UNDERSTANDING THE MEANING AND ASSESSMENT OF TRANSFORMATIVE LEARNING IN INTERNATIONAL EDUCATION: A QUANTITATIVE STUDY

By

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ABSTRACT

This research addresses the conceptual and methodological challenges of studying transformative learning within the context of international education. A comprehensive framework is employed to identify key dimensions of transformative learning, and a validated instrument (Beliefs, Events, and Values Inventory) is used to quantitatively assess those dimensions. The findings reveal that transformative learning in international education constitutes an interdependent change network across multiple dimensions. Notably, changes in one dimension significantly explain variations in other dimensions, illustrating the interconnectedness between students' evolving sense of self, worldview, knowledge evaluation, and experiential understanding. These findings carry significant implications for the field of international education, as well as for student learning and personal growth more broadly. To gain a deeper understanding of the transformative potential of international education, it is essential for scholars to adopt a comprehensive approach that encompasses the multiple dimensions of transformative learning. Focusing solely on constructs such as intercultural competence, global citizenship, and global mindset provides only a partial view of the larger change network associated with transformative learning. By expanding their understanding of transformative learning, scholars and practitioners can develop a more holistic perspective on the potential impact of international education, thereby better informing future research and practice in the field.

Keywords*: transformative learning, international education, theory, assessment*

This dissertation is dedicated to all individuals working in the field of international education who believe in the power of travel to transform people and the world.

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CHAPTER ONE: INTRODUCTION

In today's increasingly globalized world, it is crucial to have a workforce that is internationally competent. According to a recent labor market research study conducted in the United States, which evaluated over 31 million job posts and 120 million professional profiles, candidates with international experience are considered more competitive by employers (Emsi & NAFSA, 2020). Furthermore, individuals with international experience are more likely to be hired for management and leadership positions in top companies, including presidents and CEOs. This is supported by a separate study conducted by a non-profit organization IES Abroad (n.d.), which found that 97% of American college students who participated in study abroad programs found employment within one year of graduation. In contrast, only 49% of other graduates were employed within the same period. These findings underscore the importance of international education and the development of global competencies in today's job market.

International education is an integral component of higher education, which involves integrating global, international, and intercultural dimensions into the purpose, functions, or delivery of postsecondary education (Knight, 2003, p.2). It encompasses various forms, including short-term study abroad, long-term degree studies abroad, international internships, and international service-learning. Short-term study abroad is the most popular form in the United States, and it involves educational programs that take place outside the geographical boundaries of the country of origin (Kitsantas, 2004, p. 441).

Organizations such as the American Council on Education (Helms et al., 2018) and the Organization for Economic Co-operation and Development (Tremblay et al., 2012) recognize the significance of international education in workforce preparation for global job markets. Faculty members across different fields also recognize the value of international education. For instance,

engineering and medicine faculty acknowledge intercultural competence as an increasingly crucial "soft" skill for graduates to work in internationally collaborative professional environments (Bazaz & Moonaghi, 2014; Vitto, 2008). Faculty members in education (Wong, 2018), mathematics (Prediger, 2004), and nursing (Koskinen & Tossavainen, 2004) also value these skills. The shared argument is that the world needs a globally minded and interculturally competent workforce, and international education has the potential to shape students into workers with these characteristics.

International education is recognized as a high-impact and potentially transformative practice (Kuh, 2008; Savicki & Price, 2021). Transformative Learning (TL) theory has been increasingly used in the field of international education over the last decade (Pang et al., 2023), as it offers a framework for understanding how individuals experience significant changes that shape how they conceptualize and interact with the world (Hoggan, 2016). TL occurs when individuals experience impactful events, critically examine their existing views, open themselves to alternatives, and subsequently change how they make meanings out of the world (Cranton, 1997). While TL theory has traditionally been applied to other contexts, the emerging interest in using it to examine international education is driven by a desire to better understand the nature of learner change resulting from impactful international experiences (Pang et al., 2023).

A growing body of literature explores TL theory in international education context (Bamber & Hankin, 2011; Makara & Canon, 2020; Ritz, 2010; Strange & Gibson, 2017). For instance, studies show that international experiences transform students' perspectives toward HIV/AIDS healthcare, help them grow compassion, empathy, and inspire them to become more involved in community services (Dass-Brailsford & Serrano, 2010). Similarly, pre-service teachers report that their international experiences heighten their dispositions and commitments

to exploring diversity and civic engagement, as well as prepare them to act on global issues (Vatalaro et al., 2015). In another study, retrospective accounts of study abroad alumni several years after their sojourns show that the intercultural mindset fostered through their international experiences continues to affect their perspectives about diversity, aspirations, and future decisions (Nada & Legutko, 2022).

In summary, TL theory is gaining popularity among scholars for illuminating the nature of student transformation in international education. Although international education does not guarantee TL for everyone, it provides a pedagogical opportunity for learner transformation (Bain & Yaklin, 2019; Stone & Duffy, 2015).

Research Issues

By reviewing the current literature, I have identified two research issues: (1) confusion over what constitutes TL, and (2) shortage of quantitative evidence on TL.

Confusion Over What Constitutes Transformative Learning

Research in the context of international education tends to describe TL loosely and imprecisely (Pang, et al., 2023). Educators and researchers often use TL theory and the associated phrases such as ‘transformative learning,’ ‘transformational learning,’ and ‘learner transformation’ to promote international education. However, there appears to be a discrepancy between how TL scholars describe transformation and how those in the broader field of international education study it. For example, TL scholars have developed specialized definitions and descriptions for TL (e.g., Boyd, 1991; Mezirow, 1996). In contrast, scholars in international education use TL as an umbrella term to describe a variety of constructs from intercultural competence, global citizenship, to global mindset (Lyons et al., 2018; Mule et al., 2018; Root & Ngampornchai, 2013).

Although these constructs studied by scholars in international education relate to dimensions of TL, they are not how TL scholars conceptualize and study it. The general argument among international education scholars is that the world needs a globally minded and inter-culturally competent workforce, and that international education has the potential to "transform" students into such a workforce. However, the types of growth and development studied by international education scholars are not necessarily the kind of "significant and irreversible changes" that TL scholars focus on (Hoggan, 2016, p. 71). If TL is used to describe all types of change reported in international education literature, the theory's substantiality to explain the phenomenon of TL will significantly decrease.

As the theme of the International Transformative Learning Conference, or ITLC (2022), the most esteemed scholarly event in the field of TL, suggests: "If everything results in transformation, it doesn't suggest a very high bar for this type of change [...] the word [transformation] has become so ubiquitous to have almost no meaning."

In summary, while many scholars in international education assert that they study TL, what they are actually examining is something different. The ambiguity surrounding what constitutes TL results in a lack of a clear conceptual foundation for empirical evaluation in the literature. Therefore, a more precise and nuanced understanding of TL in the context of international education is essential to avoid diluting the theory's meaning and to facilitate empirical evaluation.

Shortage of Quantitative Evidence

TL literature needs more quantitative evidence. Most empirical studies on TL are qualitative that commonly involve thematic and inductive analyses of anecdotal and retrospective accounts from interviews (Romano, 2018). Qualitative studies provide helpful in-

depth, and diverse descriptions of TL. However, they are often based on idiosyncratic interpretations from a small group of individuals.

In a scathing critique of the TL field, Newman (2012) questions the existence of TL. He posits that researchers use participants' stories and anecdotes as the only information to verify the result of transformation. Newman argues that these accounts contain insights by invention, and that "transformative learning only exists in the realm of theory" (2012, p. 40). Relying predominantly on qualitative methods, TL scholars miss the opportunity to enrich how we conceptualize and assess TL.

A special issue of the Journal of Transformative Education posits a need to operationalize TL theory using quantitative methods (Acheson & Dirkx, 2021). The editors indicate that while quantitative instruments for assessing TL are being developed, they must be more consistently grounded in TL theory (Acheson & Dirkx, 2021). Additionally, empirical research documenting the processes to foster TL is standard but less so for those trying to assess it (Taylor, 2007). Assessing TL has been a long-standing challenge, partially because TL theory has evolved into a metatheory, a conglomerate of many different theoretical perspectives of TL (Hoggan, 2016). Subsequently, confusion over what constitutes TL renders the operationalization of TL theory for assessment a problematic task.

Existing quantitative studies assessing TL are sparse (Acheson et al., 2022; Taylor, 2007). However, the literature needs assessment strategies to document TL on a large scale. Quantitative methods diversify current understandings about TL and provide evidence for reshaping pedagogical policies in today's culture of assessment in higher education (Acheson et al., 2022). International education stakeholders can benefit significantly from reliable means to quantify TL if international programs continue to be promoted as TL.

Research Questions

This research aims to provide a conceptual clarification of TL and to establish a statistical foundation for its quantitative assessment, utilizing data collected from international education programs. TL is complex and multidimensional construct that involves experiencing a profound and enduring shift in the fundamental premises of thoughts, feelings, and action, resulting in a transformative change in our ways of being in the world (Hoggan, 2016; O'Sullivan et al., 2002). TL encompasses a variety of dimensions, such as cognition, emotion, behavior, consciousness, and identity, which makes it challenging to operationalize and assess. In this study, I will use an established framework that delineates the core dimensions of TL, underscoring its multidimensionality and operationalization parameters (Hoggan, 2016).

