

Assessing Transformative Learning: Toward a Unified Framework

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Robert Charles Cox

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Abstract

This study describes the development, administration, and results of an exploratory, 30-item instrument to assess aspects of transformative learning attributable to an educational program. The instrument, *TRansformative Outcomes and PrOcesses Scale* (TROPOS), assesses four subscales associated with transformative learning: *criticality*, *attitude toward uncertainty*, *social support*, and *transformative outcomes*. Potential instrument items were derived from a literature review. A panel of experts evaluated these items for inclusion in the study. Study participants were alumni of the same master's degree program who graduated during the past 10 years, 2007-2016 (N=119). This study examined overall instrument reliability ($\alpha = 0.884$) and subscale reliability; correlation between *criticality* and *transformative outcomes* was determined ($r = 0.541$) as well as by subscale; regression analysis was performed between *transformative outcomes* and the remaining three subscales ($r = 0.593$). Analysis found no statistically significant difference in alumni responses by year of graduation. Further analysis detected alumni in their 20's reported increased *transformative outcomes* scores relative to other age groups by decade (sig. = 0.021). Preliminary differences in subscale scores by gender emerged. TROPOS is intended to serve as an instrument for researchers to conduct replication studies to examine external validity and for researchers to propose new subscales to expand the instrument's scope. This study raises subtle questions concerning processes underlying transformative learning, particularly by indicating potential constraints in critical reflection's prominence as well as through reinforcing the potential for additional moderating or mediating constructs accounting for transformative learning outcomes.

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Chapter 1

Introduction to the Study

As a theory of learning, transformative learning considers linkages between learning and worldview; however, these linkages are far from simple. At its core, transformative learning “describes how adults integrate new information, perspectives, or practice into their worldview as they engage in learning” (King, 2004, p. 155).

Transformative learning is a theory of how learners modify their worldview in order to make sense and account for new knowledge at odds with prior beliefs (Courtenay, Merriam, & Reeves, 1998). As such, the theory centers on how people transform their perspective on themselves, their peers, and the world around them.

Over the decades since transformative learning’s initial formulation, researchers have conducted numerous qualitative studies investigating transformative learning theory; however, quantitative studies remain preliminary (Cranton & Hoggan, 2012; Taylor, 2000; Taylor & Snyder, 2012) or await further replication studies beyond an initial group (Stuckey, Taylor, & Cranton, 2013). Indicating the challenges in developing a quantitative instrument, qualitative studies document broad agreement regarding elements of transformative learning, such as the importance of social relations, dialog, emotions, and learner readiness, but also point to a variety of processes through which transformative learning occurs, ranging from rational, discursive critical reflection to spiritual, arts-based, and intuitive approaches, discussed further in Chapter 2 (Gunnlaugson, 2008; Snyder, 2008; Taylor, 2007; Taylor & Snyder, 2012).

Stuckey, Taylor, and Cranton (2013) describe the most recent instrument assessing transformative learning, highlighting several reasons for developing an instrument, including how transformative learning theorists appear to be coalescing around common definitions and outcomes; how distinctions between transformative learning and other forms of learning continue to emerge; and how developing and testing an instrument fosters continued scholarly discussion to further refine understanding of definitions, processes, and outcomes in transformative learning, resulting in a more unified theory that accounts for an increasingly diverse range of observations. Such goals correspond to those within psychometric theory and evaluation, fields that hold instrument development serves as a means through which researchers can test, clarify, and refine assumptions (Funnell & Rogers, 2011; Gay, Mills, & Airasian, 2009).

Statement of the Problem

The wealth and diversity of studies investigating transformative learning, especially qualitative studies, demonstrate the theory to be complex and further demonstrate such learning's outcomes to be far-reaching and permanent; therefore, efforts to operationalize such a vast theory into a psychometric framework present numerous challenges and questions, including questions of how to isolate and define core variables for psychometric measurement; how to unify these variables within a common psychometric framework that accounts for potentially complex interrelations between these variables; and identifying a population sharing a common, potentially transformative, experience within which to further explore these variables, their interrelations, and the outcomes of transformative learning. Further, Stuckey, Taylor, and

Cranton's (2013) instrument operationalizing specific processes through which transformative learning occurs may also indicate the presence of deeper, common latent variables underlying transformative learning. Developing a psychometric framework to assess transformative learning should facilitate further understanding into what conditions encourage as well as discourage transformative learning, especially within an educational environment, such as in undergraduate and graduate programs.

Purpose

This study centered on constructing a psychometric framework to assess transformative learning and piloting an exploratory instrument derived from this framework: the resulting instrument is named TRansformative Outcomes and PrOcesses Scale (TROPOS).

Research Objectives

In order to accomplish the goal of constructing a psychometric framework as well as piloting an exploratory instrument, this study's objectives were to:

- 1) Conduct a literature review within transformative learning to identify common themes described in research and theoretical studies. Cluster these common themes into defined variables within a psychometric framework
- 2) From this psychometric framework, derive a pool of original, potential items for use in an exploratory, pilot instrument assessing transformative learning
- 3) Engage an expert panel of transformative learning researchers to review these potential items, evaluating ex/inclusion of items in the proposed instrument
- 4) Conduct an exploratory, quantitative study among graduate students

- 5) Validate the psychometric framework through statistical analysis, enumerating future potential instrument revisions and research questions

Theoretical Framework

The theoretical framework for this proposed study rests in transformative learning theory. In foundational work, Mezirow (1991) proposed transformative learning as a comprehensive theory of learning that describes how learners identify, challenge, and refine assumptions underlying worldview that guide a learner's actions and decisions. Transformative learning's focus centers on how a learner's worldview changes and becomes more inclusive of a range of ideas and open to new possibilities. Mezirow (1978 & 1991) conceptualized transformative learning as beginning with a learner observing or experiencing something dissonant from the learner's worldview; often, this dissonance is deeply disruptive because it conflicts with a learner's assumptions and beliefs, rather than basic cause-effect expectations (Mezirow, 1985). Nevertheless, it is not the mere presence of something dissonant that triggers transformative learning; rather, a learner must recognize and interpret an observation or idea to be dissonant and then must choose to identify the assumptions that lead the learner to recognize dissonance. Furthermore, the learner challenges these assumptions through a process of critical reflection, which can proceed through a variety of means. Broadly, critical reflection drives a validation process in which a learner assesses existing assumptions and considers new or revised assumptions, accepting or rejecting them. A component of a critically reflective process rests in the learner constructing a new worldview with modified assumptions that remove or minimize the apparent dissonance, resulting in a more open, permeable, and less

contradictory view of self and the broader world. More recent literature (Dirkx, 1997 & 2012; Mezirow, 2000; Tisdell, 2003 & 2012) demonstrates transformative learning can be conceptualized not just as being driven by a rational, dialog-based, discursive process, but also as a process led by a learner's engagement in art, spirituality, intuitive reflection, and other extra-rational methods of deep reflection.

This study focused on identifying, describing, and measuring commonalities within transformative learning literature. Specifically, the common characteristics and attitudes of learners undergoing transformative learning are conceptualized in a psychometric framework composed of five subscales: *self-directed learning*, *social support*, *attitude toward uncertainty*, *criticality*, and *transformative outcomes*.

Significance of the Study

By identifying, proposing, and testing a psychometric framework to assess transformative learning, this study advances transformative learning literature by determining whether common themes identified in the literature emerged in an empirical study. Should the proposed psychometric framework be found to be an adequate fit through statistical analysis (discussed in chapters 4 and 5), then the study further validates existing ideas posited in transformative learning literature; however, should a particular subscale be determined to not be adequate in statistical analysis, or one or more subscales appear to be of greater importance, then the study offers new perspectives on the nature of transformative learning, permitting further clarification and refinement of the theory, in turn promoting further inquiry (both qualitative and quantitative) and deeper understanding, a need within the field (Taylor, 2015).

Assumptions

The following assumptions underlie this study:

1. Individual learners have characteristics that may promote or inhibit, rather than guarantee, the likelihood of a learner experiencing transformative learning.
2. These learner characteristics can be isolated and defined through a literature review.
3. Due to complexities and individual processes of transformative learning, these characteristics are expected to fit within a psychometric framework to define conditions that promote or inhibit the likelihood of a learner engaging in transformative learning.
4. Learners participating in this study will respond truthfully and thoughtfully.

Delimitations

The following delimitations were noted for this study:

1. The sample was drawn from the population of current students and alumni of a master's degree program, with most students serving as employees of public service agencies and organizations.
2. While the study focused on identifying general characteristics of transformative learning, the sample delimits the findings to transformative learning among students in a specified and bounded graduate learning environment.

Definitions

Attitude toward uncertainty: A learner's attitude toward anticipating or experiencing a loss of certainty, typified by feeling stumped, confused or experiencing a sense of stepping outside one's comfort zone.

Criticality: A learner questioning beliefs of oneself and others (regardless of method), evaluating the validity of such beliefs, and re-framing these beliefs.

Learner: synonymous with *survey participant* in this study, either a current graduate student or program alum.

Self-directed learning: A learner's willingness to engage in learning, demonstrated by setting and pursuing goals, especially when facing obstacles.

Social support: A learner's constructive engagement with a social group whose members exhibit mutual trust and respect, thereby facilitating a balance between support and constructive critique.

Transformative outcomes: A learner's profound re-assessment of beliefs, typified by changed assumptions and a more inclusive, open perspective toward self and others.

Outline of the Study

Chapter 1 describes the proposed study's problem statement, purpose, theoretical framework, hypotheses, significance, assumptions, delimitations, and definitions. Chapter 2 presents a review of the literature relevant to problems and methods in assessing transformative learning and describes commonalities across studies that resulted in this study's subscales. Chapter 3 defines details of the proposed study's methodology, including descriptions of how the researcher engaged the expert panel members to review

potential instrument items as well as research design, the population and sample for the instrument administrations, sampling procedures, instrumentation, data collection and analysis procedures. Chapter 4 discusses the study's results. Chapter 5 places the study in a broader theoretical context and considers future research directions.

Chapter 2

Literature Review

This section considers foundational and contemporary perspectives in transformative learning theory; notes challenges identified in literature regarding assessing transformative learning; identifies commonalities and recurrent themes in transformative learning literature; and finally proposes a psychometric framework unifying these commonalities.

Foundational Perspectives

Transformative learning's roots rest in research describing the experiences of women entering or re-entering higher education, many of whom had families, employment, or experienced other major life transitions (Mezirow, 1978; Mezirow & Marsick, 1978). Mezirow (1978) described how these students did not simply engage in rote learning, such as memorizing and demonstrating competence in a field of study, but that while pursuing an academic program, they also engaged in a process of re-understanding themselves, their assumptions, and perceptions of their roles in life. Mezirow summarizes this form of learning, stating:

There are certain challenges or dilemmas of adult life that cannot be resolved by the usual way we handle problems—that is, by simply learning more about them or learning how to cope with them more effectively. Life becomes untenable, and we undergo significant phases of reassessment and growth in which familiar assumptions are challenged and new directions and commitments are charted. (1978, p. 101)

Mezirow (1991) expanded this formative work by proposing transformative learning as a new and comprehensive theory of learning. While constructing transformative learning theory, Mezirow (1991) drew from Habermas's (1984) research regarding domains of learning and Freire's (1970) description of conscientization through which learners “achieve a deepening awareness of both the sociocultural reality which shapes their lives and of their capacity to transform that reality by acting upon it” (p. 27). Mezirow (1991) posits transformative learning as an emancipatory process through which a learner recognizes inadequacies and contradictions in a learner's worldview, seeking a more open, better justified set of assumptions guiding future actions. Mezirow proposed transformative learning occurs through a ten-phase process (2000, p. 22) (Table 1.1).

Table 1.1. Ten phases of transformative learning proposed by Mezirow (2000).

Phase	Characteristics
1	A disorienting dilemma
2	A self-examination with feelings of guilt or shame
3	A critical assessment of epistemic, sociocultural, or psychic assumptions
4	Recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change
5	Exploration of options for new roles, relationships, and actions
6	Planning of a course of action
7	Acquisition of knowledge and skills for implementing one's plans
8	Provisional trying of new roles
9	Building of competence and self-confidence in new roles and relationships
10	A reintegration into one's life on the basis of conditions dictated by one's perspective

To summarize this foundational perspective on transformative learning, Mezirow (1991, 2000, & 2012) emphasized the importance of the individual's experience of a

disorienting dilemma (a classic example being a life-threatening diagnosis) leading to a sense of deep uncertainty, spurring critical reflection of assumptions. Following a process of critical reflection, a learner forms new assumptions regarding expectations and responsibility, leading the learner to test these new assumptions and finally re-integrate these new assumptions into daily life, guiding future action. It is important to note this formative research conceptualizes critical reflection as a primarily dialogic, rational process where the learner tests and validates assumptions, evaluating which assumptions to keep, modify, and reject. Furthermore, such critical reflection hinges on the learner's need for as unbiased, complete information as possible (Mezirow, 1991). In many ways, this emphasis on rational thinking and discourse as a means to identify, critique, and revise assumptions provides a straightforward validation process similar to that found within Socratic method and other dialog-based critique processes in which the extension of premises to their logical conclusions often reveals unexpected problems or contradictions, leading to the recursive revision of premises.

This emphasis on rationality emerges from Mezirow's (1991) analysis of Popper's (1935/2002) study of how to evaluate the utility of a scientific theory through confirmation and disconfirmation, Kuhn's (1970) examination of how scientific revolutions occur through theory testing, Habermas's (1984) investigations into the use of logic in communication and learning, among other philosophical influences. These representative studies rely on scientific method of hypothesis testing and validation, which in turn underlie much of the emphasis on rational thinking and discourse as a means to transformation (Mezirow, 1991).

Critiques and the Development of Contemporary Perspectives

In considering Mezirow's foundational, ten-phase model, early studies demonstrate that the transformative learning process is not the same across individual learners. While each learner may experience individual phases of transformative learning per Mezirow's model, learners may skip one or more phases, return to a prior phase, or experience one phase in a more pronounced manner than another (Dewane, 1993; Taylor, 1997). In a qualitative dissertation, Lytle (1989) interviewed registered nurses returning to university study to earn a bachelor's degree in nursing, noting presence or absence of each of Mezirow's phases of transformative learning. While several students experienced all ten phases, a key finding is how approximately half of study participants skipped phases of the ten-phase model or experienced phases out of sequence.

Lytle's (1989) study illustrates transformative learning's potential non-linear process for students undergoing a common experience in nursing school. As cited by Courtenay, Merriam, and Reeves (1998, p. 67), Taylor's review (1997) of transformative learning research revealed that Mezirow's ten-phase process "was confirmed in general by some studies . . . but later studies found it to be a recursive, evolving, and spiraling process. . . . Questions still remain about the order and the interrelationship of the different factors" (pp. 43-44).

Since its introduction, researchers continue to critique the theory's foundational premises (e.g. Cranton & Kasl, 2012; Merriam, 2004; Newman, 2012; Tisdell, 2003), such as questioning the necessity of critical reflection as a dialogic, rational process as well as introducing new refinements, such as the role of more extra-rational processes in

identity development, such as intuition (Dirkx, 1997 & 2012; Dirkx, Mezirow, & Cranton, 2006; Mezirow, 2000) and spirituality (Tisdell, 2003), for example. Tisdell (2003) also discusses how researchers may exhibit an overreliance on Mezirow's (1991 & 2000) conceptualization of transformative learning, leading researchers to overlook extra-rational processes leading to similar transformative outcomes or to limit understanding of transformative learning by utilizing the theoretical blinders of a "fairly narrow view of process" (Cranton & Kasl, 2012, p. 394).

Furthermore, other researchers have pointed to an apparent issue of researchers potentially misclassifying some forms of learning as transformative due to unclear definitions of transformation (Newman, 2012) or through learners feigning transformations (Brookfield, 2000).

Among the broad range of critiques of transformative learning as a rational, dialog-based process, a common thread emerges: at its core, transformative learning is a cognitive process rooted in an individual's perception and interpretation. Such cognitive processes are both inherently and deeply subjective and individual in nature. Individuals bring different life experiences, histories, narratives, aspirations, motivations, and so forth to a learning experience; therefore, learners can be expected to utilize any number of processes relevant to a particular individual to shape interpretation, such as processes rooted in creativity, spirituality, dialog, and so forth. Furthermore, individuals with apparently similar backgrounds can be expected to utilize similar processes for dissimilar ends; for example, two people may draw stylistically similar portraits of a shared experience, but interpret the portraits in radically different ways based on individual

perception based on individual experiences. Therefore, relegating transformative learning to a process based on any single means inherently limits the theory's utility in describing the diversity of learners' experiences resulting in shifts in worldview.

Existing Instruments

Methods to assess transformative learning range from qualitative, interview-based studies (see Cheney, 2010; Taylor 1997 & 2007; Taylor & Snyder, 2012, for discussion) to two formal surveys as well as specialized scales approximating or informed by transformative learning theory (e.g. Kember et al, 2010). Of the formal scales, the first is a preliminary instrument (Learning Activities Survey, or LAS) seeking to measure transformative learning on a broader scale among multiple learners rather than the prior, more individualized qualitative studies (King, 2009). The LAS utilizes each phase of Mezirow's (2000) ten-phase model as an instrument item, asking if a learner has experienced a particular phase. While studies have utilized this instrument (e.g. Brock, 2010; Glisczinski, 2007) to explore prevalence of transformative learning phases, Taylor and Snyder (2012) emphasize a thorough critique and validation of the instrument has not occurred. Furthermore, the studies mentioned previously that suggest the strict, ten-phase model (Mezirow, 1991) to be a narrow conceptualization of a broader range of transformative learning processes indicate inherent limitations in such a measurement model; despite such limitations, the instrument remains foundational in gleaning further details into what such a broader range of transformative learning processes could be.

More recently, the second instrument, developed by Stuckey, Taylor, and Cranton (2013), assesses transformative learning among college-educated adults, including

detecting transformative learning through three processes previously defined by Cranton (2006): 1) cognitive/rational processes, 2) extra-rational processes, and 3) engagement in social critique. An expert panel developed items for these three processes through which transformative learning may occur. Following a pilot study, the finalized instrument consists of 19 sub-scales. The researchers administered the scale with 136 participant responses. The survey is presently available online at

www.transformativelearningsurvey.com

This instrument first asks the participant to recall a specific, life-altering event that occurred in adulthood; then describe it and identify how it impacted the participant's life (Stuckey et al., 2013). Participant responses coincide with those investigated in prior studies, including: "life-threatening illness of self or loved one (n=16), divorce or separation (n=13), educational experiences (n=13), birth of a child (n=12), loss of job (n=7), living outside country or culture, immigration (n=7), and love/marriage (n=5)" (p. 217). With a significant adult-life event in focus, the participant then responds to items along 4-level likert scales (*mostly disagree, slightly disagree, slightly agree, mostly agree*).

A core finding in this study is that a learner's *learning outcomes* score correspond to at least one of the three process scales (rational, extra-rational, social critique). Of key importance, the researchers found: "The process strands identified within each major perspective similarly are confirmed as separate processes but related to each other" (2013, p. 224). This finding indicates other, latent factors may account for the specifically operationalized processes linking the three process scales with the learning outcomes

scale. As discussed later in chapters 2 and 3, Stuckey, Taylor, and Cranton's (2013) *learning outcomes* scale shares similarities with this study's proposed scale *transformative outcomes*, which is primarily due to broader agreement in outcomes of transformative learning, rather than specific processes (Cranton & Hoggan, 2012).

The researchers conclude stating: "... to move the field forward, we need to begin to place boundaries on the amorphous term 'transformative learning' in order to collaboratively develop surveys and tools of discovery, subject to future revision as our understanding becomes clearer and refined" (p. 224).

Although currently lacking replication studies, the initial instrument administration represents another important step in the process of developing an instrument to assess transformative learning, particularly through examining a variety of means through which transformative learning may occur. Further, Stuckey, Taylor, and Cranton's (2013) study signals other, latent factors may better unify specific learning processes into a more general framework.

Challenges in Measuring Transformative Learning

As a result of this diverse environment for theory development, some researchers indicate transformative learning theory has developed to a point where researchers have moved inquiry from the question of identifying whether transformative learning has occurred to the question of how it occurs (Gunnlaugson, 2008; Snyder, 2008; Taylor, 2007). Nevertheless, operationalizing a vast and comprehensive theory into a psychometric framework and derived instrument capable of detecting specific instances

of transformative learning presents numerous challenges to instrument development, including:

1. Question of process: Does literature describe transformative learning a staged or dynamic process?
2. Question of domain or context: A trigger event or dilemma can originate from any domain of an individual's experience, yet can impact an individual's entire worldview. How would an instrument detect transformative learning across a range of domains?
3. Question of scope of measurement: Can an instrument only detect transformative learning in retrospect through measurement of outcomes? How would an instrument measure transformative learning in process or detect the probability a particular learner may or may not engage in transformative learning?

