

An Exploratory Examination of Reflective Thinking in  
Certified Human Performance Improvement Professionals

by

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AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Educational Leadership  
College of Education

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

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This exploratory study investigated reflective thinking by professionals in the workplace and relationships between participant demographics and reflective thinking. The Questionnaire for Reflective Thinking (QRT) was used to assess the quality of reflective thinking in a sample (n = 102) of individuals certified by the International Society for Performance Improvement (ISPI) as Certified Performance Technologists (CPT) (N = 697). Business leaders seek employees who practice reflective thinking. Employers and students expect college coursework to provide the needed skills and educators recognize this need. Researchers have developed reliable measures of reflective thinking, but the quality of reflective thinking practiced by professionals in the workplace is not known. Hierarchical multiple regression analysis was used to examine QRT scores for habitual action, understanding, reflection, and critical reflection, with respect to the demographic variables of gender, age, years of experience, education level, and academic discipline. Significant relationships between age and scores for habitual action, experience and scores for habitual action, education level and scores for understanding, gender and scores for critical reflection, and experience and scores for critical reflection were identified. No other differences in QRT scores based on the independent variable gender, age, experience, education level, or academic discipline were statistically significant.

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## **Chapter 1 - Introduction**

The globalization of business has created an even greater need to improve performance at the individual, group, and organizational levels to be competitive in today's market. Employers seek competent employees with certain skills and knowledge they feel are critical to the success of their business now and into the future. Educators have adopted various approaches to develop these abilities in students, one of which is reflective thinking (Kember et al., 2000). It is widely accepted that successful professionals need to be able to practice reflective thinking since much of what they do lacks well-defined solutions (Kember et al., 1999). Business leaders have adopted this belief (Casner-Lotto & Barrington, 2006) and professional educators have interpreted this to mean the education of professionals should develop students' abilities to reflect on their actions. Many professional courses have incorporated reflective thinking (Kember et al., 1999; Kember et al., 2000). However, whether professionals practice reflective thinking in the workplace, and if so, to what extent, requires further study. Performance improvement is the confluence of several fields that have traditionally had a narrower focus in improving business performance (Lauer, 2008). Certified Performance Technologists (CPT) are recognized by employers as human performance improvement professionals (ISPI, 2016a). This study investigated the quality of reflective thinking practiced by CPTs, and how the quality may be related to participant demographics (gender, age, experience, education level, and academic discipline).

This chapter provides an overview of the study, including background of the issues, the problem and purpose of the study, and the research questions. It then briefly describes the research methodology, the subjects, and the instrumentation. Finally, the chapter discusses the significance of the study and the study limitations and assumptions, then defines key terms used.



## Background

There is an expectation by students and industry that academic coursework will instill in students needed specialist as well as basic employability skills (Belardi, 2015; Heimler, 2010). Graduates agreed they should receive skills for workplace success in college, college faculty agreed the skills should be emphasized in the curriculum, and human resource managers generally agreed that they expect to receive such skills from recent graduates (Heimler, 2010). Researchers (Kember et al., 1999; Kember et al., 2000) have expanded the widely accepted belief that successful professionals need to practice reflective thinking to imply that courses educating professions need to develop reflective thinking skills. Liu, Frankel, and Roohr (2014) asserted that the ability to think critically, and therefore, think reflectively, is one of the most important skills for a college graduate to be an effective contributor in the global workforce. When students graduate and enter a profession, they are expected to be able to exercise reflective thinking (Lucas & Tan, 2006). However, while most Americans say that their time in post-secondary schools should prepare them to be productive in the workforce (Belardi, 2015; Heimler, 2010), and college and university officials are confident in their institution's ability to prepare students for success in the workforce (Weathers, 2014), less than half of Americans believe college graduates are prepared to succeed in the workplace (Busteed & Kafka, 2015; Lumina Foundation & Gallup, 2014). A 2015 Gallup poll (Busteed & Kafka, 2015) concluded that the reduction over three consecutive years in the percentage of Americans who agree that college graduates are well prepared for success in the workplace is effectively a "no confidence" vote on the work readiness of college graduates.

## **Professional Needs**

Scarlett (1991) wrote that there are seven qualities to a profession: knowledge of literature and the arts, personal integrity, social responsibility, technical prowess, faith there is meaning and value in life, humility, and knowledge of history. Abbott (1988) maintained that a profession must lay exclusive claim to a specialized area of expertise. Larson (1977) listed the visible characteristics of a profession as being a professional association with a shared cognitive base, institutionalized training, formal licensing, work autonomy, colleague control, and a code of ethics. It is widely recognized that much of the work of professionals today deals with issues or problems that have been variously described as ill-defined, wicked, messy, or indeterminate and are rooted in complex environments that exhibit nonlinear behavior and do not have ideal solutions (Cilliers, 2002; Gunderson & Holling, 2002; Kember et al., 1999; Kember et al., 2000; Odum, 1994).

The term *professional* describes the standards of education and training that prepare graduates of universities and institutes with the knowledge and skills necessary to perform their role within a profession (Jaeger, 2003). Researchers and professional organizations see reflection, especially personal reflection on experience, as a key factor for acquiring and maintaining balanced professionalism along the continuum of education (ABIM, ACP-ASIM, & EFIM, 2002; Aukes, Geertsma, Cohen-Schotanus, Zwierstra, & Slaets, 2007; Crues & Crues, 2006; Irvine, 1999; Simpson, Furnace, Crosby, & Cumming, 2002). Thirty years ago, Donald Schön (1987) observed that many professional education courses failed to prepare students to practice as professionals after leaving school. Schön (1983, 1987) argued that a more appropriate model for professional education was equipping students to become reflective practitioners able to deal with multi-faceted problems. Kember et al. (2000) reported

innumerable professional courses in many disciplines and countries claim to be based upon a reflective practitioner approach.

Executives responding to an American Management Association (AMA) Critical Skills Survey (2012) said they need employees who can think critically, solve problems, innovate, collaborate, and communicate more effectively in the workplace to keep up with the fast pace of change in business to compete on a global level. An Association of American Colleges and Universities (AACU) survey (2011) found 95% of chief academic officers from 433 institutions rated critical thinking as an important intellectual skill for their students. This finding resonates with voices from the workforce; 81% of the employers surveyed by AACU (2011) wanted colleges to place a stronger emphasis on critical thinking. Levine-Brown, Bonham, Saxon, and Boylan (2008) reported that college students preparing to be a member of the modern workforce must be willing to go beyond the minimum in terms of solving problems and making decisions. Smith and Szymanski (2013) argued that, in quest for better test scores based largely on memorization, many students leave the high school education system without the thinking skills that are necessary to succeed in higher education. Ghanizadeh (2017) reported there is a consensus among educators that rational and deep thought is a standard of intellectual excellence required for full and constructive participation in academic, individual, and social lives. Development of higher order thinking skills is the core objective of higher education. College students must not only be willing and able to make informed, fair-minded judgments in contexts of relative uncertainty in a wide variety of situations but also be willing and able to critically challenge and modify existing understanding, beliefs, and standards applied in any given problem situation (Facione, Giancarlo, Facione, & Gainen, 1995; King & Kitchener, 1994).

## **Critical and Reflective Thinking**

In a brief history of the idea of critical thinking, Paul, Elder & Bartell (1997) observed that Socrates set the agenda for the tradition of critical thinking more than 2,500 years ago; to reflectively question common beliefs and explanations, carefully distinguishing those beliefs that are reasonable and logical from those which lack adequate evidence or rational foundation to warrant a belief. Reflective and critical thinking of Plato and Aristotle, like other Greek skeptics, emphasized the need to be able to see through the way things appear on the surface to the way they really are. From this emerged a focus on thinking systematically to trace implications broadly and deeply. In the middle ages, this systematic approach to thinking was embodied in the writings and teachings of such thinkers as Thomas Aquinas. As a necessary step in developing his ideas, he ensured his thinking systematically stated, considered, and addressed all criticisms of his ideas. During the Renaissance, scholars in Europe applied this systematic, critique-based way of thinking to religion, art, society, law, and human nature. This practice continued with contributions from others including Francis Bacon, Descartes, and other well-known thinkers to the 20th Century, including John Dewey. According to Paul et al. (1997), the collective contributions to the history of thinking, have produced a set of fundamentals of thought and reasoning that can be applied to the study of any subject.

Professionals need to be able to think fast and act smart, often in situations that are complex, uncertain, and where no effective policy or procedure exists (Kreitzberg & Kreitzberg, 2011). Examples of traditional professions include medicine, theology, law, and the military. Reflective thinking is often referenced as a characteristic of a competent professional (Lethbridge, Andrusyszyn, Iwasiw, Laschinger & Fernando, 2013). Research shows reflective

thinking is a recognized competency for wrestling with such real situations (Facione, 1990; Wolters et al., 2014).

According to Ennis (1987), reflective thinking is an essential component of critical thinking. Critical thinking is defined by the American Philosophical Association Project as, “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference and is founded on the conceptual criteria upon which a judgment is based” (Facione 1998, p. 2). Critical thinking has been described as “purposeful and reflective judgment (or thinking) about what to believe or what to do in response to observations, experience, verbal or written expressions, or arguments” (Department of the Army, 2012, p.2-7). Ivie (2001) defined critical thinking in terms of reflective practice enabling learners to “establish clear and logical connections between beginning premises, relevant facts, and warranted conclusions” (p. 10).

Cognitive demands in solving ill-structured problems require epistemic cognition, reflective judgment, and well-developed critical thinking skills (Day, Harrison, & Halpin, 2009). Phan (2007) reported that research evidence indicates reflection is beneficial in both the teaching and learning processes, as it enables both students and educators to think critically about their own learning and professional development. Moon (2008) noted reflective thinking has been conceptualized as contemplating upon what we do either after accomplishing the task or while doing it, and that reflective thinking provides students with a useful lens into analyzing and evaluating their learning processes and helps learners to monitor their own development from raw beginner to experienced ones.

The ultimate outcome of reflection is the development of specific skills that may assist individuals to become more critical and to develop expertise in their areas of professionalism (Phan, 2007). Facione (2000) reported, “The general consensus is that critical thinking per se is

judging in a reflective way what to do or what to believe” (p. 61). Ghanizadeh (2017) also found that reflection and critical reflection, as measured by the Questionnaire for Reflective Thinking (QRT) (Kember et al., 2000), predicted critical thinking, as measure by the Watson–Glaser Critical Thinking Appraisal (2002), positively and significantly.

### **Valued Employee Skills**

Businesses and society face enormous challenges today, including increasing global competition, emerging markets, changing energy costs, burgeoning health care costs, changes in technology, and the political and economic landscape. Professional reasoning and motivation are requisites to becoming expert practitioners (Musolino, 2006; Schell & Schell, 2008). Employers see specific employee thinking, communicating, and problem-solving skills as critical to the success of their business in the future (AMA, 2012; Casner-Lotto & Barrington, 2006; Lumina Foundation & Gallup, 2014). In 2006, an in-depth study of the corporate perspective on the readiness of new entrants into the U.S. workforce by level of educational attainment was conducted by The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management (Casner-Lotto & Barrington, 2006). The study included results from both a survey of more than 400 human resources professionals and interviews with senior business executives. When asked to name the most important skill their employees will need in the next five years, critical thinking, defined as the exercise of sound reasoning and analytical thinking, ranked the highest, surpassing innovation or the application of information technology (Casner-Lotto & Barrington, 2006). In 2006, business executives went on record stating that their current workforce is not as well developed in these skills as they need to be (AMA, 2010). Cultivation of these skills and

attitudes involves higher-order thinking skills, commitment, and the integration of experience with knowledge through reflective thinking (Dunn & Musolino, 2011).

### **Reflective Thinking and Learning**

Teaching that facilitates thinking critically is imperative to all education to develop within each student not only personal competence, but the competence to judge wisely in matters of life (Dewey, 1997; Newman, 1960; Paul, 1990). Lucas and Tan (2006) observed that the capacity to reflect underpins the exercise of professional judgment and ethical awareness, and is regarded as an integral part of learning to learn. The need to develop reflective practice is also an essential part of professional learning. Accrediting bodies such as the Southern Association of Colleges and Schools (SACS), require assessment and documentation of critical thinking in the graduates of accredited institutions (McDade, 1999). In adulthood, informed decisions require the ability to reflect on the validity of assumptions associated with the source and content of existing knowledge, values, and emotions (Mezirow & Associates, 2000). For true learning to occur, Schön (1992) suggested that a reaction must follow perception; the student must learn to occasionally stop and think, and that deep and conscious reflections would follow.

The general concept of learning through reflection on doing, or experience, is ancient (Felicia, 2011). More than two millennia ago, the Greek philosopher, Aristotle, wrote, “for the things we have to learn before we can do them, we learn by doing them” (Aristotle, 350 BCE, p. 1). Experiential learning, as an articulated educational approach, emerged much more recently. Beginning in the 1970s, David Kolb helped to develop the modern theory of experiential learning, drawing heavily on the work of John Dewey, Kurt Lewin, and Jean Piaget (Dixon, Adams, & Cullins, 1997). Mezirow (1977, 1991, 1992, 1998) has written extensively about reflective thinking as an essential component of his model of transformative learning for adults.

Some researchers (Boyd & Fales, 1983; Davis, 1998; Dewey, 1997; Moon, 1999; Naghdipour & Emeagwali, 2013; Schön, 1983) regard the ability to involve reflective thinking in resolving complicated learning situations as one of the essential elements of the learning process.

Reflecting on practice has become an element of professional competence required to bridge the theoretical and practical gap in any profession (Mann, Gordon, & MacLeod, 2009).

Reflective practice is an integral part of professional thinking (Bannigan & Moores, 2009). Parham (1987) described professional thinking as the ability to distinctly and critically analyze decision-making and engage in reflection. Professional thinking involves rational thinking and deliberation incorporating professional knowledge and expertise (Donaghy & Morss, 2000). Bannigan and Moores (2009) suggested that the need for professionals to use both practical knowledge and personal experiences in their thinking is why reflective practice is such an important skill. Educators have incorporated activities to promote reflection into undergraduate, graduate, and continuing education across a variety of professions, but the evidence to inform and support such curricular interventions remains largely theoretical (Mann et al., 2009). While business leaders have expressed their need for specific skills, including reflective thinking, in new employees (Casner-Lotto & Barrington, 2006), there has been very limited research measuring to what extent experienced professionals practice reflective thinking.

### **Measuring Reflective Thinking**

The literature often refers to reflective thinking as a learning outcome of education and as a characteristic of a competent professional; however, there has been little research on consistent methods to assess the extent to which students engage in reflective thinking (Atkins & Murphy, 1993; Carroll et al., 2002; Hannigan, 2001; Ireland, 2008; Kember et al., 2000; Kember et al., 2008; Levett-Jones, 2007). Phan (2007) reported studies employing both qualitative and



quantitative methodological approaches have sought to explore how critical reflective practice fits in with teaching and learning processes, as well as the development of specific skills required for reflection itself. Kember et al. (2000) observed many professional courses aim to promote reflective thinking or reflection upon practice, but “there is a scarcity of readily usable instruments to determine whether students engage in reflective thinking and, if so, to what extent” (p. 381). Available instruments mainly focus on clinical reasoning and critical thinking regarding well-defined problems (King & Kitchener, 1994), or reflective writing (Wong, Kember, Chung, & Yan, 1995). Development and execution of teaching and assessment strategies focused on the development of higher order thinking such as reflective thinking is complex (Drennan, 2010).

### **Development of Assessment Instruments**

Researchers and educators have called for an instrument to assist in consistently identifying the existence and extent of reflective thinking in which students are engaged in their programs (Chirema, 2007; Jensen & Joy, 2005; Kember et al., 1999; Kember et al., 2000; Kember et al., 2008; Richardson & Maltby, 1995; Wong et al., 1995; Wong et al., 1997). Initial data collected was qualitative in nature, from reflective journals, student interviews and classroom observation (Kember et al., 1999). While that research provided valuable insights into the effects various aspects of the curriculum design had on the types of reflective thinking among students, Kember et al. (2000) believed time required to gather and analyze the data exceeded that normally available for routine curriculum evaluation. In seeking to develop an instrument to determine whether students engage in reflective thinking and, if so, to what extent, Kember et al. (2000) employed a combination of an extensive review of the literature and initial testing to develop a theory-based, self-report four-scale instrument, the Questionnaire for Reflective

Thinking, or QRT. The QRT measures four constructs; habitual action, understanding, reflection, and critical reflection. Kember et al. (2000) described these constructs as follows:

*Habitual action* is activity performed automatically or with little conscious thought because of learning through frequent activity. Examples are using a keyboard or riding a bicycle. The work of experienced professionals dealing with common problems or issues can become quite habitual. When someone has experienced a particular type of problem many times, their way of dealing with similar cases becomes routine.

*Understanding* is thoughtful action based on existing knowledge without attempting to appraise that knowledge. This is action without relating to other situations such as the understanding a student might reach of a concept without reflection on the significance of that concept in a personal or practical situation.

*Reflection* involves the critique of assumptions about the content or process of problem solving, including making a taken-for-granted situation problematic and raising questions regarding its validity.

*Critical reflection* involves the testing of premises and requires a critical review of presuppositions from conscious and unconscious prior learning. Since this requires a significant change of perspective, Kember et al. (2000) predict observation of critical reflection only rarely.

### **Use of Assessment Instruments**

In addition to the development of assessment instruments (Aukes et al., 2007; Biggs, Kember, & Leung, 2001; Dunn & Musolino, 2011; Kember et al., 1999; Kember et al., 2000), researchers investigating the measurement of reflective thinking have focused largely on assessing reflective thinking in students (Kember et al., 1996b; Lim, 2011; Wong et al., 1995) and teachers (Larrivee, 2008). Measurement among students has been limited to the perspective

that development of reflective thinking is a means to improving academic performance among undergraduate students (Kember et al., 1996b) and advanced nursing students (Wong et al., 1995) and only indirectly addresses development of professional competencies for the workplace (Lim, 2011). Measurement of reflective thinking among practicing professionals has been limited to examining the validity of instruments for measuring reflective thinking (Aukes et al., 2007). While there has been research associating some individual demographics with preferred learning styles that include reflective observation (Joy & Kolb, 2009; Kolb & Kolb, 2005), there is a scarcity of research associating extent of reflective thinking with demographic factors.

### **Theoretical Framework**

This study views reflective thinking as a multidimensional construct based on Mezirow's (1991) treatment of reflective thinking as an essential component of his model of transformative learning for adults. Mezirow separated reflective and non-reflective action. He identified three types of non-reflective actions: habitual action, thoughtful action, and introspection; and two levels of reflective action. He further divided the lower or less critical level into two types, reflection on content and reflection on process, using terminology borrowed from Dewey (1997). Mezirow labeled the more critical form of reflection premise reflection.

This study uses the four constructs developed by Kember et al. (1999) to categorize and assess reflective thinking. Starting with Mezirow's (1991) work, Kember et al. (1999) relabeled the more critical form of reflection as critical reflection. To produce a more useable instrument, they viewed reflection on content and reflection on process as two components of one reflective thinking scale they labeled reflection. Kember et al. (2000) excluded Mezirow's introspection scale "partly on psychometric grounds and partly because it refers to the affective domain" (p.

383). The result was four constructs for reflective thinking: habitual action, understanding, reflection, and critical reflection described as follows:

### **Habitual Action**

Habitual action is activity taken automatically with little or no deliberate thought that is based on and is a result of previous learning and frequent application in other situations (Kember et al., 2000). Habitual action occurs, for example, when a student responds to an academic task by providing an answer without attempting to reach an understanding of the concept or theory that underpins the topic. Such a response is consistent with a surface approach to learning, but the two constructs are not equivalent (Kember et al., 2008).

### **Understanding**

Kember et al. (2000) described understanding as thoughtful action that, “makes use of existing knowledge, without attempting to appraise that knowledge, so learning remains within pre-existing meaning schemes and perspectives” (p. 384). This is understanding without relating to other situations such as the understanding a student might reach of a concept without reflection on the significance of that concept in a personal or practical situation. The attempt to reach an understanding of a concept or topic distinguishes understanding from habitual actions. This understanding, however, is not related to personal experiences or other real-life applications (Kember et al., 2008). Kember et al. (2000) narrowed down this construct to focus on “an understanding of a concept without reflecting upon its significance in personal or practical situations” (p. 384) to improve parsimony within constructs.

### **Reflection**

Reflection involves what Mezirow (1991) described as “the critique of assumptions about the content or process of problem solving” (p. 105). Schön’s (1983) framework and writings on

the reflective practitioner within the context of professional practice influenced this definition (Mezirow, 1991). Kember et al. (2000) narrowed Mezirow's construct during development of the QRT to provide parsimony within each construct, combining Mezirow's (1991) content reflection and process reflection into this single category. The reflection category goes beyond the understanding category by the application of theory. The delineation between the reflection and the understanding categories is that the process of reflection takes a concept and considers it in relation to personal experiences (Kember et al., 2008). The critique of premises or presuppositions pertains to "problem posing" as distinct from "problem solving." Problem posing involves making a taken-for-granted situation problematic, raising questions regarding its validity.

### **Critical Reflection**

Critical reflection involves the testing of premises. Kember et al. (1999) took the term *critical reflection* from Dewey (1997) who distinguished between critical reflection and less considered reflection. Mezirow used the term premise reflection to recognize a higher level of reflective thinking through which individuals could transform their meaning framework. Premise reflection involves the individual becoming aware of why they perceive, think, feel or act as they do (Mezirow, 1991). Researchers (Kember et al., 1999; Kember et al., 2000) expressed the observation that Mezirow's (1991) premise reflection borrows from the writings of Habermas (1970, 1971). "Premise reflection involves our becoming aware of why we perceive, think, feel, or act as we do and of the reasons" (Mezirow, 1991, p. 108) and "requires a critical review of presuppositions from conscious and unconscious prior learning and their consequences" (Kember et al., 2000, p. 385). Individuals can be slaves to their experiences. Ingrained assumptions are hard to change, in part because they can be so deeply embedded that

the individual is unaware of the assumption. Critical reflection involves a transformation of personal perspectives and, therefore, as Kember et al. (2008) asserted, is unlikely to occur frequently.

### **Problem Statement**

Business leaders believe they require employees who can think critically and solve problems (Casner-Lotto & Barrington, 2006). Facione (1990) and Wolters et al. (2014) recognized reflective thinking as an aspect of critical thinking for identifying the right problems to solve in complex situations, and solving them. Educators have recognized the need to develop critical work-required skills including critical and reflective thinking in post-secondary education (Akbari, 2007; Boyd & Fales, 1983; Dewey, 1997; Newman, 1960; Paul, 1990; Schön, 1983) and researchers have developed reliable measures of reflective thinking (Aukes et al., 2007; Kember et al., 2000). The problem is that business leaders believe that they need employees who practice reflective thinking, but the quality of reflective thinking practiced by professionals in the workplace is not known.

### **Purpose of the Study**

The purpose of this research was to investigate the quality of reflective thinking practiced by certified human performance improvement professionals in the workplace. Further, it investigated relationships between participant demographics (gender, age, experience, education level, and academic discipline) and the assessed quality of reflective thinking.

While reflective thinking is an important skill for success in the workplace, little is known about how and to what degree professionals truly practice it. This exploratory study employed with a group of Certified Performance Technologists (CPT) as an accessible population of individuals recognized as professionals in the workplace. Using the theoretical

constructs of Mezirow (1977, 1992) and Dewey (1997), this research utilized the QRT, a four-scale instrument measuring four constructs; habitual action, understanding, reflection and critical reflection (Kember et al., 2000). Researchers (Boyd & Fales, 1983; Farber & Armaline, 1994; Gilstrap & Dupree, 2008; Greiman & Covington, 2007) identified a need to examine the relationship of reflective thinking and individual demographics such as gender, age, occupation, and education. This investigation used the QRT to measure the quality of reflective thinking in a sample of Certified Performance Technologists (CPT) professionals, and then examined how those results relate to participant gender, age, years of experience, education level, and academic discipline.

### **Research Questions**

The following questions guided this research:

There are two primary descriptive research questions.

1. What are the reflective thinking scores for habitual action, understanding, reflection, and critical reflection as measured by the Questionnaire of Reflective Thinking (QRT) in a group of Certified Performance Technologist (CPT) professionals?

2. What are the demographics of the Certified Performance Technologist (CPT) professionals' population sample based on gender, age, years of experience, education level, and academic discipline?

There is one primary inferential research question:

3. Do the demographic variables (gender, age, years of work experience, education level, and academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist (CPT) professionals?

Sub-questions:

3a. What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and gender (male/female)?

3b. What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and age group (24 and younger, 25-34, 35-44, 45-54, and 55 and older)?

3c. What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and years of work experience (5 and less, 6-10, 11-15, 16-20, and 21 and more)?

3d. What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and education level (high school or associate degree, bachelor degree, master degree, and doctorate degree)?

3e. What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and academic discipline (Pure/Hard, Pure/Soft, Applied/Hard, Applied/Soft)?

### **Research Design**

This research used an applied non-experimental research design, an exploratory descriptive and associational approach, and quantitative methods (Gliner, Morgan, & Lech, 2009). As Mann et al. (2009) pointed out, because of the early stage of research in fostering reflective learning and measuring reflective thinking, exploratory research approaches are appropriate to use to develop general understanding of the construct, common definitions, and terminology. This study employed an applied research design as opposed to a theoretical



research design (Gliner et al., 2009). Since no treatments were applied in this research, it used a non-experimental design (Gliner et al., 2009). This research applied quantitative methods employing a descriptive approach to address the first and second research questions. It is appropriate to use a descriptive approach when there is only one variable considered at a time (Gliner et al., 2009). To address the third research question about the potential relationship of five attribute independent variables (gender, age, experience, education level, and academic discipline) and QRT scores, this study used an associational approach (Gliner et al., 2009). Since there were no active independent variables in this non-experimental design, it could not prove causation.

### **Population**

This research investigated reflective thinking practiced by professionals in the workplace. Thus, the target population is professionals in the workplace. Unfortunately, this target population is not readily available. Therefore, this research was conducted by sampling a population that was readily available, and is representative of the target population, known as the accessible population (Fraenkel, Wallen, & Hyun, 2012; Snedecor & Cochran, 1967). The International Society for Performance Improvement (ISPI) created the Certified Performance Technologist (CPT) credential in 2001 based on a series of competencies and values identified by the society as being necessary for the ethical and successful practice of performance improvement (ISPI, 2016a; Lauer, 2008). The CPT designation recognizes professionals who have demonstrated the ability to add value and produce measurable results while collaborating with stakeholders and working within the constraints of an organization (ISPI, 2013b).

Being a professional encapsulates the essence of an individual's personal integrity in concert with his or her interpersonal skills. This includes the ability to be sensitive to others'

feelings, attitudes, and motives. It also includes the ability to receive and disseminate feedback to and from others and to adjust personal behavior if necessary (Houger & Roux-Zink, 2013). Employers seek competent professional employees with certain skills and knowledge they feel are critical to add value toward the success of their business now and into the future (AMA, 2012; Casner-Lotto & Barrington, 2006; Lumina Foundation & Gallup, 2014). Practice of reflective thinking is one of the skills employers seek (Dunn & Musolino, 2011).

The term *certification* typically means that a person has accomplished a prescribed set of steps or demonstrated competencies within a designated set of standards established by a governing body (Houger & Roux-Zink, 2013). In the case of CPTs, that governing body is the ISPI (2013b). A professional group, such as ISPI, usually establishes principles or standards as a means for governing themselves (Covey, 1991). As is generally the case, criteria accompany each principle to set expectations of adherence by the members of the group or organization (Poscher, 2009).

The CPT designation is more rigorous than most other professional performance improvement or consulting credentialing processes (ISPI, 2013b). The designation is highly prized by employers because it is based on repeated, proven work assessed through a combination of client or employer's attestations as well as a review of documents by qualified reviewers trained and appointed by the ISPI CPT Governance Committee (ISPI, 2013b). Additionally, the standards have been validated through research including involvement of employers (Hoard & Stefaniak, 2016; ISPI, 2013a; Lauer, 2008). Figure 1 summarizes these standards.

Figure 1.  
*Certified Performance Technologist Standards.*

**Standard 1: Focus on Results or Outcomes**

- Help clients determine what they want to accomplish
- Challenge assumptions to uncover important priorities
- Weigh the risk of unanticipated outcomes

**Standard 2: Take a Systemic View**

Help clients recognize:

- How functions are interdependent
- Relationship between internal practices, the marketplace, and society
- Impact of misalignment of goals and practices

**Standard 3: Add Value**

- Consider appropriate range of solutions and the implications before taking action
- Provide respectfully push back and challenge assumptions
- Effectively manage time and resources

**Standard 4: Work in Partnership with Clients and Stakeholders**

- Involve client and all stakeholders at every phase
- Engage specialists as needed
- Listen; ensure voices of all are sought and integrated into solution

**Standard 5: Determine Need or Opportunity**

- Clarify intent with client
- Determine scope and appropriate method of analysis
- Determine magnitude of gap, interpret and report to client

**Standard 6: Determine Cause**

- Consider multiple factors: social, culture, workplace, worker
- Gather and analyze data
- Interpret and report findings to client with recommendations

**Standard 7: Design Solutions including Implementation and Evaluation**

- Describe each solution's features, feasibility, alignment to identified factors, expected outcomes and improvement
- Include timing, schedules, resources required, plan to sustain improvements

**Standard 8: Ensure Solutions' Conformity and Feasibility**

- Compare solution to design specifications
- Pilot test solution
- Oversee improvements and changes

**Standard 9: Implement Solutions**

- Develop strategies that allow clients to sustain change
- Develop messaging, tools, and feedback mechanism to monitor progress
- Facilitate addressing deviations from the plan

**Standard 10: Evaluate Results and Impact**

- Help clients select appropriate measures
- Leverage data already being collected
- Discuss what data means and explain implications

Certification as a CPT represents proficiency in applying performance improvement principles for thinking, communicating, and collaborating to identify and solve problems to achieve desired performance improvements (Dessinger, Moseley, & Van Tiem, 2012). These are

the specific skills employers have identified as critical in their workplaces to keep up with the fast pace of change and to compete on a global level (AMA, 2012; Casner-Lotto & Barrington, 2006; Lumina Foundation & Gallup, 2014). The CPT is an evidence-based credential, not one based on results of a test or exam. Certification by ISPI as a performance technologist also requires pledging to adhere to the CPT Code of Ethics – a promise to maintain professional behaviors founded on a set of guiding principles (Houger & Roux-Zink, 2013).

Individuals designated by ISPI as CPTs are a population of practicing professionals who employers and clients have attested perform in accordance with a prescribed set of standards. These include working collaboratively with stakeholders to identify problems, determining the cause of the problems, developing and implementing solutions, and evaluating the results and impact on the business and organization, as well as adhering to a code of ethics (ISPI, 2016a). Practice of these standards demonstrates the critical thinking and reasoning skills senior business executives expressed as desirable prerequisites in employees (Casner-Lotto & Barrington, 2006; Dunn & Musolino, 2011). Therefore, the quality of reflective thinking practiced in the population of CPTs is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This study solicited participants from the CPTs certified by the ISPI.

### **Instrument**

This study used the QRT (Kember et al., 2000) to assess the quality of reflective thinking. The QRT is a 16-item self-report questionnaire utilizing a 5-point Likert response scale consisting of four items for each of the four constructs, or scales, covering a broad spectrum of reflective thinking: habitual action, understanding, reflection, and critical reflection. The sum of the responses to the four items for each of the four scales produces a score for each scale. Each score ranges from 4 (strongly disagree on all four items) to 20 (strongly agree on all four items).

The QRT has acceptable internal consistency (0.63 to 0.76 Cronbach's alpha) and construct validity has been supported through confirmatory factor analysis (Leung & Kember, 2003).

### **Demographic Variables**

The demographic variables included in this study – gender, age, years of work experience as a performance improvement professional, education level, and academic discipline – are based on ones used in other research (Biglan, 1973; Boyd & Fales, 1983; Brint, Cantwell, & Saxena, 2011; Joy & Kolb, 2009; Kolb, 1984; Kolb & Kolb, 2005; Lusk, Kerr, & Kauffman, 1998; Lustig & Strauser, 2008; Malaney, 1986; Naghdipour & Emeagwali, 2013; Neumann, 2001; Stoecker, 1993; Wilson, 2010). This study operationalized and collected these factors as categorical variables in a survey completed by each participant. There were five categories for age (24 and below, 25–34, 35–44, 45–54, 55 and above). Similarly, there were five categories for years of work experience as a human performance professional (5 or less, 6–10, 11–15, 16–20, and more than 20). There were four categories for education level (high school or associate degree, bachelor degree, master degree, and doctorate degree). Finally, there were four categories for academic discipline: Pure/Hard, Pure/Soft, Applied/Hard, Applied/Soft.

### **Data Collection**

An open on-line survey using the Qualtrics™ survey tool was used to ask participants to consent to participate in the research and then to complete the QRT and provide demographic information (Appendix A). The ISPI supports academic research and provides research survey guidelines for researchers at [https://www.ispi.org/ISPI/Resources/Student\\_Research\\_Survey\\_Guidelines](https://www.ispi.org/ISPI/Resources/Student_Research_Survey_Guidelines). In accordance with these guidelines, an email solicitation (Appendix B) provided to the ISPI Operations Manager was sent to all internationally-based CPTs in good standing and

all US-based CPTs. This email consisted of an overview of the research, an informed consent form, an estimate of the time required to participate, and directions to the on-line open survey.

### **Data Analysis**

Participant QRT results and demographic data from the on-line survey were entered into Excel and SPSS Statistics to exam the data and compute descriptive statistics for analysis. To address research question 3, an associational approach using hierarchical multiple regression with significance level,  $\alpha = .05$ , was used to examine the dependent variables, scores on the QRT, with respect to the independent demographic variables of gender, age, years of employment as a human performance professional, education level, and academic discipline.

### **Significance of the Study**

Both students and employers expect education coursework to provide students the skills needed to succeed in the workplace (Heimler, 2010). The workplace requires skills, knowledge, and abilities to deal with issues or problems that researchers and writers have described as ill-defined, wicked, messy, or indeterminate, with multiple facets and no ideal solutions (Cilliers, 2002; Kember, et al., 2000; Odum, 1994). Existing research suggests the relationship among reflective thinking and individual demographics such as gender, age, education, and profession need to be examined (Boyd & Fales, 1983; Lethbridge, et al., 2013; Mamede & Schmidt, 2005; Naghdipour & Emeagwali, 2013). Most existing research on reflective thinking involved college students with associated limitations in ranges of age, education, and professional experience. This research introduced the use of the QRT to assess quality of reflective thinking in the workplace. It expanded the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace and increased the ranges of age,

education, and experience and added the dimension of academic discipline to identifying relationships among reflective thinking and individual demographics.

Teaching students to think reflectively and to reason their way through both well-structured and ill-structured situations to identify the right problems to solve, and to solve them, is a common goal for higher education (King, Wood, & Mines, 1990). Understanding the quality of reflective thinking practiced by professionals in the workplace and examining relationships with selected individual demographics among study participants furthers the research on design and execution of curricula for teaching reflective thinking and preparing students for success in the workplace.

### **Limitations**

This was an exploratory study. The research was conducted under several limitations, some of which can be addressed in further study. The limitations that apply to this research include:

1. The identification of professionals in the workplace from only one source, the International Society for Performance Improvement (ISPI), limits generalization of results. The research assumed the group of individuals responding to the solicitation for participation in this study formed a representative sample of the larger population of CPTs, but there was no specific selection of respondents to ensure that the survey population was reflective of demographic characteristics of the entire CPT population. Participants were volunteers, and their disposition and motives for volunteering are unknown. This may have produced skewed results, limiting generalizability of the results to populations.

2. The results of this study are limited by the accuracy and the truthfulness of the participants' self-reported data. The QRT is a self-report questionnaire utilizing a 5-point Likert response scale. It was assumed that respondents understood what was required of them, they answered the questionnaire items truthfully and to the best of their ability, and that answers to the questionnaire items accurately reflect practices of professionals in the workplace. However, these assumptions could not be verified so accuracy and truthfulness of the participants' self-reported data was limited.
3. The number of participants ( $n = 102$ ) was less than the sample size computed a priori required for the analysis design used to test the hypotheses associated with each demographic factor, assuming a medium effect size ( $n = 106$ ), resulting in greater risk of Type II errors.
4. The study investigated the quality of reflective thinking professionals practice in the workplace. Practice of reflective thinking varies based on many factors besides those measured in this research such as type of problem being addressed and extent of experience with other problems of similar nature under similar circumstances. Problems new to the individual dealing with complex situations require application of reflective, and potentially, critically reflective thinking, while another iteration of a familiar situation can be addressed successfully through habitual action thinking. These factors were not accounted for in this study.
5. Results identify associations existing between variables, but since there were no active independent variables in this non-experimental design, it cannot prove causation.



## **Assumptions**

The following are a list of assumptions for this study:

1. The group of individuals responding to the solicitation for participation in this study formed a representative sample of the larger population of CPTs.
2. Respondents understood what was required of them and answered survey questions truthfully and to the best of their ability.
3. Answers to the QRT questions accurately reflected their practices in the workplace.
4. The quality of reflective thinking practiced in the population of CPTs was an indicator of the extent to which professionals engage in reflective thinking in the workplace.

## **Definitions of Key Terms**

*Academic discipline:* There are four categories for academic discipline used in this study based on the work of Biglan (1973): Pure/Hard, Pure/Soft, Applied/Hard, Applied/Soft. Pure academic disciplines are those in which results are focused on discovery, explanation, understanding, and interpretation. Applied academic disciplines are those in which research results in products, techniques, protocols, or procedures. Hard academic disciplines are those in which the parameters of problems can be specified with a high degree of certainty and where deductive logic and complex, logical manipulations are central tools. Soft academic disciplines are those in which problems are often ill-structured, cannot be described always or be described completely, and certainty of solutions is elusive (Biglan, 1973).

*Critical reflection:* One of the four constructs of reflective thinking measured by the QRT, critical reflection involves the testing of premises and requires a critical review of presuppositions from conscious and unconscious prior learning (Kember et al., 2000).

***Critical thinking; critical thinkers:*** “critical thinking (is) purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment was based. Critical thinking (CT) is essential as a tool of inquiry. CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit” (Facione, 1990).

***Habitual action:*** One of the four constructs of reflective thinking measured by the QRT, habitual action is a result of learning through frequent activity performed automatically or with little conscious thought (Kember et al., 2000).

***Performance improvement:*** A systematic approach to improving productivity and competence, performance improvement uses a set of methods and procedures and a strategy for solving problems for realizing opportunities related to the performance of people. More specific, it is a process of selection, analysis, design, development, implementation, and evaluation of programs to most cost-effectively influence human behavior and accomplishment. It is a systematic combination of three fundamental processes: performance analysis, cause analysis, and intervention selection, and applies to individuals, small groups, and large organizations (ISPI, 2016a).

**Professional:** A member of an organized body of experts, often with entrance exams and other formal prerequisites and an enforced code of ethics or behavior, a professional applies specialized knowledge to particular cases (Carr-Saunders & Wilson, 1964).

**Quality of reflective thinking:** The collection of QRT scores for habitual action, understanding, reflection, and critical reflection provides a measure of an assessment of the quality of reflective thinking practiced by an individual. This is not a mathematical combination of individual scores into a single score. It can be displayed as an array of the four individual scores.

**Reflection:** One of the four constructs of reflective thinking measured by the QRT, reflection involves the critique of assumptions about the content or process of problem solving, including making a taken-for-granted situation problematic and raising questions regarding its validity (Kember et al., 2000).

**Reflective practice:** A form of mental processing—like a form of thinking—that an individual uses to fulfil a purpose to achieve some anticipated outcome. Reflective practice is applied to relatively complicated or unstructured ideas for which there is not an obvious solution and is largely based on the further processing of knowledge and understanding and possibly emotions that we already possess (Bannigan & Moores, 2009; Moon, 2000).

**Reflective thinking:** "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (Dewey, 1997, p. 6).

**Understanding:** One of the four constructs of reflective thinking measured by the QRT, understanding is demonstrated thoughtful action based on existing knowledge without attempting to appraise that knowledge (Kember et al., 2000).

## Summary

Business leaders seek reflective employees who have learned how to learn and can apply new knowledge to meet needs of businesses today and into tomorrow. The ability to think reflectively plays an important role in the learning process, both while in school and in the workplace. Educators, students, and employers all expect educational programs to produce the skills needed for success in the workplace and there is debate about how well colleges and universities prepare students. There is little research determining the extent of reflective thinking practiced by successful professionals in the workplace. Certified Performance Technologists have repeatedly demonstrated success as attested by their clients and employers practicing the skills employers are looking for in employees. This exploratory study examined the quality of reflective thinking CPTs practice in the workplace. Further, it investigated the relationship of individual demographics including gender, age, experience, education level, and academic discipline and the quality of reported reflective thinking. The next chapter provides an overview of the existing reflective thinking literature.

