSE11	CTSE11	CTSE11	CTSE11	CTSE11
CTSE12	-	-	-	-	-	-
CTSE13	CTSE13	CTSE13	CTSE13	CTSE13	CTSE13	CTSE13
CTSE14	CTSE14	CTSE14	CTSE14	CTSE14	CTSE14	CTSE14
CTSE15	CTSE15	CTSE15	CTSE15	CTSE15	CTSE15	CTSE15
CTSE16	CTSE16	-	-	-	-	-
CTSE17	CTSE17	CTSE17	CTSE17	CTSE17	CTSE17	CTSE17
CTSE18	CTSE18	CTSE18	CTSE18	CTSE18	CTSE18	CTSE18
CTSE19	CTSE19	-	-	-	-	-
CTSE20	CTSE20	-	-	-	-	-
CTM01	-	-	-	-	-	-
CTM02	-	-	-	-	-	-
CTM03	-	-	-	-	-	-
CTM04	-	-	-	-	-	-
CTM05	CTM05	CTM05	CTM05	CTM05	CTM05	CTM05
CTM06	CTM06	CTM06	CTM06	CTM06	CTM06	CTM06
CTM07	CTM07	-	-	-	-	-
CTM08	CTM08	CTM08	-	-	-	-
CTM09	-	-	-	-	-	-
CTM10	-	-	-	-	-	-
CTM11	-	-	-	-	-	-
CTM12	-	-	-	-	-	-
CTM13	CTM13	-	-	-	-	-

Phase 1 Instrument	Item Reduction Procedure					Phase 2 Instrument
Items (N = 98)	Subscale Inter-Item Correlation Items (N=60)	EFA Step One Items (N=49)	EFA Step Two Items (N=46)	EFA Step Three Items (N=45)	Emergent Factor α if items deleted Items (N=44)	Items (N=44)
CTM14	CTM14	CTM14	CTM14	CTM14	CTM14	CTM14
CTM15	CTM15	CTM15	CTM15	CTM15	CTM15	CTM15
CTM16	CTM16	CTM16	CTM16	CTM16	CTM16	CTM16
CTM17	-	-	-	-	-	-
CTM18	-	-	-	-	-	-
CTM19	CTM19	CTM19	CTM19	CTM19	CTM19	CTM19
TLOC01	-	-	-	-	-	-
TLOC02	-	-	-	-	-	-
TLOC03	-	-	-	-	-	-
TLOC04	-	-	-	-	-	-
TLOC05	TLOC05	TLOC05	TLOC05	TLOC05	TLOC05	TLOC05
TLOC06	TLOC06	TLOC06	TLOC06	TLOC06	TLOC06	TLOC06
TLOC07	TLOC07	TLOC07	TLOC07	TLOC07	TLOC07	TLOC07
TLOC08	-	-	-	-	-	-
TLOC09	TLOC09	TLOC09	TLOC09	TLOC09	TLOC09	TLOC09
TLOC10	TLOC10	TLOC10	TLOC10	TLOC10	TLOC10	TLOC10
TLOC11	-	-	-	-	-	-
TLOC12	-	-	-	-	-	-
TLOC13	-	-	-	-	-	-
TLOC14	TLOC14	TLOC14	TLOC14	TLOC14	TLOC14	TLOC14
TLOC15	-	-	-	-	-	-
TLOC16	-	-	-	-	-	-
TLOC17	TLOC17	TLOC17	TLOC17	TLOC17	TLOC17	TLOC17
ATCT01	ATCT01	ATCT01	ATCT01	ATCT01	-	-
ATCT02	ATCT02	ATCT02	-	-	-	-
ATCT03	ATCT03	ATCT03	ATCT03	ATCT03	ATCT03	ATCT03
ATCT04	-	-	-	-	-	-
ATCT05	-	-	-	-	-	-
ATCT06	-	-	-	-	-	-
ATCT07	-	-	-	-	-	-
ATCT08	-	-	-	-	-	-
ATCT09	ATCT09	ATCT09	ATCT09	ATCT09	ATCT09	ATCT09
ATCT10	-	-	-	-	-	-