These questions pose continuing challenges for researchers interpreting and operationalizing transformative learning theory into an effective instrument. Answers to these questions from the literature yield differing foundational premises in instrument development.

Question of Process

When constructing an instrument, a researcher should develop a model outlining how an observed phenomenon unfolds. Within program evaluation, such a model is a logic model or program theory (Funnell & Rogers, 2011; Posavac, 2011) outlining proposed causal chains regarding how a phenomenon unfolds. Such a model does not

have to be perfect; rather, a researcher refines and updates model assumptions in a recursive effort to construct a model that better corresponds with observations and theory (Funnell & Rogers). Gunnlaugson (2008) indicates the need for a framework similar to a program theory or logic model by proposing the development of a set of axioms guiding transformative learning. Such a model or set of axioms would provide a means to make a researcher's assumptions explicit and thereby serve as the basis for constructing an instrument to assess transformative learning.

As discussed previously, transformative learning theory's roots rest in a rational, discursive, and stage-based model proposed by Mezirow (1991). The ten-phase model (Mezirow, 2000) became a mainstay of transformative learning theory, including its operationalization into a preliminary psychometric instrument with scale questions derived directly from the ten phases, the Learning Activities Survey (King, 2009).

The contrasts between conceptualizations of transformative learning as a linear, stage-based process or as a non-linear, recursive process are further expanded by a concurrent debate considering whether transformative learning's primary drivers are primarily rational (such as a learner's discussion, planning) or extra-rational processes (such as a learner's intuition, creativity). In a later work, Mezirow (2000, p. 21) states, "reflectivity involves reasoning and/or intuition" and continues, "both are significantly influenced by conditioned emotional responses."

For example, the ongoing debate between a more rational, discursive approach to transformative learning, and a more intuitive mode of transformative learning, represents an important distinction for a researcher developing an instrument (Dirkx, Mezirow, &

Cranton, 2006; Mezirow, 1998 & 2012). Constructing an assessment model based on a rational, discursive theory of transformative learning may lead to one instrument, while interpreting transformative learning as driven by extra-rational, intuitive processes may result in another instrument. Finding common ground between these differing perspectives may lead to an instrument able to assess a broader range of characteristics and experiences as they relate to transformative learning.

Yet another issue regarding the process of transformation rests in whether such learning occurs through an epochal or incremental process (Mezirow, 1985; Tisdell, 2003). For example, several studies of transformative learning focus on experiences in significant life events, such as transitions into an educational program (Mezirow, 1978; Mezirow & Marsick, 1978), diagnosis of life-threatening conditions (e.g. Courtenay, Merriam, & Reeves, 1998; Courtenay et al., 2000), involuntary childlessness (Mälkki, 2012), and so forth. Due to their fundamentally extreme nature, utilizing significant life events as a focus of research highlights transformative learning processes; however, significant life events can also focus attention on transformative learning as an epochal, rather than as a process learners may engage in during comparatively normal life events. A researcher developing an assessment model of transformative learning would again need to determine how to develop a model based on epochal or incremental models of transformative learning or possibly synthesizing the two along a continuum of possible states.

These theoretical debates lead to psychometric issues in instrument development. Should an instrument focus on detecting linear stages or non-linear, recursive processes

(Mezirow, 1985 & 2000; Tisdell, 2003)? Should an instrument seek to detect transformative learning processes through rational or extra-rational processes? Should an instrument seek to measure an epochal or gradual transformation process? Each of these perspectives poses significant psychometric issues in that each perspective presents radically different foundational premises informing instrument development; however, designing a psychometric framework to capture both the polar extremes would lend toward constructing a more unified theoretical framework.

Question of Domain

The above questions regarding how to measure the process of transformative learning lead to another important challenge regarding how to measure the domain in which transformative learning processes occur. Snyder (2008) captures the essence of this issue by comparing efforts to measure transformative learning to “grabbing hold of a moving target” (p. 159).

A domain is a context or sphere of activity and can be broad or narrow in scope, such as a classroom setting, social interactions, religious lessons, and so forth. Transformative learning studies often consider transformative learning in a particular domain or specific experience. Such literature often considers a trigger event or disorienting dilemma occurring in a specific domain that in turns initiates a transformative learning process. In studies of epochal life events, a domain-specific event, such as receiving a medical test’s result or experiencing learning in a specific setting, often corresponds to the start of a transformative learning process; however, these studies also describe how a single event’s effects cascade through a person’s perspective

on self, others, and larger worldview. So, while a trigger may occur in a specific domain, the effects of transformative learning impact the whole person.

This presents a challenge within instrument development because a person may experience a trigger event in any domain of one's life, whether in an educational setting, a family event, or by oneself. Furthermore, such triggers set in motion a larger process of transformative learning that an individual may explore through any number of other domains, such as through dialog (Baumgartner, 2002), art (Mantas & Schwind, 2014), spirituality (Tisdell, 2003), and so forth.

Due to the expanse of literature considering transformative learning in numerous contexts, the potential domains triggering transformative learning may be innumerable and specific to the individual. Efforts to develop an instrument may benefit through question items focusing on general features of transformative learning, rather than specific domains in and through which transformations occur. For example, instrument items focusing on specific domains, such as classroom learning, may restrict the usefulness of an instrument outside that particular domain, potentially limiting ongoing scholarly discussion regarding transformative learning's broader principles.

Question of Scope of Measurement

The preceding questions regarding processes and domains of transformative learning lead to another question influencing instrument development: the scope or period of measurement. An instrument can be retrospective in measurement, examining past outcomes. An instrument can also be prospective, examining ongoing processes. Prior articles have pointed to greater agreement among researchers regarding the

outcomes of transformative learning than in its processes (Gunnlaugson, 2008; Snyder, 2008; Taylor, 2007). Therefore, existing instrument development can be expected to focus on retrospective outcomes, similar to King's (2009) preliminary approach in the learning activities survey instrument as well as Stuckey, Taylor, and Cranton's (2013) instrument.

An instrument's scope of measurement informs its range of use. For example, while a retrospective instrument lends itself toward assessments of outcomes, it focuses on detecting transformation after the transformative learning process has occurred. Measuring outcomes assists with the goal of measuring a program's impact, as stated by Stuckey et al. (2013) regarding intent in the development of their recent instrument: "Practically, a survey instrument offers educators and scholars the means to determine more accurately what strategies have the potential to foster transformative learning" (p. 213).

While such a retrospective, outcomes-based instrument is useful in gaining perspective on an individual's experience or insights into a program, a prospective instrument would allow a researcher to learn more about transformations in process. Furthermore, a prospective instrument could establish the probability a particular learner may be expected to engage in transformative learning. Such an intended use of a prospective instrument raises a host of ethical issues (e.g. Taylor, 1998) about the role of an educator in facilitating, interfering, or encouraging an individual's transformative learning process, but if appropriate, this could allow an educator to identify students who

may be at risk of dropping out of a program, such as an individual experiencing significant levels of disorientation.

In summary, the premises underlying a retrospective assessment may be different from those of a prospective assessment; furthermore, the range of uses differs based on instrument design. Furthermore, a question emerges as to whether an instrument could reliably detect transformative learning on the individual level without focusing on a specific domain or context.

Commonalities in Research

The literature reviews emphasize how transformative learning should be considered in a holistic sense involving multiple factors, rather than as isolated variables (Taylor, 1997 & 2007). Furthermore, “the process of transformative learning may vary according to context and those involved; however, we see the outcome for all conceptions to be similar” (Stuckey et. al, 2013). These findings signal a need for an instrument to be derived from a psychometric framework that accounts for a range of processes leading to similar outcomes, such as a probability-based model for whether learners can be expected to engage in transformative learning.

Transformative Outcomes

Cranton (1992) describes the litmus test of transformative learning is changed perspective. Mezirow (1991) emphasizes the impact of how a learner who completes a transformative learning process experiences a profound shift in his or her structure of expectations and re-frames assumptions which in turn influence future decisions and actions. Mezirow (1998) further defines an outcome of transformative learning as

“learning to think for oneself involves becoming critically reflective of assumptions and participating in discourse to validate beliefs, intentions, values and feelings” (p. 197).

Kegan (2000) further distinguishes transformative learning from more typical increases in knowledge or skill by emphasizing how transformative learning centers around deep, epistemological change, “changes not only in *what* we know but changes in *how* we know” (p. 49). Fetherston and Kelly (2007) link the transformative learning process to a Bourdieu’s (1990) concept of *habitus*, and further examination of this conceptual linkage yields further distinctions between transformative learning and other, more typical forms of learning (e.g. Cranton & Kasl, 2012; Newman, 2012).

Bourdieu’s *habitus* is a complex, multi-layered concept, but the core concept can be linked simply to our understanding of an individual’s habits. Habits are automatic responses to stimuli; importantly, these responses are automatic in that the individual gives little thought to the response. Further, such habits allow an individual to respond to a variety of stimuli quickly, but because they are automatic processes, they can also serve as blinders: reaction without further consideration. As an example, a person may grow up being told she is expected to go to university. Family, role models, and a broader community may reinforce this expectation and the student succeeds in school to accomplish the necessary tasks for university admission. Finally, the student is admitted to a university; however, the student may arrive at the university with a limited sense of why it is personally important and meaningful. As in this example, the set of deeply ingrained expectations automating responses form a part of the student’s *habitus*.

As such, *habitus* can be thought of as automatic responses that trace a path an individual follows; the path often leads to anticipated outcomes (that is their goal), but because the habitus traces the path through an automated process propelled by existing expectations, the learner may not consider other options or possibilities.

With the present example, Bourdieu's in-depth definition of habitus can be considered:

The conditionings associated with a particular class of conditions of existence produce *habitus*, systems of durable, transposable dispositions, structured structures predisposed as structuring structures, that is, as principles which generate and organize practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary in order to obtain them. Objectively 'regulated' and 'regular' without being in any way the product of obedience to rules, they can be collectively orchestrated without being the product of the organizing action of a conductor (1990, p. 53)

As presented by Fetherston and Kelly (2007), transformative learning encompasses the re-structuring of habitus, the introduction of new expectations; of further importance, this re-structuring process is not simply the replacement of expectations with new ones by an external authority, but through the learner's own

consideration and thought in forming, validating, and accepting these new expectations, resulting in an expanded worldview.

As a distinction to further define what *transformative outcomes* include, one could argue transformative learning and behaviorist re-training can both result in a new set of expectations guiding further action; however, a key distinction is that transformative learning is rooted in a deeply humanistic process (Cranton & Taylor, 2012) where individual choice, interpretation, and search for meaning are paramount to a individual's learning, whereas these are secondary considerations (if considered at all) within behaviorist paradigms of training; however, transformative learning is not driven entirely by learner choice, as illustrated by the circumstances that can initiate transformative learning, which can be traumatic or life-altering events to which the learner then responds. As such, transformative learning outcomes represent the results of a reconstructive process; a process propelled at least in part by the learner.

As illustrated above, Fetherson and Kelly's (2007) conceptual linkage between transformative learning and Bourdieu's concept of habitus provide a nexus through which to distinguish transformative learning from other forms of learning by illustrating the deep nature of personal change, both in how an individual views self and the broader world, re-iterated by Kegan's statement that the transformative learning process is typified by, "changes not only in *what* we know but changes in *how* we know" (2000, p. 49).

Nevertheless, identifying transformative outcomes can be difficult, because a learner may not recognize assumptions until they are challenged (Carson & Fisher, 2006).

As a result, transformations tend to be recognizable in retrospect, with a learner's perspective on self and world fundamentally altered, more inclusive, and more open to possibilities (Mezirow, 1991).

Attitude toward Uncertainty

Foundational work outlines how learners experience events leading to an individual questioning his or her beliefs about how one perceives the world and how one acts toward others (Mezirow, 1991). Early work describes this event as disorienting in that it would be a major life event, rather than a casual experience (Mezirow, 1985). Mezirow (1991) names such an event a disorienting dilemma; other names include trigger event (King, 2009) or Schön's much earlier observation from studies of reflection that surprise serves as a trigger for further learning (1983). Examples of epochal, disorienting dilemmas from studies include a life-threatening diagnosis (Courtenay, Merriam, & Reeves, 1998; Courtenay et al., 2000) and involuntary childlessness (Mälkki, 2012).

Nohl (2015) describes a contrast to a sudden, disorienting dilemma in a study of 80 learners engaged in constructing narrative autobiographies. While some reported sudden-onset disorienting dilemmas as proposed by Mezirow (1991), many did not with Nohl noting "transformative learning may begin unnoticed, incidentally, and sometimes even casually, when a new practice is added to old habits" (p. 45). This finding lends support to alternative models of transformative learning that address how a disorienting dilemma may not be a requirement for transformative learning (e.g. Taylor, 1997). In describing the non-determining start, Nohl (2015) affirms past findings that an event

itself does not guarantee transformation; rather, the transformative learning process builds upon multiple factors.

Despite differences between epochal and incremental processes, a commonality among learners undergoing transformative learning emerges: how a learner responds to a sense of uncertainty. With transformative learning theory's focus on a learner's recognition that previous habits, perspectives, expectations, and so forth no longer result in a stable worldview, it should be no surprise that disorientation, whether gradual or sudden, would result in a sense of uncertainty while the learner develops a new perspective.

In order to enumerate aspects of uncertainty as defined by transformative learning researchers, definitions from studies include how learners may feel inept, confused, hesitant, out of their comfort zone, and stumped or unsure how one feels (e.g. Berger, 2004; Brown, 2005; Mälkki, 2012; Stansberry & Kymes, 2007).

Such a sense of uncertainty can emerge in the presence of unsettling contradictions (Mälkki, 2012) and often results in a strong emotional response, but such an emotional response is not the same across learners; rather, the response to uncertainty varies significantly from positive to negative (e.g. Berger, 2004; Courtney et. al, 1998; Kitchenham, 2006). In prior research into reflection, Boud, Keogh, and Walker (1985, p. 19) summarize a sense of uncertainty by citing Dewey, who defines it succinctly as:

a state of doubt, hesitation, perplexity, mental difficulty, in which [reflective] thinking originates, and ... an act of searching, hunting, inquiring, to find material

that will resolve the doubt, settle and dispose of the perplexity (Dewey, 1933, p. 12).

Dovetailing Dewey's linkage between uncertainty and further inquiry, another theme emerging from studies regarding a learner's sense of uncertainty as a disruptive experience is how a loss of certainty plays an essential role for a learner's change in perspective. Brock (2010) draws a parallel between the transformative learning process and theories of development (e.g. Baxter Magolda, 1999; Kegan, 1994), describing a process of a learner moving from "certainty about one's knowledge to the ability to question" (p. 124). Berger (2004) describes how a learner's experience of uncertainty may lead the learner to inhabit a liminal space at the edge of understanding, again facilitating the potential for a learner to question assumptions; however, Berger (2004, p. 349) describes this liminal space encouraging such deep reflection (such reflection discussed later in this section) as a mean between extremes, providing an example of how, on one extreme, some learners may occupy this liminal space as "perpetual students" (McWhinney & Markos, 2003, p. 27) who remain in this liminal space without developing competencies to complete transformative learning; on the other extreme, other students may not "remain in the liminal zone long enough to experience their growth" (Berger, p. 349).

Berger (2004) further describes the importance of experiencing uncertainty in the transformative learning process by describing a "false sense of certainty that pulls people away from the edge of their understanding" (p. 348), therefore stunting the transformative

learning process by short-circuiting deep questioning that a sense of uncertainty can encourage. Whitelaw, Sears, and Campbell (2004, pp. 12-13) also discuss how learners and educational programs may circumvent experiences of uncertainty by focusing on instrumental forms of learning (such focusing on technique, expertise, and craft), leading the learner away from deeper reflection and “toward a reinforced defense of existing techniques and knowledge” (pp. 12-13); in describing such avoidance of reflection in learning, the researchers invoke Schön (1983) who states learners who avoid uncertainty, thereby focusing on instrumental learning at the expense of deeper reflection, demonstrate a belief that “uncertainty is a threat; its admission is a sign of weakness” (p. 69) and how experiencing uncertainty may well lead learners to “feel profoundly uneasy because they cannot say what they know how to do, cannot justify its quality or rigor” (p. 69).

Taylor (2003, p. 364) further considers the consequences of learners' avoidance of uncertainty, describing the lack of transformative learning in a graduate teaching program possibly resulting from:

. . . their graduate school experiences did not seem to provide the necessary catalyst (e.g., disorienting dilemma, integrative circumstances, critical reflection) Mezirow (2000) often referred to that is necessary to initiate change in meaning schemes or, in this case, beliefs about teaching. It is quite possible that by adhering to traditional humanistic philosophy of adult education (e.g., Knowles, Apps), graduate schools provide little that challenges the belief systems of their students. The emphasis on meeting the felt needs of students leads to a

consumerist approach to teaching and makes “it easier for learners to remain in their own narrow familiar, reassuring paradigms of thinking and acting” (Brookfield, 1998, p. 204).

A learner's experience of uncertainty serves as a disruptive, disjunctive experience whereby the learner experiences a gap between expectation and observation. This sense of uncertainty should encourage, but not guarantee, deeper reflection upon a learner's assumptions and how these assumptions led to a sense of uncertainty; however, this experience of uncertainty ranges across learners, with some experiencing uncertainty as a positive experience while others consider it to be a negative experience, with a continuum of experiences between these poles. Furthermore, uncertainty experienced too briefly or for too long may also impact the learner's reflective process. It is important to note there is a considerable history of studies in support of a sudden onset, disorienting dilemma or crisis, with recent exemplar studies including a study of traumatic health experiences (Brendel, 2009), suicide bereavement (Sands & Tennant, 2010), and surviving cancer (Hoggan, 2014). Nevertheless, Nohl (2015) describes how crisis is not necessarily a requirement for transformative learning to begin, and that the beginning of transformative learning may simply originate with novelty or undirected exploration of new interests over time. Therefore, rather than focusing on the nature and impact of an event, especially crises, a model for assessing transformative learning would need to consider how a learner's attitude toward and experience of uncertainty encourages or discourages a broader transformative learning process.

Criticality

Criticality, or critical reflection, centers on the identification, critique, and reformulation of underlying beliefs or assumptions (Mezirow, 1991). As an historical corollary, Peirce (1878) describes the comfort a learner may experience in holding beliefs that bring certainty of both thought and action. Peirce (1878) describes an individual's beliefs as “thoughts at rest” encapsulating crystallized belief structures and further describes how doubt and lack of certainty can lead a learner to experience discomfort, leading a learner through a process of inquiry through which a learner seeks to re-establish and re-crystallize thoughts into beliefs, thereby returning to a sense of stability and certainty.

In contrast, criticality may be prompted by a sense of uncertainty or doubt regarding beliefs, as discussed previously, which places a thought back into motion through a learner's re-examination of a belief. As illustrated by the prior, historical example, transformative learning theorists conceptualize criticality as a deep process of identifying, testing, re-formulating, and validating one's beliefs regarding self and others, setting a learner's thoughts into motion in search of new explanations and attributions to account for gaps and contradictions between expectations and observations.

An exemplar of the conceptual basis justifying the centrality of reflection rests in the idea that “experience alone is not the key to learning” and that reflection “is an active process of exploration and discovery which often leads to very unexpected outcomes” (Boud, Keogh, & Walker, 1985, p. 7). Early research linked critical reflection as a necessary pre-requisite for transformative learning (Lytle, 1989; Taylor, 1997). In such

foundational work, critical reflection involves logical discourse and the identification, testing, and exploration of assumptions through a process of validation (Mezirow, 1991); however, Taylor's (1997) first literature review of studies and dissertations found a theme of "unconscious knowing, learning that takes place outside of one's focal awareness" (p. 52) and that a model of transformative learning only emphasizing critical reflection as the primary path to transformation "cannot explain meaning scheme and meaning structure transformations that occur outside the bounds of intentional construal" (p. 52). Several of the studies Taylor reviewed (1997) emphasized the role of emotions as part of a reflective process as well as context-dependent methods of expression. This emphasis on other forms of reflection leading to transformation, such as forms based on empathy, intuition, and spirituality as outlined by Dirkx (1997 & 2012) and Tisdell (2003), for example, has continued through current research.