## **Chapter 2 - Literature Review**

### **Introduction**

The purpose of this research was to investigate the quality of reflective thinking practiced by certified human performance improvement professionals in the workplace. Further, it investigated relationships between participant demographics (gender, age, experience, education level, and academic discipline) and the assessed quality of reflective thinking. Employers seek competent employees with certain skills and knowledge they feel are critical to the success of their business now and into the future. Martin (2005) contended that a significant transformation has taken place within the workforces of large corporations since the mid-1960s. In the last 50 years, the payroll cost and number of workers engaged in making products has declined. Today, indirect managerial labor dominates fully loaded payroll cost. These workers are manufacturing decisions rather than products and services (Martin, 2005). This population cuts across multiple sectors of society: corporate, service, and government, and they are important. It is these people who will create understanding of how and why events occur in the world and the ways and means for solving the resulting problems. Exercise of reflective thinking is an important aspect of the skills employers seek.

### **Reflective Thinking**

Multiple definitions for reflection, reflective thinking, reflective learning, and critical reflection exist in the literature. The numerous definitions available and lack of consensus about the terminology are problematic (Bain, Ballantyne, Packer, & Mills, 1999; Bell, Kelton, McDonagh, Mladenovic, & Morrison, 2011; Brown & McCartney, 1998; Fisher, 2003; Hatton & Smith, 1995; LaBoskey, 1993; Stefani, Clarke, & Littlejohn, 2000; Thorpe, 2004). Bell et al. (2011) reported that a review of the literature on reflection in higher education by Rogers (2001),

found: “in addition to the confusion regarding terminology, there is a lack of clarity in the definition of reflection, its antecedent conditions, its processes and its identified outcomes” (p. 38). This situation prompted Thorpe (2004) to argue, “the lack of common definitions for the terms we use continues to complicate our ability to compare, and therefore, to gain from the research efforts within our discipline [nursing] and others” (p. 339).

Some researchers (Lee, 1996; Tweed & Lehman, 2002) have suggested that the concept of reflective thinking is rooted in the Confucian tradition. However, John Dewey is widely recognized as the originator of the concept of reflective thinking as an aspect of learning and of adult education (Bolton, 2010; Kember et al., 2000; Leung & Kember, 2003). Dewey (1997) defined reflective thinking as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (p. 6). He believed reflective thinking was distinguished from other forms of thinking in two ways. First, reflective thinking involved “a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates” (p. 13). Second, reflective thinking involves a willingness to “suspend judgment during further inquiry” (p. 13). Dewey thought of reflection as a forerunner to action in response to things that puzzle or disturb us. He emphasized focusing reflective energies on future actions rather than simply pondering the past, and argued that a person who was not sufficiently critical might reach a hasty conclusion without examining all the possible outcomes. He introduced a distinction between reflection and critical reflection, observing that reflection alone that did not consider all possible outcomes was not sufficient to prevent reaching a hasty conclusion, a distinction that persists today (Leung & Kember, 2003).

A review of literature conducted by Mann et al. (2009) found that professional practice of reflection fulfills several functions, including helping to make meaning of complex situations

and enabling learning from experience. Reflective thinking involves not only cognitive processes, but also affective, social, cultural, and political reasoning (Jensen & Joy, 2005; Mezirow, 1981). Reflection does not occur in all situations. Reflection appears to be stimulated most often by complex clinical problems. Since the perceptions of these problems vary according to an individual's experience, the process of reflection varies across individuals and context. The tendency as well as the ability to reflect also appears to vary across individuals. In practicing professionals, the process of reflection appears to be multi-factorial and to include different aspects. In addition to reflection both on and during work, it appears that the anticipation of challenging situations also stimulates reflection (Mann et al., 2009).

### **Reflective Practice**

The practice of reflective thinking, and understanding of what that means, varies considerably among and within different disciplines. The term "reflective practice" carries multiple meanings that range from the idea of professionals engaging in solitary introspection to that of engaging in critical dialogue with others (Finlay, 2008). In general, however, reflective practice refers to the process of learning and gaining insights about one's self and one's practices through and from experiences (Boyd & Fales, 1983; Jarvis, 1992; Mezirow, 1981). The point of reflective practice is to recapture practical experiences and mull them over critically to gain new understandings and so improve future practice (Finlay, 2008). Reflective practice is an essential bedrock of professional identity (Finlay, 2008) and has become an element of professional competence required to bridge the theoretical and practical gap in a profession (Mann et al, 2009).

Dewey's ideas provided a basis for the concept of reflective practice in Schön's (1983, 1987) influential work on development of reflective practitioners. One of Schön's (1983, 1987)

most enduring contributions was identifying two types of reflection: reflection-in-action (thinking while doing) and reflection-on-action (after-the-event thinking). In both types of reflection, professionals seek to build new understandings that shape their action in an evolving situation. Schön's argument was that professional practice is complex, unpredictable and messy, and that to cope, professionals have to be able to do more than follow set procedures. Novice practitioners, lacking tacit knowledge and unable to exercise knowing-in-action, tend to cling to rules and procedures they can apply mechanically. Professionals, on the other hand, can monitor and adapt their practice simultaneously, seemingly intuitively. Reflection in-action and on-action help professionals to revise, modify, and refine their expertise.

### **Reflective Thinking and Critical Thinking**

Reflective thinking and critical thinking are intertwined. John Chaffee, when asked about his perspective of critical thinking, stated that the heart of thinking critically is developing a reflective orientation (Paul et al., 1997). Robert Ennis (1985a) defined critical thinking as rational reflective thinking concerned with what to do or believe. According to Paul (1995), critical thinking is the disciplined process of conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered or generated by observation, experience, reasoning, and reflection. Research has portrayed critical thinking as a process of reflective thinking (Brookfield, 2000; Mezirow & Associates, 2000; Schön, 1983, 1987) involving a composite of traits, skills, and dispositions (Ennis, 1985b; Facione, Facione & Sanchez, 1994; Norris, 1985; Paul & Heaslip, 1995). Reflective thinking is regarded as one of the essential elements of the learning process (Boyd & Fales, 1983; Davis, 1998; Dewey, 1997; Moon, 1999; Naghdipour & Emeagwali, 2013; Schön, 1983). Reflective thinking cultivates meaningful learning in the teaching and learning processes, and helps students and educators alike to develop specific skills



that may assist them to be more critical, and to develop expertise in their areas of professionalism (Phan, 2006). Learning to think critically involves acquiring the ability to make reflective judgments (Facione, 1998). According to Brookfield (1987), reflective skepticism is a key component of critical thinking. The inclusive definition of critical thinking developed by the South Carolina Higher Education Assessment network states that critical thinking is a reflective, systematic, rational, and skeptical use of cognitive representations, processes, and strategies to make decisions about beliefs, problems, and/or courses of action (Cook et al., 1996). Reflective thinking is a recognized aspect of critical thinking for wrestling with real problems existing in complex situations (Facione, 1990; Wolters et al., 2014). Researchers (Facione, 1990; Mann et al., 2009; Wolters et al., 2014) recognized reflective thinking as a competency for wrestling with real world, ill-defined, wicked, messy, or indeterminate problems rooted in complex environments. In their synthesis of multiple studies of the process of reflective learning, Boyd and Fales (1983) identified reflective thinking as the core difference between whether a person repeats the same experience several times, becoming highly proficient at one behavior, or learns from experience in such a way that he or she is cognitively or affectively changed.

Professionals operate in the real world where problems do not present themselves as a given. They must set up the perceived problems to be solved by naming the things to focus on and framing the context. Only then can they apply acquired knowledge and experience to select the best ways and means available to solve the problem. This is especially important in situations that are puzzling, uncertain, and appear to be complex (Schön, 1983). Frequently noted in general education literature, reflection and reflective practice are often described as essential attributes of competent professionals who are prepared to address these challenges (Epstein & Hundert, 2002; Mann et al., 2009; Schön, 1983, 1987). Kember et al. (2008) came to

several conclusions about reflection and professional practice from their review of the literature and their attempts to integrate college-based education with professional practice:

- The subject matter of reflection is an ill-defined problem – the type of issues and cases dealt with in professional practice.
- In professional practice, the process of reflection may be triggered by an unusual case or deliberate attempts to revisit past experiences.
- Reflection can occur through stimuli other than problems or disturbances to the normal routine. The stimuli may be encouraged or arranged.
- Reflection operates through a careful re-examination and evaluation of experience, beliefs and knowledge.
- Reflection most commonly involves looking back or reviewing past actions, though competent professionals can develop the ability to reflect while carrying out their practice (p. 370).

### **Concept and Theory**

This study viewed reflective thinking as a multidimensional construct based on Mezirow's (1991) treatment of reflective thinking as an essential component of his model of transformative learning for adults. Mezirow separated reflective and non-reflective action. He identified three types of non-reflective actions: habitual action, thoughtful action, and introspection; and two levels of reflective action. He further divided the lower or less critical level into two types, reflection on content and reflection on process, terminology borrowed from Dewey (1997). Mezirow labeled the more critical form of reflection as premise reflection.

With roots commonly attributed to Dewey (1997), researchers and writers (Kolb & Kolb, 2005; Leung & Kember, 2003; Rodgers, 2002) have used reflection as a conceptual framework

for understanding thinking and learning processes. Rodgers (2002) distilled and characterized Dewey's concept of reflection and the purposes it served into four criteria:

1. Reflection is a meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas. It is the thread that makes continuity of learning possible, and ensures the progress of the individual and, ultimately, society. It is a means to essentially moral ends.
2. Reflection is a systematic, rigorous, disciplined way of thinking, with its roots in scientific inquiry.
3. Reflection needs to happen in community, in interaction with others.
4. Reflection requires attitudes that value the personal and intellectual growth of oneself and of others (p. 485).

Mezirow (1991) interpreted Dewey's concept in a way that reflection equates to validity testing. Applying aspects of critical theory, Mezirow defined reflective thinking as the critique of assumptions about the process or content of problem solving and goes on to distinguish problem posing, raising questions about the premises or presuppositions, from problem solving. Extending Dewey's distinction between reflection and critical reflection, Mezirow (1998) saw critical reflection as involving a change to personal beliefs. As Leung and Kember (2003) pointed out, Mezirow (1981, 1991, 1998) contributed to the establishment of reflective thinking as a prominent framework within adult education.

Schön (1983, 1987) applied the concept of reflection to professional practice and the education of practitioners. He expressed concern in observing that many professional education courses failed to recognize the true nature of professional practice and were instead using a

technical-rational approach teaching procedures for solving well-defined problems with unique solutions. He argued that a more appropriate model for a professional education was equipping students to become reflective practitioners, equipping them with abilities to deal with multi-faceted problems. He distinguished between what he called *reflection-in-action* and *reflection-on-action*. Reflection-in-action is the result of unconsciously competent professionals practicing what Schön referred to as *knowing-in-action*, an act involving deliberate thought while taking action required in difficult, unusual situations. Reflection-on-action involves a review of actions taken in past situations to acquire new knowledge and prepare for future situations. Schön argued that scientific knowledge taught in institutions was helpful, and may even be necessary to inform practice as a professional, but it was not sufficient. This led to his influential conclusion that many professional education courses failed to prepare students to practice as professionals after leaving school and the need for development of reflective practice to complement the scientific knowledge taught.

Others (Newnes, Hagan, & Cox, 2000) recognized the ability to examine ongoing activities with a critical eye as a sign of a mature professional by others as well. The practice of reflection can involve the personal use of self-awareness about what an individual takes from and brings to a situation based on their life experiences, social contexts, and previous relationships. In addition, the practice of reflection can be used as a description of learning by doing over time through experience (Stedmon, Mitchell, Johnstone, & Staite, 2003). Both interpretations of reflective practice include aspects of an individual's knowledge partly from self-reflection and partly from reflecting on practical experience. Reflective practice, therefore, leads a critical and evaluative approach to relating understanding to perceived wisdom of a profession (Stedmon et al., 2003). A reflective scientist-practitioner model (Stedmon et al., 2003), with a scientific

paradigm for discovering multiple truths and a reflective framework for the status of those truths, gave equal value to multiple, different sources of knowledge. Bleakley (1999) observed that this framework for reflective practice draws understanding only from personal knowledge. He went further, arguing for the inclusion of practice within wider social contexts and reflection on reflections.

A review of literature on reflection and reflective practice in education of health professionals conducted by Mann et al. (2009) highlighted that reflective capacity is regarded as an essential characteristic for professional competence. That same review noted that many educators believed that the emergence of reflective practice acknowledges the need for students to act and to think professionally as an integral part of learning throughout their courses of study. It noted that activities to promote reflection had been incorporated into undergraduate, postgraduate, and continuing medical education, and across a variety of health professions.

The literature suggested that a deep approach to learning and reflection seem integrally related and mutually enhancing. The possibility of a relationship between reflective thinking and deep and surface learning has been proposed, but such a relationship has not been well researched (Mann et al., 2009). Deep approaches to study appear more likely to occur in association with reflective thinking (Mann et al., 2009). Mann et al. (2009) suggested that this connection between reflection and deep learning corresponds with a theoretical position of Moon's (1999) that the iterative processes involved in reflection may be the key to moving from surface to deep approaches to learning. Leung and Kember (2003) suggested that these two constructs, reflective versus non-reflecting thinking, and deep versus surface learning, had emerged from different fields of inquiry as a reason for this gap in research.

## **Framework of Reflective Thinking**

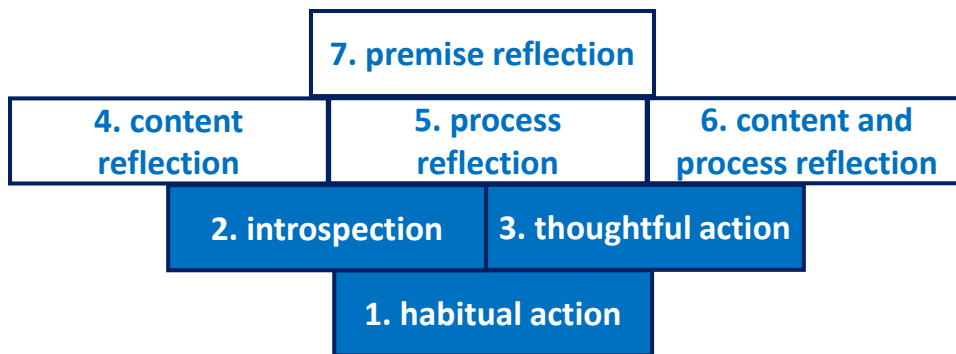
Dewey (1997), who defined reflective thinking as “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends,” (p. 6) is credited with the original conceptual framework for reflection (Leung & Kember, 2003). Dewey saw two subprocesses involved in reflective action: “(a) a state of perplexity, hesitation, doubt; and (b) an act of search or investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested belief” (p. 9). Dewey also introduced a distinction between critical reflection and less considered reflection, arguing that a person who was not sufficiently critical might reach a hasty conclusion without examining all the possible outcomes. Mezirow (1991) perpetuated this distinction, adding that critical reflection involves a change in personal beliefs.

Several writers in the field of adult education have provided categorical descriptions of reflection from critical theory. Mezirow’s (1981, 1991, 1992) writings on reflection related to his transformative theory of adult learning is often cited. Other adult education writers such as Boud, Keogh, and Walker (2013), Boud and Walker (1991), and Jarvis (1987), employed an experiential approach when proposing models of reflective thinking processes.

Kember et al. (1999) developed a coding scheme for estimating quality of reflective thinking based on Mezirow’s (1991) work, identifying and illustrating a hierarchical relationship among seven categories for reflective thinking as shown in Figure 2. The first three coding categories (1-habitual action, 2-introspection, and 3-thoughtful action) are shaded to denote non-reflective actions. Categories 4 to 7 (4-content reflection, 5-process reflection, 6-content and process reflection, and 7-premise reflection) represent levels of reflective action where categories 4 to 6 are on the same level and category 7 is considered a higher level of reflection (Bell et al.,

2011). Referring to their illustration showing seven categories of reflective thinking at Figure 2, Kember et al. (1999) argued that the “level of reflective thinking increases from bottom to top” (p. 24). Other researchers (Bell et al., 2011) saw this categorization scheme as an integrated whole, rather than as ‘levels’ of reflection.

Figure 2  
*Coding Categories and Stages of Reflective Thinking*



Source: Kember et al., 1999, Figure 1, p. 25.

During their development of the QRT, Kember et al. (2000) narrowed Mezirow’s (1991) construct to four categories to provide parsimony within each construct. They retained Mezirow’s categories of habitual action and understanding, but combined his content reflection and process reflection into the single category labeled reflection. This reflection category can be delineated from the understanding category because the process of reflection takes a concept and considers it in relation to personal experiences (Kember et al., 2008). Mezirow used the term *premise reflection* to recognize a higher quality of reflective thinking through which individuals can transform their meaning framework. Premise reflection involves the individual becoming aware of why he or she perceive, think, feel or act as they do (Mezirow, 1991). Mezirow derived his explanation of premise reflection from critical theory. “Premise reflection involves our becoming aware of why we perceive, think, feel, or act as we do and of the reasons” (Mezirow,

1991, p. 108) and “requires a critical review of presuppositions from conscious and unconscious prior learning and their consequences” (Kember et al., 2000, p. 385). Individuals can be slaves to their experiences. Mental models built on personal experiences include ingrained assumptions, generalizations, and images of how the world works (Hickman, 2007). These are hard to change because they are often so deeply embedded that the individual is unaware of them. The fourth category used by Kember et al. (2000), critical reflection, involves the testing of premises and a transformation of personal perspectives. Therefore, Kember et al. (2008) predicted that it occurs infrequently. The work of Baxter Magolda (1992) complements these constructs, focused as it is on the way in which action is underpinned by beliefs and values (Lucas & Tan, 2006).

The four constructs used in the QRT are:

**Habitual action.** Habitual action is “that which has been learnt before and through frequent use becomes an activity that is performed automatically or with little conscious thought” (Kember et al., 2000, p. 383). Habitual action occurs when someone responds to a requirement by acting or providing an answer without attempting to reach an understanding of underpinning concept or theory (Kember et al., 2008). What is habitual will vary from individual to individual, depending on the extent to which they are accustomed to performing within a given situation, executing a particular task, or solving a particular problem. Some situations, tasks, or problems may initially seem ambiguous and ill-structured but change to well-structured as an individual gains experience and knowledge. Schön (1983) called this type of behavior knowing-in-action.

**Understanding.** Understanding takes place without relating to other situations (Leung & Kember, 2003). Understanding is the meaning and associated rationale derived from a specific



isolated situation that influences actions taken in that situation without relating that situation to previous learning or other situations (Kember et al., 2000). Understanding is distinguished from habitual action by an individual attempting to reach an understanding of a concept or topic.

When a student is reading, he or she searches for the author's underlying meaning. While a deep approach to learning is employed, this does not necessarily imply reflection is taking place. The student can understand the concepts, but without relating them to personal experiences or real-life applications. As such, the concepts have no personal meaning and may not be assimilated into an individual's knowledge. This limited level of thinking commonly occurs with undergraduates who lack experience. Concepts can be learned from a book without an understanding of how they might be applied in practice (Kember et al., 2008).

**Reflection.** Reflection is active, persistent and careful consideration of any beliefs or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends (Kember et al., 2000; Leung & Kember, 2003). Reflection can be distinguished from understanding because the process of reflection takes a concept and considers it in relation to personal experiences. With reflection, the person applies theory to practical applications. When an individual relates a concept to other knowledge and experience with personal meaning, that experience and personal meaning becomes attached to the concept (Kember et al., 2008).

**Critical reflection.** Critical reflection is considered a higher form of reflective thinking that involves an individual becoming aware of why they perceive, think, feel, or act as they do (Leung & Kember, 2003). Critical reflection is reflection plus the awareness of why the specific knowledge and beliefs were selectively applied to the new situation and the potential consequences produced from that application. Critical reflection implies undergoing a transformation of perspective (Mezirow, 1991). Many actions of an individual are governed by a

set of beliefs and values the individual may have almost unconsciously assimilated from their experiences and environment. To undergo a change in perspective requires an individual to recognize and change these presumptions. To undergo critical reflection, it is necessary to conduct a critical review of presuppositions from conscious and unconscious prior learning and their consequences. Such ingrained assumptions are hard to change, in part because the individual is often unaware that they are assumptions or even that they exist. Critical reflection is, therefore, unlikely to occur frequently (Kember et al., 2000; Kember et al., 2008). Critical reflection will likely be more commonly observed in students who are still learning about a subject or profession and have not yet formed ingrained conceptions (Kember et al., 2008), than professionals.

The form of reflective thinking practiced depends on the situation as well as the skills, knowledge, and disposition of the individual. A situation may prompt reflective thinking the first time it presents. However, as an individual becomes more experienced engaging with similar situations, rubrics practiced in the past may be sufficient without reflection. The type of thinking that directs decisions may be related to the phase of a person's professional development (Schmidt, Norman, & Boshuizen, 1990; Wainwright, Shepard, Harman, & Stephens, 2010).

### **Measuring Reflective Thinking**

Schön's (1983,1987) call for professional education to equip students to become reflective practitioners was widely received and resulted in many professional courses in many disciplines and countries claiming to be based on a reflective practitioner approach (Kember et al., 2000). In their research relating learning approach and reflective practice, Leung and Kember (2003) noted that while research on approaches to learning is associated with studies on

learning in schools and universities, research on reflection is most commonly associated with adult education or applied to the education or work of professionals.

Researchers (Kember et al., 2000; Naghdipour & Emeagwali, 2013) have expressed surprise at how little research has been devoted to methods for assessing if students do engage in reflective thinking, and if so, to what extent, leading them to assume that no assessment was being conducted. Noting that reflecting on practice has become an element of professional competence required to bridge the gap between theoretical and practical application in a profession, Naghdipour and Emeagwali (2013) observed that if it was feasible to assesses students' levels of reflective thinking, it would be possible to seek ways to help the students become better reflective thinkers. However, they found that while there were means available to measure such things as critical thinking ability and disposition (e.g., The California Critical Thinking Disposition Instrument (CCTDI)), instruments for assessing reflective thinking were scarce and limited.

Researchers involved in a major project to synthesize conclusions about curriculum design for promoting reflective thinking (Kember et al., 1996a, 1996b) experienced a need for methods to determine whether students were being prompted to think reflectively. They initially utilized qualitative techniques with data from student reflective journals, student interviews, and classroom observations (Kember et al., 2000). This provided some valuable insights, but collecting the data and the analysis required more time than the researchers believed would normally be available for routine curriculum evaluation. The researchers later adopted existing protocols (Kember et al., 1999; Wong et al., 1995) and a coding scheme based on types of reflective thinking described by Mezirow (1991) for assessing the quality of reflective thinking evident in student journals. Using this approach, according to the researchers, the category and

extent of reflective thinking could be assessed in individual students, and by aggregating results across an entire class, a determination could be made of whether a curriculum promoted reflective thinking (Kember et al., 1999). The researchers, however, noted three limitations to this approach for assessing reflective thinking (Kember et al., 2000). First, it can only be utilized in courses that require writing reflective journals. Second, it cannot be used in a pre- and post-test design to determine if there was a change in reflective thinking. Third, as with similar qualitative approaches, it requires application of judgment by someone familiar with Mezirow's work.

To overcome these limitations, and the need to quantitatively assess reflective thinking in students, Kember et al. (2000) set out to develop an objective questionnaire to measure levels of different categories of reflective thinking. Among the characteristics sought in this questionnaire were that it be short so that it did not take much time to complete, that it be easy to administer and quick to objectively score, and that the results were easily interpreted by teachers, not expert researchers (Kember et al., 2000).

Building on earlier research (Kember et al., 1999), Kember et al. (2000) produced a trial version of the Questionnaire for Reflective Thinking (QRT) incorporating four scales that they tested with 350 health service students of a university in Hong Kong. Following this initial trial, they revised the questionnaire to more closely fit the four scales. They repeated this trial and revision cycle three additional times. Next, the researchers used confirmatory factor analysis to determine if each of the four items for each factor were measuring that factor and not contributing to others. The researchers judged the scales to be acceptable indicators of the four constructs (Kember et al., 2000). The resulting QRT was a 16-item four-scale questionnaire on

reflection that has been tested repeatedly (Basol & Evin Gencel, 2013; Dunn & Musolino, 2011; Lethbridge et al., 2013; Lucas & Tan, 2006).

While Kember et al. (2000) utilized health service students in developing the QRT, they assert that the QRT should be suitable for all disciplines, and other populations such as professionals in the workplace, since “the literature, from which the framework was derived, referred to reflective thinking as a generic construct rather than specific to particular disciplines or professions” (p. 393). Lucas and Tan (2006), while using the QRT to investigate the development of a reflective capacity by undergraduates during work-based placement learning and its relationship to final year academic performance, challenged this assertion after pointing out the habitual action and the understanding scales did not operate as expected in their study. When examining the reliability and responsiveness of the QRT, Dunn and Musolino (2011) found that the internal consistency was at an acceptable level for the understanding and critical reflection dimensions, but below acceptable levels for the habitual and reflection dimensions. They further noted that both measures, however, offered utility for examining changes in reflective thinking and approaches to learning for entry level students. Following their examination of the psychometric properties of the QRT, Lethbridge et al. (2013) noted that the habitual action scale items should be scrutinized to understand why the path coefficients were consistently low in their research. Similarly, they suggested one or two items on the understanding and reflection scales could also be inspected and reworded to improve representation of those scales as well.

### **Classification Scheme for Academic Disciplines**

Biglan (1973) developed a classification scheme for academic disciplines that provides one of the few conceptual approaches to examining the diversity of academic disciplines

(Stoecker, 1993). Biglan originally developed his scheme to examine the collection of college professors, which is both a homogeneous group and one characterized by its diversity of individual experiences, activities, and beliefs. Within each discipline, subject matter defines the dimensions of knowledge, the modes of inquiry, significant reference groups and work experiences, and rewards. Within institutions exists a stratified system of faculty roles and hierarchal arrangements of different goals. Disciplinary characteristics are generally stronger influences on faculty than institutional affiliations (Stoecker, 1993). Biglan (1973) surveyed perceptions of academic faculty at one large university and one small college regarding similarities among academic disciplines, and produced the three dimensions of the Biglan classification: the hard-soft dimension based on the extent to which the departments have a well-developed paradigm, the pure-applied dimension to deal with whether departments emphasize pure research or practical application of subject matter, and the life-nonlife dimension to classify departments on the basis of their concern with living or inanimate objects.

Investigations of this classification scheme have shown that it can consistently discern systematic differences in academic disciplines. Smart and Elton (1975) examined goal orientations of academic departments. Smart and McLaughlin (1978) investigated reward structures within academic disciplines. Muffo and Langston (1981) looked at faculty salary variability, faculty staffing, and structural work-load patterns. Accumulating literature suggests that the Biglan classification system contributes to the recognition of the unique characteristics of academic disciplines that may reveal a profile of the faculty within different departments as well as specific types of department organization. While the schema has been tested several times on data related to faculty and administrators, it has also been tested with student data (Malaney, 1986). Smart and Elton (1975) suggested the Biglan schema as an approach that

"might reveal broad differences among students and/or faculty in these academic environments in terms of their personal backgrounds, educational and vocational aspirations, cognitive styles, and personality traits" (p. 587). The Biglan classification scheme provides a valid framework for studying academic diversity within the higher education system (Malaney, 1986). It continues to be a strong construct for classifying faculty as evidenced by its power to discriminate current faculty.

In this study, the Biglan dimensions were used to categorize the differences in characteristics of students enrolled in academic majors that have been classified by the Biglan scheme. The life-nonlife dimension was omitted from this study because, as noted by Malaney (1986), the practical reasons for the existence of this dimension have never been fully explicated in the literature. Biglan appeared to be most concerned with the hard/soft and pure/applied dimensions. Smart and Elton (1982, p. 225) noted for their study, "It may well be that the life-nonlife dimension is of more statistical than practical significance."

### **Ways Individual Demographics Relate to Reflective and Critical Thinking**

Farber and Armaline (1994) noted the need for research on the influences of race, class, gender, ethnicity, special needs, and other relevant cultural factors on reflective thinking in their exploration of the development of reflective thinking in preservice teachers and their students. The research that led to development of the QRT (Kember et al., 2000), however, did not investigate relationships among participant demographic factors and scores on the QRT. Other research that included inquiry into the cultural differences in learning styles using Kolb's ELT, found that gender, age, level of education and area of specialization of the respondent had a bearing on learning styles (Joy & Kolb, 2009).

## **Gender**

Several studies have examined differences in reflective thinking or critical thinking based on gender. CPTs participating in this study were nearly evenly divided between male and female. This was not the case in other studies. In Wittenberg's (2000) study examining reflective disposition of preservice physical education teachers, the number of male participants outnumbered female participants by nearly 3:1. Clocklin (1995), Hall (1996) and Ircink-Waite (1989) used nursing students in their studies on critical thinking and experienced female subjects outnumbering male subjects by more than 2:1, 10:1, and 25:1 respectively.

Results from research examining differences in reflective thinking or critical thinking generally reveal no significance difference between males and females (Clocklin, 1995; Hall (1996); Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999; Phan, 2006, 2007, 2009; Wittenburg, 2000). Communications differences between males and females that may affect reflective and critical thinking are reported by Wood (1994). According to Wood, females tend to share feelings and provide support more than males and are more careful to wait their turn and ask others for their opinion. Males, on the other hand, are typically more assertive, presumably to establish status and power, gain respect, and win competitions. Research by Dow and Wood (2006) concludes that females use their thinking skills and solve problems as much as males, but using a style that is less confrontational and direct. This may be due in part to some physiological differences, but they conclude is largely due to the effect of culture. Halpern et al. (2007) reported that women tend to have stronger verbal skills, particularly in writing, and a better memory for objects, events, words, and activities. Men generally excel in mentally manipulating objects and in the performance of quantitative tasks. Walsh and Hardy (1999) found in a comparison of gender and scores on the California Critical Thinking Disposition



Inventory (CCTDI), females scored higher than males in open-mindedness and maturity. Clocklin (1995), Hall (1996), and Ircink-Waite (1989) reported no significance noted between gender and critical thinking scores in nursing students. Research conducted by McDade (1999) into relationships between learning styles and critical thinking ability among health professional students found there to be no correlation with gender. And, Mamede and Schmidt (2005) found no significant association with gender and reflective practice in physicians. Similarly, Phan's (2006) longitudinal study of first-year college undergraduate mathematics students in the South Pacific reported no statistically significant gender differences in learning approaches, reflective thinking, or academic performance. Phan's (2007) study of second-year undergraduate students in the South Pacific also found no statistically significant differences between genders in terms of learning approaches, the four constructs of reflective thinking in the QRT, or academic performance. Hutto (2009), however, found female adult learners were significantly more disposed to self-directed learning, which involves the ability to think reflectively, than were males among adult graduate students in the United States. Walsh and Hardy (1999), however, found in a comparison of gender and scores on the California Critical Thinking Disposition Inventory (CCTDI), females scored higher than males in open-mindedness and maturity. Leach (2011), found that differences in the 5 dimensions of the California Critical Thinking Skills Test (analysis, deduction, evaluation, induction, and inference) among college students based on gender needed further study.

### **Age**

There is limited evidence that an individual's age may be a factor in whether someone has sufficient experience upon which to reflect (Naghdipour & Emeagwali, 2013). Burrows (1995) and Hobbs (2007) have suggested that individuals need to be developmentally ready,

something that may be dependent on age, to engage in critical reflection. Many other studies examining reflective thinking or critical thinking were conducted using student populations with the age of participants heavily weighted to the younger end of the range used (Clocklin, 1995; Hall, 1996; Naghdipour & Emeagwali, 2013; Ircink-Waite, 1989; Pascarella, 1989; Terenzini, Springer, Pascarella, & Nora, 1995; Wittenburg, 2000). CPTs participating in this research have been recognized as professionals in the workplace. The age of study participants was heavily weighted to the older end of the range used, the opposite of that observed in most other studies involving assessment of reflective thinking and critical thinking. Ircink-Waite (1989) reported no significance between age and critical thinking scores in nursing students. Similarly, McDade (1999), looking into relationships between learning styles and critical thinking ability among health professional students, found no correlation between age and critical thinking ability. Hall (1996) identified a negative association between age and critical thinking ability in nursing students and Mamede and Schmidt (2005) noted that physicians' reflective practice decreased with increased age. However, Hutto (2009), found adult learners in the age category 46-55 scored significantly higher on assessment of propensity for self-directed learning involving reflective practice than did respondents in three other age groups, and Clocklin (1995) found nursing students over the age of 40 years had significantly higher critical thinking scores than those under age 40.

### **Experience**

There is limited evidence that work experience may be a factor in reflective and critical thinking. Schön (1983) argued that expert practitioners in a profession were distinguished from novices by their ability to reflect on their practice when dealing with unusual or particularly complex cases. There is evidence that novices, individuals lacking practical mastery, are

inclined to follow models mechanically. Thus, the amount of time an individual has been working in a particular field, may be a factor in whether or not they have sufficient experience upon which to reflect (Naghdi-pour & Emeagwali, 2013). With more experience, however, Gordon (1984) found that such reliance on models is reduced. Some researchers (Mamede & Schmidt, 2005) have noted that reflective practice appears to decrease with increased years of practice. Ircink-Waite (1989), however, reported no significance noted between years of work and critical thinking scores in nursing students. Similarly, McDade (1999) identified no correlations in health professional students between the demographic variable of work experience and learning styles or critical thinking ability.

### **Education Level**

Some research indicated that critical thinking skills increase beyond the effects of natural maturation as a result of attending postsecondary education (Pascarella, 1989; Terenzini et al., 1995). Looking specifically at differences in the quality of reflective thinking with respect to students' level of education, Naghdipour and Emeagwali (2013) found that the higher the level of students' education, the better reflective thinkers they could be. Similarly, Lethbridge et al. (2013), using the QRT, found nursing postgraduates were more likely to engage in reflection and critical reflection as compared to undergraduates. Buzdar and Ali (2013), using the QRT to investigate the possibilities of developing reflective thinking among learners through distance education programs, found the impact of students' previous education was significant and positive on the scores for understanding and critical reflection, and negative on the scores for reflection.

## **Academic Discipline**

Multiple researchers have examined reflective thinking across academic disciplines without addressing the relationship of the academic discipline on the results (Biggs et al., 2001; Leung & Kember, 2003; Lucas & Tan, 2006; Phan, 2007, 2009). Much research on reflective thinking in students has involved subjects in a single academic discipline such as nursing (Andreou, Papastavrou, & Merkouris, 2014; Lethbridge et al., 2013; Prestholdt, 1995; Zygmunt & Schaefer, 2006) or teaching (Yenice, 2012; Zapalska & Dabb, 2002) and therefore have not addressed the relationship of the results and the academic discipline of the participants. While not addressing reflective thinking directly, King et al. (1990) found a significant effect for academic discipline in Reflective Judgement Interview (Kitchener & King, 1994) results with social science majors scoring higher than technology focused disciplines. Why would the quality of reflective thinking vary among students of different academic disciplines? It is likely that students can be expected to take on certain traits that are germane to a particular academic field. As Malaney (1986) observes, while it is certain that demographic characteristics such as ethnic background and gender will not change based on a student's experiences in a specific academic discipline, other characteristics such as quantitative and verbal skills are emphasized at varying rates depending on area of study and different demands of different academic disciplines. The results of research to determine if there were differences in the five dimensions of the California Critical Thinking Skills Test based on colleges indicate that students within certain academic disciplines perform better in some areas of critical thinking (Leach, 2011).

## **Summary**

Results from research examining differences in reflective thinking or critical thinking based on demographic factors generally reveal no significant difference between males and

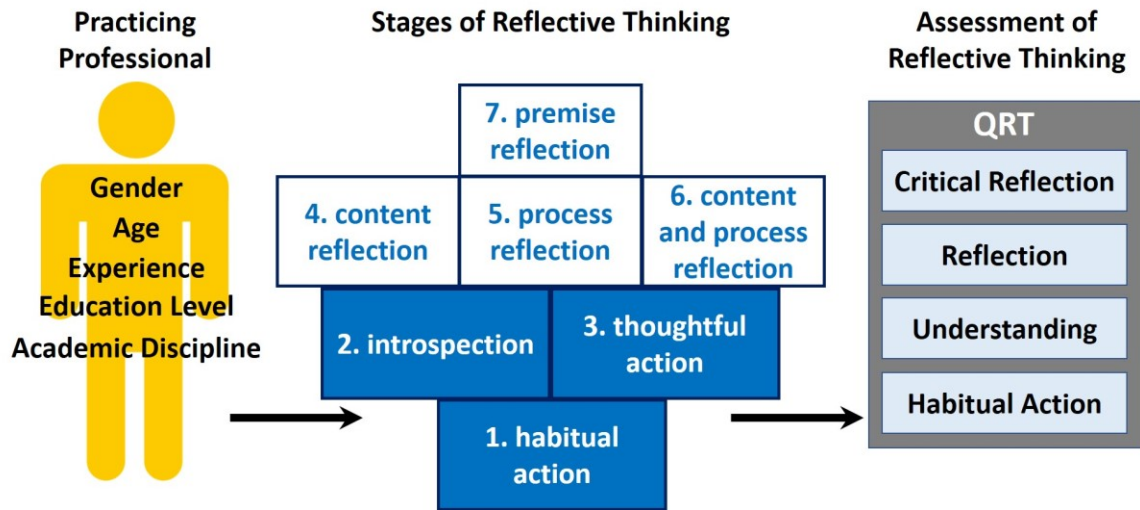
females (Clocklin, 1995; Ircink-Waite, 1989; Mamede & Schmidt, 2005; Phan, 2006, 2007; Wittenburg, 2000). There is limited evidence that an individual's age may be a factor in their developmental readiness to reflect (Burrows, 1995; Hobbs, 2007) or that someone must have sufficient experience upon which to reflect (Naghdipour & Emeagwali, 2013) that suggests a relationship between age and reflective or critical thinking. While some researchers report no significant difference in critical thinking based on experience (Ircink-Waite, 1989; McDade, 1999), evidence that work experience may be a factor in reflective thinking is very limited (Mamede & Schmidt, 2005). There is evidence that reflective thinking and critical thinking skills increase beyond the effects of natural maturation as a result of attending postsecondary education (Buzdar & Ali, 2013; Lethbridge et al., 2013; Naghdipour & Emeagwali, 2013; Pascarella, 1989; Terenzini et al., 1995). Multiple researchers have examined reflective thinking across academic disciplines without addressing the relationship of the academic discipline on the results (Biggs et al., 2001; Leung & Kember, 2003; Lucas & Tan, 2006; Phan, 2007, 2009). There is, however, very limited research directly investigating a relationship between academic discipline and reflective thinking or critical thinking skills. Leach (2011) did find that students within certain academic disciplines perform better in some areas of critical thinking.

### **Conceptual Framework**

Today, professionals are manufacturing decisions rather than products and services (Martin, 2005). These are the people who create understanding of how and why events occur in the world and derive the ways and means for solving the resulting problems. It is widely accepted that successful professionals need to be able to practice reflective thinking since much of what they do lacks well-defined solutions (Kember et al., 1999). Figure 3 depicts the conceptual framework for this study. Professionals of different genders and ages enter the

workplace with combinations of unique personal experiences, education level, and academic discipline. Reflective practice is seen as an essential bedrock of professional identity (Finlay, 2008) and has become an element of professional competence required to bridge the theoretical and practical gap in any profession (Mann, et al., 2009). Kember et al. (1999) developed a seven-stage coding scheme as shown in the center of Figure 3. This scheme was based on Dewey's (1997) writings on reflective action and Mezirow's (1991) writings on reflective thinking processes related to his transformational theory of adult learning. Kember et al. (2000) developed the QRT for assessing if students engage in reflective thinking and if so, to what extent, to seek ways to help the students become better reflective thinkers. In their development of the QRT, Kember et al. (2000) narrowed this seven-stage coding scheme to the four constructs on the right in Figure 3 to provide parsimony within each construct of the instrument. The QRT was designed to be short and not take much time to complete, to be easy to administer and quick to objectively score, and to produce results that can be easily interpreted by teachers and other not expert on reflective thinking (Kember et al., 2000). This research investigated reflective thinking practiced by professionals in the workplace, and the relationships between participant demographics (gender, age, experience, education level, and academic discipline) and the assessed quality of reflective thinking.