Hoggan (2016) developed a typology of TL by organizing the common types of change studied in the literature into dimensions of TL. This typology, based on articles from top journals in the field, provides insight into the parameters that scholars should use to distinguish instances of TL. This typology is particularly useful for this study because it provides a starting point for conducting quantitative assessment research. To assess TL, I will employ a validated instrument that has a proven track record of measuring TL in diverse international contexts (Acheson et al., 2022; Wang et al., 2020; Wiley et al., 2021).

Primary Question

To what extent are changes in TL dimensions interdependent? While TL is recognized as a multidimensional concept (Hoggan, 2016; O'Sullivan et al., 2002), the existing literature lacks a clear understanding of how these dimensions are related. Thus, my research aims to fill this gap by exploring the relationship between TL dimensions since transformation in one dimension is likely to affect other dimensions (Acheson et al., 2022).

To introduce the concept of interdependence, I tentatively define it as the strong association between changes in each TL dimension and changes across all other dimensions. To further appreciate this concept, it is important to consider how each dimension relates to one another. For instance, TL involves an interdependent change network because changes in individuals' perspectives about the world (Worldview) are interdependent with their developing sense of self (Self), capacity to construct and evaluate knowledge (EpiCapacity), and their emotional and mental inclinations to experience the world (Ontology), as defined by Hoggan (2016). In the next chapter, I will elaborate on each of the TL dimensions, their root in TL theory, and their relationship with one another.

Secondary Question

The secondary question complements the primary question by investigating: *How are baseline TL characteristics associated with changes in TL dimensions*? Baseline characteristics refer to pre-existing attributes or qualities in TL dimensions, which are measured using pre-test data. While pre-test data is commonly used in social science research, few quantitative studies have explored changes in TL dimensions while considering baseline characteristics. This is problematic because students have different characteristics that influence how they experience the learning environment and the outcomes they derive (Renn & Reason, 2021). Consequently, researchers cannot assume that all students will change in the same direction and to the same extent from international education experiences without accounting for baseline characteristics (Wang et al., 2020). Examining the association between baseline TL characteristics and changes in TL dimensions can shed light on the factors that influence TL in international education contexts and inform pedagogical design and assessment practices.

Research Inspiration

I am an international student from China, and I have spent the last six years studying in Canada and the past three years studying in the United States. My experience of international education has been a significant source of research inspiration and personal growth. Without studying abroad, I believe that my mindset, career, and life would have been entirely different than they are today.

For me, international education has been a journey of self-discovery and transformation. Through this journey, I have gained new perspective of myself, my home country, and my ability to reconcile different perspectives. As an international student, I have encountered contrasting beliefs, values, political and economic systems in Canada, the United States, and China. The concept of TL has been helpful in reflecting on my international experience and providing me with a conceptual framework to articulate my transformative journey in both personal and scholarly contexts.

According to Bamber (2016), international education is a transformative journey toward authenticity. Studying and living abroad has helped me become more authentic in terms of acknowledging my challenges, building efficacy, being honest, and staying humble. It has also enabled me to create authentic relationships with others by accepting differences, keeping an open mind, and sharing recognition. My international education experience has transformed my perspective on myself, others, and the world around me. This dissertation aims to capture and express the transformative aspects of international education.

Summary

The study of TL in international education is a promising field, but it faces some challenges that need to be addressed. Firstly, TL is often described in vague or imprecise terms,

and sometimes confused with related but distinct concepts. Secondly, although qualitative research has been instrumental in advancing our understanding of TL, quantitative methods are needed to expand and deepen our empirical knowledge.

This dissertation addresses these issues by pursuing two main objectives: (1) clarifying the conceptual foundations of TL in the context of international education, and (2) providing a rigorous quantitative assessment of the interdependence among TL dimensions, using data from international education programs. To achieve these objectives, I draw on a comprehensive framework that identifies the key dimensions of TL and use a validated instrument to measure them quantitatively.

The dissertation is organized as follows. In chapter two, I provide a conceptual clarification about TL and offer a tool to assess it. Specifically, I showcase (a) how international education scholars have studied TL, (b) theoretical perspectives about TL, (c) an assessment framework that outlines TL dimensions, and (d) an instrument to operationalize those dimensions. In chapter three, I describe the data, variables, statistical procedure, and methodological limitations. I also provide evidence of the reliability and validity of the measurement instrument. In chapter four, I present the results of the statistical analysis, focusing on the interdependence among TL dimensions and the relationship between baseline characteristics and changes in TL. In chapter five, I discuss the implications of these findings for theory, practice, and future research. Finally, I conclude the dissertation with a reflection on the contributions and limitations of the study, as well as recommendations for future research.

CHAPTER TWO: LITERATURE REVIEW

The purpose of this research is to provide a comprehensive understanding of transformative learning (TL) and to assess it quantitatively using data from international education programs. I structure this chapter into four sections.

In the first section, I present the result of a systemic literature review of journal articles on TL assessment in the context of international education. This section provides an overview of the current state of the literature on how international education scholars have empirically studied TL. I highlight the significant trends that frame the two research issues outlined in chapter one.

In the second section, I discuss two theoretical perspectives on TL that are most relevant to international education scholarship. While there are numerous theoretical perspectives, I focus on the two that describe two distinct yet complementary aspects of TL. In the third section, I demonstrate an existing framework that integrates the two theoretical perspectives. The framework specifies TL dimensions that provide the parameters for the empirical study of the interdependence between them.

Finally, I introduce a validated instrument designed to assess changes. The instrument contains scales to measure various changes congruent with TL theory. I demonstrate how I operationalize those scales for TL dimensions. Overall, this chapter provides a comprehensive understanding of TL and establishes a framework for assessing it quantitatively in the context of international education.

Transformative Learning in International Education

This review aims to provide a comprehensive understanding of TL has been studied in the context of international education.

Systemic Review Method

The materials for this review were gathered from Google Scholar and EBSCOhost. I searched Google Scholar using the Publish or Perish software given three inclusion criteria: "transformative learning," "international education," and "empirical studies." The timeframe ranged from 2012 to 2022. The Google Scholar search yielded 605 results. I applied the same three criteria to the built-in search engine on EBSCOhost for the same timeframe. In addition, EBSCO allowed me to add the criteria; "English language only," "peer-reviewed only," and "journal articles only". The EBSCOhost search yielded 178 results. The combined results provided a total of 783 articles. Removing duplicates and selecting only peer-reviewed journal articles resulted in a sample of 191 articles.

I then refined this sample by excluding articles if they were: (1) not empirical, (2) not about TL, (3) not about international education, and (4) not journal articles. A total of 125 articles were excluded, leaving 66 articles as the final sample size for review. I included 14 additional articles that met the criteria, but they were not initially identified from the two search venues. I found those articles during my previous reviews. This resulted in a total of 80 articles in the final sample pool for the literature review.

I then tabulated these articles by creating the following variables: (1) method (quantitative, qualitative, or mixed method); (2) specific method (i.e., observation, reflection, or survey); (3) sample size; (4) research question or purpose; (5) research context; (6) definition of TL/connection to TL theory; and (7) findings/contributions. The tabulated information led to the following four significant findings.

Systemic Review Results

First, there is a need for a more balanced distribution of research methodologies in the literature. The majority of articles reviewed were qualitative in nature, comprising 54 out of the 80 peer-reviewed articles in the systematic literature review. Quantitative studies were less common, comprising only 17 articles, with the remaining 9 articles categorized as mixed-methods studies. Moreover, of the quantitative studies, only four focused on measuring TL directly, with the others using TL theory to describe change in another topic. This indicates a significant need for more quantitative studies that explicitly aim to assess TL.

Second, reviewed quantitative and qualitative articles approach TL assessment in distinct ways. Quantitative research typically focuses on documenting program impact using measurement constructs, while qualitative research prioritizes understanding the meaning-making of participants' lived experiences.

Qualitative studies in this review predominantly explore two areas of interest: (1) transformative experiences in international teacher training (e.g., Arshavskaya, 2017; Baecher & Chung, 2020; Coryell, 2013; Senyshyn & Smith, 2019), and (2) transformative pedagogies in international education (e.g., Bamber et al., 2018; Bell et al., 2016; Chang et al., 2012; Chiocca, 2021; Intolubbe-Chmil et al., 2012; Johan et al., 2019; Monaghan & Hartmann, 2014; Nada et al., 2018; Nalani et al., 2021; Ritz, 2010; Smith et al., 2014).

These studies center on examining the perspectives and lived experiences of instructors and students (Arshavskaya, 2017; Baecher & Chung, 2020; Chiocca, 2021; Coryell, 2013; Dunn et al., 2014; Johan et al., 2019; Liu & Yumei, 2015; Monaghan & Hartmann, 2014; Nada et al., 2018; Vatalaro et al., 2015; Wang, 2017). Many of them also view TL as processes in addition to outcomes.