With a diversity of approaches, some commonalities emerge. For example, critical reflection serves as a means for a learner to re-order, re-understand, and re-frame experiences, integrating new experiences with current understanding (Mezirow, 2000). Furthermore, critical reflection as described by transformative learning theorists can be distinguished from introspection or awareness of an emotional state because critical reflection involves the questioning of beliefs with a likely result that a learner's inquiry may lead to the testing, refinement, and/or rejection of these beliefs (Mezirow, 1991). Additionally, Carson and Fisher (2006) note that both identifying as well as challenging assumptions facilitates greater reflection than solely identifying assumptions without

challenging them. Critical reflection as described within transformative learning theory involves both the identification and critique of underlying assumptions.

Kember et al. (2000) cites Dewey's definition of such critical reflection, describing it 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” (1933, p. 9). Carson and Fisher (2006, p. 703) describe reflective individuals, stating “Dewey argued that reflective individuals have certain characteristics: open-mindedness, a willingness to accept intellectual responsibility for one’s own views, wholeheartedness (i.e., a willingness to face fears and uncertainties), and enthusiasm.” It is important to note in Dewey's definition that reflection contains both intellectual and affective components, a theme found throughout transformative learning research, including Dirkx's (1997) reference to Cousineau (1994), stating “learning through soul involves a deep interconnectedness of the socioemotional dimension of learning with the world of ideas and intellectual tasks” (p. 85).

Further agreement into the nature of critical reflection can be found in defining what it is not, through divergence, such as a learner following others with minimal questioning, particularly those seen as authorities (Cranton & Carusetta, 2004, p. 290) or engaging in “habitual action” in which a learner follows routine or habit without appraisal (Kember et al, 2000).

Another central concept regarding critical reflection ties into transformative learning's roots in humanism (Cranton & Taylor, 2012), emphasizing how a learner engaging in critical reflection may transition from an external source of authority and

appraisal of knowledge to an internal one. Such a transition of authority from external to internal is further discussed by Kegan (1994 & 2000) and echoed in Kohlberg's (1976, 1981 & 1984) prior research into models of moral development.

Criticality, also referred to as critical reflection on assumptions, centers on the identification, critique, and re-formulation of assumptions, especially as these beliefs relate to a learner adopting new habits and new perspectives on self and others. To further criticality's definition, criticality can be distinguished from rhetorical technique. While rhetorical technique focuses on strategies a debater may employ to win an argument (e.g. Schopenhauer, 1896/2005), criticality as discussed within transformative learning focuses on a learner's mindful contemplation of beliefs and their consequences, which can occur through any number of processes. As such, criticality's aim rests not in winning an argument to cease or short-circuit further discussion, but the identification and opening of beliefs to further inquiry, a purpose opposite that of rhetorical technique's. Within transformative learning literature, critical reflection often means dialog-based (whether internal or external) reflection; however, criticality as discussed within this study focuses primarily on the end result (identification, critique, and re-formulation of assumptions) regardless of method through which a learner may engage in criticality, whether through rational dialog or extra-rational exploration.

Self-Directed Learning

Broadly, theorists researching self-directed learning consider why some learners learn with limited external prompting while others do not. Stockdale's (2003) development of an instrument to assess self-directed learning among students utilizes

Brockett and Hiemstra's (1991) conceptual framework (personal responsibility orientation, or PRO) of self-directed learning, in which personal responsibility plays a central role, stating “by personal responsibility we mean that individuals assume ownership for their thoughts and actions” (p. 26). Stockdale and Brockett (2010, p. 162) further clarify that Brockett and Hiemstra's foundational work conceptualizing the PRO model (1991) defines personal responsibility as both a process a learner engages in, such as developing and carrying out a plan for learning (p. 18), as well as defining personal responsibility as an attribute of the learner, including “beliefs and attitudes that pre-dispose one toward taking primary responsibility for their learning” (p. 29).

To connect research in self-directed learning with transformative learning, Fetherston and Kelly (2007) state:

Taylor (1998) discussed the often-overlooked issue of student responsibility in transformative learning, citing research findings suggesting that responsibility is key to the process (pp. 59-60). If students are unwilling to engage—to take responsibility for their learning—transformative learning cannot occur. (p. 277)

Similar to the PRO model's focus on learners developing and pursuing a learning plan, Mezirow (1991) emphasizes the role of learner self direction and goal setting, stating: “All transformative learning involves taking action to implement insights derived from critical reflection” (p. 225). Cranton (1996, p. 95) identifies “self-directed learning as a foundation of transformative learning, and critical reflection as a central process involved in transformative learning.” In a related line of research into reflection, Boud,

Keogh, and Walker (1985, p. 11) further describe how critical reflection “is pursued with intent” and “it is not idle meanderings or day-dreaming, but purposive activity directed toward a goal” (p. 11). Taylor (2007) summarizes how “there seem to be shared transformational characteristics that transcend context, such as greater self-directedness, assertiveness, self-confidence and self-esteem” (p. 184).

Transformative learning literature mentions a host of interrelated concepts discussed within the broader literature on self-directed learning, including goal-directed action, responsibility, agency, autonomy, choice, initiative, planning, and other similar terms; Cranton and Taylor (2012) emphasize such core ideas emerging from humanist roots extend into self-directed as well as transformative learning. Fetherston and Kelly (2007) summarize how learner attitudes central to transformative learning include a “willingness to confront the feelings aroused by new knowledge, new experience, or struggle and to work through them reflectively” (p. 278).

Despite apparent similarities in focus, Mezirow (1985) explores the relation between transformative and self-directed learning (1985, p. 28), and issues a cautionary statement:

The obvious lesson here is that self-directed learners can operate at several different levels of rationality, morality, and sophistication. Distorted meaning perspectives generate distorted learning needs. In a limited sense, learners can be self-directed even though they suffer from acute tunnel vision. Their self-directed learning efforts may be motivated by venality, bigotry, viciousness, self-deception, and even self-destructiveness. They can assess their needs, set

objectives, plan their learning experiences, carry them out, and evaluate them. To what learning needs or interests should an adult educator attend? Clearly, he or she should attend to the ones that help learners to move in the direction of more authentic meaning perspectives and that enable them to participate fully and freely in dialogue so that they can come to understand their experience better while preserving the rights of others to do the same.

Due to these parallels between self-directed learning and transformative learning theories, research within self-directed learning (Guglielmino, 1977; Oddi, 1986; Stockdale, 2003) serves as an exploratory avenue to assess this potential dimension of transformative learning. Furthermore, the noted interrelations between self-directed learning and critical reflection further support self-directed learning's role as a probable catalyst within the broader transformative learning process; however, it remains important to further consider Mezirow's (1985) cautionary note.

Social Support

Foundational work within transformative learning theory emphasizes the importance of social support, whether it transpire through discourse or through experiencing other learners' perspectives as a means to frame and re-frame one's own understanding (Mezirow, 1991 & 2000). Whitelaw, Sears, and Campbell (2004) discuss research emphasizing how shared understanding and thinking among individuals situated in a social context increases participation in learning as well as its impact. Within transformative learning literature, considerable agreement emerges regarding how

individuals experiencing transformative learning pursue and engage in a social support network. For many, this involves social support grounded within a common experience. Taylor (2000) summarizes the role of social support within the larger transformative learning process, stating:

It is through building trusting relationships that learners develop the necessary openness and confidence to deal with learning on the affective level, which is essential for managing the threatening and emotionally charged experience of transformation. Without the medium of healthy relationships, critical reflection would seem to be impotent and hollow, lacking the genuine discourse necessary for thoughtful and in-depth reflection. (p. 308)

Taylor (1997) further emphasizes the importance of social support as a stabilizing process for those engaged in transformative learning, concluding: “It is through relationships that learners develop the necessary openness and confidence to deal with learning on an affective level, which is essential for managing the threatening and emotionally charged nature of the transformative learning experience” (p. 53); however, citing Berger (2004), Taylor (2007, p. 183) clarifies in a later literature review that not all support is equally important in the transformative learning process, stating “support as comfort is not transformative, instead it needs to be in the form of ‘good company,’ helping students sustain the courage needed (e.g. living with the discomfort) and recognizing their own narrative while at the edge of their learning.” In contrast to overly comfortable relations suppressing transformative learning, Fetherston and Kelly (2007)

discuss how toxic social relations among group members, typified by apathy and lack of motivation, degrade learning experiences.

Therefore, social support encouraging transformative learning depends on a balance between the push into discomfort and uncertainty and the pull of safe relations (Berger, 2004) or maintaining a balance between confrontation and safety (Taylor & Laros, 2014). Brown (2005) further discusses the difficult and precarious nature of such balances in social relations, emphasizing how social relations within transformative learning must extend beyond “genial cooperation” (p. 23) of conversation into dialog's inherent disequilibrium and discomfort (p. 23). Carson and Fisher summarize such balanced relations as “critical friends” (2006, p. 714).

Social interaction serves as a recurring theme within transformative learning, with literature emphasizing the importance of balance between comfort and safety with the discomfort of identifying, questioning, and re-forming assumptions. Social interaction balancing discomfort and support can open individuals to experiencing, reflecting on, and exploring uncertainty at the edge of one's understanding, a necessary component of transformative learning (Berger, 2004).

Proposed Psychometric Framework for Assessment

The results of transformative learning, captured through the theme of *transformative outcomes*, represent a reconstructive process led by the individual learner, who seeks to develop a more comprehensive, consistent, and open view of the world and of self. In this reconstructive process, four processes emerged from the literature review and form the foundation of the reflective process in transformative learning: *attitude*

toward uncertainty, criticality, self-directed learning, and social support. These four processes, combined with *transformative outcomes*, compose the five proposed themes for development into psychometric subscales.

The researcher conceptualized the four process themes as stabilizing and de-stabilizing characteristics. Stabilizing characteristics play a central role among learners undergoing transformative learning, primarily through facilitating coping mechanisms and resilience, thereby keeping a learner's sense of vulnerability, often inherent in transformative learning, manageable. This study conceptualizes stabilizing characteristics through two subscales: a) *self-directed learning* and b) *social support*.

The second driver in transformative learning within the present psychometric framework is encompassed by de-stabilizing characteristics, which the study defines through two subscales, a) *criticality* and b) *attitude toward uncertainty*. *Criticality* and *attitude toward uncertainty* serve as disruptive elements in learning that can push a learner away from comfort and habit and into an exploratory phase of identifying, questioning, and reframing assumptions. Drawing upon the literature, this study conceptualizes transformative learning as occurring through the presence and interaction of all the subscales.

Nevertheless, each subscale appears to be necessary, but individually insufficient to foster transformative learning. As Berger (2004) describes transformative learning as a process of both push and pull to encourage a learner to experience and explore uncertainty at the edge of a learner's understanding or comfort zone, so too does this study's conceptualization of transformative learning depend on both stabilizing (*self-*

directed learning and *social support*) and de-stabilizing (*attitude toward uncertainty* and *criticality*) characteristics to co-occur in order to foster, but not guarantee, transformative learning (*transformative outcomes*). For example, *social support* or *self-directed learning* alone may keep a learner within his or her comfort zone, perpetuating existing habits and understanding, pulling a learner from the edge of understanding. *Criticality* or *attitude toward uncertainty* also may shock and disrupt a learner's thinking, pushing a learner into and past the edge of understanding. Therefore, when a learner experiences concepts captured on each and every subscale, a balance is more likely to occur, encouraging transformation in a learner's view of self and others through a reconstructive, push and pull process (Berger, 2004).

This reflects findings in literature that transformative learning occurs at the intersection of multiple, interacting processes. For example, *social support* can either inhibit or promote transformative learning, depending on the broader context such support occurs. In summary, this exploratory study proposes four processes (*social support*, *self-directed learning*, *attitude toward uncertainty*, and *criticality*) are each necessary, but individually insufficient to promote transformative learning; rather, the sufficient presence of all four processes increases the likelihood transformative learning outcomes occur.

Chapter 3

Method

This study centered on constructing a psychometric framework to assess transformative learning and piloting an exploratory instrument derived from this framework: the resulting instrument is named TRansformative Outcomes and PrOcesses Scale (TROPOS). The developed study tested the reliability and validity of this exploratory instrument among current students and graduates of a public service graduate program.

Due to the complexity of transformative learning theory, its unique nature, and this study being exploratory in nature, original scales were constructed to test the proposed theoretical construct. The original scales for this study were operationalized through the following process:

- 1) Conduct a literature review within transformative learning to identify common themes described in research and theoretical studies. Cluster these common themes into defined variables within a psychometric framework
- 2) From this psychometric framework, derive a pool of original, potential items for use in an exploratory, pilot instrument assessing transformative learning
- 3) Engage an expert panel of transformative learning researchers to review these potential items, evaluating ex/inclusion of items in the proposed instrument
- 4) Conduct an exploratory, quantitative study among graduate students
- 5) Validate the psychometric framework through statistical analysis, enumerating future potential instrument revisions and research questions

This study operationalized transformative learning as composed of five subscales: one encompassing the results of transformative learning (*transformative outcomes*) and the remaining four encompassing the processes learners engage in which may result in transformative learning (*self-directed learning, social support, attitude toward uncertainty, and criticality*)

The model proposes the four processes subscales correspond to the fifth subscale, *transformative outcomes*. The research design, instrumentation, administration, and analysis are described below.

Research Design

This study was a quantitative, correlational-research design piloting an instrument derived from the proposed psychometric framework. The study utilized self-reported responses to assess variables of interest as described by transformative learning theory. Gay, Mills, and Airasian (2009) define exploratory research's focus as "developing or refining a theory" (p. 17). While transformative learning features extensive studies, the nature of how transformative learning unfolds and how to assess the theory remain largely preliminary (Cranton & Hoggan, 2012), with two existing instruments conceptualizing transformative learning through differing processes (King, 2009; Stuckey et al., 2013). For example, the Learning Activities Survey (King, 2009) operationalizes transformative learning through Mezirow's (1991) rational, ten-phase model. More recently, Stuckey, Taylor, and Cranton (2013) operationalize transformative learning through 19 subscales. This instrument seeks to extend this research by identifying general learner characteristics underlying transformative learning.

Therefore, the study was formative and exploratory in nature, consolidating common themes in transformative learning into proposed subscales for measurement. Due to the exploratory nature of this study, the emphasis was placed on whether the selected subscales (*self direction, social support, attitude toward uncertainty, criticality, transformative outcomes*) are reasonable, common measures of transformative learning within the proposed psychometric framework. Toward this end, the findings of the specific research objectives were addressed primarily through correlational, regression, and preliminary factor analyses to determine reliability and validity of the instrument derived from the proposed psychometric framework.

Population and Sample

This study utilized the following pseudonyms: graduate public service program, current graduate students, and program alumni. The population of participants in this study consisted of two groups from a master's degree program focusing on public service in a southeastern university. The first group of study participants was comprised of a cohort of second-year, current graduate students (N=12). The second group was composed of program alumni (N=332) who graduated during the prior 10 years (2007-2016). Current students meet three times weekly for classes and the alumni association maintains contact information on graduates, including email addresses.

Current students and graduates are typically returning adult students between the ages of 25 and 65. Students are often part- or full-time employees (particularly managers) in public service oriented fields, such as in government (social services and law enforcement), non-profit, or supporting private provider programs. Current graduate

students and program alumni are racially and ethnically diverse. This particular program is a cohort program with degree completion in eighteen months. Furthermore, the program and typical student background linked current students and alumni to a common educational experience.

Sampling Procedures

Following Institutional Review Board review and approval of the study population (Appendix H), sample participants were identified through two methods. For current students, a convenience sample was used in which a scheduled class had a voluntary portion of class time designated for instrument administration. For program alumni, the program representative reviewed the alumni email list to locate students with active email contact information. Those with active email addresses were included in the available population, and the program representative then forwarded an email directing program alumni to the survey web site.

Instrumentation

The initial, pilot instrument developed in this study is composed of five subscales: *self-directed learning, social support, attitude toward uncertainty, criticality, and transformative outcomes*. The following section defines reliability and validity as utilized in this study, then describes steps in instrument construction, followed by definitions of the five scales.

Defining Reliability

Broadly, reliability is a numerical measure of the consistency of a set of items. The greater the consistency of a set of items, the more a researcher can presume the items

measure a common concept. A researcher calculates reliability scores through a correlation coefficient. Reliability is also an inverse measure of error (Gay, Mills, & Airasian, 2009, p. 158). The higher the reliability is, the lower the error; the lower the reliability, the higher the error. Downing (2004) provides guidelines for determining what Cronbach's alpha scores are adequate by proposed use, with 0.70 as a general minimum for group or low-stakes assessments and 0.80 as a minimum for high-stakes testing. Reliability serves as a necessary but insufficient prerequisite for validity (Gay et al., 2005, p. 158).

Defining Validity

In the broadest of terms, validity addresses whether an instrument measures a particular construct in a specified population. A researcher considers several types of validity, including content, criterion, and construct validity. Content validity considers whether an instrument encompasses the scope of a particular content area. For example, achievement tests assess a student's mastery of a particular content area, such as algebra, history, biology, and so forth. Criterion validity, also known as predictive validity, considers whether scores from one instrument correspond to another instrument. Construct validity is the highest form of validity and considers how well an instrument measures a particular construct.

It is important to note a validation process requires multiple lines of testing: there is no single validation process (Bordens & Abbott, 2011). Furthermore, while expert review and theory building are important parts of the validation process, "validation

always requires empirical investigations, with the nature of the evidence depending on the type of validity” (Nunnally, 1978, p. 86).

Additionally, a researcher does not determine an instrument to be valid on its own; rather, a researcher validates an instrument for “for a particular interpretation for a particular group” (Gay et al., 2005, p. 169). Nunnally (1978) adds a further distinction by stating, “strictly speaking, one validates not a measuring instrument but rather some use to which the instrument is put” (p. 87). For example, an instrument may be validated for use with undergraduates in a psychology course, but validation with one population does not guarantee validation in another. Therefore, validation for one use of an instrument with one population does not guarantee validation for another population.

An analogy can be made between validity and accuracy; however, within psychological research the target often cannot be fully known to the researcher. Rather, the researcher constructs the target through inference from inductive observation and deductive conjecture from theory, creating a theoretical construct for measurement. Therefore, an instrument is only valid insofar as the theoretical construct the researcher creates adequately describes the phenomenon to be observed. As a result, the researcher must choose wisely and exercise appropriate judgment when constructing a variable to be measured, clearly stating how he or she defined and measured the variable of interest (Gay et al., 2005, p. 158).

Another link can be drawn between reliability and validity in that reliability is a necessary pre-requisite for validity. As stated by Gay, Mills, and Airasian (2009): “although a valid test is always reliable, a reliable test is not always valid” (p. 158).

Again, an analogy can be extended between reliability to precision and validity to accuracy. Precision is a requirement for accuracy. By implication, an instrument may be highly reliable, but invalid in that the construct to be measured is not an appropriate description of the observed phenomenon. Therefore, reliability is necessary for validity, but does not ensure validity on its own.

While a researcher computes measures of reliability through correlational coefficients, a researcher describes validity, particularly construct validity, through a qualitative continuum such as: “highly valid, moderately valid, or generally invalid” (Gay et al., 2005, p. 169). Popper (1935/2002) cites Reichenbach who further illustrates such a continuum when describing validity: “statements can only attain continuous degrees of probability whose unattainable upper and lower limits are truth and falsity” (p. 186). Considering how content and construct validity fall along a continuum as well as how an instrument is validated only for a specific use for a specific population, validity becomes tenuous and contingent upon use and circumstance (Bordens & Abbott, 2011; Nunnally, 1978).

Steps in Scale Construction

In constructing the new instrument for this study, the researcher conducted a literature review (Chapter 2) in order to define the constructs to be measured in detail; as part of the literature review, the researcher logged recurring terms and findings into a spreadsheet, noting if the finding was drawn from an empirical study or theoretical analysis. A key qualifier for a term’s inclusion rested in whether the term appeared to be essential for transformative learning to occur, therefore allowing the discernment

between what transformative learning is and what it is not. Through a multi-round process, the researcher grouped similar findings into apparently similar themes, noting saturation or recurrence of common terms around these themes. Then, the researcher derived common definitions for the themes. Following multiple rounds of revision and derivation, five themes or subscale themes emerged for inclusion in this study: *transformative outcomes, self-directed learning, social support, attitude toward uncertainty, and criticality.*

In addition to deriving variables and respective definitions, Stuckey, Taylor, and Cranton (2013), note an instrument seeking to measure transformative learning would need to be designed with a flexible framework to consider the diverse range of processes learners resulting in transformative learning outcomes; therefore, the researcher proposed a model through which these variables are expected to interact, proposing transformative learning as the interaction between the four subscale themes of *self-directed learning, social support, criticality, and attitude toward uncertainty* as necessary for, but not guaranteeing, *transformative outcomes.*

The researcher then identified existing instruments that appeared to share similarities in construct design, noting how the existing instruments were similar and dissimilar from the identified themes. In consultation with the researcher's committee, the researcher and committee agreed the identified, existing scales approximated, but did not adequately encompass the proposed five variables for measurement in this study.