Figure 3  
*Conceptual Framework*



This research is the first assessment of the quality of reflective thinking among a group of recognized workplace professional practitioners using the QRT. There is very little research quantifying the extent to which professionals engage in reflective thinking in the workplace. While there has been some research into the relationships between demographic factors such as gender, age, and education, and learning styles (Joy & Kolb, 2009) and approaches to learning (Hutto, 2009; Phan, 2007) and years of practice (Mamede & Schmidt, 2005; Naghdipour & Emeagwali, 2013), a need for such research on the relationships with such factors remains as noted by Farber and Armaline (1994).

### Summary

While there are multiple definitions and lack of consensus about reflective thinking, many researchers credit John Dewey as the originator of the concept of reflective thinking as an aspect of adult education and learning and of introducing a distinction between reflection and critical reflection (Bolton, 2010; Kember et al., 2000; Leung & Kember, 2003). Reflective practice is considered to be an element of professional competence (Mann et al., 2009). In the

real world, where professionals operate, problems do not present themselves as a given. Reflection in-action and on-action (Schön, 1983, 1987) help professionals to revise, modify, and refine their expertise. Reflective practice leads a critical and evaluative approach to relating understanding to perceived wisdom of a profession (Stedmon et al., 2003). This study views reflective thinking as a multidimensional construct based on Mezirow's (1991) treatment of reflective thinking.

Attempts to measure the degree of reflective thinking practiced by individuals led researchers to develop various constructs for reflective thinking. Included is the construct of four categories Kember et al. (2000) developed and used in the QRT: habitual action, understanding, reflection, and critical reflection. The need for research on the influences of gender and other cultural and demographic factors on reflecting thinking was noted by Farber and Armaline (1994).

While researchers have developed reliable measures of reflective thinking (Aukes et al., 2007; Kember et al., 2000), the extent to which professionals engage in reflective thinking in the workplace and the relationship of individual demographics (e.g., gender, age, years of experience, education level, and academic discipline) needs further examination.



## **Chapter 3 - Methodology**

### **Introduction**

The purpose of this research was to investigate the quality of reflective thinking practiced by certified human performance improvement professionals in the workplace. Further, it investigated relationships between participant demographics (gender, age, experience, education level, and academic discipline) and the assessed quality of reflective thinking. This chapter describes the details and appropriateness of the methodology used to conduct the study. It begins with the research questions used to guide the study. Next, it describes the overall research design in terms of the population and sample, the survey instrument, and the procedures for data collection and analysis.

### **Research Questions**

There were two primary descriptive research questions.

1. What are the reflective thinking scores for habitual action, understanding, reflection, and critical reflection as measured by the Questionnaire of Reflective Thinking (QRT) in a group of Certified Performance Technologist (CPT) professionals?

2. What are the demographics of the Certified Performance Technologist (CPT) professionals' population sample based on gender, age group, years of work experience, education level, and academic discipline?

There is one primary inferential research question:

3. Do the demographic variables (gender, age, years of work experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist (CPT) professionals?

The general regression equation showing the relationship between the independent variables of gender, age, experience, education, and academic discipline, and the dependent variable of QRT score for habitual action (HA), understanding (U), reflection (R), or critical reflection (CR) is:  $\text{QRT score} = \beta_0 + (\beta_1 * \text{gender}) + (\beta_2 * \text{age}) + (\beta_3 * \text{experience}) + (\beta_4 * \text{education}) + (\beta_5 * \text{discipline})$  where  $\beta_0$  is a constant and  $\beta_1$  through  $\beta_5$  are the slope coefficients for the independent variables.

Sub-questions:

3a: What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and gender (male/female)?

The null hypotheses for sub-question 3a:

$$H1_0: \beta_{1(\text{Habitual Action})} = 0; H1_A: \beta_{1(\text{Habitual Action})} \neq 0$$

$$H2_0: \beta_{1(\text{Understanding})} = 0; H2_A: \beta_{1(\text{Understanding})} \neq 0$$

$$H3_0: \beta_{1(\text{Reflection})} = 0; H3_A: \beta_{1(\text{Reflection})} \neq 0$$

$$H4_0: \beta_{1(\text{Critical Reflection})} = 0; H4_A: \beta_{1(\text{Critical Reflection})} \neq 0$$

3b: What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and age group (24 and younger, 25-34, 35-44, 45-54, and 55 and older)?

The null hypotheses for sub-question 3b:

$$H5_0: \beta_{2(\text{Habitual Action})} = 0; H5_A: \beta_{2(\text{Habitual Action})} \neq 0$$

$$H6_0: \beta_{2(\text{Understanding})} = 0; H6_A: \beta_{2(\text{Understanding})} \neq 0$$

$$H7_0: \beta_{2(\text{Reflection})} = 0; H7_A: \beta_{2(\text{Reflection})} \neq 0$$

$$H8_0: \beta_{2(\text{Critical Reflection})} = 0; H8_A: \beta_{2(\text{Critical Reflection})} \neq 0$$

3c: What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and years of work experience (5 and less, 6-10, 11-15, 16-20, and 21 and more)?

The null hypotheses for sub-question 3c:

$$H9_0: \beta_{3(\text{Habitual Action})} = 0; H9_A: \beta_{3(\text{Habitual Action})} \neq 0$$

$$H10_0: \beta_{3(\text{Understanding})} = 0; H10_A: \beta_{3(\text{Understanding})} \neq 0$$

$$H11_0: \beta_{3(\text{Reflection})} = 0; H11_A: \beta_{3(\text{Reflection})} \neq 0$$

$$H12_0: \beta_{3(\text{Critical Reflection})} = 0; H12_A: \beta_{3(\text{Critical Reflection})} \neq 0$$

3d: What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and education level (high school or associate degree, bachelor degree, master degree, and doctorate degree)?

The null hypotheses for sub-question 3d:

$$H13_0: \beta_{4(\text{Habitual Action})} = 0; H13_A: \beta_{4(\text{Habitual Action})} \neq 0$$

$$H14_0: \beta_{4(\text{Understanding})} = 0; H14_A: \beta_{4(\text{Understanding})} \neq 0$$

$$H15_0: \beta_{4(\text{Reflection})} = 0; H15_A: \beta_{4(\text{Reflection})} \neq 0$$

$$H16_0: \beta_{4(\text{Critical Reflection})} = 0; H16_A: \beta_{4(\text{Critical Reflection})} \neq 0$$

3e: What is the relationship between the QRT scores for habitual action, understanding, reflection, and critical reflection evident in a group of Certified Performance Technologist (CPT) professionals and academic discipline (Pure/Hard, Pure/Soft, Applied/Hard, Applied/Soft)?

The null hypotheses for sub-question 3e:

$$H17_0: \beta_{5(\text{Habitual Action})} = 0; H17_A: \beta_{5(\text{Habitual Action})} \neq 0$$

$$H18_0: \beta_{5(\text{Understanding})} = 0; H18_A: \beta_{5(\text{Understanding})} \neq 0$$

$H19_0: \beta_{5(\text{Reflection})} = 0; H19_A: \beta_{5(\text{Reflection})} \neq 0$

$H20_0: \beta_{5(\text{Critical Reflection})} = 0; H20_A: \beta_{5(\text{Critical Reflection})} \neq 0$

## **Research Design**

This research used an applied non-experimental research design, an exploratory descriptive and associational approach, and quantitative methods (Gliner et al., 2009). It explored the quality of reflective thinking practiced by professionals in the workplace measured by the QRT and investigated how participant demographics relate to QRT scores. There was a focus on attribute independent variables that were characteristics of the participants. There was no active independent variable or intervention and no treatments were applied. Mann et al. (2009) pointed out that because research in fostering reflective learning and measuring reflective thinking is in the early stage of development, exploratory research approaches are appropriate to use to develop general understanding of the construct, common definitions, and terminology. This research employed quantitative methods because the QRT quantifies each element of an accepted theoretical framework for reflective thinking. Quantitative research is based on a strategy of hypothetical deduction and statistical data analysis and uses various measurement tools (Creswell, 2007) such as the QRT. A descriptive approach is used when there is only one variable considered at a time so no statistical comparisons or relationships are made. An associational approach is used when the independent variable is continuous or has many ordered categories and the research relates the independent variables of participants in a single group (Gliner et al., 2009).

This research used a descriptive approach to address the first two research questions, “What are the reflective thinking scores for habitual action, understanding, reflection, and critical reflection as measured by the Questionnaire of Reflective Thinking (QRT) in a group of

Certified Performance Technologist (CPT) professionals?” and “What are the demographics of the Certified Performance Technologist (CPT) professionals’ population sample based on gender, age group, years of work experience, education level, and academic discipline?” These questions are exploratory in nature and involve the use of a single instrument to assess the extent to which each construct of reflective thinking, based on a single accepted framework, is present in a single population of recognized workplace professionals. An associational approach was used to address the third research question, “Do the demographic variables (gender, age, years of work experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist (CPT) professionals?” When employing an associational approach, multiple regression is a common complex associational statistic used to determine the relative contribution of each independent variable to the overall variance in the regression model (Gliner et al., 2009; Lund & Lund, 2013.; Snedecor & Cochran, 1967). This research is not about predicting the quality of an individual’s reflective thinking. It is about identifying relationships between the independent attribute demographic variables of individuals and their QRT scores. Therefore, multiple regression was used to determine if there was a relationship between the independent attribute variables and reflective thinking as assessed by the QRT (Kember, 2000) as suggested by Gliner, Morgan, and Leech (2009).

### **Variables**

When using an associational approach employing multiple regression, a great deal of care should be taken in selecting the independent variables because the values of the regression coefficients depend on these variables. Variables should be selected based on past research and if new variables are added, selection of these variables should be based on theoretical importance

(Field, 2009). While research involving the QRT has largely involved students, relationships between QRT scores and gender, age, and education level have all been examined to some degree (Buzdar & Ali, 2013; Lethbridge et al., 2013; Naghdipour & Emeagwali, 2013; Phan, 2006, 2007, 2009). Other research has examined relationships between reflective thinking and gender, age, or experience (Mamede & Schmidt, 2005; Wittenburg, 2000) and relationships between critical thinking and gender, age, experience or education level (Clocklin, 1995; Hall, 1996; Ircink-Waite, 1989; Leach, 2011; McDade, 1999; Pascarella, 1989; Terenzini et al., 1995). In the development of their theoretical model of reflective judgment, King and Kitchener (1994) highlight that development in reflective thinking occurs within the context of the individual's background, current life experiences, and previous educational experiences. Such educational experiences differ by academic discipline (Biglan, 1973; Evers, 2007; Leach, 2011). This research used participant gender, age, experience, education level, and academic discipline as independent attribute variables.

Research question three explores whether demographic elements can be related to QRT scores. Phan (2007, 2009) looked for differences between men and women studying development of a conceptual model relating reflective thinking, measured with the QRT, and learning approaches, self-efficacy beliefs, and deep processing strategies. Buzdar and Ali (2013) explored relationships between level of education and QRT scores in their investigation of developing reflective thinking through distance education programs as did Lethbridge et al. (2013) in their study of reflective thinking among nursing students. In a study to determine whether selected student variables in baccalaureate education programs for nursing had a relationship to critical thinking abilities, Ircink-Waite (1989) considered gender, age, years of work experience, and educational background. In similar studies of critical thinking ability

among health professional students, McDade (1999) and Mamede and Schmidt (2005) examined age, gender, and previous work experience. Leach (2011) sought to discover if there were differences in the dimensions of critical thinking among graduating seniors at a mid-sized university based on academic discipline and gender.

Participant demographics (gender, age, years of work experience, education level, and academic discipline) were attribute independent variables for this research, and scores on the QRT were dependent variables. Because there were no active independent variables in this non-experimental design, it could not prove causation. Table 1 shows each of the variables and survey items (Appendix A) used to answer the study research questions. The next section contains a discussion of the operationalization of each variable in this study and how the attribute independent variables have been examined in similar research.

Table 1  
*Variables*

Dependent Variables	Survey Item #
habitual action (Y1)	1, 5, 9, 13
understanding (Y2)	2, 6, 10, 14
reflection (Y3)	3, 7, 11, 15
critical reflection (Y4)	4, 8, 12, 16
Independent Variables	Survey Item #
gender (X1)	17
age (X2)	18
years of work experience (X3)	19
education level (X4)	20
academic discipline (X5)	21

**Dependent variables: QRT construct scores.** Habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) are dependent variables Y1, Y2, Y3, and Y4

respectively. The score for each dependent variable is the sum of responses to a group of four items in the study survey (Appendix A): items 1, 5, 9, and 13 for HA = Y1; items 2, 6, 10, and 14 for U = Y2; items 3, 7, 11, and 15 for R = Y3; and items 4, 8, 12, and 16 for CR = Y4. Participants rated each of these 16 items using a five-point Likert scale selecting: 5 for *strongly agree*, 4 for *agree*, 2 for *disagree*, and 1 for *strongly disagree*, reserving 3 to be selected only if a definite answer is not possible. These scores, ranging from 4 to 20, were used as the score of each variable; Y1, Y2, Y3, and Y4. The values for each interval-level continuous dependent variable were used to test the research hypotheses.

**Independent variables: Participant demographics.** The demographic variables included in this study – gender, age, years of work experience, education level, and academic discipline – were based on ones used in other similar research (Biglan, 1973; Boyd & Fales, 1983; Joy & Kolb, 2009; Kolb, 1984; Kolb & Kolb, 2005; Lusk et al. 1998; Lustig & Strauser, 2008; Naghdipour & Emeagwali, 2013) and were operationalized as categorical variables.

**Gender.** This item provided two possible responses: male and female. Results from research examining differences in reflective thinking or critical thinking generally reveal no significance difference between males and females (Clocklin, 1995; Hall, 1996; Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999; Phan, 2006, 2007; Wittenburg, 2000). Clocklin (1995) and Ircink-Waite (1989), using ANOVA, reported no significance between gender and critical thinking scores in nursing students. Mamede and Schmidt (2005), using Pearson correlation and one-way ANOVA to analyze associations between reflective practice and variables related to characteristics of physicians' work and educational background, found no significant association with gender and reflective practice. Research conducted by McDade (1999) into relationships between learning styles and critical thinking ability among health



professional students using Pearson's correlation, found there to be no correlation with gender. Similarly, Phan's (2006, 2007) longitudinal study of mathematics students in the South Pacific reported no statistically significant gender differences in learning approaches, the four constructs of reflective thinking in the QRT, or academic performance. In his study to validate and examine the reliability of the Dispositions of Reflective Thinking Questionnaire (DRTQ), Wittenburg (2000) reported multivariate ANOVA revealed no significant differences between the genders.

Hutto (2009), however, using a one-way ANOVA, found female adult learners were significantly more disposed to self-directed learning, which involves the ability to think reflectively, than were males among adult graduate students in the United States. Walsh and Hardy (1999) found in a comparison of gender and scores on the California Critical Thinking Disposition Inventory (CCTDI), females scored higher than males in open-mindedness and maturity. Leach (2011), found that differences in the five dimensions of the California Critical Thinking Skills Test (analysis, deduction, evaluation, induction, and inference) among college students based on gender needed further study.

The ratio of female to male in past study participants varied. In Wittenberg's (2000) study examining reflective disposition of preservice physical education teachers, the number of male participants outnumbered female participants by nearly 3:1. Clocklin (1995), Hall (1996) and Ireink-Waite (1989) used nursing students in their studies on critical thinking and experienced female subjects outnumbering male subjects by more than 2:1, 10:1, and 25:1 respectively.

*Age.* This item provided five possible responses: 24 and below, 25-34, 35-44, 45-54, and 55 and above to cover ages of the population. This number of possible responses was similar to

those used in other research assessing relationships between dependent variables and age as an attribute independent variable. Clocklin (1995) used three possible responses and 12 year intervals for a population of nursing students. Hutto (2009) and McDade (1999) both used five possible responses and 5 year intervals for populations of adult students. Ircink-Waite (1989) used seven possible responses and 5 year intervals for a population of senior nursing students.

There is limited evidence that an individual's age may be a factor in whether someone has sufficient experience upon which to reflect (Clocklin, 1995; Hall, 1996; Hutto, 2009; Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999; Naghdipour & Emeagwali, 2013). Some (Burrows, 1995; Hobbs, 2007) have suggested that individuals need to be developmentally ready, something that may be dependent on age, to engage in critical reflection. Hall (1996), using correlational tests, identified a negative association between age and critical thinking ability in nursing students. Mamede and Schmidt (2005) studied factors correlated to reflective practice among physicians and found reflective practice was negatively correlated to physician age using Pearson correlation and one-way ANOVA. Clocklin (1995), however, using one-way ANOVA, found nursing students over the age of 40 years had significantly higher critical thinking scores than those under age 40. Hutto (2009), also using one-way ANOVA, found adult learners in the age category 46-55 scored significantly higher on assessment of propensity for self-directed learning involving reflective practice than did respondents in all other age groups (25-30, 31-35, 36-40) with the exception of the 41-45 age group. Ircink-Waite (1989), using ANOVA, reported no statistically significance relationship between age and critical thinking scores in nursing students. Similarly, McDade (1999), investigating relationships between learning styles and critical thinking ability among health professional students, found no correlation between age and critical thinking ability using Pearson's correlation.

*Years of work experience.* This item provided five possible responses: 5 or less, 6-10, 11-15, 16-20, and 21 or more. The number of possible responses was similar to those used in other research assessing relationships between dependent variables and an attribute independent variable of years of work experience. Ircink-Waite (1989) used four possible responses: 1-5, 6-10, 11-15, and 16 and more years for a population of senior nursing students. McDade (1999) used five possible responses: 1 month to 1 year, 1 to 2 years, 2 to 3 years, 3 to 4 years, and more than 4 years for a population of health professional students.

Schön (1983) argued that expert practitioners in a profession were distinguished from novices by their ability to reflect on their practice when dealing with unusual or particularly complex cases. There is limited evidence, however, that work experience may be a factor in reflective and critical thinking (Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999). There is evidence that novices, individuals lacking practical mastery, are inclined to follow models mechanically (Ennis, 1985a). Thus, the amount of time an individual has been working in a particular field, may be a factor in whether or not they have sufficient experience upon which to reflect (Naghdi-pour & Emeagwali, 2013). With more experience, Gordon (1984) found that such reliance on models is reduced. Mamede and Schmidt (2005), in a study of factors correlated to reflective practice among physicians using Pearson correlation and one-way ANOVA, reported that reflective practice appears to decrease with increased years of practice. Ircink-Waite (1989), however, using ANOVA, reported no significance between years of work experience and critical thinking scores in nursing students. Similarly, McDade (1999), using Pearson's correlations, identified no correlations in health professional students between the variables of work experience and learning styles or critical thinking ability.

***Education level.*** This item provided four possible responses: high school or associate degree, bachelor degree, master degree, and doctorate degree, similar to research conducted by Joy and Kolb (2009) who used three; secondary, bachelor degree, and master or doctorate degree. Looking specifically at differences in the quality of reflective thinking with respect to students' level of education, Naghdipour and Emeagwali (2013) found that students with higher levels of education had the potential to be better reflective thinkers. Similarly, Lethbridge et al. (2013) found, using t-tests, there were statistically significant differences between undergraduate and postgraduate for each of the four scales of the QRT, with postgraduates more likely to engage in reflection and critical reflection as compared to undergraduates. Buzdar and Ali (2013), using the QRT to investigate the possibilities of developing reflective thinking among learners through distance education programs, using t-tests to determine statistical significance, found the impact of students' previous education was significant and positive on the scores for understanding and critical reflection, and negative on the scores for reflection. Some research indicated that critical thinking skills increase beyond the effects of natural maturation as a result of attending postsecondary education. Pascarella (1989), investigating if students attending college would show higher levels of critical thinking after their freshman year than similar students not attending college, found, using analysis of covariance, students who attended college for one year scored higher in critical thinking than a matched group who did not attend. Similar results were found by Terenzini et al. (1995), using hierarchical regression techniques.

***Academic discipline.*** This item provided four possible responses for participants to self-report their academic major within the categories of: Pure/Hard, Pure/Soft, Applied/Hard, Applied/Soft based on the best known academic discipline typology, sometimes referred to as the Biglan-Becher typology (Brint et al., 2011; Neumann, 2001). Pure academic disciplines are

those in which results are focused on discovery, explanation, understanding, interpretation, and creating knowledge. Hard academic disciplines are those in which the parameters of problems can be specified with a high degree of certainty and where deductive logic and complex, logical manipulations are central tools. Soft academic disciplines are those in which problems are often ill-structured, cannot always be described completely, and certainty of solutions is elusive. Applied academic disciplines are those in which research results in products, techniques, protocols, or procedures, or in other words, applying knowledge (Garner, 2009; Laird, Shoup, Kuh, & Schwarz, 2008)). Examples of each category are in Appendix C. These categories identify groupings of disciplines or fields with similar approaches to academic tasks, such as teaching and learning, and are similar to categories used in other research (Becher, 1981; Becher & Trowler, 2001; Braxton & Hargens, 1996, Laird et al., 2008). It is possible that an individual with a master or doctorate degree earned a bachelor degree in a different academic discipline. The survey item asking about academic discipline followed the item asking about level of education, but a weakness in the wording of this survey item is that it is unknown which degree participants considered when selecting academic discipline on the survey.

Why would the quality of reflective thinking vary among students of different academic disciplines? It is likely that students can be expected to take on certain traits that are germane to a particular academic field. As Malaney (1986) observes, while it is certain that demographic characteristics such as ethnic background and gender will not change based on a student's experiences in a specific academic discipline, other characteristics such as quantitative and verbal skills are emphasized at varying rates depending on area of study and different demands of different academic disciplines.

Multiple researchers have examined reflective thinking across academic disciplines without addressing the relationship of the academic discipline on the results (Biggs et al., 2001; Leung & Kember, 2003; Lucas & Tan, 2006; Phan, 2007, 2009). While not addressing reflective thinking directly, King et al. (1990) found a significant effect for academic discipline in their Reflective Judgement Interview (Kitchener & King, 1994) results with social science majors scoring higher than technology focused disciplines. Leach (2011) sought to determine if there were differences in the five dimensions of the California Critical Thinking Skills Test (analysis, deduction, evaluation, induction, and inference) based on academic discipline (Arts and Sciences, Business and Technology, Clinical and Rehabilitative Health Sciences, Continuing Studies, Education, Nursing, and Public Health) in an academic setting. Using a series of two-way ANOVA models and post hoc testing, Leach (2011) concluded that students within certain academic disciplines perform better in some areas of critical thinking. Nursing students scored significantly higher on the analysis dimension than Business and Technology students and Education students. Arts and Science students and Nursing students scored significantly higher on the induction dimension than Education students. Business and Technology students and Arts and Sciences students scored significantly higher on the deduction dimension than Clinical and Rehabilitative Health Services and Education students. College of Arts and Science students scored significantly higher on the evaluation dimension than Business and Technology, Clinical and Rehabilitative Health Services, and Education students. Arts and Sciences and Business and Technology students scored significantly higher on the inference dimension than Clinical and Rehabilitative Health Services and Education students.

## **Population**

This research investigated reflective thinking practiced by professionals in the workplace. Thus, the target population is professionals in the workplace. Unfortunately, this target population is not readily available. Therefore, this research was conducted by sampling a population that was readily available, and is representative of the target population, known as the accessible population (Fraenkel, Wallen, & Hyun, 2012; Snedecor & Cochran, 1967). Those individuals certified by the International Society for Performance Improvement (ISPI) as a performance improvement professional, or Certified Performance Technologist (CPT), approximate the population of practicing professions and are the accessible population for this research. Certification as a performance improvement professional includes undergoing a proficiency and competency-based review of work performed as attested by employers and clients. This review confirms repeated performance to a set of established standards that include systematic application of a systemic approach to critical thinking and professional reasoning (ISPI, 2016a). Certified Performance Technologists are professionals who display the critical thinking and reasoning skills senior business executives find desirable in employees (Casner-Lotto & Barrington, 2006; Dunn & Musolino, 2011; ISPI, 2016a). Therefore, the CPTs are good subjects for this research to investigate the quality of reflective thinking practiced by professionals in the workplace. The accessible population for this study was the ISPI Certified Performance Technologist (N = 697).

## **Statistical Power and Sample Size**

Statistical power analysis exploits the relationships among the four variables involved in statistical inference: sample size (n), significance criterion ( $\alpha$ ), population effect size (ES), and statistical power. For any statistical model, these relationships are such that each is a function of

the other three (Cohen, 1992). In planning this research, it was important to establish a priori the sample size necessary to have a specified power for a given significance criterion ( $\alpha$ ) and population effect size (ES).

The significance criteria ( $\alpha$ ) represents the risk of mistakenly rejecting the null hypothesis ( $H_0$ ) and thus of committing a Type I error (rejection of a null hypothesis which is factually true). For this research, using two-tailed tests, an appropriate value for  $\alpha$  was .05 (Cohen, 1990). As defined by Cohen (1992), power is the probability of rejecting the null hypothesis if the null hypothesis is really false, a Type II error. An acceptable level of power for this study was .80. A smaller value would incur too great a risk of a Type II error and a larger value would result in a demand for  $n$  likely to exceed the researcher's resources. The population effect size (ES) is the degree to which  $H_0$  is false indexed by the discrepancy between  $H_0$  and  $H_1$  (Cohen, 1992). For this research, a medium effect size of .50 was appropriate (Cohen, 1992).

Green (1991) and Tabachnick and Fidel (2001) provided two equations to calculate the minimum sample size. The first equation ( $n$  is equal to or greater than  $50 + 8m$ ) is used to test the overall fit of the regression model to achieve a statistical power of .80 with a medium effect size  $\alpha = .50$ . The second equation ( $n$  is equal to or greater than  $104 + m$ ) tests the individual independent variables within the model. For both calculations,  $n$  represents the sample size and  $m$  represents number of independent variables. Since this research is interested in the overall fit and the contribution of individual independent variables,  $n$  is calculated using both equations then selecting the larger value for  $n$ . For this study, the first equation yields:  $n$  is equal to or greater than  $50 + 8(5)$ ;  $n = 90$ . The second equation yields and  $n$  is equal to or greater than  $104 + 5$ ;  $n = 109$ . Based on these calculations, a sample size of 109 would be sufficient for purposes of this study. Using these same factors with the same acceptable power levels (error ( $\alpha$ ) = .05,



power  $(1-\beta) = .80$ , effect size = .50), power analysis performed using the G\*Power computer program (Faul, Erdfelder, Lang & Buchner, 2007) (version 3.1.9.2, downloaded from <http://www.macupdate.com/app/mac/24037/g-power/download>) to compute a priori the required sample size for linear multiple regression results in a sample size of 106 CPTs.

### **Instrument**

This study used the QRT (Kember et al., 2000) to examine the quality of reflective thinking practiced by CPTs in their professional practice. The QRT is a 16-item self-report questionnaire utilizing a 5-point Likert response scale consisting of four items for each of the four constructs of reflective thinking based on the work of Mezirow (1991) and Dewey (1997) – habitual action, understanding, reflection, and critical reflection. Likert scale responses range from strongly disagree (1) to strongly agree (5). Scores in each construct, or dimension, are the summed responses to associated items on the QRT. The four construct scores range from 4 (strongly disagree) to 20 (strongly agree) in terms of agreement. An overall score was not derived, as this was not consistent with the theoretical underpinnings of the QRT scale development (Kember and Leung, 2000). Although there is research demonstrating that accurate self-assessment of one's performance is difficult (Kruger & Dunning, 1999), self-judgments on personal characteristics do not automatically appear less accurate than peer-judgments (Aukes et al., 2007; Hofstee, Kiers, & Hendriks, 1998). The use of the QRT in this research to explore the quality of reflective thinking practiced by professionals in the workplace was consistent with past approaches of similar research (Basol & Evin Gencel, 2013; Bell et al., 2011; Dunn & Musolino, 2011; Kember et al., 2000; Lethbridge et al., 2013; Lucas & Tan, 2006; Mitchell-White, 2010).

When developing the QRT, Kember et al. (2000) established psychometric properties with undergraduate health science majors and a small representative sample of master's level nursing students in Hong Kong. The QRT had acceptable internal consistency -- Cronbach's alpha reliabilities were 0.62, 0.76, 0.63 and 0.68 for the four scales, respectively (Kember et al., 2000). These approximated the 0.70 level typically considered adequate for internal consistency (Polit & Beck, 2004). Leung and Kember (2003) found modest but acceptable alpha values ranging from .58 to .74 for each subscale. Phan (2006, 2007) and Lucas and Tan (2006) reported similar reliability estimates to the values described by Kember et al. (2000), in their respective studies, thereby confirming the internal consistency of the scores produced by this instrument. The QRT construct validity was supported through confirmatory factor analysis (Leung & Kember, 2003), verifying that a four-factor model was a good fit for the data. This was indicated by a comparative fit index (CFI) greater than 0.90. For comparison, a one-factor model was also tested, and determined to be a poor fit for the data, supporting the fit of the four scales to the theoretically derived dimensions of reflective thinking (Kember et al., 2000).

Research leading to the development of the QRT employed students as subjects almost exclusively. Kember et al. (2000) designed the QRT for use in academic programs. This resulted in wording the QRT items in the context of a student (e.g., *In this course...*, *...handout material for examinations...*, *To pass this course...*). As Kember et al. (2000) pointed out, the QRT can, with some modification in wording to accommodate a different context, be used to measure the quality of reflective thinking by others such as practicing professionals. Therefore, for this research, some of the wording within the QRT survey questionnaire (Appendix A) was adapted to conform to the imposed context (e.g., replaced *in this course* with *in my professional practice*) as suggested by Kember (personal communication, 13 December 2016, Appendix E).

Multiple studies have examined the use of the four-scale QRT for assessing quality of reflective thinking across different populations. All found the scheme useful and stable in identifying categories of reflective thinking (Table 2).

Lucas and Tan (2006) found that the QRT operated as expected in terms of internal consistency and reliability. However, they expressed concerns about the capacity of each QRT scale to identify variation within their sample of accounting and business undergraduate students. Following analysis of the frequency of responses on the four QRT items within each scale, they expressed concern that the four items the Habitual Action scale showed a marked difference in the distribution of responses, concluding that the variation in responses to the two group of items (1 to 5, and 9 to 13) warranted further investigation. They also observed that there appeared to be little scope for the identification of variation with a cohort at one point in time, or to changes in responses between different points in time within the Understanding scale. They also challenged the statement by Kember et al (2000) that the QRT is suitable across disciplines and populations since the framework was derived from literature that referred to reflective thinking as a generic construct pointing out that the Habitual Action and Understanding scales did not operate as expected with their population of accounting and business undergraduates. The relatively small number of subjects in their research prompted Lucas and Tan (2006) to point out that any conclusions drawn were tentative pending further inquiry.

Table 2  
*Studies Using QRT*

Author(s)	Year	Purpose of Study	Notes
Kember et al.	2000	To develop a self-assessment questionnaire using Kember et al. (1999) coding scheme. This development used undergraduate health students in Hong Kong University and a questionnaire developed in the English language.	Developed and tested QRT.
Lucas and Tan	2006	To compare the performance of the QRT within a cohort of final year accounting and business undergraduates at a UK university with the findings of Kember et al. (2000).	Concluded the QRT was worthy of further investigation and identified further work that was required to support its effective use.
Dunn and Musolino	2011	To address reliability and responsiveness of the QRT for graduate health professionals.	Outcomes supported the stability of the four-scale QRT (ICC 0.63 to 0.82) and supported the use of the QRT to assess changes in reflective thinking and approaches to learning.
Buzdar and Ali	2013	To investigate developing reflective thinking among learners through distance education programs.	Student employment status and previous education have significant impact on reflective thinking
Lethbridge et al.	2013	To test the psychometric properties of the Reflection Questionnaire, developed by Kember et al. (2000).	Results provided support for the QRT construct validity of reflective thinking.
Naghdipour and Emeagwali	2013	To compare the level of reflective thinking in undergraduate university students.	Age and the level of education are two key determinants of reflective thinking
Basol and Evin Gencel	2013	To adapt QRT (Kember et al., 2000) to Turkish and investigate its validity and reliability over a sample of Turkish undergraduate education students.	Results showed good internal consistency and construct validity.

A modified QRT was placed into the Qualtrics™ survey tool as an open survey questionnaire (Appendix A). Advantages of online surveys include increased time efficiency,

decreased data entry error, increased item response rate, and decreased cost (Strachota, Schmidt, & Conceicao, 2001). Using an online survey with open access supports collection of data from a large geographically dispersed population such as CPTs. Online surveys are convenient for respondents to take on their own time and at their own pace, and the lack of an interviewer results in less social desirability bias than interviewer-administered modes (Pew Research Center, n.d.). However, the reliability of survey data may depend on several factors. Respondents may not feel encouraged to provide accurate, honest answers. Some respondents may not feel comfortable providing answers that they feel may present them in an unfavorable manner. Also, recent research has shown the response rate to internet surveys ranged from only 5% to 15% (Tourangeau & Plewes, 2013).

The landing page of the survey displayed the Informed Consent information. Participants chose or declined to participate in the survey by clicking on their choice. If they declined, they exited the survey.

Participants completed the QRT in the first section of the survey by indicating their level of agreement with each of 16 statements (items 1 through 16) using a 5-point Likert scale. They selected: 5 for *strongly agree*, 4 for *agree*, 2 for *disagree*, and 1 for *strongly disagree*, reserving 3 to be selected only if a definite answer was not possible. Instructions asked participants to respond quickly rather than deliberate over each response. The QRT provided a score for each of the four constructs of habitual action, understanding, reflection, and critical reflection ranging from 4 to 20. In the second section of the survey, participants provided demographic information including gender, age, years of work experience as a performance improvement professional, education level, and academic discipline.

## **Overview of Research Design**

The following steps summarize the research design:

1. Approached ISPI for support in conduct of this research. The organization supports academic and professional development and will send out survey information on a researcher's behalf (ISPI, 2016b).
2. Submitted Kansas State University Institutional Review Board (IRB) application and received approval.
3. Presented proposal and received approval by the dissertation committee.
4. Developed the open survey questionnaire using the Qualtrics™ survey tool and piloted survey with 10 CPTs conveniently selected by ISPI Operations Manager to identify any problems with the procedures for data collection, to include wording of survey items, in the main study.
5. Provided research introduction and overview including link to finalized open survey questionnaire to ISPI Operations Manager for dissemination to all CPTs.
6. Collected survey questionnaire responses.
7. Conducted quantitative analysis of the survey results, including responses to QRT using SPSS Statistics.

## **Protection of Human Rights**

Before proceeding with this study, approval was gained from the Kansas State University IRB (Appendix D). Participants completed the informed consent before starting the survey. If they chose to not participate, the survey provided a "Thank you" statement, then terminated. This study used no treatment, intervention, or deception of any kind. The survey participants were anonymous.

## Pilot Study

A pilot study was conducted to identify any problems with survey distribution, the survey itself, and with the procedures for data collection in the main study. The survey invitation with link to the pilot survey was sent to the ISPI Operations Manager, who forwarded it to 10 CPTs conveniently selected by the ISPI Operations Manager. The invitation asked pilot participants to complete the survey and give feedback addressing the ease of completion, any confusing statements, and overall survey design. The pilot survey allowed participants to move forward and backward to permit revisiting previous questions. The final survey did not permit backward navigation. To support the purpose of the pilot, the survey included two items soliciting feedback that were not included in the final survey: Item 22, Please list any items below that you found confusing, did not understand, or did not know how to answer; and Item 23, Please add any comments below about any problems with opening the survey, understanding the directions on how to complete it, and the flow of the survey form.

The pilot study survey remained open for one week. Four CPTs responded; a response rate of 40%. One participant suggested rewording the response choices for the 16 QRT survey items, pointing out that the term *with some reservation* (used on the pilot version of the survey) did not seem appropriate for some survey items. As a result, the wording of response choices for the QRT survey items was changed from *definitely agree, agree with some reservation, a definite answer is not possible, disagree with reservation, and definitely disagree* to read *strongly agree, agree, a definite answer is not possible, disagree, and strongly disagree*. This revision in wording was consistent with a version of the QRT used in other research (Leung & Kember, 2003). Additionally, one respondent commented on the need to scroll down on some pages of the survey to see all the response choices. To address that concern, the orientation of response

choices for all survey questions was changed from vertical to horizontal. This resulted in the question and all response choices being visible on a single screen for all survey items. One participant reported no problems completing the survey and noted that the first page, while necessary, was a little boring to read through.

### **Data Collection**

A self-reporting survey was used to collect information from the CPT population. According to Babbie (2001), surveys offer the best method to collect data on large populations. Self-report survey research is optimal for populations, such as CPTs, too large and distributed to observe (Babbie, 2001). Research (Cook, Heath, & Thompson, 2000; Couper, 2000; Nulty, 2008) does, however, show that response rates to online surveys are nearly always very much lower than those obtained when using on-paper surveys.

As already noted, power analysis identified that 106 study participants would be required to achieve a power of .80 with an  $\alpha$  of .05 and a medium effect size when conducting analysis related to question #3: “Do the demographic variables (gender, age, years of work experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist (CPT) professionals?” “CPT Fast Facts” on the ISPI website (<https://www.ispi.org>) states there are “over 1,300 CPTs from 23 countries gaining global recognition.” Obtaining 200 participants from a population of 1,300 represents a response rate of 15.4%. The pilot study resulted in a response rate of 40%. Therefore, it was believed that a response rate of 15.4% could be obtained from a group that advertises on their website that they “support student and academic research surveys to support academic and professional development in the field of performance improvement.”



The ISPI supports academic research and provides research survey guidelines for researchers at [https://www.ispi.org/ISPI/Resources/Student\\_Research\\_Survey\\_Guidelines](https://www.ispi.org/ISPI/Resources/Student_Research_Survey_Guidelines). In accordance with these guidelines, once the pilot study was complete and the survey instrument was refined, the participant invitation email message was provided to the ISPI Operations Manager. The message introduced the research, requested participation, and included directions and a link to the survey. The original plan was to only include US-based CPTs to avoid potential of cultural bias. The ISPI Operations Manager send an email invitation (Appendix B) to US-based CPTs in good standing with ISPI. In addition to having agreed to abide by the ISPI Membership Code of Conduct and CPT standards, CPTs in good standing are those CPTs with all membership and certification dues paid and current. When it was learned from the ISPI Operations Manager that the size of this population of US-based CPTs was 403 (Appendix F), the decision was made to expand the population for this research to include internationally-based CPTs in good standing ( $n = 56$ ) and US-based CPTs no longer in good standing with ISPI ( $n = 238$ ) to provide a larger population ( $N = 697$ ) to increase the number of respondents. Expected average response rates from for email surveys can vary. Research (Cook et al. 2000; Couper, 2000; Nulty, 2008) shows that response rates to online surveys are nearly always very much lower than those obtained when using on-paper surveys. Tourangeau and Plewes (2013) examined the problem of survey non-response with a panel on a research agenda for future of Social Science data collection. From their research, the response rate to internet surveys ranged from 5% to 15%.

The ISPI Operations Manager sent the initial email invitation to this expanded population two weeks after sending the first email invitation. A second-round email invitation to be sent two weeks later to all CPTs, thanking those that had already responded and asking all others to

participate and respond to the survey, was planned. However, after two weeks, and an exchange of emails with the ISPI Operations Manager, the second-round invitation was delayed, then not send out due to ISPI commitments to accommodate other requests for email support from other ISPI members (Appendix F).

A total of 68 responses were received following the first email to the 403 US-based CPTs in good standing with ISPI – a 16.9% response rate – before the invitation email was extended to the international-based CPTs and US-based CPTs no longer in good standing with ISPI. Six weeks later, a total of 97 complete responses were received from the expanded population of 697 – an overall response rate of 13.9%. Of the 97 responses received, two did not consent to participation in the research and four failed to complete all survey items, leaving a total of 91 usable responses.

There are many methods for boosting response rates to online surveys. Extending the duration of a survey's availability is one such method (Nulty, 2008). In conferring with the dissertation committee, it was deemed necessary to solicit for an additional two months for additional survey completers. A series of three emails from the ISPI Operations Manager to the population of 697 CPTs sent over the next two months produced 11 additional responses, all usable. The ISPI Operations Manager reported no return messages from these emails sent indicating a bad email address were received (Appendix F).

Response rates are also boosted by the researcher contacting participants or sending a personal appeal. In this case, neither of those was allowed. The ISPI Operations Manager controlled when and how many organizational emails were sent to the membership at any one time. Therefore, email reminders were spaced further apart and possibly inhibited the response

rate. Kittleson (1997) found that email reminders spaced every three to five days gained the best response rate.

A review of the literature (Görizt, 2006; Massey & Tourangeau, 2013) clearly indicates that incentives increase response rates across all modes of implementation (telephone, face-to-face, mail, and internet). Therefore, it is generally recommended to use material incentives in internet surveys. Incentives, however, might prompt some people to fill out the survey multiple times (Görizt, 2006). To encourage participation as suggested by Strachota et al. (2001), the CPT participant invitation included a statement that participants could choose to provide an email addresses to be entered into a drawing for a \$100 Gift eCard. After completing the survey, participants were asked to enter their email address if they wished to be eligible for award of the \$100 Gift eCard. To mitigate the risk of individuals responding multiple times to the survey to increase their chances of winning the offered Gift eCard, the “prevent ballot box stuffing” Qualtrics™ survey protection option was utilized to prevent taking the survey more than once.