Quantitative studies, on the other hand, are typically distinguishable by their measurement constructs, which assess a range of constructs related to TL, including cultural awareness (Chwialkowska, 2020), environmental citizenship (Tarrant et al., 2014; Tarrant & Lyons, 2012), global citizenship (Mule et al., 2018), global perspective (Hudson & Tomás Morgan, 2019), intercultural sensitivity (Lyubovnikova et al., 2015), intercultural effectiveness (Dunn-Jensen et al., 2021), and intercultural development (Akdere et al., 2021).

However, most quantitative studies reviewed in this research do not focus specifically on measuring TL. Rather, they use TL theory to describe the extent of change, often by comparing learning outcomes across time (Akdere et al., 2021; Dunn-Jensen et al., 2021; Grant et al., 2021; Tarrant & Lyons, 2012), between student groups (Savicki & Price, 2021) and among academic topics (Tarrant et al., 2014). Also, some studies examine the effectiveness of certain program design features (Choi et al., 2012; Chwialkowska, 2020; Hudson & Tomás Morgan, 2019; Mule et al., 2018; Lough & Mcbride, 2014; Lyubovnikova et al., 2015; Stone et al., 2017).

Third, it is noteworthy that the majority of the reviewed articles do not primarily focus on TL, and instead use TL theory as a supplementary framework rather than fully operationalizing it. Pang et al. (2023) explain that operationalizing TL theory involves implementing the theory in empirical research design to enhance theoretical development, including defining concepts and selecting instruments to measure them. While qualitative studies tend to operationalize TL theory more often than other methods, the majority of articles across all methods use TL theory to describe constructs related to TL rather than studying it directly. In other words, these studies reference the theory to provide context or as a supplement framework to analyze findings but do not contribute to the development of TL theory itself. It is clear from this review that more

research is needed to explore TL directly and to use TL theory to enhance its theoretical development, rather than simply referencing it as a supplement to other constructs.

Out of the 17 quantitative articles reviewed, four operationalized TL theory (Savicki & Price, 2021; Stone et al., 2017; Walters et al., 2017; Wiley et al., 2021). The remaining 13 articles borrowed the theory to study intercultural competence (e.g., Akdere et al., 2021; Dunn-Jensen et al., 2021), and global citizenship (e.g., Lough & Mcbride, 2014; Mule et al., 2018; Tarrant et al., 2014; Tarrant & Lyons, 2012). The theoretical and construct focus of these articles differs from TL.

About half of the qualitative articles operationalize TL theory. The rest reference TL theory to support their discussion around intercultural learning (Barden & Cashwell, 2014), intercultural competence, leadership, and global citizenship (Cheng & Yang, 2019; Lyons et al., 2018), cultural awareness (Batey & Lupi, 2012), multicultural practices and collaboration (Uzum et al., 2019), and intercultural competence (Root & Ngampornchai, 2013).

Fourth, the existing literature on TL assessment in the context of international education is largely dominated by one author's theoretical perspectives. Mezirow's conceptualization of TL is frequently referenced, with researchers describing international learning experiences as opportunities for critical reflection on disorienting dilemmas that can transform students' frames of reference (Savicki & Price, 2021). While this perspective has been influential, it is important to note that there are other theoretical perspectives on TL that have been largely overlooked in the literature. Only three articles deviate from the predominant Mezirow perspective. Two qualitative studies briefly mention an alternative theoretical perspective of TL theory that emphasizes emotional transformation (Chiocca, 2021; Jokikokko, 2016), while one quantitative study uses a typology based on the empirical literature on TL rather than its theory (Wiley et al.,

2021). Given the limited attention to alternative theoretical perspectives, there is a need for further exploration of diverse perspectives to advance the field of TL assessment.

I summarize three significant findings from this systemic literature review of peer-reviewed journal articles on TL assessment in the context of international education:

- The field is dominated by qualitative studies and needs more quantitative evidence, but researchers of different methodological orientations study TL from different angles.
- While proportionally more qualitative than quantitative studies operationalize TL theory to contribute to theoretical development, most studies use TL theory as a supplement to describe constructs related to TL rather than studying it directly. Moreover, the majority of studies refer to TL theory through Mezirow's theoretical lens, with a few exceptions that mention alternative perspectives focusing on emotional transformation.
- Most studies claim to measure TL, but use TL theory as a supplement to describe change in something else, such as intercultural competence and global citizenship.

These findings underscore the need to address two research issues highlighted in the introduction chapter: (1) the scarcity of quantitative evidence and (2) the need to clarify what constitutes TL. Therefore, understanding TL theory is crucial before assessment. In this regard, I will review TL theory, addressing the following questions: What are Mezirow's perspectives about TL? What are the alternative theoretical perspectives? Is there an existing framework suitable for quantitative assessment research?

Transformative Learning Theory

The theory of TL has evolved into a metatheory that encompasses various theoretical perspectives that explain the phenomenon of transformation (Hoggan, 2016). TL has become one of the most prolific theoretical topics in higher and adult education since its introduction by

Mezirow in the mid-1970s. Initially, TL theory was categorized into four primary theoretical perspectives: critical reflection, consciousness-raising, development, and individuation (Dirkx, 1998). However, a recent effort to categorize TL theory has identified nine theoretical perspectives: psycho-critical, psycho-developmental, psycho-analytic, neuro-biological, sociocultural, social-emancipatory, cultural-spiritual, race-centric, and planetary (Merriam & Baumgartner, 2020).

Although TL theoretical perspectives have been labeled differently by researchers, this section's goal is not to explain every existing theoretical perspective. Instead, the focus is on identifying the appropriate theoretical perspectives for this research. For this purpose, two TL theoretical perspectives have been chosen as they are the only ones referenced in current international education scholarship. It is important to note that the breadth and depth of the literature on these two theoretical perspectives are extensive and beyond the scope of this dissertation. Therefore, the following section provides a brief overview of the two theoretical perspectives, followed by their strengths in studying student development in international education.

Perspective Transformation

The most widely referenced theoretical perspective of TL defines TL as “the process of using a prior interpretation to construct a new or a revised interpretation of the meaning of one’s experience to guide future action” (Mezirow, 1996, p. 162). Mezirow (1997) views transformation as a change in the frame of reference created when adults change their assumptions, viewpoints, beliefs, values, and feelings. Frames of reference represent the underlying structure adults use to think and act, and they consist of a habit of mind and point of view. The habit of mind describes a broad, abstract mentality that guides beliefs, attitudes, and

judgments (e.g., ethnocentrism and xenophobia), while points of view are the bricks and mortar that solidify into one's structure of thinking and habit of mind.

There are four essential steps to TL (Mezirow, 1981). The first step is experience, which represents a disorienting dilemma that challenges individuals' current understanding of an experience. The second step is critical reflection, which involves self-examination that reassesses the relationship between an individual and an experience. The word "critical" here refers to the extent of reflection, which can lead to either a meaningful or trivial result depending on how serious and deeply one engages with the process of reflection. The third step is reflective discourse, which is reflection with a social dimension, involving reflection on an experience with the help of others who share a similar experience and reflection. The goal is to develop an empathic understanding across viewpoints. The last step is action, where learners feel empowered by new frames of reference and ready to act differently.

The strength of perspective transformation lies in its alignment with the types of cognitive development frequently studied in the current literature on international education. According to this literature, international education is transformative because it provides students with the disorienting dilemma that Mezirow identifies as the foundational experience for transformative learning. Critical self-reflection and reflective discourse can then challenge and alter students' frame of reference, potentially leading to perspective transformation (Bamber & Hankin, 2011; Savicki & Price, 2021; Strange & Gibson, 2017).

For example, one study found that critical reflection helped participants realize that their study abroad experiences made them more open-minded, flexible, and transformed (Root & Ngampornchai, 2013). Even for cases where international travel is not involved, Tisdell and

Tolliver (2009) recommend using critical reflection grounded in TL theory to support culturally responsive education, as it helps learners connect their cultural roots with others.

However, as highlighted by the systematic review at the beginning of this chapter, existing studies on TL in the context of international education tend to rely solely on Mezirow's perspective transformation as the theoretical voice for TL. While these studies shed light on how perspective transformation can illuminate commonly examined constructs like intercultural competence and global mindset in international education (Cheng & Yang, 2019; Lyons et al., 2018), they fail to consider alternative dimensions of TL by exploring other theoretical perspectives. This lack of exploration and development of other theoretical perspectives on TL remains a persistent issue in the literature (Cranton & Kasl, 2012), and opens the door for critique.

For example, Newman (2012) critiqued the idea that TL represents a unique category of educational practices. He argued that good learning should always be challenging, introspective, and impactful for learners. Dirkx (2012b) responded that Newman's critique focused primarily on one strand of TL perspectives led by Mezirow and overlooked other aspects of transformation beyond human cognition and rationality, which is the other TL perspective introduced next. This intellectual debate calls for a broader consideration of TL beyond Mezirow's perspectives.