In order to derive original items for the five identified scales, the researcher initiated a multi-round process to propose a pool of potential psychometric items,

deriving potential psychometric items from each constructed variable's definition. In this process, the new, proposed transformative learning-specific items diverged from the items identified in existing instruments, as expected. Following multiple rounds of revisions and clarifications, 59 potential items emerged, and the researcher consolidated these items and definitions into a review document for an expert review panel to evaluate by simple inclusion, exclusion, or modification for inclusion (see Appendix E).

As discussed earlier, when proposing a new scale, an expert review process of some kind in which experts rate and propose modifications to items facilitates the foundation for (but does not guarantee) presumptive, face validity as well as content validity. A key reason for an expert review process rests in the premise stated earlier that within psychological research, psychological constructs, especially those based on internal, cognitive/interpretive processes, often cannot be directly measured or fully known to the researcher; therefore, a panel of experts (especially one with members holding differing perspectives on a common phenomenon) would evaluate proposed items, with the emerging consensus presenting what can be reasonably expected to be an adequate operationalization of a proposed construct.

Following construction of a pool of proposed items and their consolidation into an expert-review document, the researcher applied for institutional review board (IRB) approval to conduct a one-round expert-review process (Appendix A). Following IRB approval, the researcher and advisor identified eight potential expert panel members who have written extensively in transformative learning literature. The review document (Appendix E) asks expert to rate items as *include*, *exclude*, and *propose modifications for*

inclusion. Further, each proposed subscale had a comments section for additional notes. Of the eight experts contacted, five agreed to participate, with five responses received. The researcher tabulated item responses and designated items for inclusion by simple majority-rule from the expert-review process. Items identified for inclusion through the expert review process were used in an initial pilot study; following the pilot, subscale reliability and correlations were computed to determine if other items or subscales should be excluded. For both the pilot and full main administrations, each item utilized a five-level Likert (*Disagree Strongly, Disagree, Neutral, Agree, Agree Strongly*).

In this study, the phrase “As a result of the graduate program” preceded items encompassing the variable *transformative outcomes*; the phrase, “While I was a student in the graduate program” preceded the remaining four scales. Similar to the instrument developed by Stuckey, Taylor, and Cranton (2013), this study also asks students to recall their experiences and then respond to items; however, a difference emerges that in the existing instrument, learners can recall any single, major event in their adult life, whereas in this study, participants recall a specific, structured, shared graduate study experience. As a result, this instrument focuses on student experiences in the same program along five subscales; the underlying model presumes four of the scales (*self-directed learning, social support, criticality, attitude toward uncertainty*) all together serve as pre-requisites for the fifth scale, *transformative outcomes*. As such, the research objectives do not focus on whether these scores changed between the beginning and end of the program; rather, the research objectives focus on whether the participants report general agreement with

the proposed constructs during a common, eighteen-month program as well as whether these constructs correlate with the presence of *transformative outcomes*.

In the following section, each of the five subscales in the instrument is defined. The five subscales include: *self-directed learning*, *social support*, *attitude toward uncertainty*, *criticality*, and *transformative outcomes*.

Defining Self-Directed Learning

The study conceptualizes self-directed learning within transformative learning as a learner's willingness to engage in learning, demonstrated by setting and pursuing goals, especially when facing obstacles.

Defining Social Support

The study conceptualizes social support within transformative learning as a learner's constructive engagement with a social group whose members exhibit mutual trust and respect, thereby facilitating a balance between support and constructive critique.

Defining Attitude toward Uncertainty

The study conceptualizes attitude toward uncertainty within transformative learning as a learner's attitude toward anticipating or experiencing a loss of certainty, typified by feeling stumped, confused or experiencing a sense of stepping outside one's comfort zone.

Defining Criticality

The study conceptualizes criticality within transformative learning as a learner questioning beliefs of oneself and others (regardless of method), evaluating the validity of such beliefs, and re-framing these beliefs.

Defining Transformative Outcomes

The study conceptualizes transformative outcomes as a learner's profound re-assessment of beliefs, typified by changed assumptions and a more inclusive, open perspective toward self and others.

Data Collection Procedures

Following approval by the Institutional Review Board of the University of Tennessee, Knoxville as well as the IRB of the graduate public service program, the instrument was administered. The instrument administration occurred in two phases: first as a pilot among the cohort of second-year, current students. Following the pilot, the study proceeded by engaging alumni through an online survey.

Due to the pilot classroom environment not containing computers for all current students, a paper-and-pencil version of the 42-item survey was administered (Appendix K). This initial administration among current students served to assess basic reliability and correlations of survey items, and 12 items were removed following statistical analysis.

Following pilot analysis, program alumni utilized the 30-item online survey, presented through the University of Tennessee, Knoxville's Qualtrics platform (items in Appendix L). Neither the paper nor online surveys collected personally identifiable information. All participants received an informed consent statement. For current students, this informed consent document was a paper form (Appendix J); furthermore, following IRB recommendation, an alternate activity was presented to all students to allow those who wish not to take the survey. For alumni, the email invite contained an

attached informed consent document (Appendix J). The survey presented item statements for participants to indicate their agreement, ending with a demographic questionnaire.

The demographic questionnaire requested participants indicate gender (male/female/other) and current age by five-year brackets. Because the researcher drew the sample by year of graduation, the emailed link directed sample participants to the survey through a link specific to the year of graduation (anonymous metadata). By automating this demographic element (year of graduation) through the email process, this helped better ensure data quality.

The initial pilot study among current students was conducted in the program's classroom location per regular schedule. The researcher explained IRB ethics, including confidentiality and voluntary involvement, making it clear participation in the pilot study was not related to their coursework. Then, the researcher distributed paper surveys, read survey instructions, and allowed for questions, noting any technical or presentational issues inhibiting instrument administration, of which there were none.

For the full study among alumni, the alumni organization emailed alumni by blind carbon copy to protect identities, providing a reference to the graduate program in the subject line to increase participation and distinguish the survey from spam or junk mail. The email contained an attached waiver of informed consent statement. The email contained the online survey link along with instructions and time expectations. The UTK-sponsored Qualtrics platform stored responses and allowed export to a range of quantitative software suites. This study utilized SPSS and Microsoft Excel, both of which were available through the University's license.

Data Analysis

For the initial pilot study among current students, the researcher transcribed the responses into an electronic spreadsheet. For the study among program alumni, responses logged in Qualtrics were exported to an electronic spreadsheet. For both groups, data were reviewed for blanks, errors, and outliers (Bordens & Abbott, 2011).

Then, an organized and coded master spreadsheet was created with each instrument item listed as a column. Descriptive statistics (percentiles, mean, median, standard deviation, kurtosis, skewness, normality) were computed, described in Chapter 4. Also, reliability for each variable was computed through Cronbach's alpha. A range of further statistical methods, including correlational, regression, and preliminary factor analyses, were utilized in order to further assess instrument reliability and validity.

Limitations

The following limitations were noted in this study:

1. For the sampled alumni, the sample was a convenience sample drawn from contact records of the alumni organization.
2. For the sampled current students, the sample was a convenience, intact sample of one student cohort.
3. While a researcher can encourage study participation, the decision to participate or to not participate is made by the individual participant, based on personal preferences. As such, an individual's decision to accept or decline participation must be respected.

4. Due to the range of graduation dates among program alumni (2007 to 2016), recency was a concern to be noted in data analysis. The researcher computed descriptive statistics by class and total sample, with particular focus on reliability, a pre-requisite for validity. The researcher also conducted significance testing of responses to determine if correlational and regression analyses could proceed.

Summary

This chapter described the methods employed to develop and pilot an instrument to assess transformative learning: TRansformative Outcomes and PrOcesses Scale, TROPOS. The following chapter considers the results from the development and deployment of TROPOS through the phases of engagement with the expert panel, an initial pilot study, and the full study.

Chapter 4

Study Results

This study's purpose was to construct and pilot an exploratory instrument assessing transformative learning. The developed instrument is entitled *TRansformative Outcomes and PrOcesses Scale* (TROPOS). This chapter describes the study's results in sequence, and begins with the expert panel review process, followed by the pilot study's results among current students (completed responses, N = 12), and then proceeds with the full study among program alumni (completed responses, N = 119). Following a description of the full study's results, the study's research objectives are considered.

Expert panel

Five expert panel members completed the review document of 59 potential items, along five subscales, for use in an exploratory instrument to assess transformative learning in a graduate education program (Appendix E). Experts responded by rating proposed items as *include*, *exclude*, or *modify* (proposing a modification). Experts also provided considerable written feedback in comment fields. The researcher utilized the aggregate expert responses to classify each of the 59 potential statements as follows:

Include: Due to this study being exploratory in nature, if a simple majority (three of five experts) marked an item for inclusion, the statement was classified for inclusion in the instrument without changes. Thirty-three items met this criterion.

Modify: If an item did not reach a simple majority for inclusion, the researcher considered whether the modifications proposed by expert panel members could be

incorporated to allow a statement to be included under label “modify.” Accepted modifications are underlined in Appendix E. Seven items met this criterion.

Exclude: If a simple majority (three of five experts) marked an item for exclusion or there was not sufficient agreement among expert responses to permit item modification, the statement was classified for exclusion from the instrument. Nineteen items met this criterion.

Summary statistics for the expert panel results are included in Table 4.1. Detailed, item-level responses are included in Appendix F.

Table 4.1. Summary of results from expert panel review process.

Subscale	# Include	# Exclude	# Modify	Final # (include + modify)
Transformative Outcomes	7	5	0	7
Social Support	6	9	1	7
Self-directed Learning	1	5	4	5
Attitude toward Uncertainty	11	0	0	11
Criticality	8	0	2	10
Totals	33	19	7	40

In addition to the 40 items resulting from expert-panel review, one expert panel member proposed two new items in the *social support* scale. Following the researcher’s consideration of the proposed items, the items were included in the instrument in the pilot study (Items 8 and 9 under *social support* in Appendix G).

As demonstrated in Table 4.1, it is important to note the variation in aggregate subscale ratings, particularly that the subscale *self-directed learning* as defined in this

study (distinct from existing self-directed learning scales) contained items with the fewest inclusions and the most modifications; however, *criticality* and *attitude toward uncertainty* exhibited the most consensus for inclusion. This variation is discussed further in relation to the full study results.

Pilot Study

On October 11, 2016, 12 final-year graduate students participated in the pilot study of the instrument to assess transformative learning (TROPOS pilot). The instrument featured 42 items along five subscales, with 40 items previously selected by an expert panel and 2 included directly from expert panel feedback. Appendix K presents the instrument administered in the pilot study. Participants completed all items, so no data exclusions or missing data modifications were warranted.

Pilot Study Findings

Prior to any item exclusion, three of the five subscales exhibited adequate reliability ($\alpha > 0.70$); see Table 4.2, left-hand side. Following exclusion of items that reduced reliability scores significantly, four of five subscales exhibited adequate reliability ($\alpha > 0.70$); see table 4.2, right-hand side.

Table 4.2. Pilot study: Cronbach's alpha before and after item exclusions.

Subscale	Initial Alpha	# Items Excluded	Revised Alpha
Social Support	0.727	1	0.835
Self-directed Learning	0.495	5	<i>Excluded</i>
Att. Uncertainty	-0.136	3	0.721
Criticality	0.790	3	0.853
Outcomes	0.795	0	0.795

One subscale, *self-directed learning*, did not exhibit sufficient reliability even with exclusions, and was therefore excluded from the full study. This is not surprising based on expert-panel feedback where this scale's operationalization exhibited minimal consensus. Another subscale, *attitude toward uncertainty*, initially exhibited negative covariance prior to item exclusions, indicating a need for further examination.

Following analysis of pilot responses, all five items in the *self-directed learning* subscale as well as seven other items from other subscales were removed (see Table 4.2). Following item removal, reliability scores were re-computed, as shown in Table 4.2 (right-hand column) with all remaining subscales exceeding an acceptable minimum reliability score (>0.70); however, due to small sample size ($N=12$) for the initial pilot study, these reliability scores should be considered as preliminary and within a bounded context of the sample. Skewness and kurtosis were computed on the remaining items, and each subscale was adequate. Correlation analysis of pilot results ($N=12$) proceeded, as shown in Table 4.3.

Table 4.3. Pilot study: Pearson's correlation scores for four remaining subscales.

Subscale	Attitude toward Uncertainty	Criticality	Transformative Outcomes
Social Support	-0.085	-0.415	0.234
Att. Toward Uncertainty		0.337	0.765**
Criticality			0.006

** . Correlation is significant at the 0.01 level (2-tailed).

Listwise $N=12$

In the correlational analysis, *attitude toward uncertainty* demonstrated a strong correlation ($r=0.765$) with *transformative outcomes* and was the only statistically significant relation in the pilot study. *Social support* had a weak, inverse correlation ($r=-0.415$) with *criticality*. *Criticality* exhibited essentially no relation with *transformative outcomes* ($r=0.006$).

Considering the limited sample size in the pilot study ($N=12$), the highly preliminary pilot findings follow: 1) *social support* may dampen *criticality*, but *criticality* demonstrated no relation with *transformative outcomes*; 2) a learner's *attitude toward uncertainty* may play an important role in transformative learning. It is possible students with an increased willingness to consider new/surprising experiences while in the graduate program may be more susceptible to experiencing transformative learning; however, the lack of statistically significant relations in the pilot study limits this to a preliminary hypothesis.

Following pilot study and removal of items, the revised TROPOS instrument consisted of 30 items along four scales (Table 4.4 and repeated in Appendix L). The researcher proceeded to administer TROPOS among graduates of the graduate program through an online survey.

Table 4.4. The thirty items used in full study among program alumni.

Subscale and Item #	Item Text
Social Support 1	My fellow students often made an effort to understand my perspective
2	I usually felt safe sharing my opinions
3	I could raise questions about my fellow students' beliefs without fear of being shut out
4	My fellow students and I supported one another
5	Group discussions were usually inclusive of differing perspectives
6	I trusted my fellow students
7	My fellow students and I respected one another
8	I felt it was safe to participate in the group as my authentic self
Att. toward Uncertainty 1	I felt comfortable suspending my judgment
2	I was open to new possibilities
3	I often felt hesitant in what I believed to be true
4	I benefited from suspending my judgment
5	I often felt surprised by what I learned
6	I found discomfort could be an important part of learning
7	I found stepping outside my comfort zone helped me learn
8	I often felt uncertain about my beliefs
Criticality 1	I was willing to explore ideas I disagreed with
2	I discovered contradictions in my beliefs
3	I challenged my own beliefs
4	I challenged my fellow students' beliefs
5	My fellow students raised questions about my beliefs
6	I explored new ways to think about my beliefs
7	Disagreements helped me understand my beliefs
Transformative Outcomes 1	My deeply held beliefs changed
2	I developed a greater sense of responsibility toward others
3	I changed my goals for the future
4	I made major changes in my life
5	My view of myself changed
6	My view of the world changed
7	This program changed my life

Full study

For the full study, the researcher contacted 332 alumni of a public service graduate program. The alumni spanned 10 graduating classes (2007-2016). A total of 134 alumni responded, yielding 116 completed responses. Three responses had one missing item each, but the value was replaced with the mean of the respondent's score in the scale in which the missing item occurred, raising the responses to 119. The remaining responses were either completely blank or were significantly incomplete. Tables 4.5 and 4.6 present participant demographic responses by gender as well as age group by decade.

Table 4.5. Gender frequencies among participants.

Gender	<i>n</i>	%
Female	71	60
Male	47	39
Other	1	<1
Total	119	

Table 4.6. Age group frequencies among participants.

Age Group	<i>n</i>	%
21 – 25	1	< 1
26 – 30	11	9
31 – 35	14	12
36 – 40	15	13
41 – 45	21	18
46 – 50	15	13
51 – 55	24	20
56 – 60	8	7
61 – 65	6	5
66 – 70	4	3
>71	0	0
Total	119	

Analysis proceeded through three phases, each utilizing the same source data but exploring different subscale configurations. The purpose of the three-phase analysis was to locate any important distinctions as each succeeding phase of the analysis branched the model into more detailed subscales, culminating in the four subscales previously identified and screened through the literature review, expert panel analysis, and pilot study. The first phase of analysis considered all items as a single scale. The second phase considered two subscales: *transformative outcomes* and *transformative processes* (composed of an aggregate of *social support*, *criticality*, and *attitude toward uncertainty*). The third phase considered the four subscales: *social support*, *attitude toward uncertainty*, *criticality*, and *transformative outcomes*.

For each of the full study's three phases of analysis, the researcher evaluated whether outliers were present and whether they should be excluded from analysis in order to maintain integrity of correlation and regression analyses (Bordens & Abbott, 2011). Outliers were detected by calculating upper and lower bounds for each subscale and identifying which responses exceeded these bounds (Hoaglin & Iglewicz, 1987; Hoaglin, Iglewicz, & Tukey, 1986), particularly when outlier(s) were significant enough to shift a regression line's slope (Bordens & Abbott, 2011). Each of the three rounds of analysis yielded potential outliers within the 119 complete responses. Two outliers were detected and removed in the first two phases (n=117); three additional outliers were detected in the third phase (n=114) with four subscales. As the analysis branched the analysis from one unitary construct into two, then four subscales, an increase in the number of outliers was expected, with the total outliers remaining a small portion of the sample total. Following

outlier removal, normality, skewness, and kurtosis were acceptable in all three phases of analysis, facilitating integrity of the subsequent correlational analyses.

Phase One Analysis: All Items as Unitary Construct

For the first phase of analysis, two outliers were detected and removed listwise from the sample ($n=117$). Following outlier removal, the below were computed. Basic descriptive statistics were computed (Table 4.7). Skewness and kurtosis were acceptable (Table 4.8). Tests for normality (Shapiro-Wilk and Kolmogorov-Smirnov) revealed acceptable normal distributions (Table 4.9). A t-test for difference by gender revealed no significant differences (4.10); ANOVA tests by age (4.11) and year of graduation (4.12) revealed no significant differences. Cronbach's alpha was computed for the unitary scale ($\alpha = 0.885$) (Table 4.13). The high Cronbach's alpha and acceptable normality indicate TROPOS, as a unitary construct, is statistically reasonable.

Table 4.7. Phase one analysis: Descriptive statistics for unitary scale.

Scale	25%	Mean	Median	75%	Min	Max	Std. Deviation
All Items	3.433	3.773	3.766	4.116	2.766	5.000	0.475

Table 4.8. Phase one analysis: Kurtosis and skewness.

Scale	Kurtosis	Skewness	Std. Error of Skewness	ZED
All Items	-0.439	0.085	0.224	0.379

Table 4.9. Phase one analysis: Tests for normality.

Scale	df	<i>Shapiro-Wilk</i>		<i>Kolmogorov-Smirnov</i>	
		Statistic	Sig.	Statistic	Sig.
All Items	117	0.990	0.589	0.060	0.200

Table 4.10. Phase one analysis: Gender t-test.

Subscale	Females		Males		t-test	Sig.
	M	SD	M	SD		
All Items	3.733	0.477	3.832	0.475	1.104	0.272

** . Significant at the 0.01 level (2-tailed).

Table 4.11. Phase one analysis: ANOVA for age by decade.

Scale	F	Sig
All Items	1.297	0.276

Table 4.12. Phase one analysis: ANOVA for year of graduation.

Scale	F	Sig
All Items	0.498	0.873

Table 4.13. Phase one analysis: Cronbach's alpha.

Scale	Alpha
All Items	0.885

Phase Two Analysis: *Processes and Outcomes*

For the second phase of analysis, two outliers were detected and removed listwise from the sample (n=117). Following outlier removal, the below were computed. Basic descriptive statistics were computed (Table 4.14). Skewness and kurtosis were acceptable (Table 4.15). Tests for normality (Shapiro-Wilk and Kolmogorov-Smirnov) revealed acceptable normal distributions (Table 4.16). A t-test for differences by gender revealed no significant differences (Table 4.17); ANOVA tests by year of graduation revealed no significant differences (Table 4.18); age revealed no significant differences (Table 4.19). Cronbach's alpha computed for *transformative outcomes* ($\alpha = 0.870$) and *transformative processes* ($\alpha = 0.835$) (Table 4.20).

Table 4.14. Phase two analysis: Descriptive statistics for subscales.

Subscales	25%	Mean	Median	75%	Min	Max	Std. Deviation
Processes	3.608	3.869	3.869	4.152	2.695	5.000	0.428
Outcomes	2.857	3.460	3.428	4.071	1.428	5.000	0.885

Table 4.15. Phase two analysis: Kurtosis and skewness.