A total of 108 responses (15.5%) were received, 102 that could be used (Table 3). Responses represented a cross-section of male and female CPTs of different ages and years of experience with education levels from associate degree through doctorate degree in all four categories of academic disciplines. The power of any test of statistical significance is defined as the probability that the test will reject a false null hypothesis. Statistical power, then, is the likelihood that a study will detect an effect when there is an effect there to be detected. If statistical power is high, the probability of making a Type II error, or concluding that there is no effect when there is one, goes down (Ellis, 2010). The design of this study used a desired power of .80 and required a sample size of 106. Maintaining all other design parameters, the sample size of 102 used achieved a power of .78 using the G\*Power computer program (Faul, Erdfelder,

Lang & Buchner, 2007). While the sample size achieved was slightly less than desired, the power achieved (.78 achieved verses .80 desired) is sufficient for the study design.

Table 3  
*Data Collection Survey Actions and Responses*

Survey Action	Date	Responses
Survey invitation email sent to 403 US-based CPTs in good standing	2/7/2017	68 responses 16.9% response rate [1 did not consent]
Survey invitation email sent to 56 International CPTs and 238 US-based CPTS not in good standing	2/20/2017	29 responses 9.8% response rate [1 did not consent; 4 did not complete all items]
Reminder email sent to 697 CPTs sent the survey invitation email.	5/15/2017	1 response
Reminder email sent to 697 CPTs	5/31/2017	5 responses
Reminder email sent to 697 CPTs	7/5/2017	5 responses
Totals		108 responses 15.5% total response rate [6 did not consent or complete survey] 102 usable responses

### **Data Analysis**

The IBM Statistical Package for the Social Sciences (SPSS) Statistics version 24 was used for statistical analyses on the data set of participant responses to the research survey and the QRT items. Wording of some original QRT items was modified to better fit the context of reflective thinking in the workplace. Therefore, the reliability and structure of the modified QRT was analyzed using the EQS 6.3 program from Multivariate Software, Inc. to examine internal consistency and that each item was contributing to the measure of the desired scale and not others. Descriptive statistics of the demographic data collected from participating CPTs through

the survey was assembled and then the relationship to each of the independent demographic factors on each of the dependent QRT scores was analyzed. Differences in QRT scores for habitual action, understanding, reflection, and critical reflection based on each independent attribute demographic variable were examined to test the study hypotheses.

### **Descriptive Statistics**

Creswell (2009) defined descriptive statistics as an analysis of variables in a study that describes the data results through means, standard deviations, and ranges of scores. The survey results, including QRT scores and demographic data, were entered into an MS Excel workbook and SPSS Statistics for sorting and for computation of descriptive statistics to describe what the basic features of the data collected showed. The number and percentage of survey respondent results for each independent variable (gender, age, experience, education level, and academic discipline) were assembled and the number, means, and standard deviations of QRT scores for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) were computed to describe the demographics of the sample and associated responses to the survey items. Descriptive statistics showing mean and standard deviation for QRT scores by each independent demographic variable were also computed.

### **Reliability and Structural Analysis of Modified QRT**

To better fit the context of reflective thinking in the workplace, wording of some original QRT items was modified for this study. Therefore, the reliability and structure of the modified QRT were examined.

**Reliability.** The reliability of the modified QRT instrument was evaluated by reviewing the internal consistency, or reliability, of the four scales (HA, U, R, CR). This involved testing the properties of the modified QRT for reliability to make sure the questionnaire consistently

reflected the 4-factor construct of habitual action, understanding, reflection, and critical reflection, that it was intended to measure. In other words, a person got the same score on the questionnaire if he or she completed it at two different points in time and two people who practiced the same degree of reflective thinking got similar scores on the questionnaire. In statistical terms, testing for reliability is usually based on the idea that individual items, or in the case of the QRT, a set of items, should produce results consistent with the overall questionnaire.

According to Field (2009), the simplest way in practice to test for reliability is to use split-half reliability. Cronbach (1951) devised a measure, Cronbach's alpha that is loosely equivalent to splitting data in two in every possible way and computing the correlation coefficient for each split and is the most common measure of scale reliability (Field, 2009). The properties of the modified questionnaire were examined by computing Cronbach alpha values for each scale to determine its reliability.

**Structural analysis.** As in the development of the original QRT (Kember et al., 2000), the next step in examining the modified QRT was to show that the four items for each scale were measuring that scale and not contributing to others. The fit of the items to the intended scales was tested using confirmatory factor analysis. The scales were originally constructed by Kember et al. (2000) with a four-factor model in mind, so it was appropriate to test the fit to the hypothesized model, rather than use exploratory factor analysis. Confirmatory factor analysis is a multivariate statistical procedure used to test how well measured variables represent the different constructs under study. The QRT contained four scales: habitual action, understanding, reflection, and critical reflection, each of which was measured by four QRT items. Therefore, the construct of the QRT met the established criteria of at least four constructs and at least three items per construct be present (<http://www.statisticssolutions.com/confirmatory-factor-analysis/>).

The extent to which the model was a good fit to the data was measured by the model chi-squares statistic ( $\chi^2$ ) with associated degree of freedom (df) and Bentler's comparative fit index (CFI). Models with small chi-squares value and CFI values greater than 0.9 are normally considered to indicate an acceptable fit (Bentler, 1990).

A model of the construct of the QRT representing the factor correlations was drawn to show the relationships among QRT items and the aspect of reflective thinking that item is intended to measure. The link from a scale to an item path coefficient can be interpreted as a measure to describe how strongly the item is affected by its corresponding scale that is considered as a latent factor. An arrow drawn between two latent variables denotes the correlation between these two variables. The correlation should have a value between -1 and 1.

### **Relationship of Independent Factors and QRT Scores**

This research examined the quality of reflective thinking practiced by CPT professionals by determining the QRT scores for a group of CPTs, and how those QRT scores for habitual action, understanding, reflection, and critical reflection related to the gender, age, experience, education level, and academic discipline of the CPTs. Research question 3 asks, "Do the demographic variables (gender, age, years of work experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist professionals?"

Regression analysis is a statistical technique for investigating the relationship among variables. It indicates the significant relationships between dependent and independent variables and the strength of impact of multiple independent variables on a dependent variable (Ray, 2013). Linear regression establishes a relationship between dependent and independent variables using a best fit straight line. A linear regression analysis is most often used to determine the

change in the dependent variable for a one unit change an independent variable, to determine how much of the variation in the dependent variable is explained by the independent variable, and to calculate new values for the dependent variable from values for the independent variable (Lund & Lund, 2013). Therefore, regression analysis is a useful statistical technique for addressing question 3. Multiple regression extends linear regression to include multiple independent variables and includes determination of the overall fit of the regression model and the relative contribution of each of multiple independent variables. Since this research question 3 includes five independent variables, multiple regression is more appropriate than simple regression as a statistical technique for addressing question 3.

There are multiple regression analysis techniques available. Binomial logistic regression is a regression technique used when the dependent variable is dichotomous. Since the dependent variables of QRT scores for habitual action, understanding, reflection, and critical reflection are not dichotomous, this technique is not appropriate for the investigation of question 3. Automatic Linear Modeling is a tool for analyzing data set with large number of independent variables as potential predictors of a dependent variable with goal of identifying subset from the large pool of independent that gives adequate prediction accuracy for a reasonable cost of measurement (Yang, 2013). This research explored the relationships between five independent variables and each of four dependent variables. The number of independent variables was small (5) and relationships with all were of interest, not the determination of a smaller subset. Therefore, the linear regression Automatic Linear Modeling technique was not appropriate for this research.

In cases of multiple independent variables, the researcher can use forward selection or backward elimination step wise approaches for selection of most significant independent variables. Forward selection starts with most significant independent variable and adds the next



most significant for each step. Backward elimination starts with all independent variables and removes the least significant for each step. The aim is to maximize the power to calculate the dependent variable with a minimum number of independent variables (Mense, 2001). Again, relationships with all independent variables are of interest, not the determination of a smaller subset. Therefore, the use of forward or backward elimination step wise approaches are not appropriate for this research.

Hierarchical multiple regression, like standard multiple regression, is a technique for determining the overall fit of the regression model and the relative contribution of each of multiple independent variables. The goals of hierarchical multiple regression, however, are slightly different. In standard multiple regression, all the independent variables are entered into the regression equation at the same time. In hierarchical multiple regression, the independent variables are entered into the regression equation in an order selected by the researcher. This provides ability to control for the effects of covariates on results and takes into account the possible effects of each independent variable on the dependent variable (Lund & Lund, 2013). Based on this review of potential statistical techniques, hierarchical multiple regression was selected for examination of question 3.

As reported in Chapter 2, the relationship between gender and reflective or critical thinking, and the relationship between age and reflective or critical thinking has been examined many times. With gender, results generally reveal no significance difference between males and females (Clocklin, 1995; Hall, 1996; Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999; Phan, 2006, 2007, 2009; Wittenburg, 2000). Most of this research used student populations with the age of participants heavily weighted to the younger end of the range used (Clocklin, 1995; Hall, 1996; Ircink-Waite, 1989; Naghdipour & Emeagwali, 2013; Pascarella,

1989; Terenzini et al., 1995; Wittenburg, 2000). With age, however, results of these studies were mixed with most reporting a positive relationship between age and practice of reflective or critical thinking. Therefore, since the relationships between both gender and age and reflective or critical thinking are generally known, age was entered into the regression model first since most research reports a positive relationship, and gender was entered second since most the research reports little effect. Education and experience have both been studied, but to a lesser extent than gender and age. Results generally show a positive relationship between education and reflective or critical thinking (Buzdar & Ali, 2013; Lethbridge et al., 2013; Naghdipour & Emeagwali, 2013; Pascarella, 1989; Terenzini et al., 1995) with results between experience and reflective or critical thinking mixed (Ennis, 1985; Gordon, 1984; Ircink-Waite, 1989; Mamede & Schmidt, 2005; McDade, 1999; Naghdipour & Emeagwali, 2013). Therefore, education was entered third and experience was entered fourth. The relationship between academic discipline and reflective or critical thinking is the least well know of the five independent variables (King et al., 1990; Leach, 2011), and was therefore entered last. Academic discipline was a non-ordered categorical independent variable with four categories (Pure/Hard, Pure/Soft, Applied/Hard, and Applied/Soft). Three dummy variables were used to code representation of these categories (Table 4) while building the regression model and using SPSS to interpret the model results. The Applied/Soft group was the largest group so was chosen as the baseline group against which all other groups were compared (Field, 2009). A separate hierarchical multiple regression analysis was performed for each of the dependent variables: QRT scores for habitual action, understanding, reflection, and critical reflection.

Table 4  
*Dummy Coding for Academic Discipline Data*

Academic Discipline	Dummy 1 Applied/Soft vs Applied/Hard	Dummy 2 Applied/Soft vs Pure/Soft	Dummy 3 Applied/Soft vs Pure/Hard
Applied/Soft	0	0	0
Applied/Hard	1	0	0
Pure/Soft	0	1	0
Pure/Hard	0	0	1

Before using a multiple regression to analyze the data collected in response to research questions 1 and 2 and address research question 3, it was critical to make sure that the data could actually be analyzed using multiple regression by testing several assumptions (Field, 2009; Lund & Lund, 2013). Two assumptions are that the dependent variable is a continuous or interval variable and that the independent variables are either continuous (i.e., an interval or ratio variable) or categorical with mutually exclusive categories. QRT scores for habitual action, understanding, reflection, and critical reflection, the dependent variables being examined, are each interval variables ranging in value from 4 to 20. Participant gender, age, experience, education, and academic discipline are mutually exclusive categorical variables. Thus, these two assumptions have been met.

Other assumptions to be tested are:

- Independence. All the values of the outcome variable are independent. Said another way, each value of the outcome variable comes from a separate entry.
- Linearity. The relationship between the dependent variable and each of the independent variables, and the dependent variable and the independent variables collectively, is linear.
- Homoscedasticity. The residuals are equal for all values of the dependent variable.

- No perfect multicollinearity. The independent variables are not highly correlated with each other. If they were, then it would be problematic to understand which independent variable contributes to the variance explained in the dependent variable.
- No significant outliers, high leverage points or highly influential points. Outliers, leverage points, and influential points represent observations that in some way are unusual and have a negative impact on the regression equation used to relate the value of the dependent variable based on the independent variables.
- Normally distributed errors. To run inferential statistics to determine statistical significance, it is assumed that the residuals in the model are random, normally distributed variables with a mean of 0. This means that the differences between the model and the observed data are most frequently zero or very close to zero, and that any differences happen only occasionally. As Field (2009) points out, some people confuse this assumption with the idea that independent variables have to be normally distributed when they do not.

Residuals are the differences between the values of the outcome calculated by the model and the values of the outcome observed in the sample (Field, 2009). A regression model was built in SPSS Statistics for each of the QRT scores for habitual action, understanding, reflection, and critical reflection (the independent variables) to check these assumptions.

The assumption of independence of observations was largely addressed by the study design. Each observation is an individual participant's response to the participant open survey questionnaire and are related only by all participants being in the study population. Therefore, by design, each observation was independent. However, using SPSS Statistics, independence of observations was checked using the Durbin-Watson statistic (Durbin & Watson, 1951) which

tests for serial correlations between errors. The test statistic can vary between 0 and 4, with a value of 2 meaning that the residuals are uncorrelated (Field, 2009).

Using multiple linear regression assumes there is a linear relationship between the dependent variable and the independent variables. A scatter plot of the studentized residuals against the unstandardized calculated values was used (Field, 2009; Lund & Lund, 2013) to determine if a linear relationship existed between the dependent variable (QRT score for habitual action, understanding, reflection, and critical reflection) and the independent variables collectively (participant gender, age, experience, education, and academic discipline). Because each of the independent variables was a categorical variable, the need to establish if a linear relationship exists between the dependent variable and each of the independent variables can be ignored (Lund & Lund, 2013). The assumption of homoscedasticity, that the residuals are equal for all values of the calculated dependent variable, was tested by plotting the studentized residuals against the unstandardized calculated values, similar to how the assumption of linearity was tested (Lund & Lund, 2013).

Multicollinearity occurs when two or more independent variables are highly correlated with each other and leads to problems understanding which independent variable contributes to the variance explained in the dependent variable. SPSS Statistics was used to detect multicollinearity through inspection and interpretation of correlation coefficients and Tolerance/VIF values. Inspection of the correlation matrix of all the independent variables was conducted to see if any correlated very highly (above .80) (Field, 2009; Lund & Lund, 2013). VIF values indicate whether an independent variable has a strong linear relationship with other independent variables. A VIF value of 10 is a good indicator that this assumption has been

violated. The tolerance statistic is the reciprocal of the VIF. Therefore, values below 0.1 also indicate this assumption has been violated (Field, 2009; Lund & Lund, 2013).

Outliers, leverage points, and influential points have a negative impact on the regression equation used to calculate the value of the dependent variable based on the independent variables. SPSS Statistics was used to detect outliers using case wise diagnostics to detect whether a particular standardized (residuals divided by an estimate of their standard deviation) or studentized deleted residual (unstandardized residual divided by an estimate of its standard deviation) is greater than  $\pm 3$  standard deviations. Any values greater than  $\pm 3$  standard deviations were investigated to determine if they should be removed.

The SPSS Statistics values for the leverage variable was used to determine whether any cases exhibited high leverage of the observed value. The maximum leverage variable value computed by SPSS is 1. Leverage values less than 0.2 were considered as safe, 0.2 to less than 0.5 as risky, and values of 0.5 and above as dangerous (Lund & Lund, 2013). Any values considered risky or dangerous were investigated to determine if they should be removed.

The SPSS Statistics values for the Cook's Distance variable was used to determine whether any cases exhibited high influence on the observed value. The Cook's Distance variable is a measure of the overall influence of a case on the model with values greater than 1 being a cause for concern (Cook & Weisberg, 1982). Any cases with values greater than 1 were investigated to determine if they should be eliminated.

### **Summary**

The purpose of this research was to investigate the quality of reflective thinking practiced by certified human performance improvement professionals in the workplace. Further, it investigated relationships between participant demographics (gender, age, experience, education

level, and academic discipline) and the assessed quality of reflective thinking. The participants were solicited from the population of 697 performance improvement professionals certified as a CPT by the ISPI. The quality of reflective thinking practiced by participating CPTs was quantified using a version of the QRT modified for use in the workplace. After assessing the reliability and structure of the modified QRT, an associational approach was employed and a series of hierarchical regression models were created using SPSS Statistics to examine the dependent variables, scores on the QRT, with respect to the independent demographic categorical variables of gender, age, experience, education level, and academic discipline.

## **Chapter 4 - Findings**

### **Introduction**

This chapter provides analysis of the data collected during this research. To address the first research question, descriptive statistics for habitual action, understanding, reflection, and critical reflection QRT scores from the sample of CPTs that participated in this research were assembled. To address the second research question, demographic data for the sample of CPTs that participated in this research were assembled. Study participants (n = 108) responded to an invitation distributed via email by the ISPI Operations Manager to CPTs (N = 697), a response rate of 15.5%. Six responses were incomplete and could not be used, leaving 102 responses representing a usable response rate of 14.6%. This research used hierarchical multiple regression to determine how CPT's QRT scores relate to participant gender, age, experience, education, and academic discipline and address the third research question. Discussion of the quantitative data is divided into four sections. The first section describes the QRT scores of participating CPTs, the first research question. The second section describes the demographics of participating CPTs, the second research question. The third section discusses relationships between the QRT scores and participant demographic factors, the third research question. The fourth section describes the reliability and structural analysis of the QRT instrument.

### **Research Question 1: Reflective Thinking Scores**

The first research question is descriptive in nature: What are the reflective thinking scores for habitual action, understanding, reflection, and critical reflection as measured by the Questionnaire of Reflective Thinking (QRT) in a group of Certified Performance Technologist (CPT) professionals? Participating CPTs scored highest in reflection (17.25) followed closely by understanding (16.96), then critical reflection (16.08), and finally, habitual action (9.67).



Descriptive statistics for the QRT scores for habitual action, understanding, reflection, and critical reflection for all CPT responses to the survey are shown in Table 5.

Table 5  
*Descriptive Statistics of CPT QRT Scores*

	Habitual Action	Understanding	Reflection	Critical Reflection
N	102	102	102	102
Mean	9.67	16.96	17.25	16.08
Std Error of Mean	.288	.205	.177	.247
Std Deviation	2.912	2.068	1.789	2.496
Variance	8.482	4,276	3.202	6.231
Range	13	10	9	11
Minimum	4	10	11	9
Maximum	17	20	20	20

Mean scores for habitual action and critical reflection were lower than scores for understanding and reflection. This was not surprising based on the conceptual descriptions and is consistent with results from other studies (Buzdar & Ali, 2013; Dunn & Musolino, 2011; Kember et al., 2000; Lethbridge et al., 2013; Lucas & Tan, 2006). Those other studies involved students, and as noted by Lethbridge et al. (2013), “it would be expected that students use habitual action and critical reflection dimensions of reflective thinking less often than understanding and reflection dimensions during their educational programme” (p. 308). The CPT results indicate that this pattern also exists among practicing professionals in the workplace.

To see how the CPT QRT scores compared to those of other populations in other studies that used the QRT, the CPT QRT scores were compared to those reported by Kember (2000) when the QRT was developed, and those reported by Lucas and Tan (2006) evaluating the QRT for future use within a cohort of accounting and business studies undergraduates (Table 6). No other studies reporting complete, detailed results from using the QRT were found. Kember (2000) reported scores from the QRT completed by 265 undergraduates (year 3 = 42, year 2 =

163, and year 1 = 60) and 38 graduate health science students of a university in Hong Kong.

Lucas and Tan (2006) reported results of two cross-sectional groups of final year accounting and business studies undergraduates (n = 72 and n = 51); stage of the academic year when the QRT was completed was not reported.

Table 6  
*Comparison of Mean QRT Scores between CPTs and Previous Research*

Group	Size	HA (s.d.)	U (s.d.)	R (s.d.)	CR (s.d.)
CPTs	102	9.67 (2.91)	16.96 (2.07)	17.25 (1.79)	16.08 (2.50)
Kember (2000) health science students	303	10.58 (2.91)	15.88 (2.90)	15.25 (2.21)	12.70 (2.82)
CPT/Kember <i>t</i> -statistic mean difference ( <i>confidence level</i> )		-2.732* (99.34%) ( <i>df</i> =403)	3.474* (99.94%) ( <i>df</i> =403)	8.270* (100%) ( <i>df</i> =403)	10.763* (100%) ( <i>df</i> =403)
Lucas & Tan (2006) accounting & business students – 1 <sup>st</sup> issue	72	9.9 (2.6)	17.8 (1.7)	15.8 (2.4)	13.8 (3.2)
CPT/Lucas & Tan (1 <sup>st</sup> issue) <i>t</i> -statistic mean difference ( <i>confidence level</i> )		-.536 (40.76%) ( <i>df</i> =172)	-2.834* (99.48%) ( <i>df</i> =172)	5.565* (100%) ( <i>df</i> =172)	5.271* (100%) ( <i>df</i> =172)
Lucas & Tan (2006) accounting & business students – 2 <sup>nd</sup> issue	51	10.4 (3.0)	16.4 (2.7)	14.8 (3.2)	14.3 (3.6)
CPT/Lucas & Tan (2 <sup>nd</sup> issuer) <i>t</i> -statistic mean difference ( <i>confidence level</i> )		-1.448 (85.2%) ( <i>df</i> =151)	1.421 (84.26%) ( <i>df</i> =151)	6.073* (100%) ( <i>df</i> =151)	3.566* (99.95%) ( <i>df</i> =151)

\*-significantly different ( $p < .05$ )

The CPT QRT scores for understanding, reflection, and critical reflection were significantly higher and the score for habitual action was significantly lower than those Kember et al. (2000) reported from the first practical applications of the QRT with nursing undergraduate

and graduate students. The CPT QRT scores for reflection and critical reflection were significantly higher than the scores in both groups of the Lucas and Tan research. The CPT QRT score for understanding was significantly lower than the first group of the Lucas and Tan (2006) research, and higher, but not significantly higher, than the second group of the Lucas and Tan research. The CPT QRT score for habitual action was lower than both groups of the Lucas and Tan research, but not significantly lower. In all four cases, mean scores for habitual action and critical reflection were lower than those for understanding and reflection. The CPT scores for reflection were higher than their scores for understanding, just the opposite of the other three cases. The CPTs were generally older, had more experience, and had higher levels of education than the students in Kember et al. (2000) and Lucas and Tan (2006).

The number, means and standard deviations of QRT scores for habitual action, understanding, reflection, and critical reflection to responses to the survey items for each demographic factor category are shown in Table 7.

Table 7

*Descriptive Statistics of QRT Scores by Demographic Factor*

		QRT Scores							
		Habitual Action		Understanding		Reflection		Critical Reflection	
Gender	n	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Male	58	9.48	2.824	17.17	2.249	17.26	1.934	16.67	2.495
Female	44	9.91	3.041	16.68	1.788	17.25	1.601	15.30	2.298
Age	n	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
<=24	0								
25-34	3	9.00	5.292	17.67	2.082	18.33	2.082	17.00	1.732
35-44	11	11.64	2.803	16.82	2.136	16.55	1.440	16.73	1.902
45-54	28	10.29	2.522	16.86	1.779	17.21	1.931	15.68	2.982
55=>	60	9.05	2.831	17.00	2.217	17.35	1.764	16.10	2.384
Work Experience	n	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
<=5	1	7.00	-	16.00	-	19.00	-	16.00	-
6-10	9	8.78	3.420	17.00	1.803	17.22	1.302	17.11	2.147
11-15	12	11.08	2.712	17.58	1.832	18.00	1.537	17.17	1.697
16-20	19	9.42	3.203	17.00	1.795	16.79	2.097	15.84	2.500
21=>	61	9.64	2.763	16.84	2.252	17.23	1.783	15.79	2.640
Education Level	n	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
High School/Associate Degree	2	10.00	2.828	12.50	3.536	15.50	2.121	15.50	3.536
Bachelor Degree	10	9.60	2.011	15.60	2.757	16.70	2.111	14.40	2.366
Master Degree	62	9.63	2.982	17.19	1.716	17.26	1.755	16.34	2.134
Doctorate Degree	28	9.75	3.158	17.25	1.993	17.57	1.709	16.14	3.0763
Academic Discipline	n	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Pure/Hard	5	10.80	3.347	16.60	1.140	16.60	1.140	15.60	2.881
Pure/Soft	10	9.60	3.098	17.00	1.054	17.30	1.252	16.50	1.958
Applied/Hard	19	9.21	2.760	17.21	2.529	17.05	2.041	16.05	2.738
Applied/Soft	68	9.72	2.936	16.91	2.114	17.35	1.835	16.06	2.515

**Research Question 2: Participant Demographics**

The second research question is descriptive in nature: What are the demographics of the Certified Performance Technologist (CPT) professionals' population sample based on gender,

age, experience, education level, and academic discipline? Participants were nearly evenly divided by gender (male = 56.9% (58), female = 43.1% (44)) with 59% (60) being 55 or older, 27% (28) being 45-54 and only 11% (11) being between 35 and 44 and 3% (3) being between 24 and 34. There were no participants reported being 24 years old or younger. 59.8% (61) reported having more than 20 years of employment as a human performance professional, followed by 18.6% (19) having between 16 and 20, 11.8% (12) with between 11 and 15, 8.8% (9) with between 6 and 10, and only 1% (1) with 5 or less years of experience. Nearly 60.8% (62) reported having a master degree followed by 27.5% (28) with doctorate degrees, 9.8% (10) with Bachelor degrees, and approximately 2% (2) with a high school or associate degree. Two-thirds, 66.7% (68), classified their academic discipline as Applied/Soft: Applied where research results in products, techniques, protocols, or procedures, versus Pure, where research results are focused on discovery, explanation, understanding, and interpretation; and Soft, where the problems are often ill-structured, cannot be described always or be described completely, and certainty of solutions is elusive, versus Hard, where the parameters of problems can be specified with a high degree of certainty and where deductive logic and complex, logical manipulations are central tools. This was followed by 18.6% (19) who reported Applied/Hard, 9.8% (10) as Pure/Soft, and 4.9% (5) as Pure/Hard. More than 88% of CPTs reported having a master or doctorate degree, therefore it is possible that some CPTs have been educated in more than one of the four categories of academic discipline addressed in this research. The survey item asking about academic discipline followed the item asking about level of education (Appendix A). This may have influenced responders to indicate the academic discipline at their highest level of education, but that is not known for certain. The number and percentage of survey respondent results for

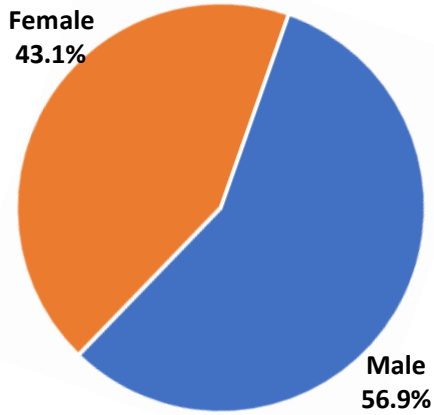
each independent categorical variable (gender, age, years of experience, education level, and academic discipline) are shown in Table 8 and Figure 4.

Table 8  
*Descriptive Statistics of Demographic Independent Categorical Factors*

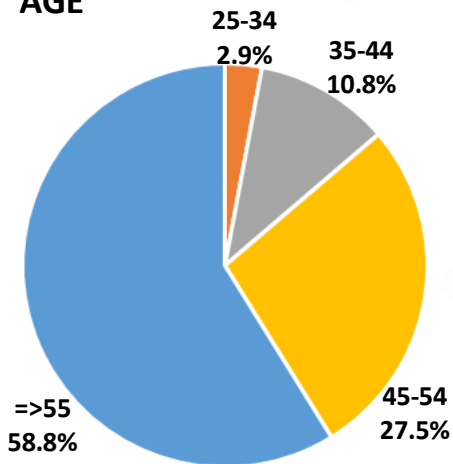
Gender	n	%
Male	58	56.9%
Female	44	43.1%
Age	n	%
≤ 24	0	0%
25-34	3	2.9%
35-44	11	10.8%
45-54	28	27.5%
≥ 55	60	58.8%
Years of Experience	n	%
≤ 5	1	1.0%
6-10	9	8.8%
11-15	12	11.8%
16-20	19	18.6%
≥ 21	61	59.8%
Education Level	n	%
High School/Associate Degree	2	2.0%
Bachelor Degree	10	9.8%
Master Degree	62	60.8%
Doctorate Degree	28	27.5%
Academic Discipline	n	%
Pure/Hard	5	4.9%
Pure/Soft	10	9.9%
Applied/Hard	19	18.6%
Applied/Soft	68	66.7%

Figure 4  
Demographic Independent Categorical Factors

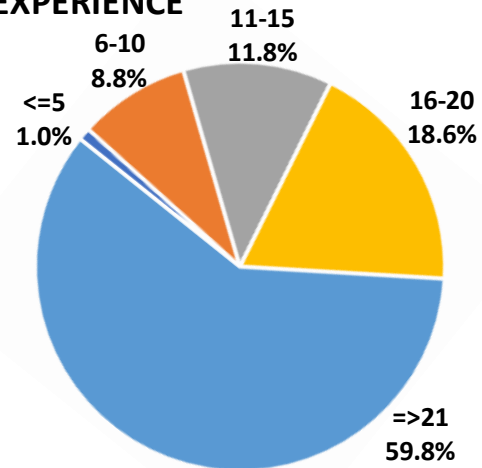
**GENDER**



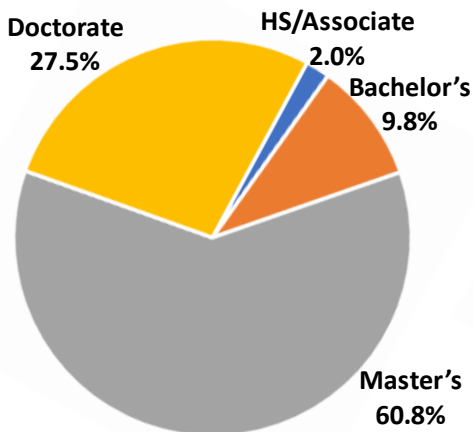
**AGE**



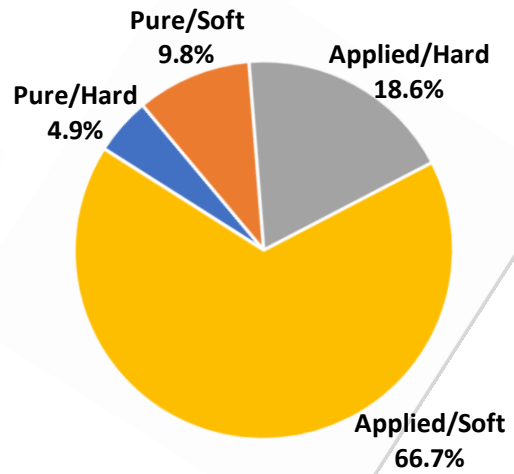
**EXPERIENCE**



**EDUCATION LEVEL**



**ACADEMIC DISCIPLINE**



The percentage of survey respondent results for each age, gender, education level, and academic discipline category for each level of experience category are shown in Table 9. A review of the percentage of survey respondent results for each age category for each level of experience category reveals a mix of ages for each level of experience category. Similarly, there is a mix of male and female CPTs for each level of experience category over 5 years.

Table 9  
*Age, Gender, Education, and Discipline versus Experience*

Variable	Experience				
	≤ 5	6-10	11-15	16-20	≥ 21
Age	1	9	12	19	61
25-34	100%	11.1%	0%	5.3%	0%
35-44		33.3%	41.7%	10.5%	1.6%
45-54		33.3%	50.0%	31.6%	21.3%
≥ 55		22.2%	8.3%	52.6%	77.0%
Gender	1	9	12	19	61
Male	0%	66.7%	66.7%	31.6%	62.3%
Female	100%	33.3%	33.3%	68.4%	37.7%
Education	1	9	12	19	61
HS/Associate Degree	0%	0%	0%	0%	3.3%
Bachelor Degree	0%	11.1%	0%	10.5%	11.4%
Master Degree	100%	77.8%	66.7%	84.2%	49.2%
Doctorate Degree	0%	11.1%	33.3%	5.3%	36.1%
Discipline	1	9	12	19	61
Applied-Soft	100%	55.6%	66.7%	73.7%	65.6%
Applied-Hard	0%	11.1%	25.0%	5.3%	22.9%
Pure-Soft	0%	22.2%	8.3%	10.5%	8.2%
Pure-Hard	0%	11.1%	0%	10.5%	3.3%

### **Research Question 3: Relationship of Demographic Factors and QRT Scores**

The third research question is: Do the demographic variables (gender, age, experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist (CPT) professionals? To address this question and determine if there was a significant difference in the QRT scores for habitual action, understanding, reflection, and critical reflection based on the



demographic variables, the data was examined using a series of hierarchical multiple regression models for each dependent variable, the CPT QRT scores for habitual action, understanding, reflection, and critical reflection. Using hierarchical multiple regression, the independent variables can be entered into the model in steps to determine how much each variable uniquely adds to the overall regression model. The independent variable age was entered first, followed by gender, then education was added, followed by experience, and academic discipline was added last. A separate hierarchical multiple regression analysis was performed for each of the dependent variables: QRT scores for habitual action, understanding, reflection, and critical reflection.

### **Hierarchical Multiple Regression Assumptions**

Parametric statistical procedures rely on assumptions about the distribution of the underlying population, the means and standard deviations of the distribution, and the presence and impact of outliers. To draw conclusions about a population based on a regression analysis done on a sample, several assumptions must be true (Field, 2009; Lund & Lund, 2013). Specifically, before deciding to use multiple regression to examine how CPT QRT scores for habitual action, understanding, reflection, and critical reflection relate to the gender, age, experience, level of education, and academic discipline of the CPTs, it was necessary to take into consideration the eight assumptions in Table 10.

Table 10  
*Assumptions for Using Hierarchical Multiple Regression*

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Assumption #1:	Dependent variable should be measured at the continuous level
Assumption #2:	Independent variables should be continuous or categorical
Assumption #3:	Independence of observations, which means that there is no relationship between the observations in each group or between the groups themselves
Assumption #4:	The relationship between the dependent variable and each of the independent variables, and the dependent variable and the independent variables collectively, is linear
Assumption #5:	The residuals are equal for all values of the dependent variable (homoscedasticity)
Assumption #6:	The independent variables are not highly correlated with each other (no multicollinearity)
Assumption #7	There should be no significant outliers, high leverage points, or highly influential points
Assumption #8	Residuals (errors) are approximately normally distributed

---

Source: Lund, A. and Lund, M. (2013)

The QRT scores for habitual action, understanding, reflection, and critical reflection were the dependent variables in this research and met assumption #1. The demographic attribute independent variables in this research each had from two to five categories, so assumption #2 was met. Participant responses to the study survey, each made independent of any other participant's response, were the study observations. To further ensure assumption #3 was met, independence of observations was checked using the Durbin-Watson statistic (Durbin & Watson, 1951) computed using SPSS which tests for serial correlations between errors. The Durbin-Watson test is a test for a particular type of independence, 1st-order autocorrelation, which means that adjacent observations (specifically, their errors) are correlated, not independent (Lund & Lund, 2013). Model summaries of CPT QRT scores including the Durbin-Watson statistic are displayed in Table 11. The Durbin-Watson statistic can vary between 0 and 4, with a value of 2 meaning that the residuals are uncorrelated (Field, 2009). There was independence of residuals,

as assessed by a Durbin-Watson statistic of 2.124 for habitual action, 2.037 for understanding, 1.951 for reflection, and 1.852 for critical reflection.

Table 11  
*Model Summaries of CPT QRT Scores*

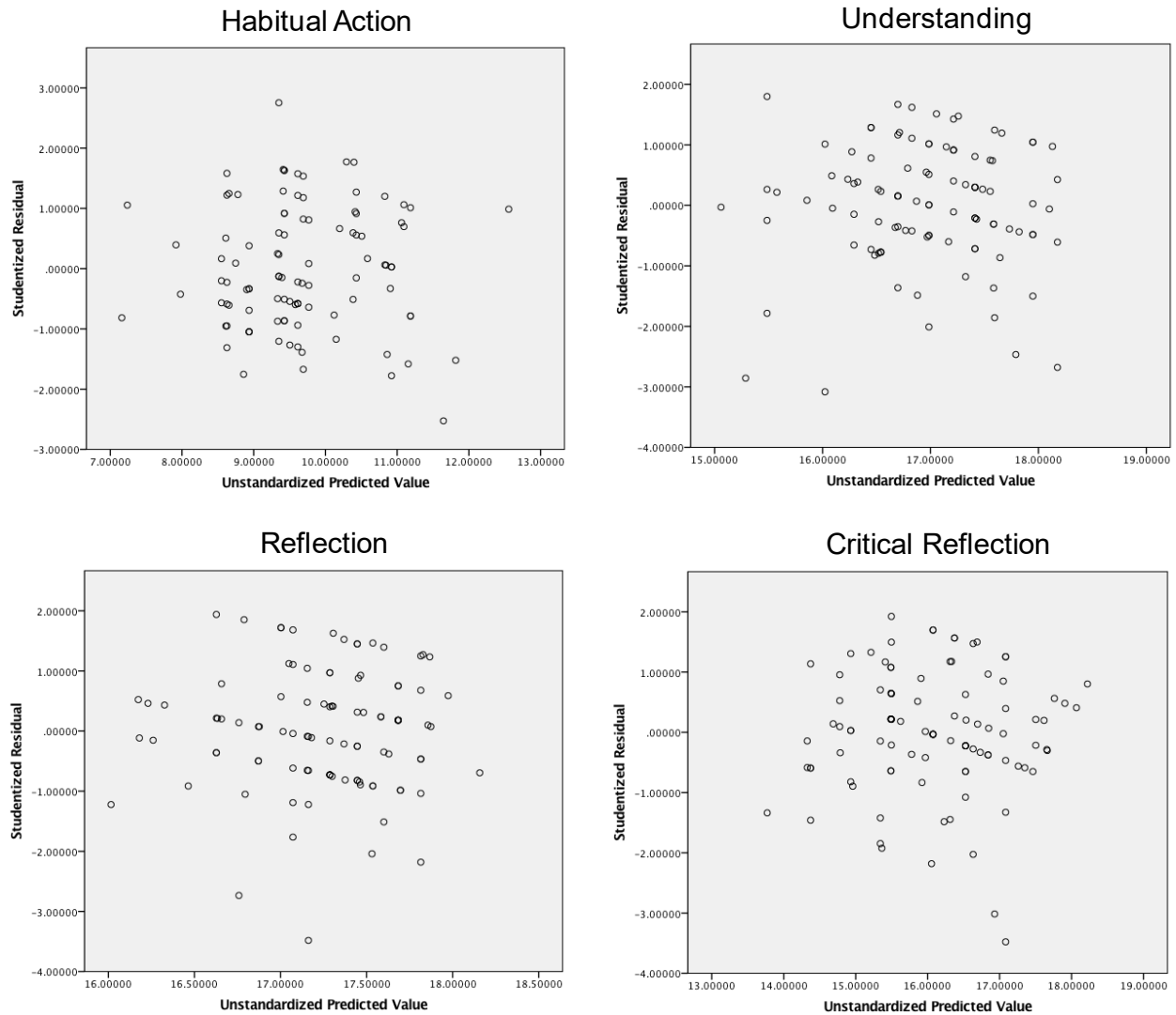
QRT Score	R*	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
HA	.328	.107	.041	2.852	2.124
U	.339	.115	.049	2.017	2.037
R	.250	.063	-.007	1.796	1.951
CR	.387	.150	.086	2.3864	1.852

\* independent variables: (Constant), gender, age, experience, education, discipline

Assumption #4 is that: (a) the independent variables collectively are linearly related to the dependent variable; and (b) each independent variable is linearly related to the dependent variable. A scatterplot of the studentized residuals against the unstandardized calculated values for each CPT QRT Score (HA, U, R, and CR) was used to establish if a linear relationship existed between the dependent and independent variables collectively (Lund & Lund, 2013). Since the residuals for HA, U, R and CR all form a horizontal band, as shown in the scatterplots in Figure 5, the relationship between the dependent variables (HA, U, R, and CR) and the independent variables collectively (gender, age, experience, education, and discipline) is likely to be linear (Lund & Lund, 2013). Because each of the independent variables was a categorical variable, the need to establish if a linear relationship exists between the dependent variable and each of the independent variables can be ignored (Lund & Lund, 2013).