Phase 1 Instrument	Item Reduction Procedure					Phase 2 Instrument
Items (N = 98)	Subscale Inter-Item Correlation Items (N=60)	EFA Step One Items (N=49)	EFA Step Two Items (N=46)	EFA Step Three Items (N=45)	Emergent Factor α if items deleted Items (N=44)	Items (N=44)
ATCT11	ATCT11	ATCT11	-	-	-	-
ATCT12	-	-	-	-	-	-
ATCT13	ATCT13	ATCT13	ATCT13	ATCT13	ATCT13	ATCT13
ATCT14	-	-	-	-	-	-
PBC01	-	-	-	-	-	-
PBC02	-	-	-	-	-	-
PBC03	-	-	-	-	-	-
PBC04	PBC04	-	-	-	-	-
PBC05	PBC05	-	-	-	-	-
PBC06	PBC06	-	-	-	-	-
PBC07	PBC07	-	-	-	-	-
PBC08	PBC08	-	-	-	-	-
CTI01	CTI01	CTI01	CTI01	CTI01	CTI01	CTI01
CTI02	CTI02	CTI02	CTI02	CTI02	CTI02	CTI02
CTI03	CTI03	CTI03	CTI03	CTI03	CTI03	CTI03
CTI04	CTI04	CTI04	CTI04	CTI04	CTI04	CTI04
CTI05	CTI05	CTI05	CTI05	CTI05	CTI05	CTI05
CTI06	CTI06	CTI06	CTI06	CTI06	CTI06	CTI06
CTN01	CTN01	CTN01	CTN01	CTN01	CTN01	CTN01
CTN02	-	-	-	-	-	-
CTN03	-	-	-	-	-	-
CTN04	-	-	-	-	-	-
CTN05	CTN05	CTN05	CTN05	CTN05	CTN05	CTN05
CTN06	CTN06	CTN06	CTN06	CTN06	CTN06	CTN06
CTN07	CTN07	CTN07	CTN07	CTN07	CTN07	CTN07
CTN08	CTN08	CTN08	CTN08	-	-	-
CTVA01	-	-	-	-	-	-
CTVA02	CTVA02	CTVA02	CTVA02	CTVA02	CTVA02	CTVA02
CTVA03	CTVA03	CTVA03	CTVA03	CTVA03	CTVA03	CTVA03
CTVA04	CTVA04	CTVA04	CTVA04	CTVA04	CTVA04	CTVA04
CTVA05	CTVA05	CTVA05	CTVA05	CTVA05	CTVA05	CTVA05
CTVA06	-	-	-	-	-	-

APPENDIX F: STATISTICAL TABLES

Table 31. Correlation Matrix for Construction Training Self-Efficacy (N = 244)

	Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	M	SD
1.	CTSE01	1																		4.12	.759
2.	CTSE02	.713	1																	4.14	.789
3.	CTSE03	.678	.649	1																4.24	.800
4.	CTSE04	.581	.496	.712	1															4.38	.821
5.	CTSE05	.447	.452	.525	.360	1														3.92	.759
6.	CTSE06	.629	.576	.653	.548	.546	1													4.30	.802
7.	CTSE07	.527	.470	.493	.418	.536	.464	1												3.78	.838
8.	CTSE08	.580	.478	.603	.521	.382	.530	.469	1											4.19	.783
9.	CTSE09	.568	.510	.681	.610	.407	.539	.454	.711	1										4.34	.811
10.	CTSE11	.523	.477	.488	.401	.383	.502	.453	.555	.530	1									3.78	.781
11.	CTSE13	.634	.597	.649	.560	.533	.645	.536	.517	.548	.613	1								3.97	.818
12.	CTSE14	.516	.472	.573	.497	.405	.532	.489	.435	.429	.548	.667	1							3.77	.861
13.	CTSE15	.616	.558	.580	.547	.413	.566	.450	.492	.530	.558	.733	.660	1						3.89	.828
14.	CTSE17	.496	.424	.560	.520	.458	.545	.461	.672	.640	.485	.522	.425	.462	1					4.21	.690
15.	CTSE18	.560	.554	.517	.420	.492	.523	.561	.435	.427	.556	.638	.582	.532	.451	1				3.91	.789
16.	CTSE16	.536	.517	.565	.534	.417	.524	.470	.511	.575	.525	.591	.444	.464	.478	.492	1			4.15	.924
17.	CTSE19	.576	.513	.641	.617	.427	.576	.457	.700	.692	.547	.613	.494	.601	.637	.456	.543	1		4.11	.817
18.	CTSE20	.478	.498	.514	.412	.430	.597	.369	.568	.532	.494	.502	.422	.533	.554	.350	.421	.536	1	4.20	.944