Subscales	Kurtosis	Skewness	Std. Error of Skewness	ZED
Processes	-0.161	-0.027	0.224	-0.120
Outcomes	-0.509	-0.268	0.224	-1.196

Table 4.16. Phase two analysis: Tests for normality.

Subscales	df	<i>Shapiro-Wilk</i>		<i>Kolmogorov-Smirnov</i>	
		Statistic	Sig.	Statistic	Sig.
Processes	117	0.988	0.411	0.077	0.083
Outcomes	117	0.975	0.026	0.062	0.200

Table 4.17. Phase two analysis: Gender t-test.

Subscale	Females		Males		t-test	Sig.
	M	SD	M	SD		
Processes	3.829	0.404	3.929	0.464	1.230	0.221
Outcomes	3.416	0.922	3.514	0.840	0.585	0.560

** . Significant at the 0.01 level (2-tailed).

Table 4.18. Phase two analysis: ANOVA for year of graduation.

Subscales	F	Sig
Processes	0.528	0.851
Outcomes	0.305	0.972

Table 4.19. Phase two analysis: ANOVA for age by decade.

Scale	F	Sig
Processes	1.065	0.377
Outcomes	1.788	0.136

Table 4.20. Phase two analysis: Cronbach's alpha.

Subscales	Alpha
Processes	0.835
Outcomes	0.870

Pearson r was computed (Table 4.21) between *outcomes* and *processes*, yielding a moderately high correlation ($r = 0.551$). The high Cronbach's alpha scores and acceptable normality scores for *outcomes* and *processes* indicate TROPOS, as a two-level construct, is statistically reasonable.

Table 4.21. Phase two analysis: Pearson's correlation scores for two measured subscales.

Subscale	Outcomes
Processes	0.553**

** . Correlation is significant at the 0.01 level (2-tailed).
Listwise N=117

Phase Three Analysis: Four Subscales

For the third phase of analysis, five outliers were detected and removed listwise from the sample ($n=114$). Following outlier removal, the below were computed. Basic descriptive statistics were computed (Table 4.22).

Table 4.22. Phase three analysis: Descriptive statistics for subscales.

Subscales	25%	Mean	Median	75%	Min	Max	Std. Deviation
Social Support	4.125	4.448	4.500	4.750	3.250	5.000	0.437
Att. Uncertainty	3.250	3.598	3.625	3.875	2.500	5.000	0.504
Criticality	3.142	3.593	3.690	4.142	1.285	5.000	0.741
Outcomes	2.857	3.475	3.500	4.035	1.429	5.000	0.873

Skewness and kurtosis were acceptable (Table 4.23). Tests for normality (Shapiro-Wilk and Kolmogorov-Smirnov) revealed acceptable normal distributions (Table 4.24).

In the third phase, three of four scales demonstrated reliability scores as determined by Cronbach's $\alpha > 0.70$ (Table 4.25). One scale's α (*attitude toward uncertainty*) fell short of the 0.70 threshold ($\alpha = 0.64$); however, the remaining scales exceeded the minimum threshold as did the instrument's reliability as a whole. As the subscale model branched into four subscales, the subscales began to exhibit statistical issues, primarily that reliability decomposed for *attitude toward uncertainty*, and that skewness for *social support* began approaching limits for acceptability, leaving *criticality* and *transformative outcomes* as the most statistically sound standalone subscales. ANOVA tests by year of graduation revealed no significant differences (Table 4.26), consistent with analyses in phases one and two.

Table 4.23. Phase three analysis: Skewness.

Subscales	Kurtosis	Skewness	Std. Error of Skewness	ZED
Social Support	-0.111	-0.627	0.226	-2.774
Att. Uncertainty	-0.039	0.232	0.226	1.026
Criticality	0.460	-0.496	0.226	-2.194
Outcomes	-0.555	-0.228	0.226	-1.008

Table 4.24. Phase three analysis: Tests for normality.

Subscales	df	<i>Shapiro-Wilk</i>		<i>Kolmogorov-Smirnov</i>	
		Statistic	Sig.	Statistic	Sig.
Social Support	114	0.936	0.000	0.108	0.002
Att. Uncertainty	114	0.987	0.325	0.075	0.161
Criticality	114	0.978	0.053	0.087	0.032
Outcomes	114	0.975	0.034	0.059	0.200

Table 4.25. Phase three analysis: Cronbach's alpha.

Subscales	Alpha
Social Support	0.773
Att. Uncertainty	0.645
Criticality	0.853
Outcomes	0.868
All Items	0.884

Table 4.26. Phase three analysis: ANOVA for year of graduation.

Subscales	F	Sig
Social Support	0.879	0.547
Att. Uncertainty	0.770	0.644
Criticality	0.538	0.844
Outcomes	0.382	0.941

During significance testing, table 4.27 captures that, by gender, participants exhibited a statistically significant difference in *criticality* scores, with males reporting significantly higher criticality scores than females, explored further in the later section: *Supplemental Analysis by Gender*.

Table 4.27. Phase three analysis: Gender t-test.

Subscales	Females		Males		t-test	Sig.
	M	SD	M	SD		
Social Support	4.411	0.440	4.511	0.433	1.185	0.239
Att. Uncertainty	3.577	0.518	3.621	0.489	0.448	0.655
Criticality	3.452	0.722	3.831	0.720	2.719	0.008**
Outcomes	3.416	0.922	3.556	0.800	0.828	0.410

** . Significant at the 0.01 level (2-tailed).

As significance testing continued, a further distinction emerged when ANOVA testing indicated a statistically significant difference in age by decade for *transformative outcomes* scores (Table 4.28). A means plot (Appendix N) reveals the difference in scores detected by ANOVA occurred among participants in their 20's, who reported significantly higher *transformative outcomes* scores than participants in their 30's, 40's, 50's and 60's.

Table 4.28. Phase three analysis: ANOVA for age group by decade.

Subscales	F	Sig
Social Support	1.351	0.256
Att. Uncertainty	1.055	0.382
Criticality	0.233	0.920
Outcomes	3.027	0.021*

*. Significant at the 0.05 level (2-tailed).

Third phase analysis with the four subscales proceeded with correlational analysis (Table 4.29), which yielded one subscale with moderate correlation to *transformative outcomes, criticality* ($r = 0.541$). All subscale correlations were statistically significant (all $p < 0.01$, except one with $p < 0.05$); however, the remaining subscale correlational coefficients were weak ($r < 0.50$). Analysis continued by examining individual items through regression and preliminary factor analyses, discussed at length in the following sections.

Table 4.29. Phase three analysis: Pearson's correlation scores for four measured subscales.

Subscales	Attitude toward Uncertainty	Criticality	Transformative Outcomes
Social Support	0.241**	0.209*	0.291**
Att. Toward Uncertainty		0.418**	0.399**
Criticality			0.541**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Listwise N=114

Regression Analysis

The study continued with regression analysis, beginning with multiple regression to determine correlation between the independent, predictor variables (all items from *social support*, *attitude toward uncertainty*, and *criticality*) against the dependent, outcome variable, *transformative outcomes*. Unlike Pearson's correlation analysis, regression analysis applies weights to individual predictor variables, allowing for a more complete consideration of how well the independent and dependent variables correlate (Bordens & Abbott, 2011). A high regression coefficient ($r \geq 0.50$) and corresponding

coefficient of determination ($r^2 \geq 0.25$) would demonstrate the predictor variables account for a meaningful portion of variability in the dependent variable *transformative outcomes*. Such a finding would also indicate the observations support the underlying theoretical model: that the process subscales correspond to *transformative outcomes*.

In order to conduct regression analyses, variance inflation factor (VIF) scores were computed for the three independent variables (social support, attitude toward uncertainty, and criticality). None of the VIF scores exceeded 3.0 (the max was 1.250), so regression could proceed.

For the phase 3 sample (n=114), linear regression found the three processes scales (*social support, attitude toward uncertainty, criticality*) related moderately to *transformative outcomes* ($r = 0.593$; $r^2=0.352$), shown in Table 4.30, lending support to the study's goal of developing a model to account *transformative outcomes*.

Table 4.30. Multiple regression: Transformative outcomes v three process scales.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.593	0.352	0.334	0.713
Predictors: (Constant), Criticality, Social Support, Attitude toward Uncertainty				
Listwise N=114				

In addition to the regression model in Table 4.30, further analysis considered which of the process subscales (criticality, *social support*, and *attitude toward uncertainty*) accounted for the greatest variance in the dependent variable, *transformative*

outcomes. Table 4.31 presents detailed regression analysis and that *criticality* accounts for the most variance in *transformative outcomes*.

Table 4.31. Regression predictions.

	Unstandardized Coefficients		Standardized Coefficients		
Subscale	B	Std. Error	Beta	t-test	Sig.
(Constant)	-0.879	0.761		-1.156	0.250
Social Support	0.315	0.159	0.158	1.977	0.051
Att. Uncertainty	0.313	0.149	0.181	2.105	0.038
Criticality	0.509	0.100	0.432	5.074	0.000

Note. Dependent Variable: *Transformative Outcomes*

Following regression analysis between the three process scales and *transformative outcomes*, a preliminary analysis into the individual items within the four scales proceeded. It is important to note that regression analysis of individual scale items is preliminary due to relatively small sample size. The goal of this preliminary analysis was to detect potential patterns that may emerge in the preliminary factor analysis, such as if specific scale items accounted for significant variance in *transformative outcomes*. Table 4.32 presents the results of this analysis.

Table 4.32. Multiple regression: Transformative outcomes v each process item.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.694	0.481	0.349	0.705

Predictors: (Constant), C7, SS8, U4, U8, SS3, U2, SS5, U6, U3, SS7, U7, SS2, U5, C5, C1, SS1, U1, SS4, C6, C2, C4, SS6, C3
Listwise N=114

The preliminary item-level regression analysis continued with step-wise, multiple regression. While basic linear regression applies regression weights to all independent variables, step-wise regression seeks to identify which independent variables account for the most variance in the dependent variable (Bordens & Abbott, 2011). Step-wise regression allows a researcher to identify survey items that account for the most variance in *transformative outcomes*; however, results must be considered with caution due to the stochastic nature of step-wise regression, in which relatively small sample sizes can yield seemingly strong relations. Step-wise regression proceeds through a series of stepped models, with each step accounting for more model variation, until “none of the remaining variables add significantly to R-squared” (2011, p. 479).

Step-wise regression among the 114 responses in phase three analysis yielded three items accounting for 35% of variance in *transformative outcomes* scores ($r = 0.596$; $r^2=0.355$), shown in Table 4.33. Items from best-fit model (step-wise regression model five) are included in Table 4.34.

Table 4.33. Stepwise regression analysis.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.449 ¹	0.202	0.195	0.783
2	0.534 ²	0.285	0.273	0.745
3	0.584 ³	0.341	0.323	0.718
4	0.609 ⁴	0.371	0.347	0.705
5	0.596 ⁵	0.356	0.338	0.710

1. Predictors: (Constant), C3
 2. Predictors: (Constant), C3, U8
 3. Predictors: (Constant), C3, U8, C7
 4. Predictors: (Constant), C3, U8, C7, SS1
 5. Predictors: (Constant), U8, C7, SS1
- Dependent Variable: Transformative Outcomes

Table 4.34. Items in stepwise regression model five.

Subscale and Item #	Item Text
Att. Toward Uncertainty (8)	I often felt uncertain about my beliefs
Criticality (7)	Disagreements helped me understand my beliefs
Social Support (1)	My fellow students often made an effort to understand my perspective

Supplemental Analysis by Gender

Third phase analysis revealed male participants reported statistically higher *criticality* scores than females; however, analysis by gender revealed a further distinction. In order to examine this gender difference in *criticality* scores (table 4.27), correlations and regression were re-computed by gender for all process subscales (*social support*, *attitude toward uncertainty*, and *criticality*) as independent variables and *transformative outcomes* as the dependent variable. Correlational analysis by subscale for males is presented (table 4.35) as well as for females (table 4.36), summarizing in broad terms differences in subscale correlations by gender. The results of regression analysis for males are presented (tables 4.37 and 4.38) as well as for females (tables 4.39 and 4.40).

Table 4.35. Males: Pearson's correlation scores for four measured subscales.

Subscales	Attitude toward Uncertainty	Criticality	Transformative Outcomes
Social Support	0.114	0.239	0.415**
Att. Toward Uncertainty		0.494**	0.200
Criticality			0.425**

** . Correlation is significant at the 0.01 level (2-tailed).

Listwise N=44

Table 4.36. Females: Pearson's correlation scores for four measured subscales.

Subscales	Attitude toward Uncertainty	Criticality	Transformative Outcomes
Social Support	0.318**	0.151	0.221
Att. Toward Uncertainty		0.395**	0.497**
Criticality			0.618**

** . Correlation is significant at the 0.01 level (2-tailed).

Listwise N=69

Table 4.37. Multiple regression for males: Transformative outcomes v three process scales.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.534	0.285	0.231	0.701

Predictors: (Constant), Criticality, Social Support, Attitude toward Uncertainty
Listwise N=44

Table 4.38. Regression predictions for males.

Subscale	Unstandardized Coefficients		Standardized Coefficients	t-test	Sig.
	B	Std. Error	Beta		
(Constant)	-0.638	1.303		-0.490	0.627
Social Support	0.613	0.254	0.332	2.413	0.020
Att. Uncertainty	-0.018	0.252	-0.011	-0.072	0.943
Criticality	0.390	0.175	0.351	2.230	0.031

Note. Dependent Variable: *Transformative Outcomes*

Table 4.39. Multiple regression for females: Transformative outcomes v three process scales.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.678	0.460	0.435	0.693

Predictors: (Constant), Criticality, Social Support, Attitude toward Uncertainty
Listwise N=69

Table 4.40. Regression predictions for females

Subscale	Unstandardized Coefficients		Standardized Coefficients	t-test	Sig.
	B	Std. Error	Beta		
(Constant)	-1.094	0.923		-1.185	0.240
Social Support	0.117	0.201	0.056	0.584	0.561
Att. Uncertainty	0.501	0.184	0.282	2.723	0.008
Criticality	0.637	0.127	0.498	5.021	0.000

Note. Dependent Variable: *Transformative Outcomes*

These correlational and regression analyses by gender indicate an interesting distinction. For both males and females, *criticality* explains considerable variance in *transformative outcomes* scores, but *criticality* corresponds more to *transformative outcomes* for females than males. Although a gender difference emerged in *criticality* scores in ANOVA tests with males reporting higher *criticality* scores than females, items from the *criticality* scale correlated more highly with *transformative outcomes* for females rather than males.

Additionally, females demonstrated much greater correspondence between *attitude toward uncertainty* and *transformative outcomes* than did males. Finally, *social support* demonstrates a more prominent role for males than females. While these differences by gender may be statistical artifacts of small sample sizes, they may also indicate a distinction by gender in the role of the processes corresponding to transformative learning. Replication studies with larger sample sizes would be needed to investigate this further.

To conclude the supplemental statistical analysis of TROPOS study results by gender, a highly preliminary stepwise regression of individual process items by gender was conducted. By identifying particular items by gender accounting for most variance, future researchers may utilize these items as a starting point to revisit, revise, and potentially propose new subscales to examine potential gender differences further.

For males (tables 4.41 and 4.42), four process items correlated ($r=0.712$; $r^2=0.512$) with transformative outcomes. For females (tables 4.43 and 4.44), four process items correlated ($r=0.752$; $r^2=0.538$) with transformative outcomes. These items (four for males, four for females) are entirely non-overlapping and distinct by gender. It should be noted though that these gender distinctions are preliminary due to small sample sizes (males $n_m = 44$; female $n_f = 69$). While highly preliminary, this provides further perspective on possible gender differences in the processes corresponding to transformative learning.

Table 4.41. Stepwise regression for males.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.492 ¹	0.242	0.223	0.705
2	0.609 ²	0.370	0.340	0.650
3	0.663 ³	0.439	0.397	0.621
4	0.712 ⁴	0.507	0.456	0.590

1. Predictors: (Constant), U8
 2. Predictors: (Constant), U8, SS1
 3. Predictors: (Constant), U8, SS1, U4
 4. Predictors: (Constant), U8, SS1, U4, C6
- Dependent Variable: Transformative Outcomes

Table 4.42. Items in stepwise regression model five for males.

Subscale and Item #	Item Text
Att. Toward Uncertainty (8)	I often felt uncertain about my beliefs
Social Support (1)	My fellow students often made an effort to understand my perspective
Att. Toward Uncertainty (4)	I benefited from suspending my judgment
Criticality (6)	I explored new ways to think about my beliefs

Table 4.43. Stepwise regression for females.

Regression Model #	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.511 ¹	0.261	0.250	0.799
2	0.658 ²	0.433	0.415	0.705
3	0.702 ³	0.493	0.469	0.672
4	0.732 ⁴	0.536	0.507	0.648
5	0.757 ⁵	0.573	0.539	0.626
6	0.752 ⁶	0.565	0.538	0.627

1. Predictors: (Constant), U5

2. Predictors: (Constant), U5, C6

3. Predictors: (Constant), U5, C6, C5

4. Predictors: (Constant), U5, C6, C5, U7

5. Predictors: (Constant), U5, C6, C5, U7, C1

6. Predictors: (Constant), U5, C5, U7, C1

Dependent Variable: Transformative Outcomes

Table 4.44. Items in stepwise regression model six for females.

Subscale and Item #	Item Text
Att. Toward Uncertainty (5)	I often felt uncertain about my beliefs
Criticality (5)	My fellow students raised questions about my beliefs
Att. Toward Uncertainty (7)	I found stepping outside my comfort zone helped me learn
Criticality (1)	I was willing to explore ideas I disagreed with

Preliminary Factor Analysis

Third phase analysis concluded with exploratory factor analysis. This study's sample size does not meet the recommended minimum threshold of five responses per item (Beavers et. al, 2013; Nunnally, 1978), so results are preliminary. The scree plot (Appendix O) indicates eight components with eigenvalues over 1.0; three components with eigenvalues over 2.0 were selected for exploratory analysis.

The three-factor model was extracted through exploratory factor analysis (principal components extraction, direct oblimin rotation). It must be noted again that these results are preliminary due to sample size. Appendix P presents structure loadings and table 4.45 presents variance explained with the three-factor model. The model revealed how items from *transformative outcomes* and *criticality* primarily composed the first factor; *social support* primarily composed the second factor; *attitude toward uncertainty* primarily composed the third factor. Fourteen items cross-loaded on more than one factor.

Table 4.45. Total variance explained through 3-component factor analysis.

Component	Total	<i>Initial Eigenvalues</i>	
		% of Variance	Cumulative %
1	7.622	25.406	25.406
2	3.108	10.361	35.767
3	2.106	7.020	42.787

As reflected in the factor analysis structure matrix, the prior correlational analysis (presented in Table 4.29) supports *transformative outcomes* and *criticality* as one factor. It is also important to note that eight of the 14 cross-loaded items were previously identified in the multiple regression analysis by gender (Tables 4.42 and 4.44) with *transformative outcomes* as the dependent variable (forming part of factor one), so cross-loadings may at least in part be accounted for through differences in response by gender.

Analysis of Research Objectives

The study's five research objectives are listed below, with an analysis following each. Chapter 5 follows, in which the implications from the finding are explored in greater depth.

Research Objective 1

Conduct a literature review within transformative learning to identify common themes described in research and theoretical studies. Cluster these common themes into defined variables within a psychometric framework.

The study accomplished this goal. Chapter 2 contains the literature review identifying common themes, clustered into five subscales: *transformative outcomes*, *social support*, *self-directed learning*, *attitude toward uncertainty*, and *criticality*.

Research Objective 2

From this psychometric framework, derive a pool of original, potential items for use in an exploratory, pilot instrument assessing transformative learning.

The study accomplished this goal. Fifty-nine potential items were developed and are listed in Appendix F.

Research Objective 3

Engage an expert panel of transformative learning researchers to review these potential items, evaluating ex/inclusion of items in the proposed instrument.

The study accomplished this goal. Five expert panel members reviewed the 59 items, resulting in 40 items for inclusion in the pilot study, along with two additional original items proposed by an expert panel member (see Appendix G).

Research Objective 4

Conduct an exploratory, quantitative study among graduate students.

The study accomplished this goal. This study describes the development of TROPOS. As described in Chapter 4, the researcher conducted a pilot study among current graduate students (N=12) as well as a full study with program alumni (N=119). The pilot study instrument for current student contained 42 items; the full study instrument for program alumni contained 30 items.