Figure 5

*QRT Habitual Action, Understanding, Reflection, and Critical Reflection Studentized Residuals against Unstandardized Calculated Values*



The assumption of homoscedasticity, assumption #5, is that the residuals are equal for all values of the calculated dependent variable. The plots of the studentized residuals against the unstandardized calculated values in Figure 5 used to check for linearity (assumption #4) can be used to check for heteroscedasticity (assumption #5) as well (Lund & Lund, 2013). If the spread of the residuals does not increase or decrease across the calculated values (i.e., the points of the plot exhibit no pattern and are approximately constantly spread) then the assumption of

homoscedasticity is met. There was homoscedasticity, as assessed by visual inspection of the plot of studentized residuals versus unstandardized calculated values for CPT QRT scores for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) in Figure 5.

There are two stages to identifying multicollinearity and testing assumption #6: inspection of correlation coefficients and Tolerance/VIF values. Multicollinearity occurs when you have two or more independent variables that are highly correlated with each other. Pearson correlation coefficients of CPT independent variables (gender, age, experience, education, and academic discipline) for the dependent CPT QRT scores for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) generated by SPSS Statistics are displayed in Tables 12, 13, 14, and 15. Inspection of these correlations, the first stage of identifying multicollinearity, revealed there were no correlations larger than 0.7 indicating none of the independent variables are highly correlated with each other (Field, 2009; Lund & Lund, 2013).

Table 12  
*Correlations of Independent Variables for CPT Habitual Action (HA) Scores*

Pearson Coefficient	HA	Gender	Age	Experience	Education	Applied/Soft vs Applied/Hard	Applied/Soft vs Pure/Soft	Applied/Soft vs Pure/Hard
HA	1.000	.073	-.232	.017	.009	-.075	-.008	.089
Gender	.073	1.000	-.014	-.040	.029	-.264	-.087	-.106
Age	-.232	-.014	1.000	.593	-.017	-.032	-.009	-.348
Experience	.017	-.040	.593	1.000	.045	.092	-.087	-.060
Education	.009	.029	-.017	.045	1.000	-.062	.132	.022
Applied/Soft vs Applied/Hard	-.075	-.264	-.032	.092	-.062	1.000	-.158	-.109
Applied/Soft vs Pure/Soft	-.008	-.087	-.009	-.087	.132	-.158	1.000	-.075
Applied/Soft vs Pure/Hard	.089	-.106	-.348	-.060	.022	-.109	-.075	1.000

Table 13  
*Correlations of Independent Variables for CPT Understanding (U) Scores*

Pearson Coefficient	U	Gender	Age	Experience	Education	Applied/Soft vs Applied/Hard	Applied/Soft vs Pure/Soft	Applied/Soft vs Pure/Hard
U	1.000	-.118	-.002	-.059	.287	.058	.006	-.040
Gender	-.118	1.000	-.014	-.040	.029	-.264	-.087	-.106
Age	-.002	-.014	1.000	.593	-.017	-.032	-.009	-.348
Experience	-.059	-.040	.593	1.000	.045	.092	-.087	-.060
Education	.287	.029	-.017	.045	1.000	-.062	.132	.022
Applied/Soft vs Applied/Hard	.058	-.264	-.032	.092	-.062	1.000	-.158	-.109
Applied/Soft vs Pure/Soft	.006	-.087	-.009	-.087	.132	-.158	1.000	-.075
Applied/Soft vs Pure/Hard	-.040	-.106	-.348	-.060	.022	-.109	-.075	1.000

Table 14  
*Correlations of Independent Variables for CPT Reflection (R) Scores*

Pearson Coefficient	R	Gender	Age	Experience	Education	Applied/Soft vs Applied/Hard	Applied/Soft vs Pure/Soft	Applied/Soft vs Pure/Hard
R	1.000	-.002	.049	-.080	.180	-.054	.008	-.084
Gender	-.002	1.000	-.014	-.040	.029	-.264	-.087	-.106
Age	.049	-.014	1.000	.593	-.017	-.032	-.009	-.348
Experience	-.080	-.040	.593	1.000	.045	.092	-.087	-.060
Education	.180	.029	-.017	.045	1.000	-.062	.132	.022
Applied/Soft vs Applied/Hard	-.054	-.264	-.032	.092	-.062	1.000	-.158	-.109
Applied/Soft vs Pure/Soft	.008	-.087	-.009	-.087	.132	-.158	1.000	-.075
Applied/Soft vs Pure/Hard	-.084	-.106	-.348	-.060	.022	-.109	-.075	1.000

Table 15  
*Correlations of Independent Variables for CPT Critical Reflection (CR) Scores*

Pearson Coefficient	CR	Gender	Age	Experience	Education	Applied/Soft vs Applied/Hard	Applied/Soft vs Pure/Soft	Applied/Soft vs Pure/Hard
CR	1.000	-.275	-.056	-.187	.125	-.005	.056	-.044
Gender	-.275	1.000	-.014	-.040	.029	-.264	-.087	-.106
Age	-.056	-.014	1.000	.593	-.017	-.032	-.009	-.348
Experience	-.187	-.040	.593	1.000	.045	.092	-.087	-.060
Education	.125	.029	-.017	.045	1.000	-.062	.132	.022
Applied/Soft vs Applied/Hard	-.005	-.264	-.032	.092	-.062	1.000	-.158	-.109
Applied/Soft vs Pure/Soft	.056	-.087	-.009	-.087	.132	-.158	1.000	-.075
Applied/Soft vs Pure/Hard	-.044	-.106	-.348	-.060	.022	-.109	-.075	1.000

The second stage of identifying multicollinearity is inspection of Tolerance and Variance Inflation Factor (VIF) values. VIF is the reciprocal of Tolerance and quantifies the severity of multicollinearity in an ordinary least squares regression analysis. It provides an index that measures how much the variance of an estimated regression coefficient is increased because of collinearity. A Tolerance value less than 0.1 – which is a VIF of greater than 10 – is an indicator assumption #6 has been violated (Field, 2009; Lund & Lund, 2013). Tolerance and VIF values for the five independent variables of gender, age, experience, education, and academic discipline for CPT QRT scores were computed using SPSS Statistics and are displayed in Table 16. All the Tolerance values are greater than 0.1 (the lowest is 0.530) so, as was the case with examination of the correlation tables, none of the independent variables appear to be highly correlated with each other and assumption #6 is met for this set of data.

Table 16  
*Tolerance and VIF Values for Independent Variables of CPT QRT Scores*

	Collinearity Stats.	
	Tolerance	VIF
Gender	.883	1.133
Age	.530	1.886
Experience	.599	1.669
Education	.972	1.029
Applied/Soft vs Applied/Hard	.842	1.187
Applied/Soft vs Pure/Soft	.921	1.086
Applied/Soft vs Pure/Hard	.792	1.262

Unusual points (e.g., outliers, leverage points, and influential points) have a negative impact on the regression equation used to calculate the value of the dependent variable based on the independent variables, thus the need for assumption #7. SPSS Statistics was used to detect outliers using case-wise diagnostics to detect whether particular standardized residuals (residuals divided by an estimate of their standard deviation) and an examination of studentized deleted residuals (unstandardized residuals divided by an estimate of their standard deviation) to identify any cases where the residual is greater than +/-3 standard deviations. These case-wise diagnostics identified one outlier for QRT scores for reflection (one case with a standardized residual greater than +/- 3 standard deviations from the mean) and one outlier for QRT scores for critical reflection (Table 17).

Table 17  
*Outliers from Case Wise Diagnostics of CPT QRT Scores*

QRT Score	Case #	Std. Residual ( $< -3$ or $> 3$ )
HA	none	
U	none	
R	27	-3.431
CR	38	-3.388



Examination of the studentized deleted residual identified the same two potential outliers (case 27 for reflection, and case 38 for critical reflection) plus one additional potential outlier (case 13 for understanding) with studentized deleted residuals greater than +/-3 standard deviations of the mean (Table 18). Examination of these three cases failed to reveal any data entry errors.

Table 18  
*Potential Outliers from Examination of Studentized Deleted Residuals of CPT QRT Scores*

QRT Score	Case #	Studentized Deleted Residual ( $< -3$ or $> 3$ )
HA	none	
U	13	-3.234
R	27	-3.711
CR	38	-3.706

SPSS Statistics was used to produce the leverage values for each case. A general rule of thumb to determine whether any cases exhibit high leverage is to consider leverage values less than 0.2 as safe, 0.2 to less than 0.5 as risky, and values of 0.5 and above as dangerous (Field, 2009; Lund & Lund, 2013). Inspection of ordered leverage values for CPT QRT scores identified four “risky” cases with leverage values between 0.2 and 0.5 for all four QRT scores (Table 19). Examination of these cases failed to reveal any data entry errors.

Table 19  
*Potential Risky Points from Examination of Leverage Values of CPT QRT Scores*

QRT Score	Case #	Leverage Value
HA, U, R, CR	8	.334
	9	.237
	65	.236
	97	.216

To check for influential points, SPSS Statistics was used to compute Cook’s Distance values for each CPT QRT scores case. As a rule of thumb, any Cook’s Distance values above 1

should be investigated (Cook & Weisberg, 1982; Field, 2009; Lund & Lund, 2013).

Examination of Cook's Distance values identified all values were below 1, therefore there are no influential points needing investigation.

The diagnostics used to identify outliers, leverage points, and influence points that have a negative impact on the regression model are tools for identification of how good or bad the model is in terms of fitting the sampled data. They are not, however, a way of justifying the removal of data points to affect some desirable change in the regression parameters.

Investigation of assumption #7 identified three potential outlying cases (one each for understanding, reflection, and critical reflection) and four risky cases. However, Cook's distance for all cases, including these potential outliers and risky cases, was  $<1$ . Therefore, there was no need to delete any of these cases since none of them had a large effect on the regression analysis (Stevens, 2002, p. 135, as cited in Field, 2009, p. 219).

The final assumption for using multiple regression to examine the set of data on CPT independent variables and dependent QRT scores is that residuals are approximately normally distributed. Two common methods were used to check the assumption of normality of the residuals (Field, 2009; Lund & Lund, 2013): (1) a histogram with superimposed normal curve and a P-P Plot (Figures 6 through 9); and (2) a Normal Q-Q Plot of the studentized residuals (Figure 10).

Figure 6  
*Frequency Distribution and Normal P-P Plots of CPT Habitual Action (HA) Regression Standardized Residuals*

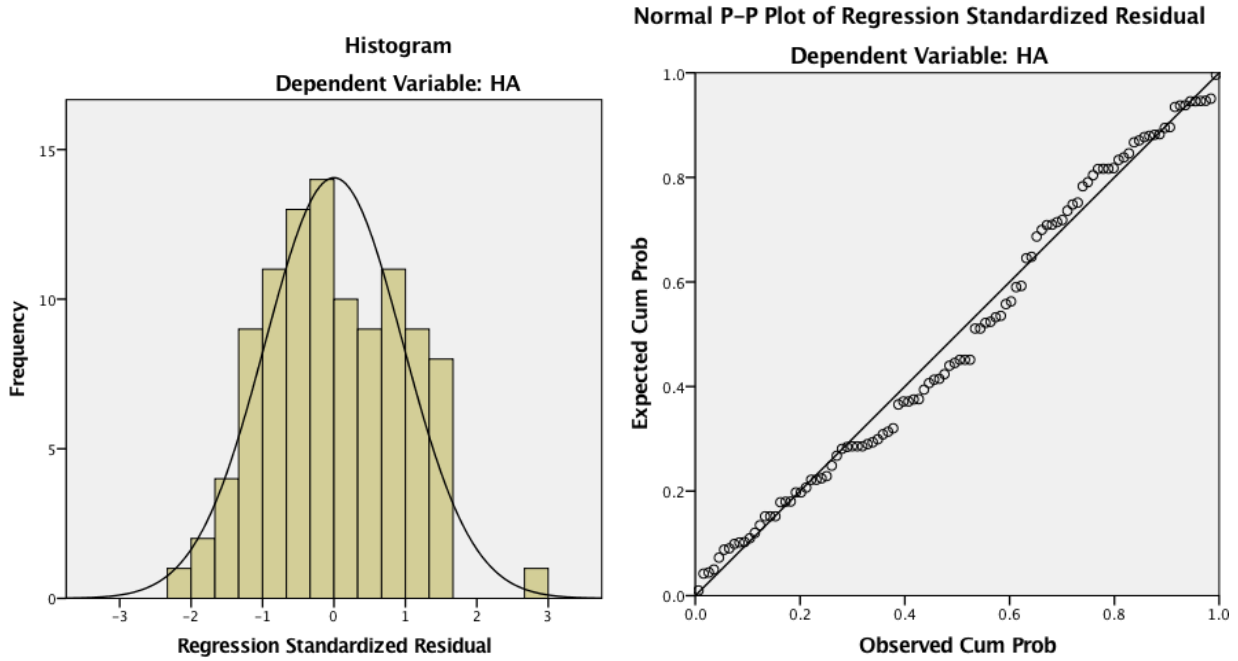


Figure 7  
*Frequency Distribution and Normal P-P Plots of CPT Understanding (U) Regression Standardized Residuals*

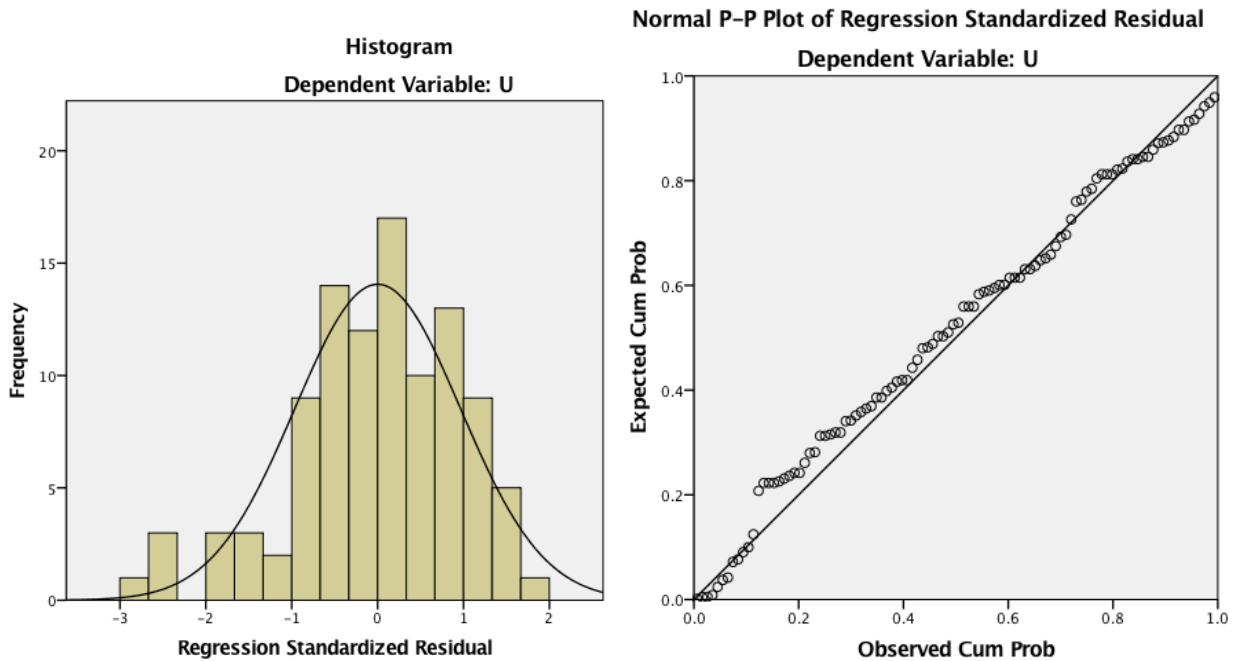


Figure 8

*Frequency Distribution and Normal P-P Plots of CPT Reflection (R) Regression Standardized Residuals*

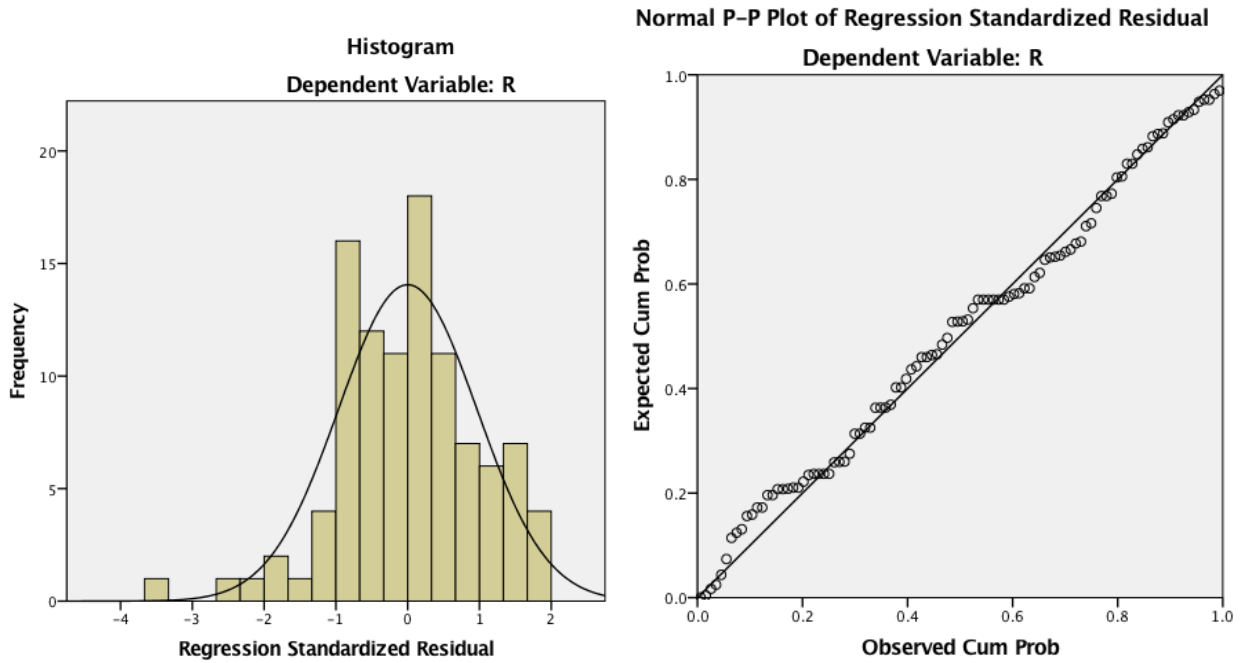


Figure 9

*Frequency Distribution and Normal P-P Plots of CPT Critical Reflection (CR) Regression Standardized Residuals*

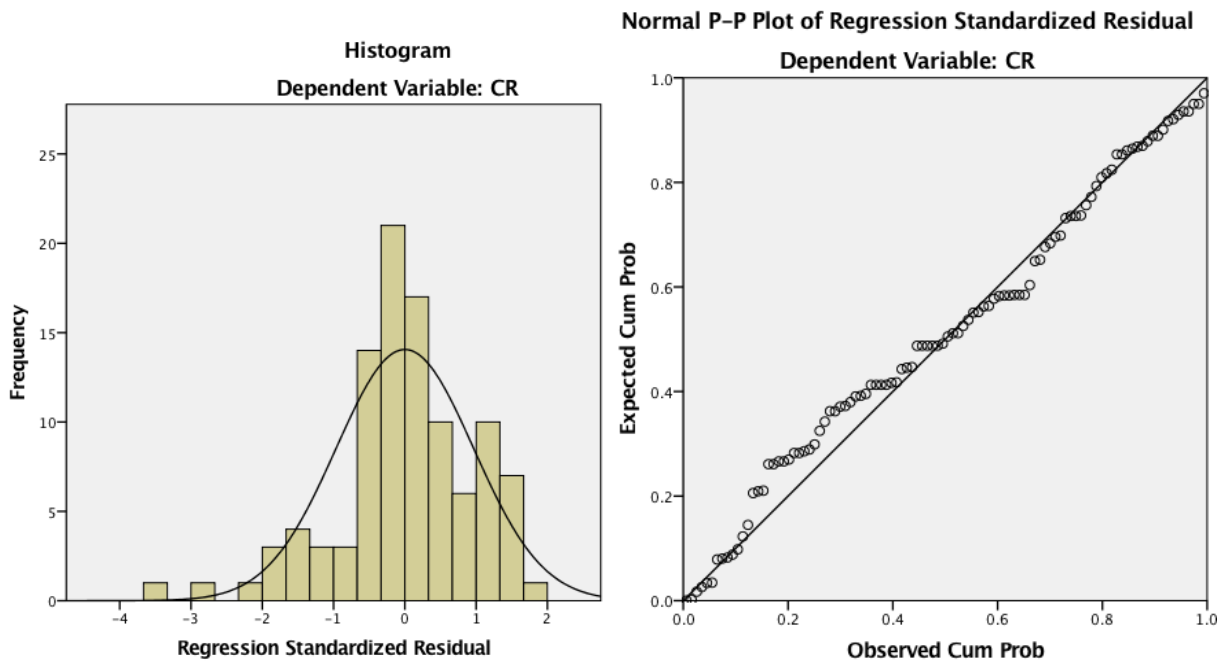
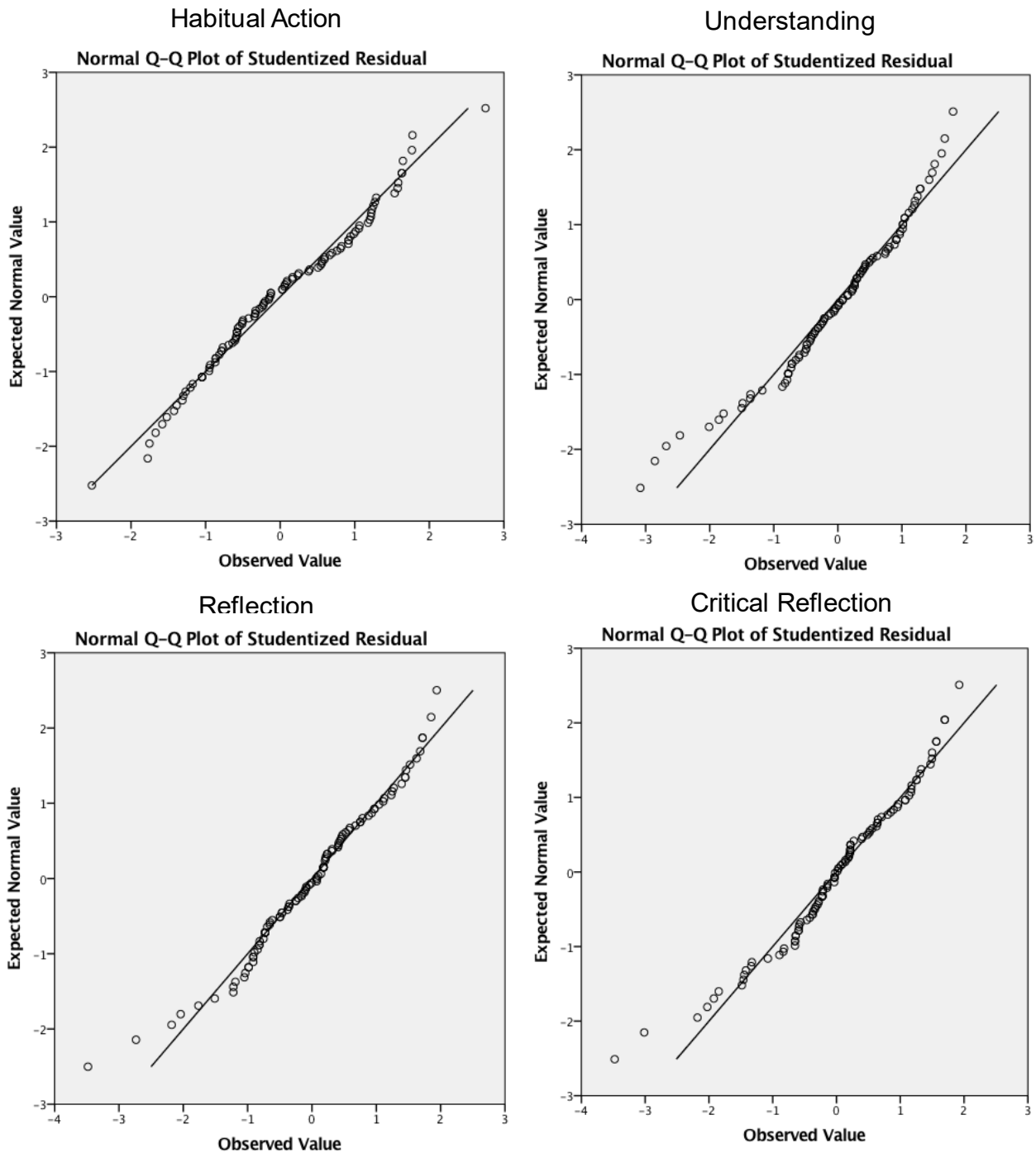


Figure 10  
Normal Q-Q Plots of Studentized Residuals for CPT QRT Scores for Habitual Action (HA), Understanding (U), Reflection (R), and Critical Reflection (CR)



From examination of the histograms, the Regression Standardized Residuals for CPT QRT habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) were

approximately normal with habitual action moderately, positively skewed and understanding, reflection, and critical reflection moderately, negatively skewed. Examination of the P-P Plots and the Q-Q Plots showed that although the points were not aligned perfectly along the diagonal line, they were close, indicating that the residuals were close to normal. As multiple regression analysis is robust against deviations from normality (Field, 2009; Lund & Lund, 2013), this result was accepted as evidence the assumption of normality was not violated.

### **Determining Differences Between Models and Model Fit**

The main objective of a hierarchical multiple regression is to determine the proportion of the variation in the dependent variable explained by the addition of new independent variables (Field, 2009; Lund & Lund, 2013). In standard multiple regression, all the independent variables are entered into the regression model at the same time. In hierarchical multiple regression, the independent variables are entered into the regression model a few at a time. The order independent variables are entered into the model is based on what has been learned from prior research (Field, 2009). The independent variable age was entered first, followed by gender, then education was added, followed by experience, and academic discipline was added last. Each model had measures that showed how well that model explained the dependent variable. In other words, what was the impact the additional independent variable to the regression model. Table 20 summarizes these measures for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) models.

Table 20

*Habitual Action (HA), Understanding (U), Reflection (R), and Critical Reflection (CR)*  
*Hierarchical Regression Models Summary*

Model	<i>R</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	Std Error of Estimate	Change Statistics				
					<i>R</i> <sup>2</sup> Change	<i>F</i> Change	df1	df2	Sig <i>F</i> Change
<b>Habitual Action (HA)</b>									
1 <sup>a</sup>	.232	.054	.044	2.847	.054	5.683*	1	100	.019
2 <sup>b</sup>	.242	.059	.040	2.854	.005	.511	1	99	.476
3 <sup>c</sup>	.242	.059	.030	2.869	.000	.001	1	98	.978
4 <sup>d</sup>	.311	.097	.060	2.824	.038	4.112*	1	97	.045
5 <sup>e</sup>	.328	.107	.041	2.852	.010	.367	3	94	.777
<b>Understanding (U)</b>									
1 <sup>a</sup>	.002	.000	-.010	2.078	.000	.000	1	100	.985
2 <sup>b</sup>	.118	.014	-.006	2.074	.014	1.701	1	99	.239
3 <sup>c</sup>	.313	.098	.071	1.993	.084	9.150*	1	98	.003
4 <sup>d</sup>	.328	.108	.071	1.993	.009	1.028	1	97	.313
5 <sup>e</sup>	.339	.115	.049	2.017	.007	.253	3	94	.859
<b>Reflection (R)</b>									
1 <sup>a</sup>	.049	.002	-.008	1.796	.002	.237	1	100	.628
2 <sup>b</sup>	.049	.002	-.018	1.805	.000	.000	1	99	.986
3 <sup>c</sup>	.187	.035	.005	1.784	.033	3.308	1	98	.072
4 <sup>d</sup>	.239	.057	.018	1.773	.022	2.270	1	97	.135
5 <sup>e</sup>	.250	.063	-.007	1.796	.006	.185	3	94	.906
<b>Critical Reflection (CR)</b>									
1 <sup>a</sup>	.056	.003	-.007	2.505	.003	.318	1	100	.574
2 <sup>b</sup>	.281	.079	.060	2.420	.076	8.149*	1	99	.005
3 <sup>c</sup>	.311	.097	.069	2.409	.018	1.905	1	98	.171
4 <sup>d</sup>	.376	.141	.106	2.361	.045	5.036*	1	97	.027
5 <sup>e</sup>	.387	.150	.086	2.386	.009	.318	3	94	.812

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

\*  $p < .05$

The multiple correlation coefficient is the Pearson correlation coefficient (*R*) between the scores calculated by the regression model and the actual values of the dependent variables (i.e., the QRT scores of habitual action (HA), understanding (U), reflection (R), and critical reflection (CR)). The coefficient of determination (*R*<sup>2</sup>) is a measure of the proportion of variance in the

dependent variable explained by the independent variables. In other words,  $R^2$  is the proportion of variance in the dependent variable that is explained by the independent variables over and above the mean model. The mean model is the mean of the dependent variable. The variability of the model will be lower than the variability of the mean model because there has been a reduction in variability caused or explained by the addition of the independent variables.  $R^2$  is a measure of overall regression model fit. It is the measure of most importance for the interpretation of hierarchical multiple regression. Examination of Table 20 shows that for each dependent variable (habitual action, understanding, reflection, and critical reflection), a greater amount of the variation in the dependent variable was explained for each model starting with Model 1 (age), to Model 2 (adding in gender), to Model 3 (adding in education) to Model 4 (adding in experience) and finally Model 5 (adding in academic discipline).

$R^2$ , however, is based on the sample and is considered a positively-biased estimate of the proportion of the variance of the dependent variable accounted for by the regression model. To mitigate the effect of this positive bias, another measure called the adjusted  $R^2$  is used which corrects this positive bias to provide a value expected in the study population. The adjusted  $R^2$  will always be smaller than  $R^2$ , but is often used to report the percentage of variance explained (Field, 2009; Lund & Lund, 2013). Examining the change in the  $R^2$  value from the previous models ( $R^2$  Change column) along with whether this change is statistically significance (Sig.  $F$  Change column) identifies in what way the independent variables improved the variance explained at each stage (Model 1 to Model 2, Model 2 to Model 3, Model 3 to Model 4, Model 4 to Model 5).

For habitual action (HA) (Table 20), the value of  $R^2$  was .054 for Model 1 including the independent variable for age. This model was statistically significant ( $p = .019$  under the “Sig  $F$



Change” column). The addition of the independent variable for gender (Model 2) produced a value of  $R^2 = .059$ , an increase of .005, or about .5%, but not a statistically significant increase;  $F(1, 99) = .511, p = .476$ . The addition of the independent variable for education (Model 3) did not change the value of  $R^2$ , therefore the addition of education did not add statistically significantly to the calculation of habitual action. The addition of the independent variable for experience (Model 4), however, produced a value of  $R^2 = .097$ , an increase of .038, or about 3.8%, a statistically significant increase;  $F(1, 97) = 4.112, p = .045$ . Finally, the addition of the independent variables representing academic discipline (Model 5) produced a value of  $R^2 = .107$ , an increase of .010, or only about 1%, not a statistically significant increase;  $F(3, 94) = .367, p = .777$ .

For understanding (U) (Table 20), the value of  $R^2$  was .000 for Model 1 including the independent variable for age. This model was not statistically significant ( $p=.985$ ). The addition of the independent variable for gender (Model 2) produced a value of  $R^2 = .014$ , an increase of .014, or about 1.4%, but not a statistically significant increase;  $F(1, 99) = 1.701, p = .239$ . The addition of the independent variable for education (Model 3), however, produced a value of  $R^2 = .098$ , an increase of .084, or about 8.4%, a statistically significant increase;  $F(1, 98) = 9.150, p = .003$ . The addition of the independent variable for experience (Model 4) produced a value of  $R^2 = .108$ , an increase of .009, or just less than 1%, not a statistically significant increase;  $F(1, 97) = 1.028, p = .313$ . Finally, the addition of the independent variables representing academic discipline (Model 5) produced a value of  $R^2 = .115$ , an increase of .007, or less than 1%, not a statistically significant increase;  $F(3,94) = .253, p = .859$ .

For reflection (R) (Table 20), the value of  $R^2$  was .002 for (Model 1 including the independent variable for age. This model was not statistically significant ( $p = .628$ ). The

addition of the independent variable for gender (Model 2) did not change the value of  $R^2$ , therefore the addition of gender did not add statistically significantly to the calculation of reflection. The addition of the independent variable for education (Model 3) produced a value of  $R^2 = .035$ , an increase of .033, or about 3.3%, not a statistically significant increase;  $F(1, 98) = 3.308, p = .072$ . Similarly, the addition of the independent variable for experience (Model 4) produced a value of  $R^2 = .057$ , an increase of .022, or about 2.2%, not a statistically significant increase;  $F(1, 97) = 2.270, p = .135$ . Finally, the addition of the independent variables representing academic discipline (Model 5) produced a value of  $R^2 = .063$ , an increase of .006, or only about .6%, not a statistically significant increase;  $F(3, 94) = .185, p = .906$ .

For critical reflection (CR) (Table 20), the value of  $R^2$  was .003 for Model 1 including the independent variable for age. This model was statistically significant ( $p = .574$ ). The addition of the independent variable for gender (Model 2), however, produced a value of  $R^2 = .079$ , an increase of .076, or about 7.6%, a statistically significant increase;  $F(1, 99) = 8.149, p = .005$ . The addition of the independent variable for education (Model 3) produced a value of  $R^2 = .097$ , an increase of .018, or less than 2%, not a statistically significant increase;  $F(1, 98) = 1.905, p = .171$ . However, the addition of the independent variable for experience (Model 4) produced a value of  $R^2 = .141$ , an increase of .045, or about 4.5%, a statistically significant increase;  $F(1, 97) = 5.036, p = .027$ . Finally, the addition of the independent variables representing academic discipline (Model 5) produced a value of  $R^2 = .150$ , an increase of .009, or just less than 1%, not a statistically significant increase;  $F(3, 94) = .318, p = .812$ .

The order the independent variables were entered into the models was varied in subsequent runs to determine impact on the identified significant relationships identified between demographic factors and QRT scores. When the independent variables representing academic

discipline were entered first of second and gender was entered last, there was no significance relationship between gender and CR while the other significant relationships remained.

Of the four full models, the highest assessment of overall model fit was for critical reflection with an  $R^2$  for the overall model of .150 and an adjusted  $R^2$  of .086. This means that the independent variables of gender, age, experience, education, and academic discipline accounted for 15% of the variability in the QRT score for critical reflection in the model. The adjusted  $R^2$  provides an indicator of how well the model generalizes. The difference between the  $R^2$  and adjusted  $R^2$  values is:  $.150 - .086 = .064$  (a reduction of about 43%). This shrinkage means that if the model were derived from the accessible population of CPTs rather than a sample, it would account for about 43% less variance in the outcome. The next highest assessment of overall model fit was for understanding with an  $R^2$  for the overall model of .115 and an adjusted  $R^2$  of .049. The model for habitual action was next with an  $R^2$  for the overall model of .107 and an adjusted  $R^2$  of .041. The lowest assessment of overall model fit was reflection with an  $R^2$  for the overall model of .063 and an adjusted  $R^2$  of .007. These statistics indicate that the combination of the independent variables of gender, age, experience, education, and academic discipline accounted for a small portion of the total variance in QRT scores for habitual action (about 11%), understanding (about 12%), reflection (about 6%), and critical reflection (about 15%).

### **Statistical Significance of the QRT Score Models**

The statistical significance of the five regression models for QRT scores of habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) are displayed in Tables 21 through 25. This statistical significance is an indicator of whether the model is significantly better at calculating the outcome than using the mean as a “best guess.”

Table 21  
*Statistical Significance of QRT Scores Model 1*

QRT Score Model		Sum of Squares	df	Mean Square	<i>F</i>	Sig.
HA	Regression	46.066	1	46.066	5.683*	.019
	Residual	810.600	100	8.106		
	Total	856.667	101			
U	Regression	.002	1	.002	.000	.985
	Residual	431.842	100	4.318		
	Total	431.843	101			
R	Regression	.764	1	.764	.237	.628
	Residual	322.609	100	3.226		
	Total	323.373	101			
CR	Regression	1.994	1	1.994	.318	.574
	Residual	627.379	100	6.274		
	Total	629.373	101			

Note: Independent Variables: (Constant), Age, \*  $p < .05$

Table 22  
*Statistical Significance of QRT Scores Model 2*

QRT Score Model		Sum of Squares	df	Mean Square	<i>F</i>	Sig.*
HA	Regression	50.229	2	25.114	3.083*	.050
	Residual	806.438	99	8.146		
	Total	856.667	101			
U	Regression	6.027	2	3.014	.701	.499
	Residual	425.816	99	4.301		
	Total	431.843	101			
R	Regression	.765	2	.382	.117	.889
	Residual	322.608	99	3.259		
	Total	323.373	101			
CR	Regression	49.706	2	24.853	4.245*	.017
	Residual	579.667	99	5.855		
	Total	629.373	101			

Note: Independent Variables: (Constant), Age and Gender, \*  $p < .05$

Table 23  
*Statistical Significance of QRT Scores Model 3*

QRT Score Model		Sum of Squares	df	Mean Square	F	Sig.*
HA	Regression	50.235	3	16.745	2.035	.114
	Residual	806.432	98	8.229		
	Total	856.667	101			
U	Regression	42.389	3	14.130	3.555*	.017
	Residual	389.454	98	3.974		
	Total	431.843	101			
R	Regression	11.298	3	3.766	1.183	.320
	Residual	312.075	98	3.184		
	Total	323.373	101			
CR	Regression	60.758	3	20.253	3.491*	.019
	Residual	568.614	98	5.802		
	Total	629.373	101			

Note: Independent Variables: (Constant), Age, Gender, and Education, \*  $p < .05$

Table 24  
*Statistical Significance of QRT Scores Model 4*

QRT Score Model		Sum of Squares	df	Mean Square	F	Sig.*
HA	Regression	83.032	4	20.758	2.603*	.041
	Residual	773.635	97	7.976		
	Total	856.667	101			
U	Regression	46.473	4	11.618	2.924*	.025
	Residual	385.370	97	3.973		
	Total	431.843	101			
R	Regression	18.433	4	4.608	1.466	.219
	Residual	304.939	97	3.144		
	Total	323.373	101			
CR	Regression	88.823	4	22.206	3.985*	.005
	Residual	540.550	97	5.573		
	Total	629.373	101			

Note: Independent Variables: (Constant), Age, Gender, Education, and Experience, \*  $p < .05$

Table 25  
*Statistical Significance of QRT Scores Model 5*

QRT Score Model		Sum of Squares	df	Mean Square	<i>F</i>	Sig.*
HA	Regression	91.993	7	13.142	1.616	.140
	Residual	764.674	94	8.135		
	Total	856.667	101			
U	Regression	49.560	7	7.080	1.741	.109
	Residual	382.283	94	4.067		
	Total	431.843	101			
R	Regression	20.227	7	2.890	.896	.513
	Residual	303.145	94	3.225		
	Total	323.373	101			
CR	Regression	94.261	7	13.466	2.365*	.029
	Residual	535.111	94	5.693		
	Total	629.373	101			

Note: Independent Variables: (Constant), Age, Gender, Education, Experience, and Discipline,  
 \*  $p < .05$

Tables 21 through 25 are each split into four sections; one for the model for each QRT score. The Regression Sum of Squares values represent the improvement in estimation resulting from fitting a regression line to the data rather than using the means as an estimate. The Residual Sum of Squares represents the total difference between the model and the observed data. The Mean Square is the Sum of Squares divided by the degrees of freedom (df). The value of *F* is computed as the ratio of the average improvement in estimation by the model (Mean Square for the Regression model) and the average difference between the model and the observed data (Mean Square for the Residual). The *F*-ratio represents the ratio of the improvement in estimation that results from fitting the model, relative to the inaccuracy that still exists in the model. For the habitual action (HA), understanding (U), and critical reflection (CR) models, the value of *F* is greater than 1. This indicates the improvement in estimation from fitting the regression models is much greater than the inaccuracy within the model. The “Sig.” column displays the probability of obtaining the value of *F* by chance as computed by SPSS (Field, 2009).