Consciousness Expansion

TL can be viewed from different theoretical perspectives, one of which defines it as "the expansion of consciousness and the working toward a meaningful integrated life as evidenced in authentic relationships with self and others" (Boyd & Myers, 1988, p. 261). This perspective, often referred to as the Jungian approach, was led by Robert Boyd and informed by Carl Jung's depth psychology (Dirkx, 2012a). It emphasizes the connection between consciousness and the

inner world of the Self and aims to integrate consciousness and unconsciousness for a holistic human psyche (Boyd & Myers, 1988).

The process of TL in this perspective involves two critical steps: differentiation and integration. Differentiation recognizes the separation between the "ego" and the "inner world" of the Self, with the ego representing one's experiencing of oneself as a center of willing, desiring, reflecting, and acting (Stein, 1998). The inner world represents unconsciousness, including affective, emotional, spiritual, imaginative, and instinctive dimensions of the human psyche beyond the rational and cognitive dimensions (Dirkx, 2012a).

Integration aims to integrate the previously differentiated ego-consciousness and inner world for a holistic understanding of the Self (Boyd & Myers, 1988). This stage of consciousness expansion is also referred to as “individuation” or “nurturing soul work” (Dirkx, 2012a). During this stage, individuals become receptive to the inner world of the Self and hold less firmly onto their ego-consciousness. They not only become aware of their emotions and intuitions, for example, but also express the needs of those Self aspects. Through consciousness expansion, individuals can recognize and work with the unconscious dynamics that influence their consciousness and rationality for a meaningfully integrated life. By expanding their consciousness, individuals can develop authentic relationships with themselves and others, and lead a more fulfilling life (Boyd & Myers, 1988).

The strength of consciousness expansion to reveal deeper aspects of change in international education is significant. Current literature on international education primarily examines TL through the lens of perspective transformation (Mezirow) and other related theories like intercultural competence and global mindset (Cheng & Yang, 2019; Lyons et al., 2018). However, while perspective transformation is a valuable lens, it only provides a partial view of

the transformative experience. Root and Ngmpornchai (2013) have pointed out that international education experiences can improve students' intercultural competence, but there are also deeper aspects of intercultural competence that need to be fostered and researched.

The literature on international education has largely overlooked the transformation that occurs beyond the conscious level in the inner world of Self (Pang et al., 2023). Affective change, for example, is an aspect of learning that is rarely explored in international education literature, despite the fact that these experiences often evoke strong emotions (Yoo et al., 2006). Moreover, some of the most noticeable student changes in international education, such as curiosity, patience, confidence, and adaptability, are beyond cognitive development (Hadis, 2005; Gita, 2018).

Achieving perspective transformation is already a challenging task for international educators, but reaching a level of consciousness expansion presents an additional layer of difficulty. Experiences that elicit change in both transformations are likely to be more impactful. Instructors need to implement intentional and proactive strategies to help students become comfortable with recognizing (differentiation) and connecting to (integration) their inner world of Self to reach the level of consciousness expansion.

Assessment Framework

Perspective transformation and consciousness expansion represent two overlapping yet unique theoretical perspectives of TL. They are the only TL theory referenced in international education literature. Therefore, I needed an assessment framework that integrates the two.

Hoggan (2016) developed the typology of TL by reviewing the most influential journals (determined by impact factors) in the field of TL. This typology was designed to "document the ways people change and provide insight into the parameters that we as scholars should put in

place to distinguish instances of transformative learning" (Hoggan, 2016, p. 65). Using a deductive method, Hoggan (2016) organized the common types of change studied in the literature into TL dimensions. This typology defines TL as the "processes that result in significant and irreversible changes in the way a person experiences, conceptualizes, and interacts with the world" (Hoggan, 2016, p. 71). Such a broad definition is inclusive of the different theoretical perspectives of TL.

I choose this typology for three reasons. First, the typology was developed from articles from top journals (determined by impact factors) in the field of TL. Second, the typology brings cohesiveness to the two theoretical perspectives of TL explored in this study. Third, the typology outlines TL dimensions, providing a starting point to conduct quantitative assessment research. In the remaining section, I show (1) the definition for each TL dimension, (2) the types of change from the literature that describe the dimension, and (3) type of transformation.

Worldview. This dimension refers to "significant changes in the way the learner understands the world and how it works" (Hoggan, 2016, p. 65). The types of change associated with this dimension include (a) assumptions, beliefs, attitudes, expectations, (b) ways of interpreting experience, (c) more comprehensive or complex worldview, and (d) new awareness / new understandings.

The types of change that have been explored in the TL literature, such as changes in personal beliefs, attitudes, interpretations, and awareness, align closely with Mezirow's definition of a changing "point of view" and "habit of mind," which are fundamental to transforming one's "frame of reference" (Mezirow, 1997). It is important to note that these changes go beyond simply learning new information. Rather, they involve becoming aware of things individuals may have never experienced before, and then constantly interpreting our life

experiences through this new lens of knowledge. As such, worldview transformation represents perspective transformation.

***Epistemology*.** This dimension refers to "beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs" (Hoggan, 2016, p. 67). The types of change associated with this dimension include (a) becoming more discriminating, (b) utilizing extra-rational ways of knowing, and (c) becoming more open.

When individuals become more discerning, it implies a shift in their 'habit of mind' (Hoggan, 2016) and a greater tendency for 'critical reflection', both of which are central concepts in Mezirow's (1997) perspectives. On the other hand, being more open and utilizing "extra-rational ways of knowing" suggest a process of consciousness expansion that involves becoming aware of the inner-world dynamics of the Self, which is distinct from perspective transformation (Dirkx, 2012a). Therefore, Epistemology transformation encompasses both perspective transformation and consciousness expansion.

***Capacity*.** This dimension refers to "developmental outcomes whereby learners experience systematic, qualitative changes in their abilities that allow for greater complexity in the way they see, interpret, and function in the world" (Hoggan, 2016, p. 69). The types of change associated with this dimension include (a) cognitive development, (b) consciousness, and (c) spirituality.

The changes that occur during TL such as cognitive and consciousness developments are often results of gaining new viewpoints, beliefs, or attitudes, which contribute to a shift in an individual's framework reference or what Mezirow (1997) refers to as perspective transformation. However, there are also instances where spirituality or spiritual way of knowing

transcend the cognitive capacity of consciousness, representing a different dimension of knowing that is commonly discussed as an example of consciousness expansion (Dirkx, 1998). Therefore, Capacity transformation involves both perspective transformation and consciousness expansion, as it entails expanding one's capacity for knowing beyond the cognitive realm while also transforming one's perspective on the world.

Self. This dimension refers to "a number of ways that learners experience a significant shift in their sense of self" (Hoggan, 2016, p. 66). The types of change associated with this dimension include (a) self-in-relation, (b) empowerment / responsibility, (c) identity / view of self, (d) self-knowledge, (e) personal narratives, (f) meaning / purpose, and (g) personality change.

The TL dimension of Self involves significant changes to one's sense of self in various aspects. These changes can include finding meaning and purpose in life, which involves a deeper understanding of one's life experiences. TL literature refers to this type of change as changing one's perception of self-in-relation, which is the most common type of change to the Self. This type of change involves a learner's sense of "being situated in the world" (Hoggan, 2016, p. 66) and often involves discovering, recognizing, and integrating different aspects of the self, echoing the fundamental ideas of consciousness expansion, which works towards a "meaningful integrated life" (Boyd & Myers, 1988, p. 261).

Personality change and changes in personal narratives are also examples of changes in the Self that illuminate consciousness expansion. These changes tend to occur after individuals gain new and profound realizations about themselves. Thus, the TL dimension of Self highlights various aspects of changing one's sense of self that are largely explained by consciousness expansion.

***Ontology*.** This dimension refers to "the way a person exists in the world. It concerns the deeply established mental and emotional inclinations that affect the overall quality and tone of one's existence" (Hoggan, 2016, p. 67). The types of change associated with this dimension include (a) affective experience of life, (b) ways of being, and (c) attributes.

This TL dimension captures significant change in multiple ways of existence. Ways of being refer to changes in habitual tendencies and dispositions, which are essential elements of habit of mind and thus, perspective transformation (Mezirow, 1997). Attributes, on the other hand, are primarily affective qualities, such as generosity, compassion, empathy, hopefulness, integrity, vulnerability, and trust (Hoggan, 2016, p. 68). These affective qualities are strong indicators of deeper-level changes happening in the inner-world Self, which aligns with the fundamental ideas of consciousness expansion (Dirkx, 2012a). Therefore, Ontology transformation involves both perspective transformation and consciousness expansion.

***Behavior*.** A specific definition for Behavior as a dimension from the TL typology was not provided; however, behavioral transformation was described as mainly mirroring Mezirow's (1997) conception of "planning a course of action", which is the final step of TL after experience, critical reflection, reflective discourse, and action (Hoggan, 2016, p. 68). The types of change associated with this dimension include (a) actions consistent with new perspective, (b) social action, and (c) professional practices and skills.