Research Objective 5

Validate the psychometric framework through statistical analysis, enumerating future potential instrument revisions and research questions.

The study partially accomplished this goal through correlation and regression analyses at the subscale level. Although there were insufficient responses to conduct a thorough factor analysis, the researcher conducted a preliminary factor analysis of individual subscale items. Chapter 5 enumerates future potential instrument revisions and research questions.

Summary

This chapter described the steps to develop, refine, administer, and validate the TRansformative Outcomes and PrOcesses Scale, TROPOS. Following expert panel review, an initial pilot, and a full study, the instrument demonstrated satisfactory psychometric properties and statistically meaningful results regarding processes and outcomes of transformative learning. The next chapter considers the broader implications, value, and essence of TROPOS.

Chapter 5

Conclusions and Recommendations

This concluding chapter considers the study's findings (both major and preliminary) and places these findings within the broader context of transformative learning research. This chapter ends with recommendations for future research as well as concluding reflections.

Summary of the Study

This study examined the development and initial validation of a new, exploratory instrument to assess transformative learning, TRansformative Outcomes and PrOcesses Scale, TROPOS. The researcher developed TROPOS through: identifying related concepts through a literature review, deriving psychometric items from the literature review, engaging an expert panel to review the items, conducting an exploratory study and analysis, and conducting a preliminary validation of the instrument among graduate program alumni.

Major Findings

This study's major findings include:

- 1) The development of reliable and internally valid scales assessing transformative learning outcomes and processes among alumni of a graduate program. A literature review established content validity; an expert review process paired with an empirical study established construct validity; however, replication studies are needed to establish external validity.

- 2) Overall instrument reliability was calculated ($\alpha = 0.884$), indicating that, as a unitary construct, the instrument manifests a common construct.
- 3) Linear regression found the three processes scales (*social support, attitude toward uncertainty, criticality*) related strongly with *transformative outcomes* ($r = 0.593$; $r^2 = 0.352$), indicating the process scales correspond meaningfully to *transformative outcomes*.
- 4) Further evidence for the correlation between *transformative outcomes* and *criticality* ($r = 0.541$; $r^2 = 0.292$).
- 5) Year of graduation did not reveal statistically significant differences among program alumni (10-year graduation span), which supports the finding that transformative learning is a permanent experience.
- 6) Participants in their 20's reported statistically significant, higher *transformative outcomes* scores (significance = 0.021) than participants in their 30's, 40's, 50's, or 60's; however, scores relating to transformative processes (*criticality, social support, and attitude toward uncertainty*) were not significantly different from learners in other age brackets.

Preliminary Findings

- 1) The coefficient of non-determination (or unexplained variance) between the instrument's strongest process subscale *criticality* and *transformative outcomes* ($u = 0.707$) indicates additional, as yet unoperationalized, constructs may account for meaningful correspondence with *transformative outcomes*.

- 2) There appears to be preliminary evidence for the importance of items in the *attitude toward uncertainty* subscale accounting for variance in *transformative outcomes* scores.
- 3) This study presents indications of gender differences in the processes corresponding to *transformative outcomes*. For both males and females, *criticality* explains considerable variance in *transformative outcomes* scores, but *criticality* corresponds more to *transformative outcomes* for females than males. To reemphasize the finding, although a gender difference emerged in *criticality* scores in ANOVA tests with males reporting higher *criticality* scores than females, the *criticality* subscale correlated more highly with *transformative outcomes* for females rather than males. Additionally, females demonstrated much greater correspondence between *attitude toward uncertainty* and *transformative outcomes* than did males. Finally, *social support* demonstrated a more prominent role among males than females.

Discussion and Implications

In this section, all five subscales of TROPOS are discussed, focusing on each subscale's strengths and potential enhancements. Then, a critique is presented. This section concludes with recommendations for future research.

Self-Directed Learning

The expert panel identified issues in this study's conceptualization of self-directed learning. The poor psychometric qualities of this subscale in the pilot study among current students further supports the expert panel's finding. Nevertheless, this does not

rule out self-directed learning's potential role within transformative learning; rather, it indicates future researchers may choose to utilize existing self-directed learning scales to examine this potential relation further.

Social Support

It is important to note that although *social support*'s skewness, kurtosis, and normality were acceptable, more than 20 participants answered all subscale items with the maximum score, indicating the subscale may benefit from re-conceptualization; however, the multiple regression analysis for males (tables 4.34 & 4.35) demonstrates a moderate correlation between *social support* and *transformative outcomes*, which raises questions about why a gender difference should emerge. For example, is this difference particular to the sample in question or is it generalizable to the broader population?

If the subscale is reconceptualized, it may benefit from focusing on the negative elements of social interactions, such as presence of *social toxicity* as described by Fetherston and Kelly (2007) rather than the more positive form, *social support*, utilized in this study. Further, varying combinations of *social support* and *social toxicity* may encourage or discourage transformative learning, such as when a social environment may be generally toxic, but a learner works with a constructive, supportive group, and so forth.

Social support may correspond strongly with specific, social elements of transformative learning, as shown in the correlational matrix (Appendix M), with *social support* Items 1, 6, and 8. A question to consider in future studies would be whether transformative outcomes are present when learners have negative, particularly toxic,

social experiences. Future studies may also consider whether *social toxicity* can interrupt transformative learning. A further extension of this line of inquiry would be to consider whether such measures of social support or toxicity correspond differently to *transformative outcomes* based on a learner's personality characteristics (introversion versus extroversion). For example, do some learners benefit more from social elements of transformative learning than others?

Attitude toward Uncertainty

While the *attitude toward uncertainty* scale's reliability ($\alpha = 0.645$) in the full study did not quite meet the recommended minimum threshold ($\alpha = 0.70$), the regression analyses demonstrated items from the scale account for much variance in *transformative outcomes*. While this study indicates the *attitude toward uncertainty* subscale is not sufficiently well defined to serve as an independent scale, the regression analyses demonstrate individual items relate highly with *transformative outcomes*. This indicates the scale's underlying concept, although apparently incomplete, appears to be an important element within a broader transformative learning process.

Further, the exploratory factor analysis supports that some items from *attitude toward uncertainty* could be included with other subscales, particularly Items 5, 7, and 8 with the first factor composed of *criticality* and *transformative outcomes* items. These items from *attitude toward uncertainty* may represent attitudes that further a learner's willingness to engage in critical reflection as well as other latent constructs.

Members of the expert panel anticipated both the importance of this subscale as well as its potential overlap with *criticality*, both of which the results support, particularly

the preliminary factor analysis. A key issue for researchers to discern would be whether there are possible latent variables outside the model due further consideration. Further, researchers may couple positive and negative approaches and consider whether transformative learning is possible both with and, perhaps more importantly, without elements of *attitude toward uncertainty*. Finally, this may be an inherently confounding subscale in its definition—establishing high reliability and certainty for a learner’s attitude toward uncertainty may prove to be elusive, but meaningful in future iterations of TROPOS.

Criticality

With a correlation of $r = 0.541$ ($r^2 = 0.292$), *criticality* lends the most support as a foundational element of *transformative outcomes*; furthermore, the high reliability score in the full study ($\alpha = 0.853$) and acceptable normality lend further support to *criticality* as an important subscale of *transformative outcomes*. Furthermore, these psychometric properties support use of this subscale within TROPOS for future studies.

Nevertheless, if the operationalizations of *criticality* and *transformative outcomes* are reasonably complete, the coefficient of non-determinaton ($u = 0.707$) between the two subscales indicates other, as yet unoperationalized dimensions facilitating transformative learning may be latent beyond *criticality*. This study’s correlation between *criticality* and *transformative outcomes* supports both sides of the continuing debate as to whether critical reflection is essential, supplemental, or not necessary to transformative learning.

Of course, any correlation between subscales does not indicate whether one subscale causally precedes another; rather, a correlation only describes whether subscale

scores move positively, negatively, or without relation to one another and at what rate. Future researchers may consider a matrix of possibilities, considering whether *transformative outcomes* must proceed from *criticality* and whether *criticality* may not result in *transformative outcomes*.

Transformative Outcomes

This scale within TROPOS indicates the most promise due to high reliability ($\alpha = 0.868$), acceptable normality, and no significant statistical difference in scores between genders and graduation year. While participants in their 20's reported increased scale scores that were statistically significant from other age groups, this is not an entirely unexpected result for this age group, particularly when one considers theories of adult development and that the longer one lives, the more potentially transformative events may occur, with major events in the 20's being more pronounced relative to events earlier in life.

These psychometric properties support the use of this subscale within TROPOS for future studies. Furthermore, this study's findings support the existing consensus that transformative learning theory better accounts for the outcomes of transformative learning than the routes facilitating transformative learning.

Meta-critique: Transformations in Process and in Memory

Based on the differing results of the pilot study for students in the middle of the graduate program versus program alumni remembering program experiences in the full study, this study reveals preliminary indications that the form of learning described by transformative learning theory may be different for those in the midst of a transformation

(current students) versus those reflecting back (alumni). The results of this quantitative study raise questions about the nature of transformative learning.

A learner's experience in a transformative learning process may be analogous to the classic example of the Doppler shift of the sound of a passing train—to an external observer, a train sounds different on approach, at the moment of passage, and as it proceeds into the distance. To take the analogy a step further, one could say the learner is on the train while the survey instrument is the external, stationary observer. While the sound of the train does not change for the learner on the train, the sound detected by the stationary observer (the instrument) will shift drastically during the train's approach, passage, and recession with the passenger (the learner) arriving at a new station, at which time it becomes clear to the learner that he or she has arrived at a new destination.

An interesting extension of the prior analogy regarding the passage of a train is that if the learner is conceptualized as a passenger, then the role of a learner's choice becomes an interesting question. Once a learner becomes entangled within a transformative learning process, how passive is a learner? In the examples of those experiencing involuntary childlessness or life-threatening disease, it can be argued that some of a learner's experience is passive to circumstance; however, the learner's constrained choice on how to interpret the experience serves as a catalyst, morphing the experience into one described by transformative learning theory, which is where research into self-directed learning may prove useful. In the case of students engaged in an educational program, an individual learner's choice is again constrained by program requirements and content area; nevertheless, a learner's constrained choice may again

serve as a catalyst to re-interpretation of self. Interestingly, part of the interpretative process may be a learner's recognition of constraints and re-definition of self around these constraints: the resolution of a disorienting dilemma.

Recommendations for Future Research

The development of any new instrument is a major undertaking, and the researcher encourages further replication studies as well as other researchers to propose new subscales and expand existing subscales within the TROPOS framework. Several of the below items would require research constituting an instrument revision to TROPOS.

Some possible areas for future research might include the following:

- 1) Utilizing TROPOS, either in whole or in part, to assess reproducibility of results and determining external validity in other populations and settings
- 2) Comparing TROPOS results among participants with transformations in process (current students) and those who reflect on transformations in the more distant past (alumni)
- 3) Administering TROPOS alongside Stuckey, Taylor, and Cranton's (2013) instrument to assess convergent and divergent validity
- 4) Developing new subscales expected to correlate with *transformative outcomes*.

For example, a researcher could propose a scale assessing more intuitive, spiritual, or creative approaches to learning; such a researcher could also assess a new subscale's reliability and correlations with existing TROPOS subscales. A researcher may also propose additional moderating or mediating subscales.

- 5) Refining *attitude toward uncertainty* to determine if scale reliability can exceed the recommended minimum threshold ($\alpha = 0.70$). An alternative reconceptualization may consider temporal dimensions of this subscale, such as a learner's attitude prior to, during, or after a potentially transformative event.
- 6) Re-conceptualizing *social support* as *social toxicity* and administering with *transformative outcomes* to examine subscale relations.
- 7) Administering TROPOS alongside existing scales that assess self-directed learning.
- 8) Developing a counter to *transformative outcomes*, such as a scale that encompasses learning outcomes that are non-transformative. Such a scale may measure if a learner remained in a *steady state*, such as when thinking patterns do not re-organize and transform. A divergent scale may allow for further discernment of what transformative learning is by identifying what it is not.

Relevance to Practice

While this research aims to clarify the theoretical framework for transformative learning, several findings may inform educational practice. For an educator or program administrator, the first consideration for use of this instrument would be to consider whether the processes and outcomes of transformative learning are goals of the educational program. For example, a training program or introductory course may focus on teaching content, which may not be transformative in nature, albeit useful (Cranton & Kasl, 2012; Newman, 2012).

Nevertheless, other programs, particularly programs for adult learners, integrate themes of personal and professional improvement, often attracting students who re-enter school with an expectation of transformation. Such life-transition educational programs may find use in TROPOS to assess the dynamics of learner experiences, such as whether supportive social relations, critical thinking, openness toward uncertainty, and transformative outcomes are present and in what proportion. For such a purpose, TROPOS may well help educators better understand a program's impact, therefore contributing to a broader, holistic discussion of program improvement.

Furthermore, educators, administrators, and researchers might utilize TROPOS to assess student attitudes toward their experiences during a program, at graduation, and periodically post-graduation to assess a program's longer-term impact as learners consider educational experiences through the lens of current life experiences. Such a TROPOS administration may also include a qualitative component with open-ended questions, allowing learners to pose their thoughts regarding the program. As learners remember their experiences as they respond to each TROPOS subscale, such a qualitative component could follow each subscale. Such paired quantitative and qualitative feedback may reveal new perspectives to educators as they engage in program planning and improvement.

Nevertheless, using TROPOS as a means to identify areas of improvement should proceed with caution, considering the ethical dilemmas of whether the program provides an "*invitation* to think, to be, and to act in new and enhanced ways" (Kasworm & Bowles, 2012, p. 389) or if it an explicit demand, an extreme counter-example. As an

invitation to learning where the learner chooses how to proceed, transformative learning may be fostered; however, if a program demands transformation, such a goal would be antithetical to the goals of transformative learning which places the individual learner, their choices, and their experiences at the center of a transformative learning process.

The hypothetical, binary contrast between pure invitation and pure expectation for learners to transform creates a lens through which educators can consider the necessities and practicalities of adult education. Of importance, transformative learning's deepest theoretical roots (Mezirow & Marsick, 1978) consider the realities educators face, who, as Marsick describes, must often build student confidence and "construct supplementary support structures" (p. 25) as students encounter, consider, and engage in perspective transformation. Such supports may be programmatic, such as class scheduling to accommodate student schedules, to relational in nature in which learners experience a sense of connection with educators and fellow students (1978). As such, Mezirow and Marsick (1978) consider how transformations in student perspective emerge from a constellation of interacting processes and that students themselves may enter a program unaware of how experiences and expectations may constrain learning, leaving educators to determine how they can better serve as guides in the learning process.

In considering the complex realities of adult education, TROPOS may serve as one of many tools in a broader, holistic discussion of program assessment and improvement, particularly when TROPOS is paired with a qualitative component to help educators become more aware of the subtle, yet present, aspects of learner experiences. A

better understanding of learner experience within a program can encourage program improvements that, in turn, may foster profound, life-changing learning.

Concluding Reflections

In *The Structure of Scientific Revolutions*, Thomas Kuhn (1970) describes how research, guided by the scientific method of testing and validation, follows what is normally a gradual, accretion-based process with new knowledge generally confirming and conforming to what was previously known; however, following the introduction of anomalous, dis-confirmatory observations that call previously validated knowledge into question, this generally confirmatory, accretion-based process can be followed by sudden, revolutionary paradigm shifts, after which the fundamental nature of knowledge and explanation transforms. In summary, Kuhn (1970) describes how theories researchers once considered to be valid ceased to be valid in light of new observations, provoking the need for new theories to describe and validate new observations. Drawing from Kuhn's writings on transformations and pairing them with educational theories of perspective transformations (Frerie, 1970; Habermas, 1984), Mezirow (1991) proposed a theory of learning in which an individual's worldview fundamentally shifts from a gradual, accretive, confirmatory process to one of revolution, after which the individual's worldview is no longer the same and the individual views oneself and one's relations to others in a fundamentally different manner than before such a transformation. Transformative learning theorists describe the outcomes of this learning process as a learner's development of a revised worldview based on revised assumptions; a worldview

more open to possibilities and inclusive of differing perspectives, with learners being more self aware and reflective (Dirkx, 1997 & 2012; Mezirow, 1991, 2000, & 2012).

The instrument resulting from this study, TROPOS, seeks to further researchers' understanding of transformative learning theory, particularly through developing a relatively brief instrument (30 items) divided into four, modular subscales. Future researchers may benefit from using this instrument in replication studies, and, hopefully, would build new subscales that would expand the scope of the instrument to complement and enhance understanding of the dimensions of learning described in part by transformative learning theory.

It is important to emphasize that although in this study TROPOS offers a reliable and internally valid means of assessing aspects of transformative learning among graduate students, this should not contribute to an ossification of certain theoretical stances on transformative learning, particularly classical stances ascribing a primary role to critical discourse as well as contemporary stances that emphasize other ways of learning. Rather, the instrument indicates critical reflection, which approximates *criticality* and elements of *attitude toward uncertainty*, plays an important, though likely not exclusive, role within transformative learning.

For example, if a researcher considers transformative learning as a theory that seeks to describe how individuals transform their perspective in a profound manner in order to account for observed anomalies and, further, if the researcher assumes a humanistic stance emphasizing the role of individual experience and choice, then it follows that critical reflection as well as a host of other methods may be one of many

means a learner chooses to transform their own perspective. To emphasize the point, must critical reflection always precede transformative learning? What other ways of thinking can encourage transformative learning? The continued development of additional scales within the TROPOS framework would provide a means to continue the conversation, test new perspectives, and further unify the diverse, multifaceted theory of transformative learning.

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Appendices

Appendix A: IRB Approval for Expert Panel Survey

THE UNIVERSITY of TENNESSEE 
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Knoxville, TN 37996-1529
865-974-7697
fax 865-974-7400

April 19, 2016

Re: UTK IRB-16-02962-XM

Study Title: Assessing transformative learning: Expert panel survey

Dear Robert Charles Cox:

The Administrative Section of the UTK Institutional Review Board (IRB) reviewed your application for the above referenced project. The IRB determined that your application is eligible for **exempt** review under 45 CFR 46.101(b) (2). In accord with 45 CFR 46.116(d), informed consent may be altered, with the cover statement used in lieu of an informed consent interview. The requirement to secure a signed consent form is waived under 45 CFR 46.117(c) (2). Willingness of the subject to participate will constitute adequate documentation of consent.

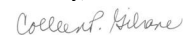
Your application has been determined to comply with proper consideration for the rights and welfare of human subjects and the regulatory requirements for the protection of human subjects. This letter constitutes full approval of your application (version 1.3), including the following documents that are stamped approved for the above referenced study:

Informed Consent Form v1.4
Cover Letter Email v1.3
Cover Letter Mail v1.2
Expert Review Panel v1.1

In the event that volunteers are to be recruited using solicitation materials, such as brochures, posters, web-based advertisements, etc., these materials must receive prior approval of the IRB.

Any alterations (revisions) in the protocol including the consent form, cover letter email, cover letter mail and expert review panel documents must be promptly submitted to and approved by the UTK Institutional Review Board prior to implementation of these revisions. You have individual responsibility for reporting to the Board in the event of unanticipated or serious adverse events and subject deaths.

Sincerely,



Colleen P. Gilrane, Ph.D.
Chair

Appendix B: Initial Email Soliciting Expert Panel Assistance

Robert Cox



• 6787 Longview Drive, Murfreesboro, TN • Phone: 931-808-4735
E-Mail: rcox26@vols.utk.edu

Date: 04/18/2016

[Recipient]

[Address 1]

[Address 2]

Dear Dr. **,

My name is Robert Cox, and I am a doctoral student in the Educational Psychology and Research program at the University of Tennessee, Knoxville (UTK). My dissertation will pilot a conceptual model and instrument to assess transformative learning. Currently, this dissertation research focuses on convening a panel of published experts within transformative learning literature (drawn from *Journal of Transformative Education* and *Adult Education Quarterly*). These experts would evaluate potential statements for use in an instrument to assess transformative learning.

As background, this instrument proposes *transformative learning outcomes* to be a composite of four interacting sub-variables: *social support*, *self-directed learning*, *criticality*, and *attitude toward uncertainty*. These four sub-variables are expected to interact in a push-and-pull process: a process that facilitates, but not necessarily guarantees, transformative learning outcomes.

I am requesting your expertise to review a list of potential statements for use in this pilot study. Should you graciously agree to participate, you would read a variable's definition, evaluate a list of proposed statements, and indicate whether each proposed statement should be included, excluded, or modified in the pilot instrument. General comments fields are included for any additional notes.

It is anticipated that this could be completed in approximately 45 minutes. This expert-review process is expected to be a one-round review. There are 59 proposed statements for your review.