Of the four models including only the independent variable for age (Table 21), only the model for habitual action (HA) was statistically significant,  $R^2 = .054$ ,  $F(1, 100) = 5.683$ ,  $p = .019$ , adjusted  $R^2 = .044$ . Of the four models including the independent variables for age and gender (Table 22), the models for habitual action (HA),  $R^2 = .059$ ,  $F(2, 99) = 3.083$ ,  $p = .050$ , adjusted  $R^2 = .040$ , and for critical reflection (CR),  $R^2 = .079$ ,  $F(2, 99) = 4.245$ ,  $p = .017$ , adjusted  $R^2 = .060$ , were statistically significant. Of the four models including the independent variables for age, gender, and education (Table 23), the models for understanding (U),  $R^2 = .098$ ,  $F(3, 98) = 3.555$ ,  $p = .017$ , adjusted  $R^2 = .071$ , and for critical reflection (CR),  $R^2 = .097$ ,  $F(3, 98) = 3.491$ ,  $p = .019$ , adjusted  $R^2 = .069$ , were statistically significant. Of the four models including the independent variables for age, gender, education, and experience (Table 24), the models for habitual action (HA),  $R^2 = .097$ ,  $F(4, 97) = 2.603$ ,  $p = .041$ , adjusted  $R^2 = .060$ , and for critical reflection (CR),  $R^2 = .141$ ,  $F(4, 97) = 3.985$ ,  $p = .005$ , adjusted  $R^2 = .106$ , were statistically significant. Of the four full models including the independent variables for age, gender, education, experience, and discipline (Table 25), only the model for critical reflection (CR) was statistically significant,  $R^2 = .150$ ,  $F(7, 94) = 2.365$ ,  $p = .029$ , adjusted  $R^2 = .086$ . This is summarized in Table 26.

Table 26  
*Hierarchical Model Significance Across CPT QRT Scores*

Model	df	HA		U		R		CR	
		F	Sig	F	Sig	F	Sig	F	Sig
1 <sup>a</sup>	(1, 100)	5.683*	.019	.000	.985	.237	.628	.318	.574
2 <sup>b</sup>	(2, 99)	3.083*	.050	.701	.499	.117	.889	4.245*	.017
3 <sup>c</sup>	(3, 98)	2.035	.114	3.555*	.017	1.183	.320	3.491*	.019
4 <sup>d</sup>	(4, 97)	2.603*	.041	2.924*	.025	1.466	.219	3.985*	.005
5 <sup>e</sup>	(7, 94)	1.616	.140	1.741	.109	.896	.513	2.365*	.029

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

## Interpreting the Model Coefficients

The general regression equation showing the relationship between the independent variables of gender, age, experience, education, and academic discipline, and the dependent variable of QRT score for habitual action (HA), understanding (U), reflection (R), or critical reflection (CR) is:  $\text{QRT score} = \beta_0 + (\beta_1 * \text{gender}) + (\beta_2 * \text{age}) + (\beta_3 * \text{experience}) + (\beta_4 * \text{education}) + (\beta_5 * \text{discipline})$  where  $\beta_0$  is a constant and  $\beta_1$  through  $\beta_5$  are the slope coefficients for the independent variables. The coefficients for the independent variables gender, age, experience education and academic discipline for the full regression models for QRT scores for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) are displayed in Tables 27 through 30. As noted in Chapter 3, academic discipline was a non-ordered categorical independent variable with four categories (Pure/Hard, Pure/Soft, Applied/Hard, and Applied/Soft). Three dummy variables were used to code representation of these categories (Table 4) while building the regression model and using SPSS to interpret the model results using the Applied/Soft group (the largest group) as the baseline group against which all other groups were compared (Field, 2009).



Table 27  
*QRT Habitual Action Score Regression Model Coefficients*

Habitual Action	Unstandardized		Standardized			95% Confidence	
	Coefficients		Coefficients			Interval for B	
	B	Std Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	12.538	1.717		7.302	.000	9.129	15.947
Gender	.264	.607	.045	.436	.664	-.941	1.469
Age	-1.495	.486	-.411	-3.074	.003	-2.460	-.529
Experience	.755	.351	.271	2.153	.034	.059	1.452
Education	-.077	.436	-.017	-.176	.861	-.942	.789
Applied/Soft vs Applied Hard	-.800	.790	-.108	-1.013	.314	-2.370	.769
Applied/Soft vs Pure/Soft	-.017	.990	-.002	-.017	.986	-1.982	1.948
Applied/Soft vs Pure/Hard	-.600	1.470	-.045	-.408	.684	-3.517	2.318

Table 28  
*QRT Understanding Score Regression Model Coefficients*

Understanding	Unstandardized		Standardized			95% Confidence	
	Coefficients		Coefficients			Interval for B	
	B	Std Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	15.423	1.214		12.704	.000	13.013	17.834
Gender	-.537	.429	-.129	-1.251	.214	-1.389	.315
Age	.158	.344	.061	.459	.647	-.525	.840
Experience	-.249	.248	-.126	-1.003	.319	-.741	.244
Education	.963	.308	.308	3.126	.002	.351	1.575
Applied/Soft vs Applied Hard	.228	.559	.043	.408	.684	-.882	1.337
Applied/Soft vs Pure/Soft	-.364	.700	-.053	-.520	.604	-1.753	1.026
Applied/Soft vs Pure/Hard	-.435	1.039	-.046	-.419	.676	-2.499	1.628

Table 29  
*QRT Reflection Score Regression Model Coefficients*

Reflection	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
	B	Std	Beta	t	Sig.	Lower Bound	Upper Bound
		Error					
(Constant)	16.256	1.081		15.037	.000	14.110	18.403
Gender	-.131	.382	-.036	-.343	.732	-.890	.627
Age	.284	.306	.127	.927	.356	-.324	.892
Experience	-.290	.221	-.170	-1.314	.192	-.729	.148
Education	.528	.274	.195	1.925	.057	-.016	1.073
Applied/Soft vs Applied Hard	-.215	.498	-.047	-.431	.667	-1.203	.774
Applied/Soft vs Pure/Soft	-.279	.623	-.047	-.447	.656	-1.516	.959
Applied/Soft vs Pure/Hard	-.546	.925	-.066	-.590	.557	-2.383	1.292

Table 30  
*QRT Critical Reflection Score Regression Model Coefficients*

Critical Reflection	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
	B	Std	Beta	t	Sig.	Lower Bound	Upper Bound
		Error					
(Constant)	17.057	1.436		11.875	.000	14.205	19.909
Gender	-1.595	.508	-.318	-3.142	.002	-2.603	-.587
Age	.153	.407	.049	.377	.707	-.654	.961
Experience	-.565	.293	-.236	-1.925	.057	-1.148	.018
Education	.558	.365	.148	1.530	.129	-.166	1.282
Applied/Soft vs Applied Hard	-.452	.661	-.071	-.683	.496	-1.764	.861
Applied/Soft vs Pure/Soft	-.244	.828	-.029	-.294	.769	-1.887	1.400
Applied/Soft vs Pure/Hard	-1.008	1.229	-.088	-.820	.414	-3.449	1.433

The first part of Tables 27 through 30 provides estimates for the *b*-values in each regression model and the individual contribution of each independent variable to the model. The

*b*-values provide information about the relationship between QRT scores for habitual action (HA), understanding (U), reflection (R), and critical reflection (CR) and the independent variables gender, age, experience, education, and academic discipline. If the *b*-value is positive, there is a positive relationship between the independent variable and the QRT score. Similarly, if the *b*-value is negative, there is a negative relationship. The value of the coefficients also provides an indicator to what degree each independent variable affects the dependent QRT score if the effects of all other independent variables are held constant. Habitual action, understanding, reflection, and critical reflection scores are interval dependent variables ranging from 4 to 20 with units of one. The range of values for each QRT score is 16 (possible high of 20 minus low of 4).

Age had a positive relationship with QRT scores for understanding, reflection, and critical reflection and a negative relationship for habitual action. Therefore, QRT scores for habitual action decrease with the age of a CPT, while scores for understanding, reflection, and critical reflection increase. Age is an ordinal categorical variable with five levels ( $\leq 24$ , 25-34, 35-44, 45-54, and  $\geq 55$ ). For habitual action, the coefficient for age is -1.495. This indicates that as age increases by one unit, habitual action will decrease by 1.495 units; a total potential decrease of 5.980, or about 37%, from the lowest to the highest age level. For understanding, the coefficient for age is .158; for reflection, the coefficient for age is .284; and for critical reflection, the coefficient for age is .153. This indicates that as age increases by one unit, understanding will increase by .158 units, a total potential increase of .632, or about 4%; reflection will increase by .284, a total potential increase of 1.136, or about 7%; and critical reflection will increase by .153, a total potential increase of .612, or about 4%.

Gender is a dichotomous independent variable. Therefore, the coefficients represent the difference in the QRT scores for habitual action, understanding, reflection, and critical reflection between the two categories (male and female). These categories were coded in the regression models as: 0 = male and 1 = female. The comparison between the two categories, then, is with respect to male, the category with the value of 0. In other words, the coefficients represent the difference in QRT scores for being female. Gender had a positive relationship with QRT scores for habitual action and a negative relationship for understanding, reflection, and critical reflection. For habitual action, the coefficient was .264; for understanding, the coefficient was -.537; for reflection, the coefficient was -.131; and for critical reflection, the coefficient was -1.595. This indicates that calculated habitual action scores for females are .264, or about 2% greater than that calculated for males (with all values of all other independent variables being held constant). Calculated understanding scores for females are .537, or about 3% less than that calculated for males; calculated reflection scores for females are .122, or less than 1% less than that calculated for males; and calculated critical reflection scores for females are 1.595, or about 10% less than calculated for males.

Education had a negative relationship with QRT scores for habitual action and a positive relationship for understanding, reflection, and critical reflection. For habitual action, the coefficient for education was -.077; for understanding, the coefficient for education was .963; for reflection, the coefficient for education was .528; and for critical reflection, the coefficient for education was .558. Education is an ordinal categorical variable with four levels (HS/associate degree, bachelor degree, master degree, and doctorate degree). This indicates that as education increases by one level, habitual action will decrease by .077, a total potential decrease of .231 or about 1%; understanding will increase by .963, a total potential increase of 2.889, or about 18%;

reflection will increase by .528, a total potential increase of 1.584, or about 10%; and critical reflection will increase by .558, a total potential increase of 1.674, or about 10%.

Experience had a positive relationship with QRT scores for habitual action and a negative relationship for understanding, reflection, and critical reflection. For habitual action, the coefficient for experience was .755; for understanding, the coefficient for experience was -.249; for reflection, the coefficient for experience was -.290; and for critical reflection, the coefficient for experience was -.565. Experience is an ordinal categorical variable with five levels ( $\leq 5$ , 6-10, 11-15, 16-20, and  $\geq 21$ ). This indicates that as experience increases by one level, habitual action will increase by .755, a total potential increase of 3.020, or about 19%; understanding will decrease by .249, a total potential decrease of .996, or about 6%; reflection will decrease by .290, a total potential decrease of 1.160, or about 7%; and critical reflection will decrease by .565, a total potential decrease of 2.260, or about 14%.

The Applied/Soft academic discipline was used as the baseline group against which all other groups were compared. The *b*-values in each regression model for the groups of academic discipline represent the changes in QRT scores from the academic discipline group compared to the Applied/Soft academic discipline baseline group. Habitual action scores were .800 points, or 5% lower, for Applied/Hard; .017 points, or much less than 1%, lower for Pure/Soft; and .600 points, or about 4%, lower for Pure/Hard than for Applied/Soft. Understanding scores were .228 points, or only about 1%, higher for Applied/Hard; .364 points lower, or only about 2%, for Pure/Soft; and .435 points, or only about 3%, lower for Pure/Hard than for Applied/Soft. Reflection scores were .215 points, or only about 1%, lower for Applied/Hard; .279 points, or only about 2% lower, for Pure/Soft; and .546 points, or about 3%, lower for Pure/Hard than for Applied/Soft. And, critical reflection scores were .452 points, or about 3%, lower for

Applied/Hard; .244 points, or about 2%, lower for Pure/Soft; and 1.008 points, or about 6%, lower for Pure/Hard than for Applied/Soft. Said another way, individuals with Applied/Hard academic disciplines scored lower on habitual action (-.800), reflection (-.215), and critical reflection (-.452) but higher in understanding (.228) than those with Applied/Soft academic disciplines; Pure/Soft academic disciplines scored lower on habitual action (-.017), understanding (-.364), reflection (-.279), and critical reflection (-.244) than those with Applied/Soft academic disciplines; and Pure/Hard academic disciplines scored lower on habitual action (-.600), understanding (-.435), reflection (-.546), and critical reflection (-1.008) than those with Applied/Soft academic disciplines.

### **QRT Score Regression Models**

A hierarchical multiple regression was run to determine if the addition of gender, then education, then experience, and then academic discipline improved the calculation of QRT scores over and above age alone. Details on each regression model are summarized in Tables 31 through 34.

Table 31

*Hierarchical Multiple Regression Relating Age, Gender, Education, Experience, and Discipline to Habitual Action*

variable	Habitual Action (HA)									
	Model 1 <sup>a</sup>		Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>		Model 5 <sup>e</sup>	
	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$
Constant	12.55***		12.36***		12.34***		12.02***		12.54***	
Age	-.84*	-.23	-.84*	-.23	-.84*	-.23	-1.37*	-3.8	-1.50*	-.41
Gender			.41	.07	.41	.07	.46		.26	.08
Ed					.01	.00	-.05	-.01	-.08	-.02
Exp							.68*	.24	.76*	.27
Applied Soft vs Applied Hard									-.80	-.11
Applied Soft vs Pure Soft									-.02	-.00
Applied Soft vs Pure Hard									-.60	-.05
	<u>Model 1<sup>a</sup></u>		<u>Model 2<sup>b</sup></u>		<u>Model 3<sup>c</sup></u>		<u>Model 4<sup>d</sup></u>		<u>Model 5<sup>e</sup></u>	
$R^2$	.054		.059		.059		.097		.107	
$F$	5.68*		3.08*		2.04		2.60*		1.62	
(df1, df2)	(1, 100)		(2, 99)		(3, 98)		(4, 97)		(7, 94)	
Sig.	.019		.050		.114		.041		.140	
Chg $R^2$	.054		.005		.000		.038		.010	
Chg $F$	5.68*		.51		.00		4.11*		.37	
(df1, df2)	(1, 100)		(1, 99)		(1, 98)		(1, 97)		(3, 94)	
Chg $F$										
Sig.										
Chg $F$	.019		.476		.978		.045		.777	

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

$N = 102$ , \*  $p < .05$ , \*\*  $p < .001$ , \*\*\*  $p < .0005$

The full model of age, gender, education, experience, and academic discipline to calculate QRT scores for habitual action (Model 5, Table 31) was not statistically significant,  $R^2 = .107$ ,  $F(7, 94) = 1.616$ ,  $p = .140$ . The model for age (Model 1, Table 31) as a determinate of habitual action was statistically significant,  $R^2 = .054$ ,  $F(1, 100) = 5.683$ ,  $p = .019$ . The addition

of gender to the calculation for habitual action (Model 2, Table 31) led to an increase in  $R^2$  of .005, not statistically significant;  $F(1, 99) = .511, p = .476$ . The addition of education to the calculation for habitual action (Model 3, Table 31) led to an increase in  $R^2$  of .000, also not statistically significant;  $F(1, 98) = .001, p = .978$ . The addition of experience to the calculation of scores for habitual action (Model 4, Table 31) led to a statistically significant increase in  $R^2$  of .038,  $F(1, 97) = 4.112, p = .045$ . Finally, the addition of academic discipline to the calculation of scores for habitual action (Model 5, Table 31) led to an increase in  $R^2$  of .010, not statistically significant;  $F(3, 94) = .367, p = .777$ .



Table 32

*Hierarchical Multiple Regression Relating Age, Gender, Education, Experience, and Discipline to Understanding*

variable	Understanding (U)									
	Model 1 <sup>a</sup>		Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>		Model 5 <sup>e</sup>	
	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$
Constant	16.98***		17.20***		15.23***		15.35***		15.42***	
Age	-.01	-.00	-.01	-.00	.00	.00	.19	.07	.16	.06
Gender			-.49	-.12	-.53	-.13	-.54	-.13	-.54	-.13
Ed					.91*	.29	.93*	.30	.96*	.31
Exp							-.24	-.12	-.25	-.13
Applied Soft vs Applied Hard									.23	.04
Applied Soft vs Pure Soft									-.36	-.05
Applied Soft vs Pure Hard									-.44	-.05
		Model 1 <sup>a</sup>		Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>		Model 5 <sup>e</sup>
$R^2$		.000		.014		.098		.108		.115
$F$		.00		.70		3.56*		2.92*		1.74
(df1, df2)		(1, 100)		(2, 99)		(3, 98)		(4, 97)		(7, 94)
Sig.		.985		.499		.017		.025		.109
Chg $R^2$		.000		.014		.084		.009		.007
Chg $F$		.00		1.40		9.15*		1.03		.25
(df1, df2)		(1, 100)		(1, 99)		(1, 98)		(1, 97)		(3, 94)
Chg $F$		(1, 100)		(1, 99)		(1, 98)		(1, 97)		(3, 94)
Sig.		.985		.239		.003		.313		.859
Chg $F$		.985		.239		.003		.313		.859

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

$N = 102$ , \*  $p < .05$ , \*\*  $p < .001$ , \*\*\*  $p < .0005$

The full model of age, gender, education, experience, and academic discipline to calculate QRT scores for understanding (Model 5, Table 32) was not statistically significant,  $R^2 = .115$ ,  $F(7, 94) = 1.741$ ,  $p = .109$ . The model for age (Model 1, Table 32) as a determinate of understanding was not statistically significant,  $R^2 = .000$ ,  $F(1, 100) = .000$ ,  $p = .985$ . The

addition of gender to the calculation for understanding (Model 2, Table 32) led to an increase in  $R^2$  of .014, not statistically significant;  $F(1, 99) = 1.401, p = .239$ . The addition of education to the calculation for understanding (Model 3, Table 32) led to a statistically significant increase in  $R^2$  of .084,  $F(1, 98) = 9.150, p = .003$ . The addition of experience to the calculation of scores for understanding (Model 4, Table 32) led to an increase in  $R^2$  of .009, not statistically significant;  $F(1, 97) = 1.028, p = .313$ . Finally, the addition of academic discipline to the calculation of scores for understanding (Model 5, Table 32) led to an increase in  $R^2$  of .007, also not statistically significant;  $F(3, 94) = .253, p = .859$ .

Table 33

*Hierarchical Multiple Regression Relating Age, Gender, Education, Experience, and Discipline to Reflection*

variable	Reflection (R)									
	Model 1 <sup>a</sup>		Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>		Model 5 <sup>e</sup>	
	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$
Constant	16.88***		16.89***		15.83***		15.97***		16.26***	
Age	.11	.05	.11	.05	.12	.05	.36	.16	.28	.13
Gender			-.01	-.00	-.03	-.01	-.05	-.01	-.13	-.04
Ed					.49	.18	.52	.19	.53	.20
Exp							-.32	-.19	-.29	-.17
Applied Soft vs Applied Hard									-.22	-.05
Applied Soft vs Pure Soft									-.28	-.05
Applied Soft vs Pure Hard									-.55	-.07
	<u>Model 1<sup>a</sup></u>		<u>Model 2<sup>b</sup></u>		<u>Model 3<sup>c</sup></u>		<u>Model 4<sup>d</sup></u>		<u>Model 5<sup>e</sup></u>	
$R^2$	.002		.002		.035		.057		.063	
$F$	.24		.12		1.18		1.47		.90	
(df1, df2)	(1, 100)		(2, 99)		(3, 98)		(4, 97)		(7, 94)	
Sig.	.628		.889		.320		.219		.513	
Chg $R^2$	.002		.000		.033		.022		.006	
Chg $F$	.24		.000		3.31		2.27		.19	
(df1, df2)	(1, 100)		(1, 99)		(1, 98)		(1, 97)		(3, 94)	
Chg $F$										
Sig.										
Chg $F$	.628		.986		.072		.135		.906	

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

$N = 102$ , \*  $p < .05$ , \*\*  $p < .001$ , \*\*\*  $p < .0005$

The full model of age, gender, education, experience, and academic discipline to calculate QRT scores for reflection (Model 5, Table 33) was not statistically significant,  $R^2 = .063$ ,  $F(7, 94) = .896$ ,  $p = .513$ . The model for age (Model 1, Table 33) as a determinate of reflection was not statistically significant,  $R^2 = .002$ ,  $F(1, 100) = .237$ ,  $p = .628$ . The addition of

gender to the calculation for reflection (Model 2, Table 33) led to an increase in  $R^2$  of .000, also not statistically significant;  $F(1, 99) = .000, p = .986$ . The addition of education to the calculation for reflection (Model 3, Table 33) led to an increase in  $R^2$  of .033, also not statistically significant;  $F(1, 98) = 3.308, p = .072$ . The addition of experience to the calculation of scores for reflection (Model 4, Table 33) led to an increase in  $R^2$  of .022, also not statistically significant;  $F(1, 97) = 2.270, p = .135$ . Finally, the addition of academic discipline to the calculation of scores for reflection (Model 5, Table 33) led to an increase in  $R^2$  of .006, also not statistically significant;  $F(3, 94) = .185, p = .906$ .

Table 34

*Hierarchical Multiple Regression Relating Age, Gender, Education, Experience, and Discipline to Critical Reflection*

variable	Critical Reflection (CR)									
	Model 1 <sup>a</sup>		Model 2 <sup>b</sup>		Model 3 <sup>c</sup>		Model 4 <sup>d</sup>		Model 5 <sup>e</sup>	
	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$	B	$\beta$
Constant	16.68***		17.31***		16.23***		16.52***		17.06***	
Age	-.18	-.06	-.19	-.06	-.18	-.06	.31	.10	.15	.05
Gender			-1.38*	-.28	-1.40*	-.28	-1.44*	-.29	-1.60*	-.32
Ed					.50	.13	.56	.15	.56	.15
Exp							-.63*	-.26	-.57	-.24
Applied Soft vs Applied Hard									-.45	-.07
Applied Soft vs Pure Soft									-.24	-.03
Applied Soft vs Pure Hard									-1.01	-.09
	<u>Model 1<sup>a</sup></u>		<u>Model 2<sup>b</sup></u>		<u>Model 3<sup>c</sup></u>		<u>Model 4<sup>d</sup></u>		<u>Model 5<sup>e</sup></u>	
$R^2$	.003		.079		.097		.141		.150	
$F$	.32		4.25*		3.49*		3.99*		2.37*	
(df1, df2)	(1, 100)		(2, 99)		(3, 98)		(4, 97)		(7, 94)	
Sig.	.574		.017		.019		.005		.029	
Chg $R^2$	.003		.076		.018		.045		.009	
Chg $F$	.32		8.15*		1.91		5.04*		.32	
(df1, df2)	(1, 100)		(1, 99)		(1, 98)		(1, 97)		(3, 94)	
Chg $F$										
Sig.										
Chg $F$	.574		.005		.171		.027		.812	

a. Independent variables: (Constant), Age

b. Independent variables: (Constant), Age, Gender

c. Independent variables: (Constant), Age, Gender, Education

d. Independent variables: (Constant), Age, Gender, Education, Experience

e. Independent variables: (Constant), Age, Gender, Education, Experience, Academic Discipline

$N = 102$ , \*  $p < .05$ , \*\*  $p < .001$ , \*\*\*  $p < .0005$

The full model of age, gender, education, experience, and academic discipline to calculate QRT scores for critical reflection (Model 5, Table 34) was statistically significant,  $R^2 = .150$ ,  $F(7, 94) = 2.365$ ,  $p = .029$ . The model for age (Model 1, Table 34) as a determinate of critical reflection was not statistically significant,  $R^2 = .003$ ,  $F(1, 100) = .318$ ,  $p = .574$ . The

addition of gender to the calculation for reflection (Model 2, Table 34) led to a statistically significant increase in  $R^2$  of .076;  $F(1, 99) = 8.149, p = .005$ . The addition of education to the calculation for critical reflection (Model 3, Table 34) led to an increase in  $R^2$  of .018, not statistically significant;  $F(1, 98) = 1.905, p = .171$ . The addition of experience to the calculation of scores for critical reflection (Model 4, Table 34) led to a statistically significant increase in  $R^2$  of .045,  $F(1, 97) = 5.036, p = .027$ . Finally, the addition of academic discipline to the calculation of scores for critical reflection (Model 5, Table 34) led to an increase in  $R^2$  of .009, not statistically significant;  $F(3, 94) = .318, p = .812$ .

The influence of each of the independent variables on QRT scores, ordered by the absolute value of the standardized coefficient ( $\beta$ ) in the full model (Model 5 of Tables 31-34), are shown in Table 35.

Table 35  
*Order of Full Model Standardized Coefficients for Habitual Action, Understanding, Reflection, and Critical Reflection*

Independent Variable	Habitual Action		Understanding		Reflection		Critical Reflection	
	Order	$\beta$	Order	$\beta$	Order	$\beta$	Order	$\beta$
Age	1	-.41	4	.06	3	.13	6	.05
Gender	4	.08	2	-.13	7	-.04	1	-.32
Education	6	-.02	1	.31	1	.20	3	.15
Experience	2	.27	3	-.13	2	-.17	2	-.24
Applied Soft vs Applied Hard	3	-.11	7	.04	6	-.05	5	-.07
Applied Soft vs Pure Soft	7	-.00	5	-.05	5	-.05	7	-.03
Applied Soft vs Pure Hard	5	-.05	6	-.05	4	-.07	4	-.09

## Reliability and Structural Analysis of Modified QRT

Since the wording of some of the QRT items was modified to better fit the context of reflective practice in the workplace, reliability and structural analysis was conducted on the modified QRT.

### Reliability

When developing the original QRT, Kember et al. (2000) computed Cronbach alpha values for each scale to assess the internal consistency, or reliability, of the four scales representing the four constructs of the QRT. The Cronbach alpha values were computed for each scale of the modified QRT to make sure the modified questionnaire consistently reflected the 4-factor construct of habitual action, understanding, reflection, and critical reflection, that it is intended to measure. Cronbach alpha values for the four scales of the original and the modified QRT are shown in Table 36.

Table 36  
*Cronbach Alpha Values for Original and Modified Versions of the QRT*

Scale	Original QRT*	Modified QRT
habitual action (HA)	0.621	0.649
understanding (U)	0.757	0.617
reflection (R)	0.631	0.699
critical reflection (CR)	0.675	0.789

\*Kember et al., 2000

Nunnally (1978) suggested that a Cronbach's alpha value of 0.70 is the minimum standard for a measure producing scores that demonstrate satisfactory internal consistency reliability. However, Tait, Entwistle, & McCune (1998) proposed that a value of 0.50 is acceptable. The Cronbach alpha values fall within acceptable levels for all four constructs in the original QRT and the modified version of the QRT. The modified QRT shows stronger values for than the original QRT for three of the four constructs.

## Structural Analysis

After confirming the validity of the modified QRT, the next step was to show that the four items for each scale – habitual action, understanding, reflection, and critical reflection – were measuring that scale and not contributing to others. Confirmation factor analysis was used to check the fit of the select QRT items to the intended scales using the EQS 6 for Windows program (Bentler & Wu, 2005), version 6.3. Table 37 details the corresponding covariance matrix used in the analysis. The model chi-squares statistic ( $\chi^2$ ) with associated degree of freedom (df) and Bentler's comparative fit index (CFI) was used to measure the extent to which the model was a good fit to the data. Models with small chi-squares value and CFI values greater than 0.9 are normally considered to indicate an acceptable fit (Bentler, 1990). The values for the four-factor model were  $\chi^2 = 117.9$  and CFI = 0.944 compared to  $\chi^2 = 179.3$  and CFI = 0.903 for the original QRT (Kember et al, 2000). Therefore, the modified QRT scales were acceptable indicators of the four constructs in the original QRT.



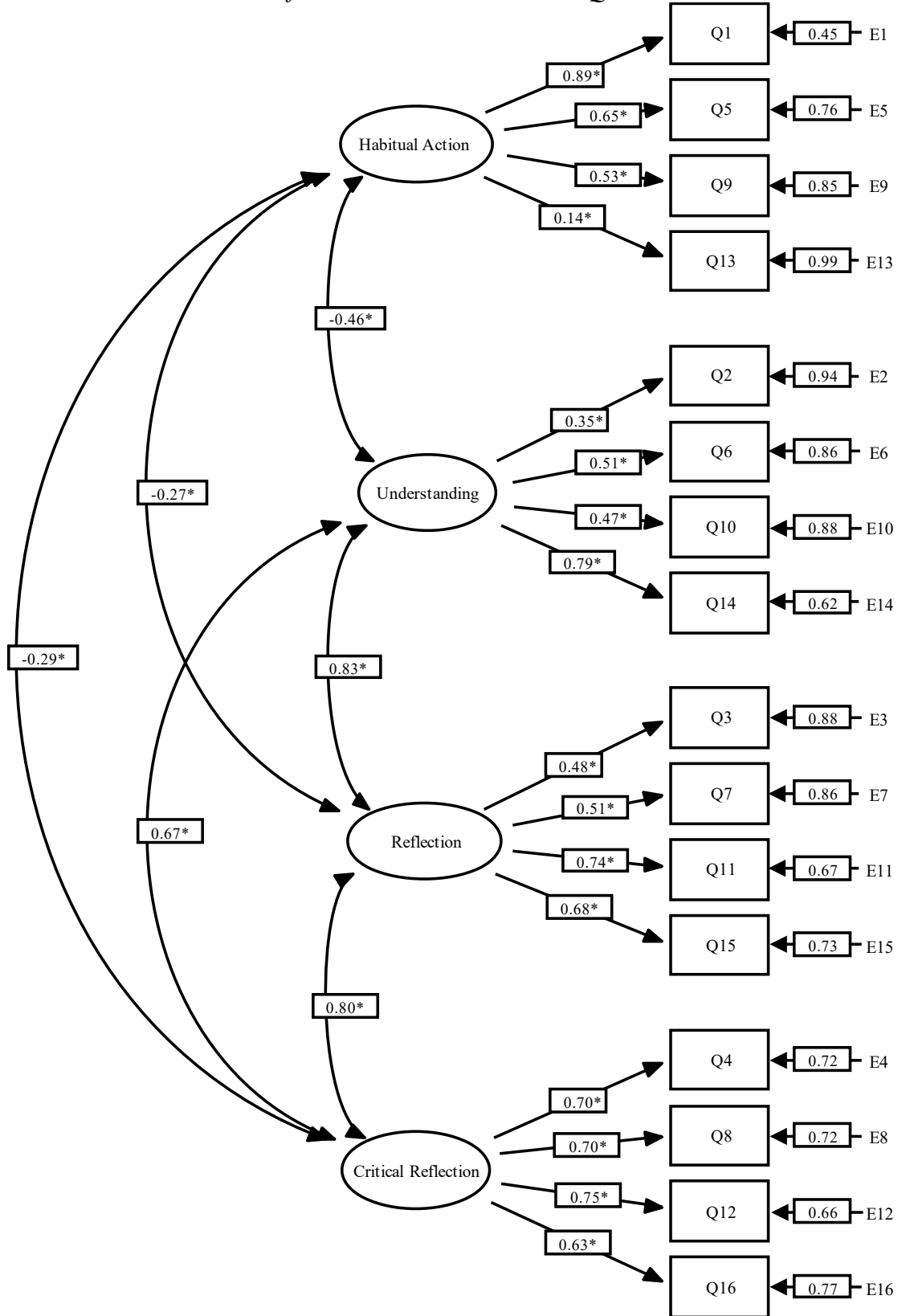
Table 37

*Variance-Covariance Matrix Used in Analysis of Modified QRT*

Items	1	2	3	4	5	6	7	8
1	1.774							
2	-0.070	0.196						
3	-0.088	0.034	0.340					
4	-0.238	0.062	0.127	0.513				
5	0.895	-0.038	-0.042	0.015	1.284			
6	-0.226	0.063	0.086	0.055	-0.091	0.567		
7	-0.055	0.045	0.138	0.108	-0.017	0.207	0.391	
8	-0.146	0.009	0.128	0.337	-0.113	0.171	0.134	0.805
9	0.552	-0.081	-0.150	-0.198	0.390	-0.068	-0.106	-0.035
10	-0.153	0.069	0.091	0.189	0.027	0.233	0.162	0.123
11	-0.183	0.050	0.148	0.203	-0.049	0.126	0.152	0.231
12	-0.232	0.057	0.145	0.311	-0.125	0.144	0.120	0.384
13	0.119	-0.003	-0.053	-0.050	0.092	-0.053	-0.055	0.104
14	-0.433	0.122	0.156	0.289	-0.100	0.256	0.200	0.278
15	-0.143	0.046	0.095	0.206	0.014	0.147	0.124	0.151
16	-0.129	0.049	0.131	0.196	-0.107	0.113	0.050	0.369
Items	9	10	11	12	13	14	15	16
9	0.865							
10	-0.074	0.808						
11	-0.069	0.190	0.491					
12	-0.159	0.204	0.317	0.707				
13	0.145	0.035	-0.049	0.018	0.707			
14	-0.289	0.278	0.278	0.300	-0.100	0.800		
15	-0.179	0.173	0.231	0.225	-0.112	0.267	0.389	
16	-0.101	0.095	0.271	0.303	0.008	0.244	0.131	0.596

The standardized solution for the model of the modified QRT is shown in Figure 11. The path coefficient – the link from a scale to an item – can be interpreted as a measure that describes how strongly the item is affected by its corresponding scale. Variables in ovals are latent constructs and variables in squares are observable measures. Paths with \* are statistically significant at 5% level. Each item is a statistical significant indicator for its specific scale. All paths are statistically significant at the 5% level.

Figure 11  
 Standardized Parameter Estimates of the Structural Model in the QRT



## Summary

All the research questions were addressed using the data collected.

Participating CPTs scored highest in reflection followed closely by understanding, then critical reflection, and finally, habitual action. The CPT QRT scores for understanding, reflection, and critical reflection were significantly higher and the score for habitual action was significantly lower than those Kember et al. (2000) reported from the first practical applications of the QRT with nursing undergraduate and graduate students.

Participating CPTs were nearly evenly divided by gender. Over half (58.8%) reported being over age 55 with decreasing numbers for each younger age group. Similarly, the majority (59.8%) reported having more than 20 years of experience as a performance improvement professional and decreasing numbers for each less experienced group. More than half (60.8%) of the CPTs reported have a master degree followed by those having a doctorate degree (27.5%), then those having a bachelor degree (9.8%). A small minority (1.9%) reported having an education level of high school or an associate degree. Two-thirds (66.7%) classified their academic discipline as Applied/Soft: Applied where research results in products, techniques, protocols, or procedures; and Soft, where the problems are often ill-structured, cannot be described always or be described completely, and certainty of solutions is elusive.

Gender had a generally neutral relationship with QRT scores with the exception of critical reflection. While females scored higher on habitual action and males scored higher on understanding, reflection, and critical reflection, these differences were small; only approximately 2% for habitual action, 3% for understanding, 1% for reflection, and 10% for critical reflection.

Age had a positive relationship with QRT scores for understanding, reflection, and critical reflection and a negative relationship for habitual action. The largest impact was on habitual action with potential total decrease in score across the five categories for age of 37%, followed by reflection (increase of just 7%), understanding (increase of 4%), then critical reflection (increase of 4%).

Experience had a positive relationship for habitual action and a negative relationship for understanding, reflection, and critical reflection. The largest impact was also on habitual action (increase of 19%), followed by critical reflection (decrease of 14%), reflection (decrease of 7%), then understanding (decrease of 6%).

Education had a negative relationship for habitual action and a positive relationship for understanding, reflection, and critical reflection. The largest impact was on understanding (increase of 18%), followed by critical reflection (increase of 10%), reflection (increase of 10%), then habitual action (decrease of 1%).

Academic discipline had a generally neutral relationship with on QRT scores with the exception of critical reflection. Approximately two-thirds of the CPTs reported having an Applied/Soft discipline. Compared to this discipline, habitual action scores were approximately 5% lower for Applied/Hard, 4% lower for Pure/Hard, and 1% lower for Pure/Soft. Understanding scores were approximately 1% higher for Applied/Hard, 2% lower for Pure/Soft, and 3% lower for Pure/Hard than for Applied/Soft. Reflection scores were approximately 3% lower for Pure/Hard, 1% lower for Applied/Hard, and only .5% lower for Pure/Soft than for Applied/Soft. Finally, critical reflection scores were approximately 6% lower for Pure/Hard, 3% lower for Applied/Hard, and 2% lower for Pure/Soft than for Applied/Soft. Said another way, compared to an Applied/Soft discipline, individuals with Applied/Hard academic disciplines

scored lower on habitual action, reflection, and critical reflection, but higher in understanding; Pure/Soft academic disciplines scored lower on habitual action, understanding, reflection, and critical reflection; and Pure/Hard academic disciplines scored lower on habitual action, understanding, reflection, and critical reflection.

Hierarchical multiple regression was used to determine how variation in QRT scores for habitual action, understanding, reflection, and critical reflection -- the dependent variables -- is explained by the independent variables. The independent variable age was entered into the regression models first. The model for habitual action was statistically significant;  $R^2 = .054$ ,  $F(1, 100) = 5.683$ ,  $p = .019$ . Statistically significant means that the regression model is a statistically significantly better fit to the data than the mean model.

The addition of the independent variable for gender to the models produced a statistically better fit for habitual action and critical reflection;  $R^2 = .059$ ,  $F(2, 99) = 3.083$ ,  $p < .050$  and  $R^2 = .281$ ,  $F(2, 99) = 4.245$ ,  $p < .050$ . The models for understanding and reflection were not statistically significant;  $R^2 = .014$ ,  $F(2, 99) = .701$ ,  $p = .499$  and  $R^2 = .049$ ,  $F(2, 99) = .117$ ,  $p = .889$ .

The addition of the independent variable for education to the models produced a statistically significantly better fit for understanding;  $R^2 = .313$ ,  $F(1, 98) = 9.150$ ,  $p < .050$ . The addition of education did not produce a statistically significantly better fit for habitual action ( $R^2 = .242$ ,  $F(1, 98) = .001$ ,  $p = .978$ ), reflection ( $R^2 = .187$ ,  $F(1, 98) = 3.308$ ,  $p = .072$ ), or critical reflection ( $R^2 = .311$ ,  $F(1, 98) = 1.905$ ,  $p = .171$ ).

The addition of the independent variable for experience to the models produced a statistically significantly better fit for habitual action ( $R^2 = .311$ ,  $F(1, 97) = 4.112$ ,  $p < .050$ ) and

critical reflection ( $R^2 = .376$ ,  $F(1, 97) = 5.036$ ,  $p < .050$ ) but not for understanding ( $R^2 = .328$ ,  $F(1, 97) = 1.028$ ,  $p = .313$ ) or reflection ( $R^2 = .239$ ,  $F(1, 97) = 2.270$ ,  $p = .135$ ).

Finally, the addition of the variables for academic discipline to the models did not produce a statistically significantly better fit for any of the dependent variables: habitual action ( $R^2 = .328$ ,  $F(3, 94) = .367$ ,  $p = .777$ ), understanding ( $R^2 = .339$ ,  $F(3, 94) = .253$ ,  $p = .859$ ), reflection ( $R^2 = .250$ ,  $F(3, 94) = .185$ ,  $p = .906$ ), or critical reflection ( $R^2 = .387$ ,  $F(3, 94) = .318$ ,  $p = .812$ ).

Statistically significant relationships were found between age and scores for habitual action, experience and scores for habitual action and for critical reflection, education level and scores for understanding, and gender and scores for critical reflection (Table 20). No other differences in QRT scores based on CPT attribute variables were statistically significant.

The wording of some QRT items was modified to accommodate application in the workplace. Examining reliability, Cronbach alpha values for the modified QRT improved for the habitual action, reflection, and critical reflection scales while decreasing slightly for the understanding scale. Structural analysis using confirmation factor analysis conducted to check the fit of the select QRT items to the intended scales showed results consistent with that of the original QRT. Following this reliability and structural analysis, the modified QRT was found to be comparable to that of the original QRT.

Discussion, conclusions, and recommendations based on these findings follow in Chapter 5.

# **Chapter 5 - Analysis and Conclusions**

## **Introduction**

In this chapter the discussion, implications, recommendations, and conclusions will be addressed. It begins with a restatement of the problem, followed by a review of the research methods and limitations, discussion of the findings and conclusions, and implications for further research and applications of this research.

## **Problem Statement**

Business leaders want employees who can think reflectively and identify the right problems to be addressed in complex workplace situations, and solve them. Educators have recognized the need to develop reflective thinking in post-secondary education (Akbari, 2007; Boyd & Fales, 1983; Dewey, 1997; Newman, 1960; Paul, 1990; Schön, 1983) and researchers have developed reliable measures of reflective thinking (Aukes et al., 2007; Kember et al., 2000). The problem is that while reflective thinking has been assessed in students, the quality of reflective thinking practiced by professionals in the workplace is not known.