The dimension of change in action in TL encompasses a range of behavioral modifications as the result of perspective transformation.-For instance, actions that align with new perspectives fall into a broad category of change that underscores the impact of Mezirow's perspective transformation. This category is broad because new perspectives can emerge from any aspect of life. Conversely, change in professional practices and skills represents a cognitive

dimension that warrants its own category. Nevertheless, this category is still rooted in perspective transformation.

Social action is another type of change in this dimension that highlights the relational aspect of being with others. Reflective discourse is a salient example from perspective transformation that exemplifies this social aspect, involving the sharing and interpretation of experiences with others who have undergone a similar process (Mezirow, 1997). Thus, Behavior transformation is largely the outward manifestation of perspective transformation, reflecting changes in the way individuals act and relate to the world around them.

Interdependence Among Dimensions. The typology presented in this paper highlights the multidimensional nature of TL, with each of the six dimensions having its own associated types of change. These types of change are well-established in the TL literature, and the two theoretical perspectives of TL help to explain them. Notably, some types of change can be explained by both theoretical perspectives. This overlap only serves to underscore the interdependent nature of TL between its dimensions.

This interdependence is a key feature of TL and highlights the need to study TL as a multidimensional construct. As Acheson et al. (2022) noted, changes in the self are unlikely to occur in isolation without ramifications for other aspects of the self. For example, changes in our worldview may be entangled with the lens through which we view ourselves, and both of these dimensions may be influenced by the criteria we use to define and acquire knowledge, as well as our ways of experiencing the world. Thus, a profound change in one of these TL dimensions is unlikely to occur without ramifications to the others.

This interdependence underscores the importance of using a comprehensive and integrated approach when researching TL dimensions using the typology. It is essential to select

an instrument that can assess diverse types of change related to the TL dimensions, allowing for a more nuanced and integrated understanding of how TL manifests in learners. By recognizing the interdependent nature of TL, researchers can gain a more profound understanding of the complex and multidimensional nature of this phenomenon. Additionally, this understanding can help address the issue of equating any change to TL and the resultant dilution of the theory's meaning.

Research Instrument

In this section, I (a) compare the existing instruments for TL assessment; (b) select the one for this research; (c) demonstrate the instrument format; (d) showcase the instrument's scale development history; and (e) explain how the scales are used in this research for TL assessment.

Instrument Comparison

Quantitative instruments are useful for assessing TL, but they inevitably simplify the breadth and depth of the theory. Therefore, it is important to carefully evaluate their psychometric properties when assessing latent constructs like TL across individuals (Furr, 2018). I have identified four instruments that have been used for TL assessment: the Learning Activities Survey by King (2009), the Transformative Learning Survey by Stuckey, Taylor, and Cranton (2013), the Transformative Learning Environment Survey by Walker (2018), and the Transformative Outcomes and Processes Scale by Cox (2021).

Although the Learning Activities Survey was the first quantitative instrument for TL assessment, it lacks empirical validation evidence. In contrast, I found such evidence for the other three instruments, including item development processes, expert review, pilot studies, reliability tests, and factor analyses. These processes suggest empirical validation, which is crucial for instrument evaluation.

However, existing TL instruments must be more consistently grounded in theory (Acheson & Dirkx, 2021). The three psychometrically sound instruments are based on select theoretical perspectives of TL. For example, the instruments developed by Cox (2021) and Walker (2018) focus entirely on Mezirow's perspective transformation. In contrast, the instrument developed by Stuckey et al. (2013) is based on three theoretical perspectives of TL. However, TL theory has evolved into a metatheory containing up to nine theoretical perspectives (Merriam & Baumgartner, 2020). Because existing TL instruments are based on select few theoretical perspectives, they may fall short in assessing alternative perspectives of TL (Pang et al., 2023). This may explain why quantitative TL instruments are not widely used in the literature, as scholars often focus on operationalizing their specialized theoretical perspective of TL in empirical research. Therefore, using existing instruments based on specific theoretical perspectives risks being biased towards certain perspectives while ignoring others.

Instrument Selection

In contrast to relying on instruments developed from specific theoretical perspectives of transformative learning (TL), I advocate for a more flexible approach based on the empirical literature. My preference is to use an instrument that assesses diverse types of change and is grounded in the TL typology, which conceptualizes TL as a metatheory without favoring any particular perspective (Hoggan, 2016). The Beliefs, Events, and Values Inventory (BEVI) is a suitable choice because it was designed to measure individual changes and has shown promise for TL assessment in recent literature (Acheson et al., 2021; Acheson et al., 2022; Wandschneider et al., 2015; Wang et al., 2020; Wiley et al., 2021). Moreover, the BEVI is recommended as an effective tool for assessing international education programs (Griffith et al., 2016; Roy, Wandschneider, & Steglitz, 2014).

By using the BEVI, I can assess diverse types of change related to TL dimensions in the typology, which better reflects the multidimensional and interdependent nature of TL. It is important to note that, like any quantitative instrument, the BEVI has limitations and cannot fully capture the breadth and depth of TL. However, it provides researchers and practitioners with a psychometrically sound tool to study and understand TL in new ways.

Instrument Format

The BEVI is a versatile web-based survey that takes approximately 30 minutes to complete (BEVI, n.d.a). It comprises of 40 demographic questions, 185 multiple-choice items, and three written response items, making it suitable for use in both stand-alone quantitative and mixed-methods research. The demographic questions are a combination of text entry and drop-down menu questions that capture background information about participants, such as their race, religion, country, educational status, level of interest in international education, and years of experience in international education. Completion of these demographic questions is mandatory for all participants.

The 185 multiple-choice items are all answered using a Likert scale. These items consist of actual belief and value statements collected from individuals worldwide (Shealy, 2016a). Participants respond to these items by selecting one of four options: Strongly Agree, Agree, Disagree, and Strongly Disagree. Notably, there is no neutral option because the BEVI assumes that people carry their beliefs, dispositions, and values with them, and these personal biases shape their responses. Participants are encouraged to respond to the items using their first instinct rather than overthinking their responses. The BEVI is often administered twice or more to capture changes in participants' beliefs, values, and attitudes before and after an experience, as well as the factors that contribute to greater or lesser levels of change (Acheson et al., 2022).

Scale Development History

The BEVI is a highly validated instrument with a robust developmental history spanning over 30 years. It has been administered over 70,000 times globally (BEVI, n.d.b). The instrument's construction involved gathering a large number of belief statements from real people worldwide, which were then subjected to structural equation modeling, including numerous iterations of factor analyses, to reduce the number of question items to 185. These items were organized into 17 scales that measure various types of individual change based on the results of factor analyses (Shealy, 2016a). Appendix A: BEVI Scales Definitions provides official definitions and examples of question items for the BEVI scales used in this research.

The BEVI is a reliable instrument, with Cronbach's Alpha estimates of item-scale reliability scores at 0.80 or higher and fitness indices from factor analyses above the recommended threshold (Shealy, 2016a). One notable initiative is the Forum BEVI Project, a six-year multi-institutional initiative focused on refining the BEVI's validity launched after the instrument's development (Wandschneider et al., 2015).

Scale Operationalization

The BEVI scales and the TL typology share an organic alignment, as the typology derives TL dimensions based on different types of learner change studied in the literature, while the BEVI scales were designed to assess different types of personal change. In this research, I use the BEVI scales to operationalize TL dimensions from the TL typology (see Appendix A: BEVI Scales Definitions). Operationalization refers to how theory is put into action for empirical research design to contribute to theoretical development, including how concepts are defined and which instruments are chosen to measure them (Pang et al., 2023, pp 79).

Two studies have already cross-walked the BEVI scales with the TL typology, providing a starting point for my research. Acheson et al. (2022) conducted the initial crosswalk between the TL typology by Hogan (2016) and the BEVI scales and verified the conceptual congruence between the TL dimensions and the BEVI scales using empirical reliability evidence (Cronbach's Alpha). Wiley et al. (2021) confirmed these results using a significantly larger dataset from the BEVI archive. Their findings suggest that the BEVI is a reliable instrument for TL assessment.

While these crosswalk studies represent a good starting point, they did not study the interdependence between TL dimensions, which is the focus of the current study. Understanding the interdependence between these dimensions is particularly illuminative and can significantly benefit TL and international education literature. I demonstrate the crosswalk between the BEVI scales and the TL dimensions in the following tables aligning the types of change associated with each TL dimension with summarized the definitions of the BEVI scales (original definitions are found in Appendix A: BEVI Scale Definitions). These summarized definitions were developed in collaboration with the leading author from the crosswalk study by Acheson et al. (2022) and myself, and are intended to concisely demonstrate the connections between BEVI scales and TL dimensions from the typology. They echo the original intent of the BEVI scales and reflect the common types of change studied in TL literature.