I would appreciate your responses by Thursday, 05/12/2016.

Request: If you are willing to participate, please respond to this email and let me know your preferred physical mail address. Once you respond, I will mail the expert review document.

Thank you for your time and expertise in this pilot study assessing transformative learning. Please feel free to contact me with any questions.

Sincerely,

Robert Cox
Researcher; University of Tennessee, Knoxville (931/808-4735)

IRB NUMBER: UTK IRB-16-02962-XM
IRB APPROVAL DATE: 04/19/2016

Appendix C: Initial Letter Soliciting Expert Panel Assistance

Robert Cox



• 6787 Longview Drive, Murfreesboro, TN • Phone: 931-808-4735
E-Mail: rcox26@vols.utk.edu

Date: 04/18/2016

[Recipient]

[Address 1]

[Address 2]

Dear Dr. **,

My name is Robert Cox, and I am a doctoral student in the Educational Psychology and Research program at the University of Tennessee, Knoxville (UTK). My dissertation will pilot a conceptual model and instrument to assess transformative learning. Currently, this dissertation research focuses on convening a panel of published experts within transformative learning literature (drawn from *Journal of Transformative Education* and *Adult Education Quarterly*). These experts would evaluate potential statements for use in an instrument to assess transformative learning.

As background, this instrument proposes *transformative learning outcomes* to be a composite of four interacting sub-variables: *social support*, *self-directed learning*, *criticality*, and *attitude toward uncertainty*. These four sub-variables are expected to interact in a push-and-pull process: a process that facilitates, but not necessarily guarantees, transformative learning outcomes.

I am requesting your expertise to review a list of potential statements for use in this instrument. Should you graciously agree to participate, you would read a variable's definition, evaluate a list of proposed statements, and indicate whether each proposed statement should be included, excluded, or modified in the pilot instrument. General comments fields are included for any additional notes.

It is anticipated that this could be completed in approximately 45 minutes. This expert-review process is expected to be a one-round review. There are 59 proposed statements for your review.

A self-addressed envelope is included for you to return your responses.

I would appreciate your responses by Thursday, 05/12/2016.

Thank you for your time and expertise in this pilot study assessing transformative learning. Please feel free to contact me with any questions.

Sincerely,

Robert Cox
Researcher; University of Tennessee, Knoxville

IRB NUMBER: UTK IRB-16-02962-XM
IRB APPROVAL DATE: 04/19/2016

Appendix D: Informed Consent Letter for Expert Review Panel

Informed Consent Statement

Assessing transformative learning: Expert panel survey

INTRODUCTION

You are invited to participate in an expert panel as part of a research study. You are asked to review a list of proposed statements for inclusion in a survey to assess transformative learning. You are invited to participate in this research study because you have published at least one article about transformative learning in either *Adult Education Quarterly* or *Journal of Transformative Education*.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

You would read provided instructions in the document "Expert panel review: Proposed items to assess transformative learning." This document presents a list of definitions and potential statements you would evaluate for inclusion in an exploratory instrument to assess transformative learning. In this review process, you would review the proposed statements and mark include/exclude/comment for each proposed statement as needed. You would then return the completed survey in the self-addressed envelope.

It is anticipated that this survey could be completed in approximately 45 minutes.

RISKS

There are no foreseeable risks other than those encountered in everyday life. There are no anticipated direct benefits to you resulting from your participation in the research.

BENEFITS

The researcher will use survey responses to refine a survey to assess transformative learning. This survey would be used in a later pilot study to test hypotheses regarding transformative learning theory.

CONFIDENTIALITY

Information in the study records will be kept confidential. Data will be stored securely and will be made available only to persons conducting the study unless participants specifically give permission in writing to do otherwise.

All paper research records containing data from individual participants will be locked and stored and will be accessible only to research personnel. All electronic research records containing data from individual participants will be computer password protected and accessible only to research personnel. No reference will be made in oral or written reports that could link participants to the study. No identifiers are requested on survey materials.

4-18-2016

IRB NUMBER: UTK IRB-16-02962-XM
IRB APPROVAL DATE: 04/19/2016

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study), you may contact the researcher, Robert Cox, at rcox26@vols.utk.edu, and (931) 808-4735 or his advisor, Dr. Mary Ziegler, mziegler@utk.edu, and (865) 974-0453.

If you have questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697. The IRB address is: 1534 White Avenue; Knoxville, TN 37996-1529

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed, your data will be deleted.

CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

4-18-2016

IRB NUMBER: UTK ²IRB-16-02962-XM
IRB APPROVAL DATE: 04/19/2016

Appendix E: Expert Panel Review Document

Expert panel review: Proposed items to assess transformative learning

Purpose

This document contains a list of potential statements for an exploratory instrument to assess transformative learning. This proposed instrument consists of five variables I have defined based both upon the literature and in consultation with my doctoral committee. These five variables are: 1) *transformative outcomes*, 2) *social support*, 3) *self-directed learning*, 4) *attitude toward uncertainty*, and 5) *criticality*. Each of the five variables is defined at the top of each page. If you would like a reference list for further review, please let me know.

The study's sample will be drawn from master's level graduate students in a public service program. The instrument will ask about their experiences during the program. This exploratory instrument proposes *transformative outcomes* depend upon the presence and interaction of the other four variables (*social support*, *self-directed learning*, *attitude toward uncertainty*, and *criticality*).

Instructions

Each page identifies a variable and the variable's specified definition. There is also a phrase preceding each proposed statement, such as "as a result of the graduate program" or "while I was a student in the graduate program."

- 1) Read the definition at the top of each page
- 2) Below the definition you will find statements designed to encompass the definition
- 3) If the statement should be included in the instrument, mark include
- 4) If the statement should be excluded in the instrument, mark exclude
- 5) If you would like to propose how the statement should be modified so it can be included, please write notes in the far right column (you do not have to mark include or exclude if you propose a modification)
- 6) If you would like to make any additional comments, a comments field is included at the end of each page.
- 7) Please be aware some statements designed to encompass a definition are stated in a negative fashion (e.g. statements 5 and 6 under *social support*). These questions are marked with an asterisk (*).
- 8) When you have finished your review, please return your responses in the attached self-addressed envelope.
- 9) **Deadline:** Please send responses by **Thursday, May 12, 2016**
- 10) **Questions?** Contact the researcher, rcox26@vols.utk.edu

Deadline: Thursday, May 12, 2016

Definition 1: Transformative Outcomes

Transformative outcomes: A learner's profound re-assessment of beliefs, typified by changed assumptions and a more inclusive, open perspective toward self and others.

As a result of the graduate # program....				
		Include	Exclude	Modifications
1	My deeply held beliefs changed	☐	☐	
2	I became a new person	☐	☐	
3	My priorities changed	☐	☐	
4	I developed a greater sense of responsibility toward others	☐	☐	
5	I changed my goals for the future	☐	☐	
6	I made major changes in my life	☐	☐	
7	I became more aware of others' needs	☐	☐	
8	My view of myself changed	☐	☐	
9	My view of the world changed	☐	☐	
10	I developed a more positive view of myself	☐	☐	
11	I developed a more positive view of the world	☐	☐	
12	This program changed my life	☐	☐	

Comments: Transformative Outcomes

Definition 2: Social support

Social support: A learner's constructive engagement with a social group whose members exhibit mutual trust and respect, thereby facilitating a balance between support and constructive critique.

While I was a student in the				
#	graduate program....	Include	Exclude	Modifications
1	I felt safe discussing ideas with my fellow students	☐	☐	
2	I trusted my fellow students	☐	☐	
3	My fellow students and I respected one another	☐	☐	
4	My fellow students and I supported one another	☐	☐	
5	I felt my point of view was attacked*	☐	☐	
6	I often needed to defend my beliefs*	☐	☐	
7	My fellow students and I usually engaged in constructive discussions	☐	☐	
8	I found most students shared responsibility for engaging in class discussions	☐	☐	
9	Students shared responsibility in reaching learning goals	☐	☐	
10	I usually felt safe sharing my opinions	☐	☐	
11	My fellow students usually felt safe sharing their opinions	☐	☐	
12	Some students often dominated group discussions*	☐	☐	
13	Group discussions were usually inclusive of differing perspectives	☐	☐	
14	I felt like my opinions were routinely dismissed*	☐	☐	
15	I often felt like an outsider*	☐	☐	
16	My fellow students often made an effort to understand my perspective	☐	☐	

Comments: Social Support

Definition 3: Self-directed learning

Self-directed learning: A learner's willingness to engage in learning, demonstrated by setting and pursuing goals, especially when facing obstacles.

While I was a student in the				
#	graduate program....	Include	Exclude	Modifications
1	I felt confident in my ability to succeed	☐	☐	
2	I took personal responsibility for my learning	☐	☐	
3	I consistently motivated myself to engage in the learning process	☐	☐	
4	I prioritized my learning goals effectively	☐	☐	
5	I was enthusiastic about my learning	☐	☐	
6	I usually felt engaged in the learning process	☐	☐	
7	I usually was able to overcome obstacles to my learning	☐	☐	
8	I valued what I learned	☐	☐	
9	I connected ideas from courses with my learning goals	☐	☐	
10	I refined my learning goals	☐	☐	

Comments: Self-directed learning

Definition 4: Attitude toward uncertainty

Attitude toward uncertainty: A learner's attitude toward anticipating or experiencing a loss of certainty, typified by feeling stumped, confused or experiencing a sense of stepping outside one's comfort zone.

While I was a student in the				
#	graduate program....	Include	Exclude	Modifications
1	I was open to new possibilities	☐	☐	
2	I often felt hesitant in what I believed to be true	☐	☐	
3	Uncertainty about my beliefs felt threatening*	☐	☐	
4	I learned about ideas that contradicted my beliefs	☐	☐	
5	I felt comfortable suspending my judgment	☐	☐	
6	I benefited from suspending my judgment	☐	☐	
7	I avoided experiencing uncertainty*	☐	☐	
8	I often felt surprised by what I learned	☐	☐	
9	I found discomfort could be an important part of learning	☐	☐	
10	I found stepping outside my comfort zone helped me learn	☐	☐	
11	I often felt uncertain about my beliefs	☐	☐	

Comments: Attitude toward uncertainty

Variable 5: Criticality

Criticality: A learner questioning beliefs of oneself and others (regardless of method), evaluating the validity of such beliefs, and re-framing these beliefs.

While I was a student in the				
#	graduate program....	Include	Exclude	Modifications
1	I was willing to explore ideas I disagreed with	☐	☐	
2	I discovered contradictions in my beliefs	☐	☐	
3	I challenged my own beliefs	☐	☐	
4	I challenged my fellow students' beliefs	☐	☐	
5	My fellow students challenged my beliefs	☐	☐	
6	I explored new ways to think about my beliefs	☐	☐	
7	Disagreements helped me understand my beliefs	☐	☐	
8	I benefited from listening to perspectives different from my own	☐	☐	
9	I avoided conversations where people disagreed*	☐	☐	
10	I reframed some of my beliefs	☐	☐	

Comments: Criticality

End of expert panel review document

**Please return your responses
in the self-addressed envelope**

Thank you

Appendix F: Descriptive Statistics of Expert Panel Responses

Definition 1: Transformative Outcomes

Transformative outcomes: A learner's profound re-assessment of beliefs, typified by changed assumptions and a more inclusive, open perspective toward self and others.

Prompt: As a result of the graduate program....

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
1	My deeply held beliefs changed	4	0	1	Include	My deeply held beliefs changed
2	I became a new person	0	2	3	Exclude	
3	My priorities changed	2	1	1	Exclude	
4	I developed a greater sense of responsibility toward others	3	1	1	Include	I developed a greater sense of responsibility toward others
5	I changed my goals for the future	3	2	0	Include	I changed my goals for the future
6	I made major changes in my life	4	0	1	Include	I made major changes in my life
7	I became more aware of others' needs	2	3	0	Exclude	
8	My view of myself changed	3	0	2	Include	My view of myself changed
9	My view of the world changed	3	0	1	Include	My view of the world changed
10	I developed a more positive view of myself	2	1	2	Exclude	
11	I developed a more positive view of the world	2	2	1	Exclude	
12	This program changed my life	3	0	2	Include	This program changed my life

Definition 2: Social support

Social support: A learner's constructive engagement with a social group whose members exhibit mutual trust and respect, thereby facilitating a balance between support and constructive critique.

Prompt: While I was a student in the graduate program....

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
1	I felt safe discussing ideas with my fellow students	2	0	3	Modify	I <u>could</u> raise questions about my fellow students' beliefs without fear of being shut out
2	I trusted my fellow students	3	0	2	Include	I trusted my fellow students
3	My fellow students and I respected one another	3	0	2	Include	My fellow students and I respected one another
4	My fellow students and I supported one another	3	0	2	Include	My fellow students and I supported one another
5	I felt my point of view was attacked*	2	1	2	Exclude	
6	I often needed to defend my beliefs*	1	1	3	Exclude	
7	My fellow students and I usually engaged in constructive discussions	2	1	2	Exclude	
8	I found most students shared responsibility for engaging in class discussions	1	2	2	Exclude	
9	Students shared responsibility in reaching learning goals	1	1	2	Exclude	
10	I usually felt safe sharing my opinions	3	0	2	Include	I usually felt safe sharing my opinions
11	My fellow students usually felt safe sharing their opinions	2	1	2	Exclude	
12	Some students often dominated group discussions*	2	1	2	Exclude	

(continued) Definition 2: Social support**Prompt: While I was a student in the graduate program....**

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
13	Group discussions were usually inclusive of differing perspectives	5	0	0	Include	Group discussions were usually inclusive of differing perspectives
14	I felt like my opinions were routinely dismissed*	2	1	2	Exclude	
15	I often felt like an outsider*	2	1	2	Exclude	
16	My fellow students often made an effort to understand my perspective	5	0	0	Include	My fellow students often made an effort to understand my perspective

Definition 3: Self-directed learning

Self-directed learning: A learner's willingness to engage in learning, demonstrated by setting and pursuing goals, especially when facing obstacles.

Prompt: While I was a student in the graduate program....

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
1	I felt confident in my ability to succeed	0	2	2	Exclude	
2	I took personal responsibility for my learning	3	0	2	Include	I took personal responsibility for my learning
3	I consistently motivated myself to engage in the learning process	2	1	2	Modify	I <u>became more able to</u> motivate myself to engage in the learning process
4	I prioritized my learning goals effectively	1	0	4	Modify	I <u>became more able to</u> prioritize my learning goals <u>over time</u>
5	I was enthusiastic about my learning	1	1	2	Exclude	
6	I usually felt engaged in the learning process	2	1	2	Exclude	
7	I usually was able to overcome obstacles to my learning	2	0	2	Modify	I <u>became more able to</u> overcome obstacles to my learning
8	I valued what I learned	2	1	2	Exclude	
9	I connected ideas from courses with my learning goals	2	0	2	Modify	I connected ideas from courses with my <u>life</u>
10	I refined my learning goals	2	1	2	Exclude	

Definition 4: Attitude toward uncertainty

Attitude toward uncertainty: A learner's attitude toward anticipating or experiencing a loss of certainty, typified by feeling stumped, confused or experiencing a sense of stepping outside one's comfort zone.

Prompt: While I was a student in the graduate program....

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
1	I was open to new possibilities	5	0	0	Include	I was open to new possibilities
2	I often felt hesitant in what I believed to be true	3	1	1	Include	I often felt hesitant in what I believed to be true
3	Uncertainty about my beliefs felt threatening*	5	0	0	Include	Uncertainty about my beliefs felt threatening*
4	I learned about ideas that contradicted my beliefs	3	0	2	Include	I learned about ideas that contradicted my beliefs
5	I felt comfortable suspending my judgment	4	0	1	Include	I felt comfortable suspending my judgment
6	I benefited from suspending my judgment	4	0	1	Include	I benefited from suspending my judgment
7	I avoided experiencing uncertainty*	4	1	0	Include	I avoided experiencing uncertainty*
8	I often felt surprised by what I learned	3	0	2	Include	I often felt surprised by what I learned
9	I found discomfort could be an important part of learning	4	0	1	Include	I found discomfort could be an important part of learning
10	I found stepping outside my comfort zone helped me learn	4	0	1	Include	I found stepping outside my comfort zone helped me learn
11	I often felt uncertain about my beliefs	3	1	1	Include	I often felt uncertain about my beliefs

Definition 5: Criticality

Criticality: A learner questioning beliefs of oneself and others (regardless of method), evaluating the validity of such beliefs, and re-framing these beliefs.

Prompt: While I was a student in the graduate program....

Item #	Original Statement	# Include	# Exclude	# Modify	Decision	Accepted Statement
1	I was willing to explore ideas I disagreed with	4	0	0	Include	I was willing to explore ideas I disagreed with
2	I discovered contradictions in my beliefs	4	0	0	Include	I discovered contradictions in my beliefs
3	I challenged my own beliefs	3	0	1	Include	I challenged my own beliefs
4	I challenged my fellow students' beliefs	3	0	1	Include	I challenged my fellow students' beliefs
5	My fellow students challenged my beliefs	2	1	1	Modify	My fellow students <u>raised questions</u> about my beliefs
6	I explored new ways to think about my beliefs	4	0	0	Include	I explored new ways to think about my beliefs
7	Disagreements helped me understand my beliefs	3	0	1	Include	Disagreements helped me understand my beliefs
8	I benefited from listening to perspectives different from my own	3	0	1	Include	I benefited from listening to perspectives different from my own
9	I avoided conversations where people disagreed*	1	1	2	Modify	I avoided conversations where people <u>thought differently than I did*</u>
10	I reframed some of my beliefs	4	0	0	Include	I reframed some of my beliefs

Appendix G: 42 items in pilot study and whether items removed following pilot

Scale and Item #	Delete item	Item Text
SS 1		My fellow students often made an effort to understand my perspective
2		I usually felt safe sharing my opinions
3		I could raise questions about my fellow students' beliefs without fear of being shut out
4		My fellow students and I supported one another
5		Group discussions were usually inclusive of differing perspectives
6		I trusted my fellow students
7		My fellow students and I respected one another
8	X	I had to censor myself in order to maintain group harmony
9		I felt it was safe to participate in the group as my authentic self
SDL 1	X	I took personal responsibility for my learning
2	X	I became more able to motivate myself to engage in the learning process
3	X	I became more able to prioritize my learning goals over time
4	X	I became more able to overcome obstacles to my learning
5	X	I connected ideas from courses with my life
U 1	X	I learned about ideas that contradicted my beliefs
2		I felt comfortable suspending my judgment
3		I was open to new possibilities
4		I often felt hesitant in what I believed to be true
5	X	Uncertainty about my beliefs felt threatening
6		I benefited from suspending my judgment
7	X	I avoided experiencing uncertainty
8		I often felt surprised by what I learned
9		I found discomfort could be an important part of learning
10		I found stepping outside my comfort zone helped me learn
11		I often felt uncertain about my beliefs
Criticality 1		I was willing to explore ideas I disagreed with
2		I discovered contradictions in my beliefs
3		I challenged my own beliefs
4		I challenged my fellow students' beliefs
5		My fellow students raised questions about my beliefs
6		I explored new ways to think about my beliefs
7		Disagreements helped me understand my beliefs
8	X	I benefited from listening to perspectives different from my own
9	X	I avoided conversations where people thought differently than did I
10	X	I reframed some of my beliefs
Tran 1		My deeply held beliefs changed
2		I developed a greater sense of responsibility toward others
3		I changed my goals for the future
4		I made major changes in my life
5		My view of myself changed
6		My view of the world changed
7		This program changed my life

Appendix H: IRB Approval for Field Study

THE UNIVERSITY of TENNESSEE 
KNOXVILLE
Office of Research & Engagement
INSTITUTIONAL REVIEW BOARD (IRB)

1534 White Ave.
Knoxville, TN 37996-1529
865-974-7697
fax 865-974-7400

October 03, 2016

Robert Charles Cox,
UTK - Educational Psychology & Counseling

Re: UTK IRB-16-03272-XM

Study Title: Assessing transformative learning: Field study

Dear Robert Cox:

The Administrative Section of the UTK Institutional Review Board (IRB) reviewed your application for the above referenced project. The IRB determined that your application is eligible for **exempt** review under 45 CFR 46 Category 2. In accord with 45 CFR 46.116(d), informed consent may be altered, with the cover statement used in lieu of an informed consent interview. The requirement to secure a signed consent form is waived under 45 CFR 46.117(c)(2). Willingness of the subject to participate will constitute adequate documentation of consent. Your application has been determined to comply with proper consideration for the rights and welfare of human subjects and the regulatory requirements for the protection of human subjects.