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 32. Correlation Matrix for Construction Training Motivation (N = 245)

	Item	1	2	3	4	5	6	7	8	9	M	SD
1.	CTM05	1									4.09	.826
2.	CTM06	.653	1								4.40	.800
3.	CTM07	.694	.607	1							4.30	.868
4.	CTM08	.528	.526	.531	1						4.22	.783
5.	CTM13	.549	.556	.629	.426	1					4.44	.899
6.	CTM14	.700	.585	.572	.450	.445	1				3.95	.815
7.	CTM15	.720	.666	.616	.514	.515	.617	1			4.29	.763
8.	CTM16	.688	.597	.573	.453	.474	.578	.611	1		3.80	.954
9.	CTM19	.689	.619	.658	.459	.445	.683	.638	.617	1	4.01	.819

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 33. Correlation Matrix for Training Locus of Control (N = 245)

	Item	1	2	3	4	5	6	7	M	SD
1.	TLOC05	1							1.79	.821
2.	TLOC06	.373	1						2.21	.889
3.	TLOC07	.363	.401	1					2.51	.932
4.	TLOC09	.476	.306	.354	1				2.07	.894
5.	TLOC10	.508	.429	.445	.364	1			2.46	.978
6.	TLOC14	.452	.370	.429	.396	.411	1		1.97	.836
7.	TLOC17	.497	.366	.383	.356	.411	.446	1	1.91	.935

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 34. Correlation Matrix for Attitude Toward Construction Training (N = 247)

	Item	1	2	3	4	5	6	M	SD
1.	ATCT01	1						4.41	0.759
2.	ATCT02	.446	1					4.34	0.757
3.	ATCT03	.507	.561	1				4.16	0.793
4.	ATCT09	.504	.475	.736	1			4.13	0.813
5.	ATCT11	.409	.551	.565	.539	1		4.16	0.795
6.	ATCT13	.491	.410	.619	.645	.456	1	4.26	0.801

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 35. Correlation Matrix for Perceived Behavior Control (N = 244)

Item	1	2	3	4	5	M	SD
1. PBC4	1					1.75	1.037
2. PBC5	.384	1				1.68	.877
3. PBC6	.363	.651	1			1.55	.743
4. PBC7	.304	.396	.375	1		1.65	.861
5. PBC8	.358	.351	.310	.599	1	1.43	.761

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 36. Correlation Matrix for Construction Training Intentions (N = 244)

Item	1	2	3	4	5	6	M	SD
1. CTI01	1						4.07	1.004
2. CTI02	.628	1					4.41	.885
3. CTI03	.730	.550	1				4.17	.963
4. CTI04	.547	.599	.688	1			4.38	.825
5. CTI05	.728	.485	.736	.584	1		4.15	1.022
6. CTI06	.566	.615	.623	.723	.665	1	4.38	.879

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 37. Correlation Matrix for Construction Training Norms (N = 244)

Item	1	2	3	4	5	M	SD
1. CTN01	1					1.84	.998
2. CTN05	.469	1				2.07	1.093
3. CTN06	.472	.533	1			1.77	.964
4. CTN07	.556	.343	.359	1		1.61	.836
5. CTN08	.605	.362	.464	.689	1	1.60	.853

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 38. Correlation Matrix for Construction Training Value Attitudes (N = 245)

Item	1	2	3	4	M	SD
1. CTVA02	1				1.76	.952
2. CTVA03	.542	1			1.87	.858
3. CTVA04	.624	.672	1		1.74	.894
4. CTVA05	.472	.587	.528	1	2.29	.897

Note: All Correlations are significant at the 0.01 level (2-tailed).