## **Review of Research Design and Methods**

Mann et al. (2009) pointed out exploratory research approaches are appropriate in the early stage of research into reflective learning and measuring reflective thinking to develop general understanding of the construct, common definitions, and terminology. This exploratory research utilized quantitative methods employing a proven descriptive approach, the QRT (Kember et al., 2000) to assess quality of reflective thinking in participants certified by the ISPI as CPT professionals, and an associative approach to address how participant demographics related to that assessment.

Data were collected from CPTs through a survey invitation. A pilot study was conducted to identify and address any problems with survey distribution, the survey itself, and with the procedures for data collection in the main study. Following the pilot study, modifications were made and the ISPI Operations Manager distributed an email message that introduced the research, requested participation, and included directions and a link to the on-line survey. That email was sent to all ISPI US-based CPTs and internationally-based CPTs in good standing with current contact information on file with the ISPI (N = 697).

This study explored the quality of reflective thinking practiced by working professionals certified by the ISPI as measured by the QRT. Based on the ISPI certification process, CPTs are representative of professionals in the workplace who have been recognized as successfully adding value in areas their employers consider to be important. Employers have consistently reported over several years a need for employees to exercise reflective and critical thinking to meet the challenges of the workplace. Research question 1 drove the collection of data to compute QRT scores for CPTs, professionals already judged successful in the workplace. These scores are one way of quantifying employer expectations about employee reflective thinking abilities and could be used by educators striving to prepare students through development of critical work-required skills including reflective and critical thinking. Research question 2 drove the collection of data to support addressing research question 3. Research question 3 investigated relationships between CPT independent attribute variables (gender, age, experience, education level, and academic discipline) and QRT scores -- relationships for professionals already judged successful in the workplace. No other research has examined reflective thinking in professionals or looked at the relationships with these independent variables individually and together.



To determine if there was a significant difference in the QRT scores for habitual action, understanding, reflection, and critical reflection based on participant demographic variables, a series of hierarchical multiple regression models were created using SPSS Statistics. The independent variables for age, gender, education level, experience, and academic discipline were entered into each of the QRT score hierarchical regression models in that order.

### **Discussion of Findings and Conclusions**

Discussion of the findings is divided into three sections. The first section on Research Question 1 describes the QRT scores of participating CPTs. The second section on Research Question 2 describes the demographics of participating CPTs. The third section on Research Question 3 discusses relationships between the QRT scores and participant demographic factors.

#### **Research Question 1: What are the reflective thinking scores for habitual action, understanding, reflection, and critical reflection as measured by the Questionnaire of Reflective Thinking (QRT) in a group of Certified Performance Technologist (CPT) professionals?**

Mean CPT QRT scores were lower for habitual action and critical reflection than for understanding and reflection, and scores for reflection were higher than for understanding (as shown in Table 5). The CPT QRT scores for understanding, reflection, and critical reflection were significantly higher and the score for habitual action was significantly lower than those Kember et al. (2000) reported from the first practical applications of the QRT with nursing undergraduate and graduate students (as shown in Table 6). Comparing the CPT QRT scores with those of accounting and business students in research conducted by Lucas and Tan (2006), CPT QRT score for habitual action were lower than both groups of the Lucas and Tan research, but not significantly lower; understanding was significantly lower than the first group of the

Lucas and Tan research, and higher, but not significantly higher, than the second group, and scores for reflection and critical reflection were significantly higher (as shown in Table 6). In all cases, mean scores for habitual action and critical reflection were lower than those for understanding and reflection. The CPT scores for reflection were higher than their scores for understanding, just the opposite of the other three cases (see Table 6). The explanation provided by Kember et al. (2000) for this difference in scores among students was that this was a result of the relatively short amount of time students spent engaged in a class. The lower critical reflection scores were explained by noting that critical reflection requires a major change of perspective and adjustments to deep-seated beliefs which requires time that was not available in the student environment. Lethbridge et al. (2013) noted, “it would be expected that students use habitual action and critical reflection dimensions of reflective thinking less often than understanding and reflection dimensions during their educational programme” (p. 308). The CPTs were generally older, had more experience, and had higher levels of education than the students in Kember et al. (2000) and Lucas and Tan (2006), but CPT results indicate that this pattern also exists among practicing professionals in the workplace.

The CPT scores demonstrate they are less likely to engage in habitual action and more likely to engage in understanding, reflection, and critical reflection than the subjects Kember et al. (2000) and Lucas and Tan (2006) reported. CPTs have been recognized for competence as professionals in the workplace and, therefore, could be expected to have higher understanding, reflection, and critical reflection scores than students who have not yet entered the workplace. The increase in QRT scores is also consistent with the claims of employers that recent college graduates do not practice reflective thinking to the extent required of successful professionals in the workplace (Casner-Lotto & Barrington, 2006).

**Research Question 2: What are the demographics of the Certified Performance Technologist (CPT) professionals' population sample based on gender, age, years of work experience, education level, and academic discipline?**

The 102 CPT study participants were nearly evenly divided by gender (male = 57%, female = 43%). Numbers of male and female CPTs are similarly distributed across each category of years of experience. Approximately 60% report being 55 or older, 27% being 45-54 and only 10% being between 35 and 44 and 3% being between 24 and 34. However, over 20% of CPTs 55 or older report having 6-10 years of experience as a human performance professional. No participants reported being 24 years old or younger. Nearly 60% reporting having more than 20 years of experience as a human performance professional, followed by 19% having between 16 and 20, 12% with between 11 and 15, 9% with between 6 and 10, and only 1% with 5 or less years of experience.

It takes time to accumulate experience as a performance improvement professional in the workplace before meeting the ISPI standards for certification as a CPT. Therefore, the small number of participants reporting 5 or fewer years of experience (n = 1) is not surprising. Over 20% of CPTs 55 and older reported having 10 or less years of experience, indicating that working as a performance improvement professional is something many individuals transition to later in life after entering the workforce in a different field.

Over 60% reported having a master degree followed by 27% with doctorate degrees, 10% with bachelor degrees, and 2% with a high school or associate degree. This could be an indicator that advanced degrees are recognized as a valued credential as a performance improvement professional, or it could be an indicator that there is something about being a CPT that makes an individual more likely to pursue graduate education.

About two-thirds (67%) classified their academic discipline as Applied/Soft, with 19% as Applied/Hard, 10% as Pure/Soft, and 5% as Pure/Hard. Examples of degrees within the Applied/Soft category include Business, Communications, Criminal Justice, Education, Finance, Management, Nursing, and Social Work (Biglan, 1973; Clark, 2003; Laird et al., 2008; Malaney, 1986; Stoecker, 1993). Additional research is required to determine why this percentage is so high. A possible explanation for this high percentage reporting Applied/Soft could be that CPTs benefit more from research in products, techniques, protocols, or procedures – what Malaney (1986) called the practical application – than having a focus on pure research. Another possible explanation could be that individuals with an interest in practical application of something over the discovery of new theory are more drawn to working as a performance improvement professional. The need for a performance improvement professional to understand ill-structured problems with no single certain solution could be a reason for the high percentage of CPTs reporting a focus on Soft versus Hard academic disciplines.

**Research Question 3: Do the demographic variables (gender, age, years of work experience, education level, academic discipline) and the QRT scores for habitual action, understanding, reflection, and critical reflection relate in a group of Certified Performance Technologist professionals?**

Examination of QRT score regression model coefficients for the independent variables provide an indicator of how each independent variable affects the dependent QRT score if all other independent variables are held constant, and thus insight on how the independent variables and QRT scores relate. Significant relationships between age and habitual action, experience and habitual action, education level and understanding, gender and critical reflection, and experience and critical reflection were identified. No other differences in QRT scores based on

the independent variable gender, age, experience, education level, or academic discipline were statistically significant.

**Gender.** Gender is a dichotomous independent variable. Since male was coded as “0” and female was coded as “1”, the coefficients for gender represent the difference in influence for female compared to male in relationships with scores for habitual action, understanding, reflection, and critical reflection. Gender has a positive relationship with QRT scores for habitual action and a negative relationship for understanding, reflection, and critical reflection. The coefficients for gender in the regression models were .264 for habitual action, -.537 for understanding, -.131 for reflection, and -1.595 for critical reflection. This means that habitual action scores for females were .264 points, or about 2% greater than for males (with all values of all other independent variables held constant). Understanding scores for females were .537, or about 3% less than for males; reflection scores for females were .122, or about 1% less than for males; and critical reflection scores for females were 1.595, or about 10% less than for males (Table 38).

Table 38  
*Relationship of Gender and QRT Scores*

Gender (female compared to male)	HA	U	R	CR
Coefficient	.264	-.537	-.131	-1.595
Female compared to Male	Female 2% higher	Female 3% lower	Female 1% lower	Female 10% lower

Once gender was introduced into the hierarchical regression model for critical reflection already including age, it was a statistically significant factor in all subsequent models for critical reflection (Table 34). The introduction of gender into the hierarchical multiple regression model for habitual action already including just age produced a statistically significant change in the model (Table 31), but gender was not statistically significant in later models for habitual action

including additional independent variables. Gender was not a statistically significant factor in the full multiple regression models for habitual action (Table 31), understanding (Table 32), or reflection (Table 33).

While research conducted by McDade (1999) and Phan (2007) found no statistically significant differences between males and females in terms of the four constructs of reflective thinking in the QRT, Hutto (2009) found female subjects were significantly more disposed to self-directed learning than were males, which he stated involves the ability to think reflectively. King and Kitchener (2002) caution that when examining gender differences, there are many other variables such as education level and experience that should be examined in conjunction with gender. Examination of Pearson correlation coefficients of CPT independent variables for the dependent CPT QRT scores showed no significant correlation between gender and any of the other independent variables (Tables 12 through 15). The introduction of gender into the hierarchical regression model for critical reflection including only age produced a statistically significant change in the model, and gender was a statistically significant factor in all subsequent models for critical reflection (Table 34).

**Age.** Age was treated as an ordinal categorical variable with five levels:  $\leq 24$ , 25-34, 35-44, 45-54, and  $\geq 55$ . Age had a positive relationship with QRT Scores for understanding, reflection, and critical reflection and a negative relationship for habitual action. The coefficients for age in the regression model were -1.495 for habitual action, .158 for understanding, .284 for reflection, and .153 for critical reflection. According to the regression models, as age increases by one level (i.e., from  $\leq 24$  to 25-34, from 25-34 to 35-44, from 35-44 to 45-54, or from 45-54 to  $\geq 55$ ), score for habitual action will drop 1.495 points, a potential total decrease of about 6 points (37%) from the lowest to the highest age level. For understanding, with a coefficient for

age of .158, as age increases by one unit, understanding will increase by .158 points, a potential total increase of less than 1 point (about 4%); reflection will increase by .284, a total potential

Table 39  
*Relationship of Age and QRT Scores*

Age	HA	U	R	CR
Coefficient	-1.495	.158	.284	.153
Total Points	≈ 6	< 1	> 1	< 1
%	37%	4%	7%	4%

increase of just over 1 points (about 7%); and critical reflection will increase by .153, a total potential increase of less than 1 point (about 4%) (Table 39).

Age was a statistically significant factor in the hierarchical regression models for habitual action (Table 31). Low scores for habitual action at younger ages could possibly be explained by a lack of exposure to sufficient performance improvement situation upon which to reflect. The negative relationship between scores for habitual action and age that results in a decrease in score as age increases could be explained by exposure to increasing numbers of new types of performance improvement situation for which the CPT has no established procedures and for which the CPT relies more on understanding, reflection, and critical reflection. Gordon (1984) found that reliance on models, and therefore habitual action, is reduced in older, more experienced individuals. This drop in habitual scores might be explained by older CPTs encountering situations that required them to reflect more on their practice to deal with unusual or particularly complex cases. Age was not a statistically significant factor in the models for understanding (Table 32), reflection (Table 33), or critical reflection (Table 34).

**Experience.** Experience was treated as an ordinal categorical variable with five levels: ≤ 5, 6-10, 11-15, 16-20, and ≥ 21. Experience had a positive relationship with QRT Scores for habitual action and a negative relationship for understanding, reflection, and critical reflection. The coefficients for experience in the regression model were .755 for habitual action, -.249 for understanding, -.290 for reflection, and -.565 for critical reflection. According to the regression

models, as experience increases by one level (i.e., from  $\leq 5$  to 6-10, from 6-10 to 11-15, from 11-15 to 16-20, or from 16-20 to  $\geq 21$ ) score for habitual action will increase .755 points, a potential total decrease of about 3 points (19%) from the lowest to the highest age level. For understanding, with a coefficient for age of -.249, as experience increases by one unit, understanding will decrease by .290 points, a potential total decrease of less than 1 point (about 6%); reflection will decrease by .290, a total potential decrease of just over 1 points (about 7%);

Table 40  
*Relationship of Experience and QRT Scores*

Experience	HA	U	R	CR
Coefficient	.755	-.249	-.290	-.565
Total Points	$\approx 3$	$< 1$	$> 1$	$> 2$
%	19%	6%	7%	14%

and critical reflection will decrease by .565, a total potential increase of a little over 2 than points (about 14%) (Table 40).

There is a strong, but not

statistically significant, correlation between the independent variables of experience and age (.593) (Tables 11-14). The relationship between experience and QRT scores is opposite in sign from the relationship between age and QRT scores; positive for habitual action and negative for understanding, reflection, and critical reflection, and the largest influence on habitual action scores. Once experience was introduced into the hierarchical regression model for habitual action already containing age, gender, and education, it was a statistically significant factor in that, and all subsequent models for habitual action (Table 31). The introduction of experience into the hierarchical multiple regression model for critical reflection already including age, gender, and education, produced a statistically significant change in the model (Table 34), but experience was not statistically significant in the full model including all independent variables. Similar to the discussion on relationships between age and habitual action scores, the positive relationship between scores for habitual action and experience that results in an increase in habitual action scores as experience increases might be explained by the accumulation of



exposure to increasing numbers of repeated types of performance improvement situation for which the CPT can rely on established procedures that do not require further understanding or reflection. While Gordon (1984) found that reliance on models, and therefore habitual action, is reduced in older, more experienced, individuals, this drop in habitual action scores associated with increase in experience could be a result of older CPTs encountering situations that required them to reflect more in their practice to deal with the introduction of unusual or particularly complex case presented to them based on their high level of experience. Experience was not a statistically significant factor in the in the full multiple regression models for understanding (Table 32), reflection (Table 33), or critical reflection (Table 34).

**Education.** Education was treated as an ordinal categorical variable with four levels: high school or associate degree, bachelor degree, master degree, or doctorate degree. Education had a negative relationship with QRT Scores for habitual action and a positive relationship for understanding, reflection, and critical reflection. The coefficients for education were  $-.077$  in the regression model for habitual action,  $.963$  for understanding,  $.528$  for reflection, and  $.558$  for critical reflection. According to the regression models, as education increases by one level (i.e., high school or associate degree to bachelor degree, from bachelor degree to master degree, or master degree to doctorate degree) score for habitual action will decrease  $.077$  points, a potential total decrease of about well less than 1 point (about 1%) from the lowest to the highest age level. For understanding, with a coefficient for education of  $.963$ , as education increases by one unit, understanding will increase by  $.963$  points, a potential total increase of almost 3 points (about 18%); reflection will increase by  $.528$ , a total potential increase of about 1.5 points (about 10%); and critical reflection will increase by  $.558$ , a total potential increase of a little over 1.5 points (about 10%) (Table 41).

Table 41  
*Relationship of Education and QRT Scores*

Education	HA	U	R	CR
Coefficient	-.077	.963	.528	.558
Total Points	<< 1	< 3	≈ 1.5	> 1.5
%	1%	18%	10%	10%

The relationship between education and QRT scores is the same in sign as the relationship between age and QRT scores; negative for habitual action and positive for

understanding, reflection, and critical reflection, and the largest influence on habitual action scores. This is consistent with the limited research that shows an increase in the quality of reflective thinking with higher education levels (Naghdipour & Emeagwali, 2013). Once education was introduced into the hierarchical regression model for understanding already containing age and gender, it was a statistically significant factor in all subsequent models (Table 32). The introduction of education into the hierarchical multiple regression model for critical reflection already including age and gender produced a statistically significant change in the model (Table 34), but education was not statistically significant in the full model including all independent variables. A greater emphasis on research and discovery of new knowledge associated with an advanced degree (master or doctorate) could be a reason for the positive relationship between education and understanding, reflection, and critical reflection. This may also reflect the small number of participants who reported having a high school or associate degree ( $n = 2$ ) compared to the numbers that reported having a master degree ( $n = 62$ ) or a doctorate degree ( $n = 28$ ). Education was not a statistically significant factor in the full multiple regression models for habitual action (Table 31), reflection (Table 33), or critical reflection (Table 34).

**Academic Discipline.** Compared to individuals with Applied/Soft academic disciplines (67%), individuals with Applied/Hard academic disciplines (18%) were associated with lower scores on habitual action (-.800), reflection (-.215), and critical reflection (-.452), but higher

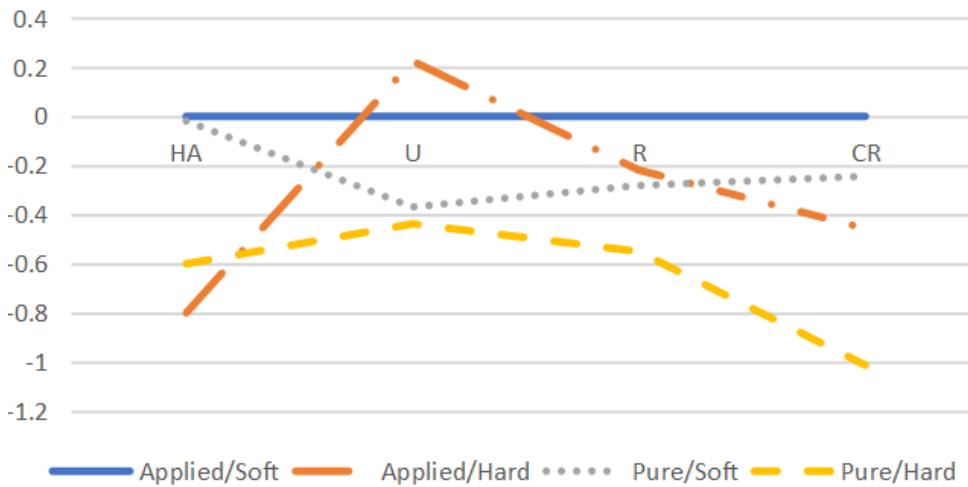
scores in understanding (.228); individuals with Pure/Soft academic disciplines (10%) were associated with lower scores on habitual action (-.017), understanding (-.364), reflection (-.279), and critical reflection (-.244); and individuals with Pure/Hard academic disciplines (5%) were

associated with lower scores on habitual action (-.600), understanding (-.435), and critical reflection (-1.008) (Table 42, Figure 12).

Table 42  
*Relationship of Academic Discipline and QRT Scores*

Academic Discipline	HA	U	R	CR
Applied/Soft	0	0	0	0
Applied/Hard	-.800	.228	-.215	-.452
Pure/Soft	-.017	-.364	-.279	-.244
Pure/Hard	-.600	-.435	-.546	-1.008

Figure 12  
*Academic Discipline Regression Models Coefficients*



Nearly two-thirds of CPTs reported Applied/Soft academic disciplines. For those reporting Applied/Hard academic disciplines, about 18%, the coefficient is .800 lower for habitual action compared to Applied/Soft. It is lower compared to the other two academic discipline groups as well. This is an indicator that having an Applied/Hard academic discipline has less influence on QRT habitual action scores than any of the other three categories of academic discipline, while having an Applied/Soft academic discipline has more influence on QRT habitual action scores than any of the other three categories. The coefficient for

understanding for Applied/Hard disciplines is higher than all three other academic discipline groups while the coefficient for Pure/Hard is lower than all three categories. This is an indicator that having an Applied/Hard discipline has more influence on QRT understanding scores than any of the other three categories of academic discipline while having a Pure/Hard academic discipline has less influence on QRT understanding scores than any of the other three categories. Similarly, having an Applied/Soft discipline has more influence on QRT reflection and critical reflection scores than any of the other categories, while having a Pure/Hard academic discipline has less influence than any of the other three categories.

None of the coefficients for the three independent variables representing academic discipline are significant in any of the full regression models for habitual action, understanding, reflection, or critical reflection. Therefore, the influence on QRT scores of the three independent variables was not statistically significant.

### **Implications of Results**

This research was conducted to expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with CPTs performance in the workplace. Further, it investigated relationships between participant demographics (gender, age, experience, education level, and academic discipline) and the assessed quality of reflective thinking. Employers seek specific employee thinking, communicating, and problem-solving skills they believe are critical to the success of their business in the future (AMA, 2012; Casner-Lotto & Barrington, 2006; Lumina Foundation & Gallup, 2014). Reflective practice is an integral part of professional thinking (Bannigan & Moores, 2009), which has been described by Parham (1987) as the ability to distinctly and critically analyze decision-making and engage in reflection. This involves rational thinking and deliberation incorporating professional knowledge and expertise

(Donaghy & Morss, 2000). Bannigan and Moores (2009) suggested that the need for professionals to use both practical knowledge and personal experiences in their thinking is why reflective practice is such an important skill. While the results of this study come with limitations, this is the first instance of using the QRT to quantify reflective thinking practiced by professionals in the workplace.

Teaching students to think reflectively and to reason their way through ill-structured, not just well-structured, situations to identify the right problems to solve, and how to solve them, is a common goal for higher education (King et al., 1990). Understanding more about the ongoing development of reflective thinking in students would assist faculty in examining progression of these skills and potentially to further develop courses and instructional strategies to promote reflective practice and self-directed learning and help students gain insights about their professional development and stimulate greater interest in self-directed learning (Dunn & Musolino, 2011). Research suggests a relationship among reflective thinking and individual demographics such as gender, age, education, and profession need to be examined (Boyd & Fales, 1983). Understanding the extent of reflective thinking practiced by professionals in the workplace and examining relationships with selected individual demographics among study participants informs research on design and execution of curricula for teaching reflective thinking and preparing students for success in the workplace. This investigation introduced the use of the QRT to assess quality of reflective thinking in the workplace versus the academic environment. It expanded the research on reflective thinking by quantifying the types and extent of reflective thinking associated with CPTs, a group of professionals that employers have attested perform well in the workplace. It adds to the body of research indicating that the journey leading to the award of advanced degrees appears to increase critical and reflective

thinking skills increase beyond the effects of natural maturation (Pascarella, 1989; Terenzini et al., 1995) and that older, more educated individuals tend to be better reflective thinkers (Merriam, Caffarella, & Baumgartner, 2007; Naghdipour & Emeagwali, 2013).

Hard academic disciplines reportedly place greater importance on student career preparation (Brint et al., 2011); however, 76% of the CPTs reported having a Soft academic discipline. As already noted, additional research is required to understand the distribution of academic disciplines among CPTs. One possible explanation for the high percentage of Soft academic disciplines reported by CPTs is that the emphasis on developing students' critical thinking skills, creative thinking, and communication skills within Soft academic disciplines reported by Brint et al. (2011) helps to prepare professionals for success in the workplace.

This investigation has also shed some light onto the idea that age, experience, and education level are factors in practice of reflective thinking skills. Proficiency in practicing reflective thinking requires years of practice and continuing education (Rodriguez, 2000). This may influence employer's expectations about the capability of new hires for practicing critical and reflective thinking. There are guidelines for developing reflective practice (Finley, 2008) employers could consider for continuing the development of the quality of employees' critical and reflective thinking, building on what was produced in school. Employers could include policies and practices that motivate individuals to practice reflective thinking as a part of professional development in the workplace, and opportunities such as optional structured supported development programs and incentives available to employees while not on-the-job.

### **Recommendations for Future Research**

Areas for future research that arise from the outcomes of this research include:

1. This study used one source, performance improvement professionals certified by the International Society for Performance Improvement (ISPI CPTs) as representatives of professionals recognized for performance in the workplace. This study could be expanded to a larger population of professionals. How would the results from some other, substantially larger, population of professionals recognized for specific performance in the workplace compare to these study results?
2. The results of this study indicated that gender was a significant factor in critical reflection scores, with higher scores associated with males than females, and no significant correlation between gender and age, experience, education level, or academic discipline. Other research using the QRT (McDade, 1999; Phan, 2007) found no statistically significant differences between genders in terms of the four constructs of reflective thinking in the QRT. Does this difference between males and females also exist in other professions (e.g., doctors, lawyers, engineers)? What combination of other independent variables explain this association with gender?
3. Comparison of the results of this study with previous research results involving nursing students by Kember et al. (2000) and accounting and business students (Lucas & Tan, 2006) identified significant differences in QRT scores. Why do they differ in the way they do? Does a similar significant difference exist between students and recognized workplace professionals in the same area of study and practice (e.g., engineering students and professional engineers, law students and practicing lawyers, or medical students and practicing medical professionals)? If so, what activities outside of the educational institute are associated with these differences?

4. Individuals certified by ISPI as a CPT do not share a common education background like some professions such as doctors and nurses, lawyers, and engineers. However, the Applied/Soft category dominated the categories of academic discipline CPTs reported in this study. More than 88% of CPTs reported having a master or doctorate degree, therefore it is possible that a number of CPTs have been educated in more than one of the four categories of academic discipline addressed in this research. More research on different disciplines would shed more light on the question of if some disciplines are associated with more reflective thinking than others. Analysis of academic faculty and curricula regarding the similarities among academic disciplines (Biglan, 1973) produced the Hard – Soft and Pure – Applied classification dimensions used in this study. Is there something about the design of curricula for Applied disciplines that promotes development of reflective thinking?
5. Nearly 60% of CPTs in this study reported having more than 20 years of experience as a professional in the workplace. How does the quality of reflective thinking change with accumulation of professional experience in the work place following college graduation? How does the quality of reflective thinking in recent college graduates compare to the quality displayed by similar graduates who are recognized as a practicing professionals in the workplace?
6. As pointed out by Peltier, Hay, & Drago (2005), the literature suggests that additional factors such as other students (Braun, 2004; Brown & Posner, 2001; Dempsey, Halton, & Murphy, 2001; Gray 2001; Hodgkinson & Brown, 2003; Peltier, Drago, & Schibrowsky, 2003) and the role of the professor (Bailey, Saporito, Kressel, Christensen & Hooijberg, 1997, Fisher & Somerton, 2000; Liimatainen, Poskiparta,



Karhila, & Sjogren, 2001; Thorpe 2001) may be significant in fostering reflection.

Examination of reflective thinking in the workplace would benefit from exploring the impact of co-workers and the role of workplace leadership in fostering reflective thinking by professionals in the workplace.

7. The QRT was not the subject of this research, however a review of the literature on the development and evaluation of the QRT failed to reveal how potential biases and weaknesses associated with Likert scales (Rinker, 2016) are mitigated or can be overcome in analysis of QRT. What are the impacts and implications of central tendency bias, acquiescence bias, and social desirability associated with use of Likert scales on QRT scores?

### **Concluding Thoughts**

The great philosopher, education reformer, and psychologist John Dewey examined what separates thinking, a basic human faculty we take for granted, from thinking *well*. He examined what it takes to train and educate people to master the art of thinking, especially when confronted with an overflow of information, or information that appears inconsistent with what we think we already know. He defined reflective thinking as, "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (Dewey, 1997, p. 6).

Business leaders say they need employees who can think reflectively (Casner-Lotto & Barrington, 2006) and educators have recognized the need to develop reflective thinking in post-secondary education (Akbari, 2007; Boyd & Fales, 1983; Dewey, 1997; Newman, 1960; Paul, 1990; Schön, 1983). Researchers have developed reliable measures of reflective thinking (Aukes et al., 2007; Kember et al., 2000) to help identify if educational curriculum designed to improve

reflective thinking are achieving that objective, but similar assessments of reflective thinking quality among professionals in the workplace are lacking.

Reflective thinking is always about something (Lucas & Tan, 2006). The quality of reflective thinking exercised by a professional in the workplace is dependent on the type of situations encountered in that workplace as well as the reflective thinking capabilities of the professional. Many situations can be satisfactorily resolved by taking immediate action with no deliberate thought or through the thoughtful action using existing knowledge without needing to appraise that knowledge that characterizes habitual action and understanding. Not all situations require application of reflection or critical reflection. For example, according to Mamede and Schmidt (2005), research demonstrated that physicians are not expected to engage in reflection when dealing with common problems familiar to them. In those situations, the reasoning practiced by doctors is highly automatic, based on activation of instances experienced previously with similar patients (Norman & Brooks, 1997; Schmidt & Boshuizen, 1993). There are situations where the critique of assumptions and testing of premises that characterize reflection and critical reflection provide insights and perspectives leading to a better outcome. Novice practitioners, lacking tacit knowledge and unable to exercise knowing-in-action, tend to cling to rules and procedures which they can apply mechanically. Professionals, on the other hand, can monitor and adapt their practice simultaneously, seemingly intuitively (Schön, 1983, 1987). Whether expert or novice, all professionals should reflect on practice – both in general and with regard to specific situations (Finlay, 2008). The practice of reflective thinking can be an enormously powerful tool to examine and transform professional practice. Hobbs (2007) recommends reflective thinking be encouraged as a self-development process in any field whose members work with people. A professional requires not just the capacity to exercise all of the

four categories of reflective thinking assessed by the QRT, but the ability to recognize what is appropriate for a particular situation.

This was an investigation of the quality of reflective thinking practiced by recognized professionals in the workplace. Certified human performance improvement professionals (CPTs) provided a representative accessible population for study. A comparison of QRT scores for habitual action, understanding, reflection, and critical reflection showed significant differences between students (Kember et al., 2000; Lucas & Tan, 2006) and CPTs. While not unexpected, why the QRT scores differ the way they do remains to be determined. This research was the first instance of using the QRT to quantify the quality of reflective thinking practiced by professionals in the workplace. It detected only limited relationship between independent personal demographic factors including gender, age, experience, education level, and academic discipline and QRT scores. It expands the research on reflective thinking by quantifying the types and extent of reflective thinking associated with CPT working professionals.

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## **Appendix A - Participant Open Survey Questionnaire**

Examining Reflective Thinking Survey Questionnaire  
Waiver of Informed Consent

Project Title: Examining Reflective Thinking in Practicing Professionals

Approval Date of Project: November 24, 2016

Principle Investigator: Dr. Royce Ann Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. innovation Dr., Olathe, KS 66061 (913) 307-7353

Co-investigator: Joel Buck

IRB Chair Contact/ Phone Information:

Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224

Cheryl Doerr, Associate Vice President for Research Compliance 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224

Purpose of the Research: The purpose of this survey is to gather information regarding the extent that you engage in reflective thinking

Procedures:

The first section collects information about the extent that you engage in reflective thinking. This is NOT a test. There are no “right” or “wrong” responses to the statements. A response is only “right” if it reflects your personal reaction, and the strength of your reaction, as accurately as possible.

The second section collects information about you, your background, and your experience. For each item, select the response that best describes you.

Length of time for survey: 10 minutes

Risks or discomforts anticipated: There are no foreseeable risks to you

Benefits Anticipated: This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace and examining relationships between selected individual demographics and extent of reflective thinking practiced by study participants. Understanding the extent of reflective thinking practiced by professionals in the work place furthers the research on reflective thinking and reflective practice by professionals.

Respondents will be eligible to be selected by a drawing to receive a \$100 Gift eCard.

Extent of Confidentiality: Your identity will be kept confidential. Participants are anonymous. Researchers will not have access to any information that will allow determination of the identity of the research subjects in this study, or to link research data to a specific individual in any way.

Terms of Participation: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation or penalty.

I verify that I have read and understand this consent form and willingly agree to participate in this study under the terms described, and by choosing this statement I voluntarily consent to participate.

I choose not to participate in this survey.

## Section 1 – Reflective Thinking Questionnaire

This section collects information about the extent that you engage in reflective thinking. Reflective thinking has been defined as the active, persistent and careful consideration of beliefs or knowledge in the light of the grounds that support the belief or knowledge and the conclusion reached.

Please select the appropriate response that indicates your level of agreement with the following statements about your actions and thinking in your professional practice.

Do not deliberate over any response. Instead, respond quickly to each item.

This is NOT a test. There are no “right” or “wrong” responses to the statements that follow. A response is only “right” if it reflects your personal reaction, and the strength of your reaction, as accurately as possible.

Please read through each statement and respond quickly.

1	When I am working on some assignments, I can do them without thinking about what I am doing.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
2	My professional practice requires me to understand concepts learned previously.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
3	I sometimes question the way others do something and try to think of a better way.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
4	As a result of my professional experiences I have changed the way I look at myself.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
5	In my professional practice I do some things so many times that I have started to do them without thinking about it.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
6	To be successful in my professional practice, I need to understand the significance of substantive information.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
7	I like to think over what I have been doing and consider alternative ways of doing it	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
8	My professional practice has caused me to challenge some of my firmly held ideas.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
9	As long as I can remember what has worked successfully in the past, I do not have to think too much.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree



10	I need to understand what I have learned in my professional practice in order to perform practical tasks.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
11	I often reflect on my actions to see how I could have improved on what I did.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
12	As a result of my work experiences I have changed my normal way of doing things.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
13	If I follow what the client in my professional practice says, I do not have to think too much at work.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
14	In my professional practice, I have to continually think about what I have learned.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
15	I often re-appraise my experience so I can learn from it and improve my next performance.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree
16	During my professional practice I have discovered faults in what I had previously believed to be right.	strongly agree	agree	definite answer is not possible	disagree	strongly disagree

## Section 2 – About you

17	Gender:				male	female
18	My age in years:	24 or younger	25-34	35-44	45-54	55 or older
19	My years of employment as a human performance professional	5 or less	6-10	11-15	16-20	21 or more
20	My education level:	High School or Associate degree	Bachelor degree	Master degree	Doctoral degree	

Academic Discipline.

**Pure** academic disciplines are those in which results are focused on discovery, explanation, understanding, and interpretation.

**Applied** academic disciplines are those in which research results in products, techniques, protocols, or procedures.

**Soft** academic disciplines are those in which problems are often ill-structured, cannot be described always or be described completely, and certainty of solutions is elusive.

**Hard** academic disciplines are those in which the parameters of problems can be specified with a high degree of certainty and where deductive logic and complex, logical manipulations are central tools.

**Examples** of each category are: **Physics is Pure/Hard, history is Pure/Soft, Engineering is Applied/Hard, and Education is Applied/Soft.**

For additional examples, <click here>

21	My academic discipline in my highest level of education:	Pure/Hard	Pure/Soft	Applied/Hard	Applied/Soft
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Close: THANK YOU for participating in this research

## **Appendix B - Participant Solicitation Email**

I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. My advisor and research director is Dr. Royce Ann Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. Innovation Dr., Olathe, KS 66061 (913) 307-7353, email: racollin@ksu.edu.

I am reaching out to you and asking you to complete a short survey as a part of my research because CPTs are a population of practicing professionals employers and clients have attested practice a prescribed set of standards that include working collaboratively with stakeholders to identify problems, determine the cause of the problems, develop and implement solutions, and evaluate the results and impact on the business and organization, and adhere to a code of ethics. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace and examining relationships between selected individual demographics and extent of reflective thinking practiced by study participants.

This survey should only take about 10 minutes to complete. Respondents will be eligible to be selected by a drawing to receive a \$100 gift card.

Participants are anonymous. Your identity will be kept confidential. Researchers will not have access to any information that will allow determination of the identity of the research subjects in this study, or to link research data to a specific individual in any way. Your participation is completely voluntary. If you decide to participate in this study, you may withdraw your consent at any time, and stop participating at any time without explanation or penalty.

[Directions and hyperlink / URL to on-line survey]

## Appendix C - Common Academic Discipline Areas by Categories

	Hard	Soft
<b>Pure</b>	Biology	Anthropology
	Biochemistry	Ethnic Studies
	Botany	Political Science
	Environmental Science	Psychology
	Microbiology	Sociology
	Bacteriology	Art (fine and applied)
	Zoology	English (language and literature)
	Kinesiology	Language / Literature
	Astronomy	History
	Atmospheric Science	Music
	Meteorology	Philosophy
	Chemistry	Theater / Drama
	Earth Science	Geography
	Mathematics	
	Physics	
Statistics		
<b>Applied</b>	Speech	Theology or Religion
	Medicine	Business Education
	Dentistry	Elementary/Middle School Education
	Veterinarian	Music or Art Education
	Pharmacy	Physical Education or Recreation
	Agriculture	Nursing
	Aero-/Astronautical Engineering	Allied health / Other Medical
	Civil Engineering	Social Work
	Chemical Engineering	Family Studies
	Computer Science	Criminal Justice
	Electrical or Electronic Engineering	Journalism
	Industrial Engineering	Accounting
	Materials Engineering	Business Administration
	Mechanical Engineering	Finance
	General Engineering	Marketing
		Management
		Architecture
		Urban Planning
	Economics	
	Communications	
	Public Administration	

Categorized based on Biglan (1973), Malaney (1986), Stoecker (1993), Clark (2003), and Laird, Shoup, Kuh, & Schwarz (2008)

## **Appendix D - Kansas State University IRB Approval**

TO: Royce Collins  
Educational Leadership  
Innovation Dr. Olathe, KS

Proposal Number: 8553

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 11/24/2016

RE: Proposal Entitled, "Examining Reflective Thinking in Practicing Professionals"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: #2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

## Appendix E - Personal Communication with David Kember

### Buck, Joel [USA]

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**From:** David Kember <david.kember@utas.edu.au>

**Sent:** Tuesday, December 13, 2016 9:33 PM

**To:** Buck, Joel [USA]

**Cc:** Royce Ann Collins (racollin@k-state.edu)

**Subject:** [External] RE: Request for Information - Questionnaire for Reflective Thinking

Dear Joel,

I get quite a lot of requests along these lines and am fairly sure that others have done what you intend to do. To adapt it change working like “in this course” to something like “in my professional practice”. Try to make it fit what your respondents do.

You can check the appropriateness of your changes by doing a factor analysis of the data you gather with the questionnaire.

I have not followed up on the use of the questionnaire, but it has been cited a lot and some of the articles may list modifications.

Kind regards.

David

---

**From:** Buck, Joel [USA][mailto:buck\_joel@bah.com]

**Sent:** Wednesday, 14 December 2016 1:11 PM

**To:** David Kember david.kember@utas.edu.au

**Cc:** Buck, Joel [USA] buck\_joel@bah.com; Royce Ann Collins (racollin@k-state.edu)  
racollin@k-state.edu

**Subject:** Request for Information – Questionnaire for Reflective Thinking

Dear Professor Kember –

I am a graduate student in adult and continuing education at Kansas State University pursuing my PhD. I am reaching out to you because of your work on the Questionnaire for Reflective Thinking, or QRT. The problem I am researching is that while the literature reveals employers saying they need employees who can think reflectively, educators recognize development of reflective practice as an objective of professional coursework, and even though there are reliable ways to measure reflective thinking, the extent to which professionals engage in reflective thinking in the workplace needs further examination.

In your article, *Development of a Questionnaire to Measure the Level of Reflective Thinking*, published in 2000, you note that while the QRT developed by you and Doris Leung is designed for use in academic programs, it could, with some modification, be used to measure the level of reflective thinking by professionals engaged in their professional practice. You provide the wording for each of the 16 items of the QRT in Appendix A of your article, and invite readers to use the questionnaire for other research purposes provided they acknowledge the source and that the copyright on the questionnaire is owned by the authors.

I would like to use the QRT to determine whether a population of practicing professionals in the workforce engage in reflective thinking, and if so, to what extent. I am writing to you to learn in what ways the use and wording of the QRT has changed since 2000 and to solicit your suggestions for how I should modify the wording of the QRT items to accommodate the change in context from classroom to workplace without compromising the integrity of the instrument itself.

Sincerely ---

Joel A. Buck  
joelbuck@k-state.edu  
(sent via webmail)



## **Appendix F - Email Exchanges with ISPI**

From: Buck, Joel [USA] (mailto:buck ioel@bah.coml  
Sent: Tuesday, December 13, 2016 7:08 PM  
To: andrea.moore@att.net; atena.bishka@gmail.cpm  
Cc: Buck, Joel [USA]; Royce Ann Collins (racollin@k-state.edu)  
Subject: Request for Infomation on CPT population

Dear Ms Bishka and Ms Moore —

I am a graduate student in adult and continuing education at Kansas State University pursuing my PhD. I am reaching out to you for information about the population of ISPI CPTs.

The problem I am researching is that while the literature reveals employers saying they need employees who can think reflectively, educators recognize development of reflective practice as an objective of professional coursework, and even though there are reliable ways to measure reflective thinking, the extent to which professionals engage in reflective thinking in the workplace needs further examination.