Note that two scales, Meaning Quest and Self Awareness, appear in several TL dimensions. While the former is about making meaning of life experiences, the latter is about understanding oneself, reflecting TL theory on perspective transformation (Mezirow, 1997) and consciousness expansion (Dirkx, 2012a). Additionally, the note "(reversed)" following three BEVI scales indicates that their summarized definitions describe the opposite of the original definitions. This is because the original definitions describe undesirable qualities, while TL

describes positive qualities. Reversing the direction of these scales is necessary for TL assessment, and has a minor empirical implication for data analysis, which is explained in more detail in Chapter Three on methodology.

Operationalizing Worldview. To operationalize Worldview as a TL dimension, the typology defines it as "significant changes in the way the learner understands the world and how it works" (Hoggan, 2016, p. 65). Worldview transformation is primarily concerned with perspective transformation, which involves changes in an individual's frames of reference towards the world. I use five BEVI scales to assess Worldview transformation by sampling five different types of change that contribute to changes in perspectives about the world.

1. Sociocultural Openness, which assesses changing perspectives by being open to difference,
2. Global Resonance, which assesses changing perspectives by engaging beyond local,
3. Ecological Resonance, which assesses changing perspectives by caring for nature,
4. Gender Traditionalism (reversed scale), which assesses changing perspectives by relaxing gender expectations, and
5. Religious Traditionalism (reversed scale), which assesses changing perspectives by accepting religious diversity.

Responses to these scales reflect individuals' beliefs, attitudes, and interpretations for diverse perspectives the world. Although these scales do not represent an exhaustive list of possible aspects from which individuals can transform their Worldview, they provide a comprehensive practical scope for assessment research.

Operationalizing Epistemology-Capacity. The TL dimensions of Epistemology and Capacity are combined into one due to their conceptual overlap (Acheson et al., 2022; Wiley et

al., 2021). Epistemology refers to individuals' "beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs." (Hoggan, 2016, p. 67). Capacity, on the other hand, refers to the "developmental outcomes whereby learners experience systematic, qualitative changes in their abilities that allow for greater complexity in the way they see, interpret, and function in the world" (Hoggan, 2016, p. 69). By combining these two concepts, I arrive at the notion of EpiCapacity, which I denote as the: developmental capacity to evaluate and construct knowledge in complex ways. Thus, transformation in EpiCapacity concerns how individuals change their ways of deriving knowledge.

The different types of change associated with Epistemology and Capacity highlight interdependence between the two TL dimensions. For example, becoming more critical about information received (a type of change in Epistemology) represents a form of cognitive development (a type of change from Capacity). Likewise, recognizing spirituality as an alternative way of deriving knowledge (types of change in Capacity) indicate individuals becoming more open to different methods of knowing including extra-rationality (a type of change from Epistemology).

To operationalize EpiCapacity, I use four BEVI scales that assess individuals' changing ways to derive their knowledge:

1. Socioemotional Convergence: Deriving knowledge socially by bridging oneself with others through nuance and empathy,
2. Self Awareness Meaning Quest: Deriving knowledge through self-examination by valuing complexity in the structures of the Self,

3. Meaning Quest: Deriving knowledge through self-examination by making meaning of life experiences, and
4. Basic Determinism (reversed scale): Deriving knowledge through complexity by avoiding simplistic judgements.

Responses to these BEVI scales reflect different methods individuals use to evaluate and construct knowledge in complex ways. Although these four BEVI scales do not represent an exhaustive list of all possible ways people derive knowledge, they assess four interdependent aspects of change that are congruent with TL theory.

Operationalizing Self. Self as a TL dimension refers to "a number of ways that learners experience a significant shift in their sense of self" (Hoggan, 2016, p. 66). This dimension encompasses various types of change, from changes in self-understanding and identity formation to shifts in personal narratives, personality, and meaning/purpose of life. These types of change are central to the TL theoretical perspective on consciousness expansion, which aims to help individuals achieve a "meaningful integrated life" (Boyd & Myers, 1988, p. 261). Consequently, transformation in Self pertains to the potential for individuals can change their sense of self.

To capture changes in the senses of self, six BEVI scales have been developed:

1. Meaning Quest: Changing sense of self by making meaning of life experiences,
2. Self Awareness: Changing sense of self by valuing complexity in the structures of Self,
3. Basic Openness: Changing sense of self by attending to one's inner world,
4. Identity Diffusion: Changing sense of self by accepting one's and others' sense of Self,
5. Needs Closure: Changing sense of self by coping with life challenges, and
6. Needs Fulfillment: Changing sense of self by meeting one's and others' needs.

These BEVI scales align with the types of learner change listed under the TL dimensions of Self, providing a comprehensive means of assessing this dimension.

Operationalizing Ontology. Ontology as a TL dimension refers to "the way a person exists in the world. It concerns the deeply established mental and emotional inclinations that affect the overall quality and tone of one's existence" (Hoggan, 2016, p. 67). While Ontology overlaps with Self and EpiCapacity, its distinctive feature is its strong emphasis on emotional change, particularly affective experiences. These types of change are discussed in the TL theory on consciousness expansion, which explores how individuals recognize and work with the unconscious dynamics that influence their consciousness and rationality (Boyd & Myers, 1988). Transformation in Ontology involves changing one's inclination for existence.

Four BEVI scales attempt to capture changing inclination for existence:

1. Emotional Attunement: Changing inclination to exist by accepting one' own and others' emotionality,
2. Physical Resonance: Changing inclination to exist by connecting with one' own body,
3. Meaning Quest: Changing inclination to exist by making meaning of life experiences, and
4. Self Awareness: Changing inclination to exist by valuing complexity in one's structures of self.

Responses to these BEVI scales reveal the different ways in which people experience life and exist in the world. While these scales do not represent an exhaustive list of potential types of learner change associated with existential inclination, they are congruent with the TL theory of consciousness expansion and provide a practical way to assess Ontology.

Operationalizing Behavior. No BEVI scales have been found to be conceptually valid for assessing Behavior (Acheson et al., 2022; Wiley et al., 2021). This is largely due to the highly contextual nature of certain types of behavior change, such as changes in professional practices, which are difficult to capture with a standardized assessment tool. While this could be considered a potential limitation of the BEVI instrument for assessing TL, it is important to note that Behavior as a TL dimension can still be meaningfully assessed through other TL dimensions.

For instance, the types of change associated with Behavior, as outlined by Hoggan (2016), can be seen as specific types of cognitive development (a type of change under Capacity), ways of being (a type of change under Ontology), or new understanding (a type of change under Worldview). Therefore, transformation in Behavior can be indirectly assessed through the assessment of other TL dimensions, which may offer a more comprehensive understanding of an individual's overall transformational journey.

It is worth noting that the typology author, Hoggan, has also considered alternative ways of organizing the TL dimensions. In fact, he is currently contemplating representing Capacity as the TL dimension in its broadest form, as it encompasses all other TL dimensions (from my conversation with him on November 29th, 2022). In this sense, all other TL dimensions could be subsumed under Capacity.

Summary

TL in international education is an emerging topic. While some scholars claim to assess TL, their focus is often on related but distinct concepts such as intercultural competence or global mindset. Furthermore, the bulk of empirical research on TL in international education has

relied on qualitative methods, indicating a need for more quantitative evidence to balance the literature.

TL theory is a broad metatheory that encompasses various theoretical perspectives, yet international education scholars tend to reference only one perspective, neglecting alternative dimensions of TL. In this study, I aim to address this gap by examining two perspectives that are particularly relevant in the context of international education. While they are complementary, each perspective highlights a unique type of transformation. To integrate these perspectives and outline key TL dimensions associated with them, I use the TL typology.

Finally, to empirically assess these dimensions, I identify a validated psychometric instrument that can be used to operationalize them. I demonstrate how TL dimensions can be quantitatively assessed using the scales from this instrument. Overall, this study offers a more comprehensive understanding of TL in the context of international education and provides a methodological framework for assessing TL dimensions in a more rigorous and systematic manner.

CHAPTER THREE: METHODOLOGY

This chapter details how I generate quantitative evidence about the interdependence between TL dimensions. The chapter has five sections. First, I describe the data from international education programs regarding sample size, source, format, and type. Second, I demonstrate my calculation of composite variables representing TL dimensions before showing the empirical evidence of the reliability and validity of those variables. Third, I discuss three control variables for improving accuracy when analyzing the TL variables. Fourth, I explain the two statistical models for the two research questions. Fifth, I disclose the potential limitations of this research.

Data

I analyze secondary data (n=1893) archived in the Beliefs, Events, and Values Inventory (BEVI) system. The data were collected from 37 higher education institutions across the United States, with the majority being four-year public universities. The data were collected from two types of international education programs: (1) short-term education abroad programs that involve international travel and (2) global curricula with no international travel. Although both types are considered international learning experiences, they are distinguishable by the presence or absence of international travel.

Data collection occurred between September 2010 and July 2017. The observations in the dataset contain identifiers for pre (T1) and post (T2) scores, enabling a time-lapsed comparison, and all observations include T1 and T2 data. Nearly all participants in the dataset identified as American citizens, with just over 2% (n=43) identifying differently. The data are scale-level, meaning they were already calculated using the item-level data by the BEVI system. The definitions of the scales used in the data are available in Appendix A: BEVI Scales Definitions.