Table 39. Rotated Factor Matrix for 44-Item CTAIS

		Factor			
Element	Item	1	2	3	4
PTB	CTI01	.771			
PTB	CTI02	.727			
PTB	CTI03	.810			
PTB	CTI04	.820			
PTB	CTI05	.810			
PTB	CTI06	.814			
PTB	CTN01	.693			
PTB	CTN05	.690			
PTB	CTN06	.676			
PTB	CTN07	.654			
PTB	CTVA02	.735			
PTB	CTVA03	.757			
PTB	CTVA04	.804			
PTB	CTVA05	.680			
CTSE	CTSE01		.664		
CTSE	CTSE02		.600		
CTSE	CTSE03		.658		
CTSE	CTSE04		.569		
CTSE	CTSE05		.627		
CTSE	CTSE06		.651		
CTSE	CTSE07		.666		
CTSE	CTSE09		.561		
CTSE	CTSE11		.752		
CTSE	CTSE13		.813		
CTSE	CTSE14		.766		
CTSE	CTSE15		.758		
CTSE	CTSE17		.754		
CTSE	CTSE18		.587		
TMA	ATCT03			.733	
TMA	ATCT09			.670	
TMA	ATCT13			.657	
TMA	CTM05			.769	
TMA	CTM06			.691	
TMA	CTM14			.753	
TMA	CTM15			.732	
TMA	CTM16			.628	
TMA	CTM19			.705	
TLOC	TLOC05				.674
TLOC	TLOC06				.628
TLOC	TLOC07				.735
TLOC	TLOC09				.600
TLOC	TLOC10				.720
TLOC	TLOC14				.670
TLOC	TLOC17				.687

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations. Eigenvalues below 0.45 were removed.