This letter constitutes full approval of your application (version 1.2), Alternative Task v 1.0; Recruitment Script-Current Students version 1.1; Recruitment Email-Alumni version 1.0; Survey Screens (online and paper) version 1.0, and Informed consent statement (modifications 9-15-16) version 1.0, stamped approved by the IRB on 10/03/16 for the above referenced study.

In the event that volunteers are to be recruited using solicitation materials, such as brochures, posters, web-based advertisements, etc., these materials must receive prior approval of the IRB.

Any alterations (revisions) in the protocol must be promptly submitted to and approved by the UTK Institutional Review Board prior to implementation of these revisions. You have individual responsibility for reporting to the Board in the event of unanticipated or serious adverse events and subject deaths.

Sincerely,



Colleen P. Gilrane, Ph.D.
Chair

Appendix I: Recruitment script, current students

My name is Robert Cox, and I am a graduate of the Cumberland MSP program a doctoral student at the University of Tennessee, Knoxville (UTK). I am researching how learning experiences correspond to how students view themselves and others. Often, when students pursue graduate education, they learn not only about a particular content area, but also learn about how they understand themselves and the broader world—the focus of this research study.

Request: I am requesting your participation in a **survey** about your experiences in the Public Service Management graduate program. You are invited to participate in this research study because you are a current student of the program. Here is some information about the survey:

- Survey responses are **anonymous**
- It is anticipated the survey could be completed in **less than 10 minutes**
- The attached informed consent statement details how your responses will be protected and how your participation is voluntary

I am passing to each student a packet that contains the consent form, the survey, an envelope to place your responses in, and an alternative activity. Should you choose to not participate, you may leave the room or remain at your seat and read through the alternative activity, a brief article you may keep. Please take a look at the survey materials and ask any questions.

(The researcher will now allow time for students to read the consent form and survey instructions)

While you complete the survey over the 10-minute period, your instructor and I will leave the classroom. Should you choose to complete the survey, please place the completed survey in the envelope. When I re-enter the room, I will ask you pass all envelopes down the row, both those with and without completed surveys.

The reason why we are using envelopes is to protect the privacy of your decision to participate as well as the confidentiality of your responses. I will also ask you to scoot your seats apart to respect and protect privacy and confidentiality. You may also move to another seat or leave the room during the 10 minute period should you choose.

Are there any questions? Please scoot your seats apart now. If you would like to move to another seat or leave the room for the 10-minute administration, you may do so now. I will return in about 10 minutes to collect the envelopes.

Thank you for your time.

Appendix J: Informed Consent for Pilot and Field Study Participants

Informed Consent Statement

INTRODUCTION

You are invited to participate in a research study. You are asked to complete an online survey about your experiences in a graduate program. You are invited to participate in this research study because you are a current student or graduate of the Cumberland University Public Service Management program.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

You would read instructions in attached survey. Then, you would respond to questions about your experiences in the graduate program. Questions ask how much you agree or disagree. It is anticipated this survey could be completed in approximately 10 minutes.

RISKS

There are no foreseeable risks other than those encountered in everyday life.

BENEFITS

The researcher will use survey responses to assess students' learning experiences. There are no anticipated direct benefits to you resulting from your participation in the research.

CONFIDENTIALITY

Information in the study records will be kept confidential. Data will be stored securely and will be made available only to persons conducting the study unless participants specifically give permission in writing to do otherwise.

All paper research records containing data from individual participants will be locked and stored and will be accessible only to research personnel. All electronic research records containing data from individual participants will be computer password protected and accessible only to research personnel. No reference will be made in oral or written reports that could link participants to the study. No identifiers are requested on survey materials.

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study), you may contact the researcher, Robert Cox, at rcox26@vols.utk.edu and (931) 808-4735 or his advisor, Dr. Ralph Brockett, brockett@utk.edu and (865) 974-2227.

If you have questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697. The IRB address is: 1534 White Avenue; Knoxville, TN 37996-1529

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed, your data will be deleted.

You will not be asked to sign your name to any document connected with this study. There will be no email correspondence that will reveal a participant's identity.

If you agree to participate, you may proceed to the survey and complete it.

CONSENT

I have read the above information. I have received (or had the opportunity to print) a copy of this form. Clicking on the button to continue and completing the survey (questionnaire) constitutes my consent to participate.

IRB NUMBER: UTK IRB-16-03272-XM
IRB APPROVAL DATE: 10/03/2016

Appendix K: Instrument for Pilot Study

Online Survey Screens

Screen 1

- **Welcome** to this survey about your graduate learning experience
- The **next 4 screens** ask about **your experiences as a student**
- **Afterward**, you will be asked about the **results** of the program
- Respond to questions to show **how much** you **agree/disagree**
- At the end of each page, click the [blue arrow >> at the bottom right](#)

Thank you for your time

Screen 1 of 8



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Screen 2

While I was a student in the graduate program . . .

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
My fellow students often made an effort to understand my perspective	☐	☐	☐	☐	☐
I usually felt safe sharing my opinions	☐	☐	☐	☐	☐
I could raise questions about my fellow students' beliefs without fear of being shut out	☐	☐	☐	☐	☐
My fellow students and I supported one another	☐	☐	☐	☐	☐
Group discussions were usually inclusive of differing perspectives	☐	☐	☐	☐	☐
I trusted my fellow students	☐	☐	☐	☐	☐
My fellow students and I respected one another	☐	☐	☐	☐	☐
I had to censor myself in order to maintain group harmony	☐	☐	☐	☐	☐
I felt it was safe to participate in the group as my authentic self	☐	☐	☐	☐	☐
	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Screen 3**While I was a student in the graduate program . . .**

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
I took personal responsibility for my learning	☐	☐	☐	☐	☐
I became more able to motivate myself to engage in the learning process	☐	☐	☐	☐	☐
I became more able to prioritize my learning goals over time	☐	☐	☐	☐	☐
I became more able to overcome obstacles to my learning	☐	☐	☐	☐	☐
I connected ideas from courses with my life	☐	☐	☐	☐	☐
	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Screen 4**While I was a student in the graduate program . . .**

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
I learned about ideas that contradicted my beliefs	☐	☐	☐	☐	☐
I felt comfortable suspending my judgment	☐	☐	☐	☐	☐
I was open to new possibilities	☐	☐	☐	☐	☐
I often felt hesitant in what I believed to be true	☐	☐	☐	☐	☐
Uncertainty about my beliefs felt threatening	☐	☐	☐	☐	☐
I benefited from suspending my judgment	☐	☐	☐	☐	☐
I avoided experiencing uncertainty	☐	☐	☐	☐	☐
I often felt surprised by what I learned	☐	☐	☐	☐	☐
I found discomfort could be an important part of learning	☐	☐	☐	☐	☐
I found stepping outside my comfort zone helped me learn	☐	☐	☐	☐	☐
I often felt uncertain about my beliefs	☐	☐	☐	☐	☐
	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Screen 5

While I was a student in the graduate program . . .

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
I was willing to explore ideas I disagreed with	☐	☐	☐	☐	☐
I discovered contradictions in my beliefs	☐	☐	☐	☐	☐
I challenged my own beliefs	☐	☐	☐	☐	☐
I challenged my fellow students' beliefs	☐	☐	☐	☐	☐
My fellow students raised questions about my beliefs	☐	☐	☐	☐	☐
I explored new ways to think about my beliefs	☐	☐	☐	☐	☐
Disagreements helped me understand my beliefs	☐	☐	☐	☐	☐
I benefited from listening to perspectives different from my own	☐	☐	☐	☐	☐
I avoided conversations where people thought differently than I did	☐	☐	☐	☐	☐
I reframed some of my beliefs	☐	☐	☐	☐	☐
	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Screen 6

These questions ask about the **results** of being in the graduate program

As a result of the graduate program . . .

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
My deeply held beliefs changed	☐	☐	☐	☐	☐
I developed a greater sense of responsibility toward others	☐	☐	☐	☐	☐
I changed my goals for the future	☐	☐	☐	☐	☐
I made major changes in my life	☐	☐	☐	☐	☐
My view of myself changed	☐	☐	☐	☐	☐
My view of the world changed	☐	☐	☐	☐	☐
This program changed my life	☐	☐	☐	☐	☐
	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Screen 7

Please indicate your gender

Male

Female

Other

Screen 8

Please indicate your current age

21-25

26-30

31-35

36-40

41-45

47-50

51-55

56-60

61-65

66-70

71-75

76-80

81+

Screen 8 of 8

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End Screen

We thank you for your time spent taking this survey.
Your response has been recorded.

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Appendix L: 30 TROPOS items used in full study among program alumni

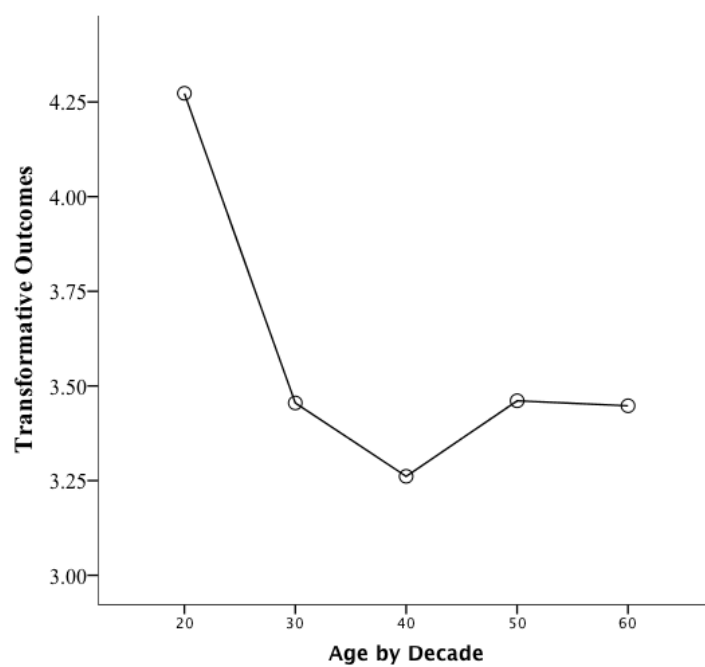
30 items used in full study

Scale and Item #	Item Text
Social Support 1	My fellow students often made an effort to understand my perspective
2	I usually felt safe sharing my opinions
3	I could raise questions about my fellow students' beliefs without fear of being shut out
4	My fellow students and I supported one another
5	Group discussions were usually inclusive of differing perspectives
6	I trusted my fellow students
7	My fellow students and I respected one another
8	I felt it was safe to participate in the group as my authentic self
Att. toward Uncertainty 1	I felt comfortable suspending my judgment
2	I was open to new possibilities
3	I often felt hesitant in what I believed to be true
4	I benefited from suspending my judgment
5	I often felt surprised by what I learned
6	I found discomfort could be an important part of learning
7	I found stepping outside my comfort zone helped me learn
8	I often felt uncertain about my beliefs
Criticality 1	I was willing to explore ideas I disagreed with
2	I discovered contradictions in my beliefs
3	I challenged my own beliefs
4	I challenged my fellow students' beliefs
5	My fellow students raised questions about my beliefs
6	I explored new ways to think about my beliefs
7	Disagreements helped me understand my beliefs
Transformative Outcomes 1	My deeply held beliefs changed
2	I developed a greater sense of responsibility toward others
3	I changed my goals for the future
4	I made major changes in my life
5	My view of myself changed
6	My view of the world changed
7	This program changed my life

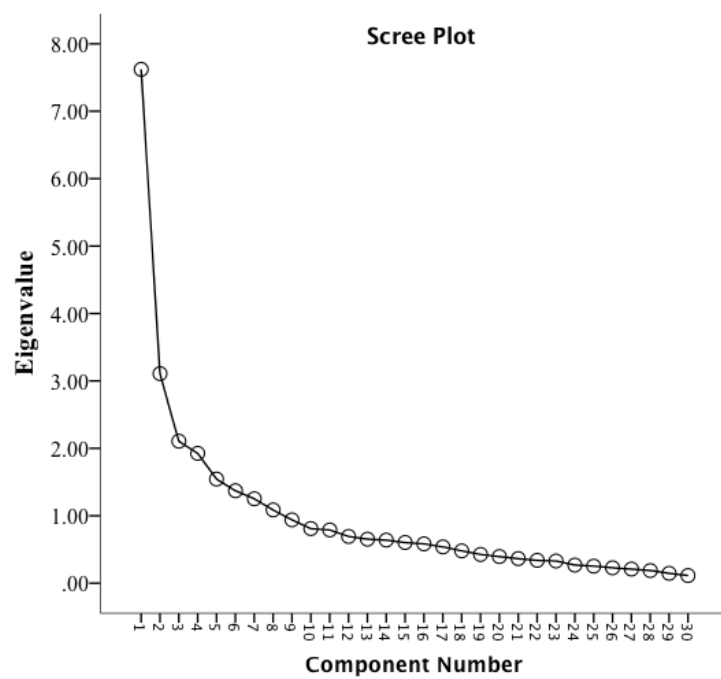
Subscale items for *social support*, *attitude toward uncertainty*, and *criticality* preceded by phrase “While I was a student in the graduate program.”

Items in subscale *transformative outcomes* preceded by phrase “As a result of the graduate program.”

		Social Support								Attitude toward Uncertainty								Criticality							Transformative Outcomes						
		SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	U1	U2	U3	U4	U5	U6	U7	U8	C1	C2	C3	C4	C5	C6	C7	Tran1	Tran2	Tran3	Tran4	Tran5	Tran6	Tran7
Social Support	SS1	1.000																													
	SS2	0.302	1.000																												
	SS3	0.246	0.307	1.000																											
	SS4	0.306	0.284	0.347	1.000																										
	SS5	0.244	0.204	0.193	0.166	1.000																									
	SS6	0.419	0.292	0.218	0.576	0.233	1.000																								
	SS7	0.307	0.138	0.113	0.481	0.269	0.620	1.000																							
	SS8	0.408	0.462	0.288	0.375	0.339	0.329	0.345	1.000																						
Attitude toward Uncertainty	U1	0.149	0.080	0.272	0.110	0.166	0.120	0.077	0.158	1.000																					
	U2	0.324	0.092	0.172	0.299	0.176	0.301	0.269	0.189	0.467	1.000																				
	U3	-0.046	-0.144	-0.040	0.081	0.113	0.080	0.108	-0.120	0.129	0.132	1.000																			
	U4	0.096	-0.097	0.149	0.116	0.052	0.158	0.007	-0.046	0.366	0.165	0.291	1.000																		
	U5	0.048	-0.019	0.100	0.237	-0.092	0.254	0.180	0.073	0.247	0.169	0.226	0.229	1.000																	
	U6	0.112	-0.026	-0.020	0.041	0.039	0.071	0.221	-0.013	0.136	0.201	0.141	0.116	0.268	1.000																
	U7	0.167	0.061	-0.032	0.069	0.075	0.115	0.216	0.145	0.135	0.267	0.037	0.118	0.189	0.352	1.000															
	U8	0.188	0.103	0.094	0.199	-0.084	0.268	0.152	0.069	0.002	0.012	0.278	0.172	0.357	0.131	0.199	1.000														
Criticality	C1	0.351	0.239	0.206	0.215	0.066	0.104	0.056	0.218	0.207	0.371	0.005	0.023	0.070	0.165	0.152	0.255	1.000													
	C2	0.431	0.191	-0.037	0.148	0.212	0.214	0.188	0.232	0.020	0.231	0.124	0.042	0.236	0.289	0.265	0.421	0.427	1.000												
	C3	0.355	0.194	0.147	0.171	0.074	0.221	0.032	0.160	0.231	0.151	0.009	0.113	0.195	0.177	0.156	0.394	0.549	0.635	1.000											
	C4	0.266	-0.008	0.046	-0.005	-0.028	0.148	-0.011	-0.038	0.221	0.133	0.128	0.057	0.181	0.254	0.064	0.175	0.307	0.343	0.559	1.000										
	C5	0.179	-0.069	-0.105	-0.051	-0.165	0.136	-0.035	-0.148	0.153	0.095	0.176	0.075	0.220	0.261	0.057	0.225	0.224	0.385	0.449	0.643	1.000									
	C6	0.274	0.161	0.026	0.114	-0.041	0.155	0.050	0.091	0.110	0.165	-0.027	-0.054	0.255	0.202	0.227	0.231	0.430	0.463	0.605	0.453	0.464	1.000								
	C7	0.209	0.016	0.032	0.088	-0.060	0.144	0.070	0.001	0.149	0.231	0.169	0.014	0.355	0.398	0.327	0.200	0.278	0.369	0.453	0.568	0.449	0.568	1.000							
Transformative Outcomes	Tran1	0.261	0.220	0.149	0.270	-0.062	0.327	0.106	0.194	0.063	0.169	0.056	0.043	0.232	0.244	0.230	0.463	0.240	0.446	0.376	0.296	0.305	0.326	0.374	1.000						
	Tran2	0.281	0.233	0.222	0.289	0.092	0.242	0.116	0.342	0.286	0.405	0.005	0.124	0.383	0.214	0.357	0.281	0.435	0.337	0.343	0.155	0.121	0.263	0.284	0.378	1.000					
	Tran3	0.212	0.182	0.058	0.082	-0.070	0.226	0.119	0.074	0.001	0.001	0.101	-0.106	0.240	0.251	0.201	0.215	0.163	0.240	0.234	0.288	0.358	0.227	0.318	0.380	0.425	1.000				
	Tran4	0.273	0.146	0.081	0.060	-0.064	0.252	0.174	0.126	0.017	0.091	0.001	-0.044	0.273	0.166	0.191	0.372	0.242	0.312	0.323	0.168	0.273	0.338	0.293	0.412	0.566	0.656	1.000			
	Tran5	0.263	0.060	0.050	0.079	0.006	0.189	0.142	0.184	0.097	0.220	0.057	-0.045	0.312	0.192	0.315	0.358	0.216	0.331	0.377	0.212	0.204	0.309	0.289	0.377	0.573	0.565	0.754	1.000		
	Tran6	0.170	0.114	0.051	0.052	-0.102	0.174	0.036	-0.060	0.147	0.229	0.101	0.066	0.305	0.241	0.205	0.404	0.307	0.273	0.346	0.250	0.338	0.358	0.329	0.358	0.506	0.444	0.628	0.699	1.000	
	Tran7	0.427	0.197	0.143	0.172	0.025	0.317	0.225	0.185	0.138	0.276	0.117	-0.076	0.167	0.234	0.133	0.210	0.302	0.303	0.410	0.445	0.352	0.453	0.346	0.311	0.367	0.422	0.480	0.517	0.522	1.000
		SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	U1	U2	U3	U4	U5	U6	U7	U8	C1	C2	C3	C4	C5	C6	C7	Tran1	Tran2	Tran3	Tran4	Tran5	Tran6	Tran7

Appendix N: Phase Three Analysis Means Plot

Age by decade plotted against transformative outcomes scores

Appendix O: Preliminary Factor Analysis Scree Plot

Appendix P: Structure Matrix: Loadings for Three-Component Model

	Factor 1	Factor 2	Factor 3
Tran4	0.773		
Tran5	0.768		
Tran6	0.741		
Tran3	0.679		
Tran7	0.675		
C3	0.652		0.453
Tran2	0.638	0.432	
C6	0.635		0.364
Tran1	0.618		
C7	0.61		0.503
C2	0.602		0.36
C5	0.559		0.491
U8	0.524		
C1	0.479	0.313	0.326
U5	0.424		0.331
U7	0.361		
SS8		0.719	
SS4		0.702	
SS6	0.32	0.669	
SS7		0.617	
SS1	0.412	0.571	
SS2		0.546	
SS3		0.521	
SS5		0.514	
U2		0.481	0.441
C4	0.537		0.57
U1		0.314	0.548
U4			0.521
U3			0.427
U6	0.383		0.386

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Factor loadings <0.3 suppressed.

Vita

Robert grew up in a family where learning and public service were daily priorities. Robert is an Eagle Scout. Following graduation from Vanderbilt University where he served as an Ingram Scholar in public service, he began working at the Tennessee Department of Children's Services where he continues to meet many dedicated public servants who make an important difference every day. These same public servants encouraged and supported his graduating from Cumberland University with a master's degree and proceeding to the University of Tennessee.

At the Department, Robert served in the children's welfare and benefits unit where he learned about policy, practice, and communication. He now continues such work on a team whose mission is to enhance the Department's child welfare computer system. Robert's focus is how to encourage engaged learning, which in turn sets the stage for mission-driven public service as well as improved quality of life.

He is married to Sara, the light of his life. They enjoy learning together through gardening, vacations to historical sites, and being present in the world together. Robert collects and reads encyclopedia sets, which provide a starting point for new things to learn.