I believe the pool of CPTs is a great population of professionals for my research. The degree of reflective thinking practiced in the workplace by the population of CPTs will be, I believe, an indicator of the extent to which recognized professionals engage in reflective thinking in the workplace. In accordance with the student research survey guidelines poste4 on the ISPI website, I plan to prepare an online survey and then submit the body of an email containing the information required in the ISPI guidelines to you for distribution to all CPTs.

To help me tailor the survey appropriately, I request you provide me with any available general descriptive statistics on the CPT population (e.g., total numbers, ratios of males to females, range of ages, distribution of education disciplines and levels of education, years of experience in performance improvement, that sort of information).

Please let me know if you have any questions.

I thank you in advance for your assistance.

Sincerely,

Joel A. Buck, CPT  
ioelbuck@k-state.edu

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From: Andrea Moore [mailto:andrea.moore@att.net]  
Sent: Wednesday, December 14, 2016 11:08 AM  
To: Buck, Joel [USA]  
Subject: RE: Request for Information on CPT population

Hi Joel,

I'm excited that you're doing this research. It should help the entire CPT population I believe. As far as what you've requested, at this point I need to direct you to Courtney Brooks from ISPI. For now, she's the keeper of the administrative CPT information you've requested. One caveat. ISPI has a very limited staff so I'm not sure if from a work perspective, Courtney will have time. One other possible alternative is that the CAGC is getting ready to have task forces look at a few different CPT-related projects where an output MAY be the info you're requesting. I'll know more about that later this week.

In summary, try Courtney. If that's not an option, the CAGC task force may work.

Good luck!

Andrea Moore, CPT, MBA, ID (ILT)  
The Institute for Performance Improvement  
Practice Leader  
andrea.moore@att.net linked in: <https://www.linkedin.com/in/andrea-mitchell-moore/>  
SKYPE: andreakmoore3

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From: Andrea Moore  
Sent: Wednesday, December 14, 2016 1:12 PM  
To: Brooks Kamin, Courtney  
Cc: buck ioel@bah.com  
Subject: FW: Request for Information on CPT population

Sorry — forgot to copy Courtney

---

From: Brooks Kamin, Courtney  
Sent: Wednesday, December 14, 2016 8:25 PM  
To: Andrea Moore <andrea.moore@att.net>  
Cc: Buck, Joel [USA] <buck ioel@bah.com>  
Subject: [External] RE: Request for Information on CPT population

Hi Joel, thanks so much for your interest in the CPT Program. We are able to send out a survey on your behalf to capture the information you are interested in. Currently, that is not data that we have on file. You would need to be an ISPI Gold Level member to take advantage of the opportunity for staff to send this message out on your behalf. But please know it is something we would be happy to do.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)  
P.O. Box 13035  
Silver Spring, MD 20910  
Office: 301.960.8837  
Fax: 301.587.8573  
Email: courtneyb@ispi.org

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On Dec 14, 2016, at 9:47 PM, Buck, Joel [USA] <buck ioel@bah.com> wrote:

Thank you, Courtney —

I understand your note to say that ISPI does not have any available general descriptive statistics on the CPT population (e.g., total numbers, ratios of males to females, range of ages, distribution of education disciplines and levels of education, years of experience in performance improvement, that sort of information). Is that correct?

Joel A. Buck  
Phone 913-680-6574  
Mobile 913-683-0005

---

From: Brooks Kamin, Courtney  
Sent: Wednesday, December 14, 2016 8:59 PM  
To: Buck, Joel [USA] <buck\_joel@bah.com>  
Cc: Andrea Moore <andrea.moore@att.net>  
Subject: Re: [External] RE: Request for Information on CPT population

Hi Joel, we do have the total count of CPTs, but that would only be information we share with members.

Courtney Brooks Kamin  
Operations Manager  
International Society for Performance Improvement (ISPI)  
P. O. Box 13035 Silver Spring, MD 20910 Office: 301.960.8837 | Fax: 301.587.8573  
courtneyb@ispi.org

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From: Buck, Joel [USA] [buck\_joel@bah.com]  
Sent: Wednesday, December 14, 2016 9:29 PM  
To: Brooks Kamin, Courtney  
Subject: RE: [External] RE: Request for Information on CPT population

Okay.

I see a reference to "over 1,300 CPTs from 23 countries" in the CPT Fast Facts sheet on the ISPI.org webpage. I was hoping for some additional information to inform how I tailor my questionnaire for this audience.

Joel A. Buck  
Phone 913-680-6574  
Mobile 913-683-0005

---

From: Brooks Kamin, Courtney <courtneyb@ispi.org>  
Sent: Thursday, December 15, 2016 7:21:52 AM  
To: Buck, Joel [USA]  
Subject: RE: [External] RE: Request for Information on CPT population

Hi Joel, our CPTs have a variety of backgrounds, intersecting with many of the areas you are interested in polling them. Can you be more specific of information you would need to craft a survey? I can work with you on this.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)  
P.O. Box 13035  
Silver Spring, MD 20910  
Office: 301.960.8837  
Email: courtneyb@ispi.org

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From: Buck, Joel [USA] [buck\_joel@bah.com]  
Sent: Thursday, December 15, 2016 8:37 AM  
To: Brooks Kamin, Courtney  
Subject: Re: [External] RE: Request for Information on CPT population

Thank you, Courtney --

My study looks at practice of reflective thinking and relating it to several attribute independent variables such as gender, level of education, and years experience. I was going to tailor the categories for these variables on the survey based on information about the actual population completing the survey -- in this case, CPTs. If the information has not already been collected, then I will use the categories I have already structured for a general population.

I know there are CPTs practicing in many countries. When I submit my survey to you for distribution to the CPT population, is it possible to limit that distribution to CPT s practicing in the US, only?

Joel Buck

---

On Jan 2, 201 7, at 9:16 AM, Buck, Joel [USA] <buck ioel@bah.com> wrote:

Courtney

A couple more questions as I continue to shape my research plan.

First, I want to pilot my survey with about 10-12 CPTs that represent the greater population of all CPTs before finalizing it and getting you to send it out to all CPTs. How can I do that? Do I send you the email to send out to the pilot group with a link to the survey, or do I need to send it to someone else?

Second, is there a way that the final survey can be sent only to CPTs working in the US? I would like to avoid potential impacts of work culture in the results.

Thank you.

Joel A. Buck  
Phone 913-680-6574  
Mobile 913-683-0005

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From: Brooks Kamin, Courtney <courtneyb@ispi.org>  
Sent: Thursday, January 5, 2017 2:09 PM  
To: Buck, Joel [USA]  
cc: Andrea Moore  
Subject: [External] Re: Follow-up to Request for Information on CPT population

Hi Joel, happy new year to you.

Please send the email/link to us and we will send out for you. We can also ensure that the final survey is sent to US based CPTs.

Courtney Brooks Kamin  
Operations Manager  
International Society for Performance Improvement (ISPI)

---

From: Brooks Kamin, Courtney <courtneyb@ispi.org>  
Sent: Thursday, January 12, 2017 AM  
To: Buck, Joel [USA]  
Subject: RE: [External] RE: Request for Information on CPT population

Hi Joel, I wanted to follow up to this. I believe I sent a response, but haven't head back from you regarding potential dates for sending this out to our US based CPTs. Let me know how we can help.

Thank you!

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

---

From: Buck, Joel [USA]  
Sent: Thursday, January 12, 2017 11:13 AM  
To: Brooks Kamin, Courtney; Joel Buck  
Subject: Re: [External] RE: Request for Information on CPT population

Courtney -

Thank you for the reminder.

I plan to conduct a pilot of the survey with 10 CPTs the last week of JAN or first week of FEB (will send you the cover letter and link to the pilot version of the survey), then, after making any adjustments to the survey needed from the results of the pilot, send you another cover letter and survey link to send out to all US based CPTs the second week in FEB.

Will that work for you?

Joel Buck

---

From: Buck, Joel [USA]  
Sent: Tuesday, January 24 2017 9:09 PM  
To: Brooks Kamin, Courtney  
cc: Joel Buck Ooelbuck@k-state.edu)  
Subject: CPT Reflective Thinking Survey -- PILOT  
Attachments: Pilot Invite.docx

Courtney —

I am ready to kick of the PILOT of the survey for my Ph.D. research as we discussed in this email thread.

Attached, and copied in below, is the body of the email that I request you send to 10 CPTs practicing in the United States. After hearing back from this pilot group, and making any modifications to the survey needed based on their responses, I will send you the body of a slightly different email message with a different survey link for you to forward to all CPTs practicing in the United States.

Please let me know if you have any questions.

Thank you for your support.

-----  
Pilot Invite

Hello —

I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. My advisor and research director is Dr. Royce Ann



Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. Innovation Drive, Olathe, KS 66061 email: racollin@ksu.edu.

I am reaching out to you to as part of a pilot group for the main study to complete a short survey and to identify any problems with the procedures for data collection so they can be corrected before the survey is conducted as part of the main study. This survey should only take about 10 minutes to complete.

The finalized survey will be sent to all CPTs practicing in the United States as a part of my research because CPTs are a population of practicing professionals who employers and clients have attested practice a prescribed set of standards. These standards include working collaboratively with stakeholders to identify problems, determine the cause of the problems, develop and implement solutions, and evaluate the results and impact on the business and organization. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace. It will also examine relationships between selected individual demographics and extent of reflective thinking practiced.

Please click on the link below to start the survey.

#### CPT Reflective Thinking Survey-Pilot

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_dfnKEOhsHbFXBr](https://kstate.qualtrics.com/SE/?SID=SV_dfnKEOhsHbFXBr)

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Sincerely,

Joel A. Buck  
joelbuck@k-state.edu

---

From: Buck, Joel [USA]  
Sent: Thursday, January 26, 2017 7:15 PM  
To: Brooks Kamin, Courtney  
Subject: FW: CPT Reflective Thinking Survey -- PILOT  
Attachments: Pilot Invite.docx

Courtney

Good evening.

Would you please provide me with an update on my request for support for this Reflective Thinking study PILOT? When will the invitation be sent out to 10 US-based CPTs?

Thank you.

Joel A. Buck

---

From: ISPI Certification <certification@ispi.org>  
Sent: Monday, January 30, 2017 2:45 PM  
To: ISPI Certification  
cc: joelbuck@k-state.edu  
Subject: [External] Message to CPTs: Pilot Survey

*This message is sent on behalf of Joel Buck, ISPI Member, conducting doctoral research in Pl.*

Hello —

I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. My advisor and research director is Dr. Royce Ann Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. Innovation Drive, Olathe, KS 66061, email: racollin@ksu.edu.

I am reaching out to you to as part of a pilot group for the main study to complete a short survey and to identify any problems with the procedures for data collection so they can be corrected before the survey is conducted as part of the main study. This survey should only take about 10 minutes to complete.

The finalized survey will be sent to all CPTs practicing in the United States as a part of my research because CPTs are a population of practicing professionals who employers and clients have attested practice a prescribed set of standards. These standards include working collaboratively with stakeholders to identify problems, determine the cause of the problems, develop and implement solutions, and evaluate the results and impact on the business and organization. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective

thinking associated with success in the workplace. It will also examine relationships between selected individual demographics and extent of reflective thinking practiced.

Please click on the link below to start the survey.

### CPT Reflective Thinking Survey-Pilot

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_dfnKEOhsHbFXBr](https://kstate.qualtrics.com/SE/?SID=SV_dfnKEOhsHbFXBr)

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Sincerely,  
Joel A. Buck joelbuck@k-state.edu

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From: Buck, Joel [USA]  
Sent: Friday, February 3, 2017 8:03 AM  
To: courtneyb@ispi.org  
cc: Buck, Joel [USA]  
Subject: CPT Reflective Thinking Survey -- ready to OPEN  
Attachments: SurveyInvite.docx

Courtney --

I am ready to open the CPT Reflective Thinking Survey for my Ph.D. research. I have captured what I needed from the Pilot survey this week. Thank you for your assistance.

Attached, and copied into the body of this email below, is the text for the email I request you sent out to all CPTs practicing in the United States.

**PLEASE SEND OUT THE EMAIL MONDAY MORNING (6 Feb) TO ALL CPTS PRACTICING IN THE UNITED STATES.**

I plan to keep this survey open for two weeks. If at the end of that time I have not received a sufficient number of responses for my research, will ask you to send out another email (that I will provide) to the same group of CPT s.

Please let me know if you have any questions.

Please copy me when you send out the survey like you did for the PILOT.

Thank you.

Joel Buck

Body of email to send out:

Hello —

I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. My advisor and research director is Dr. Royce Ann Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. Innovation Drive, Olathe, KS 66061 , email: racollin@ksu.edu.

I am reaching out to you to complete a short survey because CPT s are a population of practicing professionals who employers and clients have attested practice a prescribed set of standards. These standards include working collaboratively with stakeholders to identify problems, determine the cause of the problems, develop and implement solutions, and evaluate the results and impact on the business and organization. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace. It will also examine relationships between selected individual demographics and extent of reflective thinking practiced.

This survey should only take about 10 minutes to complete. Respondents will be eligible to be entered into a drawing to receive a \$100 gift card.

Participants are anonymous. Your identity will be kept confidential. Your participation is completely voluntary. If you decide to participate in this study, you may withdraw your consent at any time, and stop participating at any time without explanation or penalty.

Please click on the link below to start the survey.

### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChyV7AX7Rx0p](https://kstate.qualtrics.com/SE/?SID=SV_20aChyV7AX7Rx0p)

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Tuesday, February 7, 2017 AM  
To: Buck, Joel [USA]  
Subject: [External Re: CPT Reflective Thinking Survey -- ready to OPEN

Hi Joel, thanks so much for your message. Unfortunately, I was out of the office on Friday and am catching up to my emails. We will send this out today for you.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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From: Buck, Joel [USA]  
Sent: Tuesday, February 7, 2017 8:12 AM  
To: Kamin, Courtney Brooks  
Subject: Re: [External] Re: CPT Reflective Thinking Survey -- ready to OPEN

Thank you, Courtney.  
After you send the survey out, please let me know how many people it went out to -- I need that number for my report.

Joel Buck

---

From: ISPI Certification <certification@ispi.org>  
Sent: Tuesday, February 7, 2017 10:40 AM  
To: ISPI Certification  
cc: Buck, Joel [USA]  
Subject: [External] ISPI CPT Research survey  
Importance: High

*This message is sent on behalf of Joel Buck (buck ioel@bah.com). Please respond to him with any feedback or questions.*

Hello —

I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. My advisor and research director is Dr. Royce Ann Collins, Associate Professor, Educational Leadership, Kansas State University, 22201 W. Innovation Drive, Olathe, KS 66061, email: racollin@ksu.edu.

I am reaching out to you to complete a short survey because CPTs are a population of practicing professionals who employers and clients have attested practice a prescribed set of standards. These standards include working collaboratively with stakeholders to identify problems, determine the cause of the problems, develop and implement solutions, and evaluate the results and impact on the business and organization. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals engage in reflective thinking in the workplace. This investigation will expand the research on reflective thinking by quantifying the types and extent of reflective thinking associated with success in the workplace. It will also examine relationships between selected individual demographics and extent of reflective thinking practiced.

This survey should only take about 10 minutes to complete. Respondents will be eligible to be entered into a drawing to receive a \$100 gift card.

Participants are anonymous. Your identity will be kept confidential. Your participation is completely voluntary. If you decide to participate in this study, you may withdraw your consent at any time, and stop participating at any time without explanation or penalty.

Please click on the link below to start the survey.

### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChyV7AX7RxOp](https://kstate.qualtrics.com/SE/?SID=SV_20aChyV7AX7RxOp)

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From: "Buck, Joel [USA]" <buck ioel@bah.com>  
Date: Wednesday, February 8, 2017 at 8:33 AM  
To: Courtney Brooks <courtneyb@ispi.org>  
Subject: CPTs and Reflective Thinking Survey

Courtney

Thank you for sending out the mail about my research survey yesterday to all CPTs based in the United States. Would you please share with me the number of people that were sent the survey invitation? That is a piece of information I require for my research report.

Thanks again.

Joel Buck

---

From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Wednesday, February 8, 2017 10:21 AM  
To: Buck, Joel [USA]  
Subject: [External] Re: CPTs and Reflective Thinking Survey

Hi Joel, the survey was sent to 403 CPTs in the US.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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From: Buck, Joel [USA]  
Sent: Wednesday, February 8, 2017 10:33 AM  
To: Kamin, Courtney Brooks  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

Wow.

I was expecting a lot larger number.

The ISPI website states there are more than 1300 CPTs operating in 23 countries. I was expecting more like 800-1000 of them to be in the US.

If I expand the survey to include ALL CPTs, not just those in the US, how many would that be?

Joel Buck

---

From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Wednesday, February 8, 2017 10:41 AM  
To: Buck, Joel [USA]  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

Joel, these are our active CPTs. We have had 1300 come through the CPT program. The total including international renewed CPTs would be 460.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI!)

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From: "Buck, Joel [USA]" <buck ioel@bah.com>  
Date: Wednesday, February 8, 2017 at 11:49 AM  
To: Courtney Brooks <courtneyb@ispi.org>  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

Thanks.

Do you have email addresses for the other CPTs that came through the program but are not currently active?

If so, I could send them a modified version of the survey.

Joel Buck

---

From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Wednesday, February 8, 2017 12:00:11 PM  
To: Buck, Joel [USA]  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

Hi Joel, we do have their contact information, but if they are not active, they are not considered to be a CPT.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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From: Buck, Joel [USA] <buck ioel@bah.com>  
Date: Wednesday, February 8, 2017 at 1:10 PM  
To: Courtney Brooks <courtneyb@ispi.org>  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

I understand that, Courtney.

If I were to expand the research, the data on those not active would be identified so they could be separated from those active CPTs.

I would like to see how many responses I get this week, then decide whether or not to expand to inactive CPTs. Could you support sending out a second survey to the inactive CPTs next week?

Joel Buck

---

From: Kamin, Courtney Brooks [mailto:courtneyb@ispi.org]  
Sent: Wednesday, February 8, 2017 12:11 PM  
To: Buck, Joel [USA] <buck ioel@bah.com>  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

I will have to speak to the Board about reaching out to inactive CPTs.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

---

From: Buck, Joel [USA] <buck ioel@bah.com>  
Date: Monday, February 13, 2017 at 12:28 PM  
To: Courtney Brooks <courtneyb@ispi.org>  
Subject: RE: CPTs and Reflective Thinking Survey

Good morning, Courtney.

The responses to my survey invitation tapered off over the weekend leaving me with only a fraction of the total response I need for my study.

The first thing I would ask of you today is to send out another invitation to all CPTs. I have attached the body of that email as well as displaying it below.

The second thing I would ask of you is to follow up with the board on my request to extend the survey invitation to others who have been certified as CPTs by ISPI, but who are currently not active as a CPT or a member of ISPI. I have attached a document outlining my request that you can provide to the board members that lays out my request.

Thank you in advance for your assistance and support.

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Body of invitation #2

Hello —

Can you spare 10 minutes to complete a survey on your practice of reflective thinking? I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. If you complete the survey, you can be eligible to win a \$100 gift card.

I know how busy you are, and if you already responded to my first invitation to complete this survey, thank you. I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. It will also examine relationships between selected individual demographics and extent of reflective thinking practiced.

Please click on the link below to start the survey.

#### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX7Rx0p](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX7Rx0p)

Sincerely,

Joel A. Buck  
joelbuck@k-state.edu

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Attachment for ISPI Board:

To: ISPI Board (info@ispi.org)

Klaus Wittkuhn (KLAUSW11TKUHN@ispi.org), Scott Casad (scottcasad@ispi.org), Dick Handshaw (dickhandshaw@ispi.org), Don Triner (don.triner@proofpoint.net), Rose Nixon, Bill Solomonson

Subject: Reflective Thinking in the Workplace — Student Research Survey

I am a graduate student in adult and continuing education at Kansas State University pursuing my PhD. The problem I am researching is the extent to which professionals engage in reflective thinking in the workplace.

A review of the literature on reflective thinking shows that business leaders and HR managers in the United States say they need employees who can think reflectively, that educators recognize development of reflective practice as an objective of professional coursework, and that there are reliable ways to measure reflective thinking. However, researchers have not explored the extent to which professionals actually engage in reflective thinking in the workplace. I believe the pool of individuals who have successfully met the standards and been recognized by ISPI as a CPT is a great population of professionals for my research.

In my approved research proposal, I made the case that the degree of reflective thinking practiced in the workplace by the population of CPTs will be an indicator of the extent to which recognized professionals engage in reflective thinking in the workplace.

In accordance with the student research survey guidelines posted on the ISPI website, I prepared an online survey and submitted the body of an email containing the required information. The ISPI Operations Manager, Courtney Brooks Kamin distributed the mail and link to my survey to all active CPTs practicing in the United States on 7 February.

The process of meeting the standards for certification as a performance technologist is the basis for selecting CPTs as a population that can provide an indicator of the extent to which recognized professionals practice reflective thinking. CPTs, both inactive as well as active, have been recognized by their employers and clients as professionals that add value to their organizations. In order to generate more responses for my research, enough to support required statistical analysis, I request ISPI's support to distribute the survey invitation to all CPTs practicing in the United States, including those who may not have renewed their certification.

I thank you in advance for your assistance. Please let me know if you have any questions.

Sincerely,

Joel A. Buck, CPT

---

From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Wednesday, February 15, 2017 8:41 PM  
To: Buck, Joel [USAI]  
Subject: [External] Re: CPTs and Reflective Thinking Survey

Hi Joel, we've had several emails in queue this week. We will send by Monday.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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On Feb 20, 2017, at 6:29 PM, Kamin, Courtney Brooks <courtneyb@ispi.org> wrote:

Hi Joel, this has gone out to 294 recipients.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

---

From: Buck, Joel [USA] <buck ioel@bah.com>  
Date: Tuesday, February 21, 2017 at 1:00 PM  
To: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Subject: Re: [External] Re: CPTs and Reflective Thinking Survey

Thank you, Courtney

Who are these 294 individuals to whom the email went out and how is this list of people related to the 403 you told me the origin email was sent'? It is important for me to document who was being surveyed and when for my research report.

Joel Buck

---

From: Kamin, Courtney Brooks [mailto:courtneyb@ispi.org]  
Sent: Friday, February 24, 2017 9:46 AM  
To: Buck, Joel (USA) <buck\_joel@bah.com>  
Subject: Re: (Externall Re: CPTs and Reflective Thinking Survey

Hi Joel, the 294 was sent to the population you had requested: Active International CPTs and those that were expired through February 2017.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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From: Buck, Joel [USA] <buck\_joel@bah.com>  
Date: Saturday, February 25, 2017 at 8:45 AM  
To: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Subject: 2nd Round--CPTs and Reflective Thinking Survey

Courtney

Thank you for getting back to me with the information on the 294 individuals sent the second invitation to participate in my research.

Here is my recap of who I understand has been contacted. Please confirm or correct this information:

7 FEB -- An invitation to participate in this research and complete the survey was sent out to 403 active CPTs based in the United States via email.

20 FEB — An invitation to participate in this research and complete the survey was sent out to 294 additional CPTs. These 294 are Active International CPTs (not based in the United States) and CPTs with expired certifications (more than 3 years have passed since certification or last recertification) through FEB 2017.

Can you break out how many of the 294 are Active International CPT s and how many are CPTs with expired certifications?

To increase the total number of responses to surveys like this, it is accepted research practice to send participants multiple rounds of invitations to participate.

Would you please send out two more emails next Tuesday or Wednesday?

1 --One email with a second round invitation (text is below and a copy is attached - "2ndSurveyInvite\_24FEB2017") to the first group of 403 active CPTs based in the United States.  
2--A second email invitation with the same second round invitation (text is below and a copy is attached "2ndSurveyInvite 24FEB2017") to the second group of 294 International and inactive CPTs.

Thank you very much.  
I really appreciate your support on this effort.

Joel Buck joelbuck@kstate.edu

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Body of 2nd round email invitation:

Hello —

If you have already responded to my first invitation to complete this survey, THANK YOU. If not, can you spare 10 minutes to complete a survey on your practice of reflective thinking? I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their

workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflect thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift card. Please click on the link below to start the survey.

### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX'7RxOp](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX'7RxOp)

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Monday, March 6, 2017 7:53 AM  
To: Buck, Joel [USA]  
Subject: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Hi Joel. The information you have is correct, and to clarify:

230 are expired  
64 are International Active CPTS

We have been sending a large volume of emails, for our Conference and to also accommodate other requests from our members. To avoid email "burnout" we are spacing these emails out. I have saved your email and it's in queue to go out Thursday.

Courtney Brooks Kamin  
International Society for Performance Improvement (ISPI)

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From: Kamin, Courtney Brooks [mailto:courtneyb@ispi.org]  
Sent: Monday, March 6, 2017 9:19 AM  
To: Buck, Joel [USA] <buck\_joel@bah.com>  
Subject: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Hi Joel, I will do my best to try to send tomorrow. I will need to speak to staff about rearranging other emails scheduled to go out.

From: Buck, Joel [USA]  
Sent: Tuesday, May 9, 2017 7:19 PM  
To: 'Kamin, Courtney Brooks'  
Subject: RE: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey  
Importance: High

Good evening, Courtney —

I am still looking for more respondents to my "CPT and Reflective Thinking" survey.

Would you please send out the following 2 nd round email to all 697 CPTs you sent the 1 st round to?

If you have any questions, or there are any issues with this request, please let me know.

Thank you...

-----

Body of 2nd round email invitation:

Hello —

If you have already responded to my first invitation to complete this survey, THANK YOU. If not, can you spare 10 minutes to complete a survey on your practice of reflective thinking? I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflective thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift card. Please click on the link below to start the survey.

#### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChyV7AX7Rx0p](https://kstate.qualtrics.com/SE/?SID=SV_20aChyV7AX7Rx0p)

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Joel A. Buck

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From: Kamin, Courtney Brooks [mailto:courtneyb@ispi.org]  
Sent: Wednesday, May 10, 2017 9:27 AM  
To: Buck, Joel [USA] <buck\_joel@bah.com>  
Subject: Re: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Hi Joel, I can do this for you, but need to coordinate with other emails that are going out, so we are mindful of our queue.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: Buck, Joel [USA]  
Date: Wednesday, May 10, 2017 at 11:43 AM  
To: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Subject: Re: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Thank you, Courtney.  
Please let me know when you plan to send this out, and CC: me when it is sent.

Joel Buck

---



From: Buck, Joel [USA]  
Sent: Monday, May 15, 2017 5:51 AM  
To: Kamin, Courtney Brooks  
cc: Klauswittkuhn@ispi.org; Scottcasad@ispi.org; racollin@ksu.edu; Buck, Joel [USA]  
Subject: RE: 2nd Round--CPTs and Reflective Thinking Survey  
Attachments: 2nd Solicitation email\_CPT\_ReflectiveThinking.docx; 3rd  
Reminder\_email\_CPT\_ReflectiveThinking.docx

Courtney —

I need your help. It is critical that I get more CPT responses to my survey to complete the study I am conducting. Here is what I am asking ISPI to do to support this research. First, send out a 2nd participation solicitation email to all 697 CPTs to whom you sent the 1st participation email. Then, send out a 3rd email reminder to the same 697 CPTs two weeks later. The body of these two emails with links to the on-line survey are attached and included below.

I know ISPI supports student and academic research surveys to support academic and professional development in the field of performance improvement and will send out survey information on a member's behalf. It says so on the ISPI website, and as a longtime member of ISPI and a CPT, I have responded to several such surveys.

As a doctoral candidate at Kansas State University conducting research on reflective thinking by professionals in the workplace, I selected CPTs as a population representing recognized professionals in the workplace, and reached out to ISPI for support in soliciting CPTs to complete an on-line survey.

It is a requirement for survey research for at least two follow-up emails be sent to the population in order to gain the best possible sample size. My major professor, Dr. Royce Ann Collins, and doctoral supervising committee at Kansas State University require me to follow this research protocol.

Response to the 1st email you distributed for me was disappointing (only 13% return), so I reached out again, requesting that you send out a 2nd participation solicitation email on 25 February. As I mentioned in that email, it is a required research protocol to send participants multiple rounds of invitations and reminders to increase the number of respondents. For this research project, I need at least 100 more respondents. On 6 March, you replied that you would do your best to send out the 2nd solicitation email I had provided you the next day, 7 March. You also noted that you had been sending out a large volume of emails for the ISPI Conference as well as accommodating other requests from members and were spacing out emails to avoid email "burnout." That 2nd solicitation email has still not been sent out.

I am sensitive to potential for overwhelming ISPI members with many emails. If my request to forward a 2nd solicitation email now, with a 3rd reminder email two weeks later, requires approval or coordination with other ISPI officers, directors, or staff, please let me know who I need to contact for the assistance I am requesting. If you would like to contact my major professor, Dr. Collins can be reached at racollin@ksu.edu.

Joel A. Buck  
joelbuck@kstate.edu

----- body of 2nd Round Solicitation Email (to be sent as soon as possible) -----

Hello —

If you have already responded to my first invitation to complete this survey, THANK YOU. The survey on your practice of reflective thinking will only take 10 minutes to complete. I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflect thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.

#### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX7Rx0p](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX7Rx0p)

If you have any questions concerning this research, please feel free to contact me (joelbuck@ksu.edu) or my major professor, Dr. Royce Ann Collins (racollin@ksu.edu).

Sincerely,

Joel A. Buck  
joelbuck(@ksu.edu  
Phone 913-680-6574  
Mobile 9 13-683-0005

----- end body of 2nd Round Solicitation Email (to be sent as soon as possible) -----

----- body of 3rd email reminder (to be sent in two weeks) -----

Greetings!

This is a reminder that if you have not already responded to the Reflective Thinking survey, please do so, now. It will take less than 10 minutes.

I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.

### CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX7RxOp](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX7RxOp)

If you have any questions concerning this research, please feel free to contact me (joelbuck@ksu.edu) or my major professor, Dr. Royce Ann Collins (racollin@ksu.edu).

Thank you,  
Joel A. Buck  
joelbuck@ksu.edu  
Phone 913-680-6574  
Mobile 913-683-0005

-----end body of 3 rd email reminder (to be sent in two weeks) -----

Joel A. Buck

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Tuesday, May 16, 2017 AM  
To: Buck, Joel [USA]  
Subject: Re: [External] Re: 2nd Round—CPTs and Reflective Thinking Survey

Hi Joel, this was sent out yesterday evening. You were cc'd.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: Buck, Joel [USA]  
Sent: Tuesday, May 16, 2017 11:11:18 AM  
To: Kamin, Courtney Brooks  
Cc: racollin@ksu.edu  
Subject: Re: [External Re: 2nd Round--CPTs and Reflective Thinking Survey

Thank you, Courtney.  
I did not receive any messages from you or ISP I yesterday.  
Please forward me a copy for my records. Thank you.

buck\_joel@bah.com  
joelbuck@k-state.edu

Joel Buck

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From: Buck, Joel [USA]  
Sent: Monday, May 22, 2017 2:55 PM  
To: Kamin, Courtney Brooks  
cc: racollin@ksu.edu; Klauswitkuhn@ispi.org; Scottcasad@ispi.org  
Subject: Re: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Good afternoon, Courtney.

I have not seen an email from you in response to my request for a copy of the email you sent out for me last Monday, the 15th of May.

If you sent it already, please re-send to:

buck\_joel@bah.com and to joelbuck@k-state.edu in case there is a problem with me receiving your email.

Thank you.

Joel Buck

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On May 22, 2017, at 4:02 PM, Kamin, Courtney Brooks <courtneyb@ispi.org> wrote:

Hi Joel, the email definitely went out. Let me take a look and fwd to you. I also have one scheduled to go out next Monday.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Monday, May 22, 2017 3:21 PM  
To: Buck, Joel [USA]  
cc: racollin@ksu.edu; Casad, Scott (ISPI); Triner, Donald (ISPI)  
Subject: Re: [External] Re: 2nd Round--CPTs and Reflective Thinking Survey

Hi Joel. I see what the problem is regarding receiving the message. The KState email you sent in text on May 15 provided the following email address: ioelbuck@kstate.edu. While that email was not returned to us, I see in the email below another email address: joelbuck@k-state.edu. The missing dash may be why you didn't get the email. I have forwarded to both emails - please confirm when you get the email that I forwarded you, and which email is correct.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Monday, May 22, 2017 3:22 PM joelbuck@k-state.edu  
Subject: [External] Fwd: ISPI CPT Research Survey

Courtney Brooks Kamin  
OPERATIONS MANAGER  
International Society for Performance Improvement (ISPI)  
P.O. Box 13035  
Silver Spring, MD 20910  
Office: 301.587.8570  
Direct Line: 301.576.3342 Fax: 301.587.8573  
Email: courtneyb@ispi.org

Begin forwarded message:

From: ISPI Certification <certification@ispi.org>  
Date: May 15, 2017 at 9:20 PM EDT  
To: ISPI Certification <certification@ispi.org>  
Cc: <joelbuck@ksu.edu>  
Subject: ISPI CPT Research Survey

*\*This message is sent on behalf of Joel Buck (ioelbuck@ksu.edu). Please respond to him with any feedback or questions.*

Hello —

If you have already responded to my first invitation to complete this survey, THANK YOU. The survey on your practice of reflective thinking will only take 10 minutes to complete. I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. I am reaching out to you because employers and clients have

testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflect thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.

CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChyV7AX7RxOp](https://kstate.qualtrics.com/SE/?SID=SV_20aChyV7AX7RxOp)

If you have any questions concerning this research, please feel free to contact me (joelbuck@ksu.edu) or my major professor, Dr. Royce Ann Collins (racollin@ksu.edu).

Sincerely,  
Joel A. Buck joelbuck@ksu.edu

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On May 22, 2017, at 4:33 PM, Buck, Joel [USA] <buck ioel@bah.com> wrote:

I got it this time.  
Thank you, Courtney.

For the follow-up email message two weeks later, since that date falls on the 29th, Memorial Day, please send out on Tuesday the 30th or Wednesday the 31 st.

Joel Buck

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Monday, May 22, 2017 3:35 PM  
To: Buck, Joel [USA]  
cc: joelbuck@k-state.edu; Royce Ann Collins (racollin@k-state.edu); Triner, Donald (ISPI); Casad, Scott (ISPI)  
Subject: Re: [External] Fwd: ISPI CPT Research Survey  
Follow Up Flag: Follow up  
Flag Status: Flagged

Glad you got the email. I will send the next one out Tuesday!

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: ISPI Certification <certification@ispi.org>  
Sent: Wednesday, May 31, 2017 11:04 AM  
To: ISPI Certification  
cc: Buck, Joel [USA]  
Subject: [External] ISPI CPT Research Survey  
Importance: High

*\*This message is sent on behalf of Joe/ Buck (buck.joe/@bah.com). Please respond to him with any feedback or questions.*

Greetings!

This is a reminder that if you have not already responded to the Reflective Thinking survey, please do so, now. It will take less than 10 minutes.

I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.

CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX7Rx0p](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX7Rx0p)

If you have any questions concerning this research, please feel free to contact me (buckioel@bah.com) or my major professor, Dr. Royce Ann Collins (racollin@ksu.edu).

Thank you,

Joel A. Buck

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From: Buck, Joel [USA]  
Sent: Tuesday, June 20, 2017 9:11 PM  
To: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Cc: joelbuck@k-state.edu; Royce Ann Collins (racollin@k-state.edu) <racollin@k-state.edu>  
Subject: RE: ISPI CPT Research Survey -- One more reminder, please

Courtney

Thank you for your assistance to date.

Unfortunately, the last round did not produce many responses. Please send out the reminder email one more time. I need to be able to document our repeated efforts to attract participants. One more reminder will help do that.

On the earlier emails you sent out, how many did you get messages back saying that the email address was no longer active or other "not delivered" messages?

Joel A. Buck

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From: Buck, Joel [USA] <buck\_joel@bah.com>  
Sent: Monday, June 26, 2017 8:42 PM  
To: Kamin, Courtney Brooks  
cc: joelbuck@k-state.edu; Royce Ann Collins (racollin@k-state.edu)  
Subject: [External] RE: ISPI CPT Research Survey -- One more reminder, please  
Importance: High

Hello, Courtney —

I am checking in to check on the status of you sending out one more reminder as I requested last Tuesday.

Also, on the earlier emails you sent out, how many did you get messages back saying that the email address was no longer active or other "not delivered" messages?

Here is the body of the email with my correct email address:

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**Subject: ISPI CPT Research Survey**

\*This message is sent on behalf of Joel Buck. Please respond to him with any feedback or questions.

Hello —

If you have already responded to my first invitation to complete this survey, THANK YOU. The survey on your practice of reflective thinking will only take 10 minutes to complete. I am a CPT



and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflect thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.

CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChyV7AX7RxOp](https://kstate.qualtrics.com/SE/?SID=SV_20aChyV7AX7RxOp)

If you have any questions concerning this research, please feel free to contact me (ioelbuck@k-state.edu) or my major professor, Dr. Royce Ann Collins (racollin@k-state.edu).

Sincerely,

Joel A. Buck ioelbutk@k-state.edu

Phone 913-680-6574

Mobile 913-683-0005

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From: Kamin, Courtney Brooks  
Sent: Monday, June 26, 2017 8:44 PM  
To: Buck, Joel [USA] <buck\_joel@bah.com>  
Cc: joelbuck@k-state.edu; Royce Ann Collins (racollin@k-state.edu) <racollin@k-state.edu>  
Subject: [External] Re: ISPI CPT Research Survey One more reminder, please

Hi Joel, I have been out of the office and have just returned today. I will schedule the final reminder to go out this week and cc you on the message. I did not get any return messages from the previous emails sent.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: Buck, Joel [USA] <buck\_joel@bah.com>  
Date: Tuesday, July 4, 2017 at 10:22 PM  
To: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Cc: joelbuck@k-state.edu" <joelbuck@k-state.edu>, "Royce Ann Collins (racollin@k-state.edu)" <racollin@k-state.edu>  
Subject: RE: [External] Re: ISPI CPT Research Survey -- One more reminder, please

Good evening, Courtney.

I am checking in to check on the status of one more reminder invitation to all CPTs to take the CPT Research Survey discussed below. If you sent it out already, please forward me a copy

Thank you.

Joel A. Buck

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From: Kamin, Courtney Brooks <courtneyb@ispi.org>  
Sent: Wednesday, July 5, 2017 12:19:23 PM  
To: Buck, Joel [USA]  
Cc: joelbuck@k-state.edu; Royce Ann Collins (racollin@k-state.edu)  
Subject: Re: [External] Re: ISP! CPT Research Survey -- One more reminder, please

Hi Joel, I did send out the final email, and you were cc'd on it. Since you did not receive it, I just sent another final email to CPTs. The data for recipients is the same.

Let me know if you do not receive it this time. Best of luck on your study.

Courtney Brooks Kamin  
OPERATIONS MANAGER

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From: ISPI Certification <certification@ispi.org>  
Sent: Wednesday, July 5, 2017 12:18 PM  
To: ISPI Certification  
cc: joelbuck@k-state.edu  
Subject: [External] ISPI CPT Research Survey  
Importance: High  
Follow Up Flag: Flag for follow up  
Flag Status: Flagged

*\*This message is sent on behalf of Joel Buck (joelbuck@k-state.edu) . Please respond to him with any feedback or questions.*

Hello

If you have already responded to my first invitation to complete this survey, THANK YOU. The survey on your practice of reflective thinking will only take 10 minutes to complete. I am a CPT and a Ph.D. candidate at Kansas State University investigating reflective thinking practiced by professionals in the work place. I am reaching out to you because employers and clients have testified that CPTs are a population of professionals that add value in their workplace. Therefore, the quality of reflective thinking you practice is an indicator of the extent to which professionals in general engage in reflective thinking in the workplace. I also plan to examine relationships between selected individual demographics and the quality of reflective thinking practiced. If you complete the survey, you can be eligible to win a \$100 gift eCard.

Please click on the link below to start the survey.  
CPT Reflective Thinking Survey

If you have trouble with the link above, you can copy and paste the URL below into your browser

[https://kstate.qualtrics.com/SE/?SID=SV\\_20aChvV7AX7Rx\(\)p](https://kstate.qualtrics.com/SE/?SID=SV_20aChvV7AX7Rx()p)

If you have any questions concerning this research, please feel free to contact me (joelbuck@k-state.edu) or my major professor, Dr. Royce Ann Collins (racollin@k-state.edu).

Sincerely,

Joel A. Buck  
joelbuck@k-state.edu

---

From: Buck, Joel [USA] <buck\_joel@bah.com>  
Sent: Wednesday, July 5, 2017 12:24 PM  
To: Kamin, Courtney Brooks  
cc: joe!buck@k-state.edu; Royce Ann Collins (racollin@k-state.edu)  
Subject: Re: [External] Re: ISPI CPT Research Survey -- One more reminder, please

Thank you, Courtney.

I received the message you sent out this morning.

Joel Buck