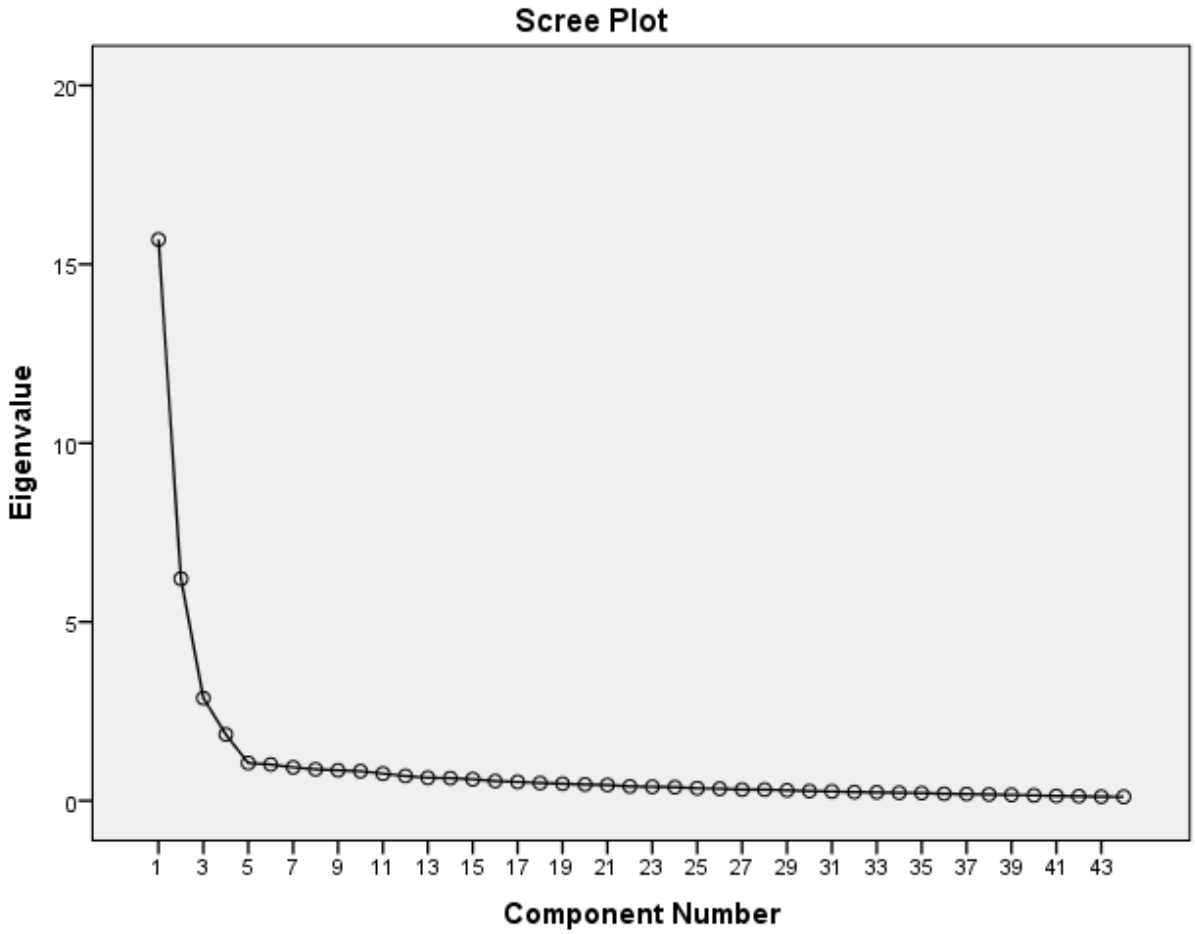


Figure 5. Scree Plot for Phase One 44-Item CTAIS

Table 40. Unrotated Factor Matrix for 4 Emergent Factors and 44 Items

Element	Item	Factor			
		1	2	3	4
TPB	CTI01	.494	.615	.069	.029
TPB	CTI02	.529	.484	.133	.198
TPB	CTI03	.619	.571	.084	.035
TPB	CTI04	.598	.573	-.013	.155
TPB	CTI05	.469	.678	.001	.019
TPB	CTI06	.593	.563	-.010	.158
TPB	CTN01	.537	.463	-.125	.134
TPB	CTN05	.547	.471	-.021	.070
TPB	CTN06	.503	.466	.113	.071
TPB	CTN07	.525	.412	-.035	.148
TPB	CTVA02	.546	.503	-.026	.170
TPB	CTVA03	.524	.598	.010	-.068
TPB	CTVA04	.528	.609	.048	.093
TPB	CTVA05	.549	.472	.047	.009
CTSE	CTSE01	.716	-.346	.178	.048
CTSE	CTSE02	.664	-.351	.118	.008
CTSE	CTSE03	.720	-.393	.132	.036
CTSE	CTSE04	.663	-.303	.025	.085
CTSE	CTSE05	.734	-.238	.079	.019
CTSE	CTSE06	.572	-.331	.133	.368
CTSE	CTSE07	.684	-.412	.125	.294
CTSE	CTSE09	.529	-.388	.208	.348
CTSE	CTSE11	.654	-.328	.134	.302
CTSE	CTSE13	.563	-.389	.140	.317
CTSE	CTSE14	.660	-.244	.051	.139
CTSE	CTSE15	.438	-.499	.114	.132
CTSE	CTSE17	.629	-.442	.148	.036
CTSE	CTSE18	.530	-.384	.161	.191
TMA	ATCT03	.756	-.067	.055	-.361
TMA	ATCT09	.833	-.030	-.030	-.248
TMA	ATCT13	.704	-.206	-.123	-.285
TMA	CTM05	.803	-.103	.056	-.362
TMA	CTM06	.722	-.198	.060	-.323
TMA	CTM14	.703	-.103	-.004	-.397
TMA	CTM15	.775	-.124	.068	-.357
TMA	CTM16	.752	.092	.187	-.254
TMA	CTM19	.731	-.099	-.031	-.354
TLOC	TLOC05	-.488	.209	.545	-.031
TLOC	TLOC06	-.383	.118	.533	-.090
TLOC	TLOC07	-.179	.075	.712	-.026
TLOC	TLOC09	-.351	.106	.523	.013
TLOC	TLOC10	-.332	.117	.640	-.096
TLOC	TLOC14	-.365	.118	.569	-.221
TLOC	TLOC17	-.326	.080	.629	.014

Extraction Method: Principal Component Analysis. 6 components extracted.