Scale Data

Using the scale-level data in this study offers two distinct advantages. Firstly, the scores on the BEVI scales are calculated using a standardization procedure that involves a much larger sample population of over 20,000 individuals sampled from around the world (Shealy, 2016a). This procedure adds a more representative effect to the scale scores, which range between 0 to 100 and indicate where individual respondents position on the scale in comparison to the large population. For instance, a score of 47 on the Emotional Attunement scale means that the individual is above 47% percent of the BEVI population in terms of their capacity to attend to their own and others' emotions.

Secondly, using the scale-level data enables the extension of existing scholarly efforts. While item-level data is preferred for validating or confirming a measurement structure, such as confirmatory factor analysis, to assess whether a new dataset would produce a similar measurement structure, it is only necessary during the instrument development stage, which is not the focus of this research. The BEVI has already been validated for studying change (Shealy, 2016a), and recent studies have confirmed the reliability of using the BEVI scales to assess TL (Acheson et al., 2022; Wily et al., 2021).

Transformative Learning Variables

To study TL dimensions, I computed composite variables by taking the mean of select BEVI scale variables. The calculation was guided by previous studies that identified BEVI scales that are conceptually consistent and empirically reliable to operationalize TL dimensions from Hoggan's (2016) typology. These studies, referred to as “crosswalk” studies, were conducted by Acheson et al. (2022) and Wiley et al. (2021). Table 1 outlines the TL dimensions and their

corresponding BEVI scales. The calculated TL variables range from 0 to 100, which reflects the range of the BEVI scales used.

Table 1

Transformative Learning Variables

Transformative Learning Variables	BEVI Scales
Worldview: "Significant changes in the way the learner understands the world and how it works" (Hoggan, 2016, p. 65)	● Sociocultural Openness ● Ecological Resonance ● Global Resonance ● Gender Traditionalism (reversed) ● Religion Traditionalism (reversed)]
EpiCapacity: "Developmental capacity to evaluate and construct knowledge in complex ways" (original definition by me).	● Socioemotional Convergence ● Self Awareness ● Meaning Quest ● Basic Determinism (reversed)
Self: "A number of ways that learners experience a significant shift in their sense of self" (Hoggan, 2016, p. 66).	● Meaning Quest ● Needs Closure ● Needs Fulfillment ● Identity Diffusion ● Basic Openness ● Self Awareness
Ontology: "The way a person exists in the world. It concerns the deeply established mental and emotional inclinations that affect the overall quality and tone of one's existence" (Hoggan, 2016, p. 67).	● Meaning Quest ● Self Awareness ● Emotional Attunement ● Physical Resonance

Note. Left column contains the definitions for transformative learning dimensions. Right column contains the scales used to operationalize those dimensions.

To ensure that the composite variables accurately reflect the dimensions of TL theory, four scales were reversed prior to their inclusion in the calculation. These scales, namely Gender Traditionalism, Religion Traditionalism, Self Certitude, and Basic Determinism, assess negative attributes that are incongruent with the positive changes expected in TL theory. By reversing the scales, the high scores on these scales indicate desirable attributes, as expected in TL theory. For instance, the Gender Traditionalism scale measures a person's inclination to uphold traditional

perspectives on gender roles and responsibilities in society, while the reversed scale measures a person's tendency to avoid such traditional perspectives. Likewise, the Basic Determinism scale assesses the propensity to make biased decisions and jump to conclusions with limited information, whereas the reversed scale measures the tendency to think critically and avoid biased decisions. To reverse, each of the four original scale scores is deducted from 100. This is because 100 is the perfect score in the original BEVI scales. When reversing, 0 becomes the ideal score.

Reliability Evidence

To ensure the reliability of the composite variables representing the TL dimensions, I conducted a Cronbach's Alpha test on my dataset. The "crosswalk" studies by Acheson et al. (2022) and Wiley et al. (2021) had previously tested the reliability of the designated BEVI scales for each TL dimension using Cronbach's Alpha. However, reliability scores can be sample-dependent, so it was important to conduct the test on my dataset as well. In total, four alpha coefficients were calculated, and all were found to be within the recommended range for the Alpha coefficient (DeVellis, 2017). The T1 variable Alpha coefficients were used as a baseline for reliability, and the T2 variable coefficients showed minimal deviation from the T1 results.

The following are the Alpha coefficients for each TL dimension and their designated BEVI scales.

- Worldview ($\alpha = .75$):
    - Sociocultural Openness
    - Ecological Resonance
    - Global Resonance
    - Gender Traditionalism (reversed)

    - Religion Traditionalism (reversed)

- EpiCapacity (α = .76):
    - Socioemotional Convergence
    - Self-Awareness
    - Meaning Quest
    - Basic Determinism (reversed)

Previous research included Self Certitude (reversed) in EpiCapacity (Acheson et al., 2022; Wiley et al., 2021); however, its inclusion significantly lowered the Alpha coefficient for this dataset from .76 to .54. Given that reliability scores are sample-dependent, removing Self-Certitude (reversed) for this dataset was logical.

- Self (α = .74):
    - Meaning Quest
    - Needs Closure
    - Needs Fulfillment
    - Identity Diffusion
    - Basic Openness
    - Self-Awareness

Self-Awareness was not included in previous research (Acheson et al., 2022; Wiley et al., 2021). However, I included it in my study because its definition, which is valuing complexity in one's structures of self, is highly relevant to the construct of Self as an dimension of TL. Including this scale marginally improved the Alpha coefficient.

- Ontology (α = .78):

- Meaning Quest
- Self-Awareness
- Emotional Attunement
- Physical Resonance

Validity Evidence

The BEVI has been extensively validated for assessing change, but its use for operationalizing the TL typology has only been explored in the two crosswalk studies by Acheson et al. (2022) and Wiley et al. (2021). To provide criterion validity l evidence for using the BEVI to operationalize TL typology, I use variables related to TL within the same dataset.

I use three BEVI questions to inquire about students' planned, current, and previous participation in international or multicultural activities. These questions prompt respondents to select all appropriate options to indicate the number of international or multicultural activities they have participated in. My assumption is that if students' answers for the three questions add up to a higher number of international and multicultural activities, they have experienced a positive impact, indicating potential TL.

For instance, one question asks students about their plans: "Do you plan to participate in any of the following international/multicultural, service, study abroad, travel, or work experiences (click all that apply)?" Respondents can choose from 15 options that list different types of activities: from 0 representing “I do not plan to participate in any of these experiences”; 3 representing “participation in a course with an international or multicultural focus”; 7 representing “study abroad”; 11 representing “work abroad”; to 14 representing “participation in off-campus international or multicultural events”.

I then generated a sum variable for this question to count the total number of options checked by each respondent. If a respondent plans to participate in five types of activities, the number counted for that individual in this variable is five. The sum variables were then correlated with all the TL dimension variables to see whether TL variables are positively associated with students' desire to seek more international or multicultural activities.

I calculated three sum variables for the T1 data and three for the T2 data, resulting in a total of six sum variables: (1) the number of total activities for current participations at T1, (2) the number of total activities for current participations at T2, (3) the number of total activities for planned participation at T1, (4) the number of total activities for planned participation at T2, (5) the number of total activities for previous participation at T1. (6) the number of total activities for previous participation at T2.

I correlated these sum variables with the four TL variables and presented the results in Appendix B: Validity Evidence: Matrices of Correlation. All correlation coefficients are positive, with most being moderate in size and some as high as .83. These coefficients indicate that students who demonstrated gains in TL variables also reported higher numbers of international and multicultural activities they have participated in. The results demonstrate that more international and multicultural activities are positively associated with higher scores in the TL variables, providing criterion validity evidence for using the BEVI to assess TL.

Control Variables

In this study, the three control variables analyzed are program type, sex, and race. They are categorical variables and are analyzed using dummy variables. Dummy regression is used to compare groups, where one group from the dummy variable serves as a reference group, and regression coefficients from the dummy variables are estimated as the difference between the

reference group and the group being compared (Schroeder et al., 2016, p. 57). The size of the difference is based on the unit of the dependent variable (Schroeder et al., 2016, p. 58).

The program type variable was initially coded with four categories, but due to the small sample sizes of multicultural living-learning community and multicultural programming, they were removed from the dataset. The variable was then re-coded as a binary variable, where 0 represents study abroad, and 1 represents a global curriculum. Both program types are internationally oriented learning experiences, but study abroad involves traveling to a foreign destination, while a global curriculum is a home-based learning experience with internationally oriented course content.

The sex variable was initially coded with two categories, but the dataset contained invalid responses, which were removed. The variable was then re-coded as a binary variable, where 0 represents male, and 1 represents female, to ensure consistency in binary dummy variable analyses throughout the study.