Table 41.Correlation Matrix for Factor 1: Planned Training Behavior (N = 244)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	M	SD
1. CTI01	1														4.07	1.004
2. CTI02	.628	1													4.41	0.885
3. CTI03	.730	.550	1												4.17	0.963
4. CTI04	.547	.599	.688	1											4.38	0.825
5. CTI05	.728	.485	.736	.584	1										4.15	1.022
6. CTI06	.566	.615	.623	.723	.665	1									4.38	0.879
7. CTN01	.443	.418	.531	.548	.501	.633	1								4.16	0.998
8. CTN05	.535	.343	.603	.498	.653	.511	.469	1							3.93	1.093
9. CTN06	.419	.478	.446	.553	.449	.595	.472	.533	1						4.23	0.964
10. CTN07	.448	.471	.537	.590	.509	.589	.556	.343	.359	1					4.39	0.836
11. CTVA02	.535	.591	.554	.678	.470	.550	.511	.520	.457	.490	1				4.24	0.952
12. CTVA03	.541	.490	.628	.600	.637	.554	.478	.538	.476	.393	.542	1			4.13	0.858
13. CTVA04	.510	.577	.583	.717	.550	.638	.579	.488	.528	.521	.624	.672	1		4.26	0.894
14. CTVA05	.514	.495	.574	.528	.564	.475	.446	.535	.447	.413	.472	.587	.528	1	3.71	0.897

Note: All correlations are significant at the 0.01 level (2-tailed).

Table 42. Correlation Matrix for Factor 2: Construction Training Self-Efficacy (N = 245)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	M	SD
1. CTSE01	1														4.12	.759
2. CTSE02	.713	1													4.14	.789
3. CTSE03	.678	.649	1												4.24	.800
4. CTSE04	.581	.496	.712	1											4.38	.821
5. CTSE05	.447	.452	.525	.360	1										4.34	.811
6. CTSE06	.629	.576	.653	.548	.546	1									3.78	.781
7. CTSE07	.527	.470	.493	.418	.536	.464	1								3.97	.818
8. CTSE09	.568	.510	.681	.610	.407	.539	.454	1							3.77	.861
9. CTSE11	.523	.477	.488	.401	.383	.502	.453	.530	1						3.89	.828
10. CTSE13	.634	.597	.649	.560	.533	.645	.536	.548	.613	1					3.91	.789
11. CTSE14	.516	.472	.573	.497	.405	.532	.489	.429	.548	.667	1				4.15	.924
12. CTSE15	.616	.558	.580	.547	.413	.566	.450	.530	.558	.733	.660	1			3.92	.759
13. CTSE17	.560	.554	.517	.420	.492	.523	.561	.427	.556	.638	.582	.532	1		4.30	.802
14. CTSE18	.536	.517	.565	.534	.417	.524	.470	.575	.525	.591	.444	.464	.492	1	3.78	.838

Note: All correlations are significant at the 0.01 level (2-tailed).

Table 43. Correlation Matrix for Factor 3: Training Motivation Attitudes (N = 245)

	Item	1	2	3	4	5	6	7	8	9	M	SD
1.	ATCT03	1									4.16	.793
2.	ATCT09	.736	1								4.13	.813
3.	ATCT13	.619	.645	1							4.26	.801
4.	CTM05	.747	.805	.670	1						4.09	.826
5.	CTM06	.649	.661	.583	.653	1					4.40	.800
6.	CTM14	.641	.629	.592	.700	.585	1				3.95	.815
7.	CTM15	.694	.672	.634	.720	.666	.617	1			4.29	.763
8.	CTM16	.622	.680	.517	.688	.597	.578	.611	1		3.80	.954
9.	CTM19	.642	.651	.615	.689	.619	.683	.638	.617	1	4.01	.819

Note: All correlations are significant at the 0.01 level (2-tailed).

Table 44. Correlation Matrix for Factor 4: Training Locus of Control (N = 245)

	Item	1	2	3	4	5	6	7	M	SD
1.	TLOC05	1							1.79	.821
2.	TLOC06	.373	1						2.21	.889
3.	TLOC07	.363	.401	1					2.51	.932
4.	TLOC09	.476	.306	.354	1				2.07	.894
5.	TLOC10	.508	.429	.445	.364	1			2.46	.978
6.	TLOC14	.452	.370	.429	.396	.411	1		1.97	.836
7.	TLOC17	.497	.366	.383	.356	.411	.446	1	1.91	.935

Note: All correlation are significant at the 0.01 level (2-tailed).