The race variable initially had nine categories, but due to the small sample sizes of some groups, they were re-coded into a new group as "Other." The race variable was then re-coded as a categorical variable with four categories, where 0 represents White, 1 represents Black/African American, 2 represents Other, and 3 represents Asian. A detailed discussion about the decision-making of re-coding the race variable is provided next. A sensitivity test was conducted to compare the two ways of coding the race variable, and it showed that re-coding did not impact statistical analyses (detail in Chapter Four).

Other Category in The Race Variable

There are different perspectives on the inclusion of the "other" category in a race variable. Some scholars argue that this category can be a useful addition to capture diversity and

complexity in racial identification. For instance, some individuals may not identify with the available racial categories or have mixed racial backgrounds, making it challenging to fit into one category. The "other" category can provide a space for these individuals to express their unique racial identities (Gee & Ford, 2011).

However, other scholars argue that the "other" category can be problematic because it homogenizes diverse experiences and identities. This category can also reinforce the misrepresentation of individuals who do not fit into the existing racial categories. Creating an "other" category may also perpetuate the dominant group's power and reinforce the binary conception of race (Williams & Mohammed, 2009).

The inclusion of the "other" category in a race variable remains a contentious issue. In my data, the numbers of individuals who selected certain categories such as Native Hawaiian/Pacific Islander and American Indian/Alaskan Native are simply too small to draw any statistical inferences. Thus, I consider combining these categories into the "other" category as necessary, although this decision is not ideal when bearing in mind the contentious issue associated with the “other” category. Thus, I acknowledge the potential limitations associated with my decision.

I recommend future quantitative TL research to collect more detailed data on the specific racial and ethnic identities of individuals. This would enable researchers to analyze the data more granularly, alleviating the issues associated with the "other" category. A potential solution could be the usage of an intersectional approach that considers multiple dimensions of identity beyond race/ethnicity, such as gender, sexual orientation, and socioeconomic status, to gain a better understanding of how identities intersect (Warner, 2008). In this research, I analyzed variables of race and sex because they are very important for educational research (Collins, 2000; Ladson-

Billings, 2009). Program type as another demographic variable is also important for my research context in international education. While I did not explicitly explore the intersection between these variables, future research could utilize intersectional approaches to study their racial and ethnic implications for TL in international education.

Statistical Models

In this study, I use Seemingly Unrelated Regression (SUR) to explore the two research questions. SUR is a multivariate procedure that is utilized when multiple dependent variables are examined in one model, and there is a concern about correlated dependent variables and their residuals among univariate regression models (Raykov & Marcoulides, 2008). As TL dimensions are conceptualized as related, this concern is validated empirically through correlation matrices shown in Appendix C: Transformative Learning Dimensions Correlations.

While univariate regression is a common technique to establish relationships among variables, it is not suitable when multiple related dependent variables are studied together, as is the case with TL dimensions. In contrast, SUR is capable of accounting for residual correlations and explaining the proportion of variance caused by interactions between multiple dependent variables. The residuals from the regression models are uniquely identified to calculate their covariances. The coefficients produced by the SUR model will differ from those generated by individual univariate regressions. I conducted a sensitivity test to compare the coefficients from the SUR model and those from univariate regression, and the results confirm the difference (see Chapter Four).

To explore the multidimensional nature of TL, I created two SUR models, one for each research question. The four dependent variables in both models represent the difference between TL T2 and T1 variables.

Primary Question

The following model explores the extent to which changes in four different TL dimensions (Worldview, EpiCapacity, Self, and Ontology) are interdependent, while controlling for demographic variables (Sex, Race, and Program type). The model is a SUR model, which allows for correlations among the dependent variables and residuals from all the regressions. The equations for the four regressions are presented below.

$$Y_{Worldview_{t2-t1}} = \beta_0^1 + \beta_1^1 EpiCapacity_{t2-t1} + \beta_2^1 Self_{t2-t1} + \beta_3^1 Ontology_{t2-t1} + \beta_4^1 Sex + \beta_5^1 Race + \beta_6^1 Program\ type + \varepsilon^1$$

$$Y_{EpiCapacity_{t2-t1}} = \beta_0^2 + \beta_1^2 Worldview_{t2-t1} + \beta_2^2 Self_{t2-t1} + \beta_3^2 Ontology_{t2-t1} + \beta_4^2 Sex + \beta_5^2 Race + \beta_6^2 Program\ type + \varepsilon^2$$

$$Y_{Self_{t2-t1}} = \beta_0^3 + \beta_1^3 Worldview_{t2-t1} + \beta_2^3 EpiCapacity_{t2-t1} + \beta_3^3 Ontology_{t2-t1} + \beta_4^3 Sex + \beta_5^3 Race + \beta_6^3 Program\ type + \varepsilon^3$$

$$Y_{Ontology_{t2-t1}} = \beta_0^4 + \beta_1^4 Worldview_{t2-t1} + \beta_2^4 EpiCapacity_{t2-t1} + \beta_3^4 Self_{t2-t1} + \beta_4^4 Sex + \beta_5^4 Race + \beta_6^4 Program\ type + \varepsilon^4$$

$$cov(\varepsilon^1, \varepsilon^2) \neq 0;\ cov(\varepsilon^1, \varepsilon^3) \neq 0;\ cov(\varepsilon^1, \varepsilon^4) \neq 0;$$
$$cov(\varepsilon^2, \varepsilon^3) \neq 0;\ cov(\varepsilon^2, \varepsilon^4) \neq 0;\ cov(\varepsilon^3, \varepsilon^4) \neq 0$$

In each regression equation, the left side (Y) represents the change score for the dependent variable, which is calculated as the difference between the T1 and T2 variables for TL dimension. On the right side, the intercept (β_0) indicates the value of the change score if all other independent variables are 0. The coefficients (β_1 to β_6) represent the degree to which each independent variable (EpiCapacity, Self, Ontology, Sex, Race, and Program type) explains the change in the dependent variable, while holding all other variables constant. The subscripts indicate which independent variable the coefficient refers to, while the superscripts indicate which regression equation the coefficient belongs to.

The control variables Sex, Race, and Program type are included to ensure that the estimates for the TL variables are not confounded by demographic factors. The residuals (ε) represent the unexplained variation in the dependent variable, after accounting for the effects of the independent variables. Each regression has a unique set of residuals (ε^1 to ε^4), which are not

independent due to the correlations among the dependent variables, precisely the reason for using SUR. To account for these correlations, the model includes six covariance terms (cov), which indicate the degree of association between the residuals from each regression. Specifically, $cov(\varepsilon^1,\varepsilon^2)$, $cov(\varepsilon^1,\varepsilon^3)$, $cov(\varepsilon^1,\varepsilon^4)$, $cov(\varepsilon^2,\varepsilon^3)$, $cov(\varepsilon^2,\varepsilon^4)$, $cov(\varepsilon^3,\varepsilon^4)$ are not equal to zero, thus the need for using SUR.

Secondary Question

This SUR model aims to understand how T1 variables impact T2-T1 variables. T1 variables represent students' baseline characteristics in TL dimensions, while T2-T1 represent the difference in TL dimension between pre- and post-results. It is important to account for these baseline characteristics as not all students will change in the same direction or to the same extent as a result of international education experiences (Wang et al., 2020). By including T1 variables in the model, researchers can more accurately understand changes in TL variables.

The model includes six independent variables in each equation, which represent students' baseline characteristics in the TL dimensions, and control for demographic variables of sex, race, and program type. The model also assumes that the error terms in each equation are correlated, which is indicated by the non-zero covariances between the error terms.

$$Y_{Worldview_{t2-t1}} = \beta_0^1 + \beta_1^1 EpiCapacity_{t1} + \beta_2^1 Self_{t1} + \beta_3^1 Ontology_{t1} + \beta_4^1 Sex + \beta_5^1 Race + \beta_6^1 Program\ type + \varepsilon^1$$

$$Y_{EpiCapacity_{t2-t1}} = \beta_0^2 + \beta_1^2 Worldview_{t1} + \beta_2^2 Self_{t1} + \beta_3^2 Ontology_{t1} + \beta_4^2 Sex + \beta_5^2 Race + \beta_6^2 Program\ type + \varepsilon^2$$

$$Y_{Self_{t2-t1}} = \beta_0^3 + \beta_1^3 Worldview_{t1} + \beta_2^3 EpiCapacity_{t1} + \beta_3^3 Ontology_{t1} + \beta_4^3 Sex + \beta_5^3 Race + \beta_6^3 Program\ type + \varepsilon^3$$

$$Y_{Ontology_{t2-t1}} = \beta_0^4 + \beta_1^4 Worldview_{t1} + \beta_2^4 EpiCapacity_{t1} + \beta_3^4 Self_{t1} + \beta_4^4 Sex + \beta_5^4 Race + \beta_6^4 Program\ type + \varepsilon^4$$

$$cov\ (\varepsilon^1, \varepsilon^2) \neq 0;\ cov\ (\varepsilon^1, \varepsilon^3) \neq 0;\ cov(\varepsilon^1, \varepsilon^4) \neq 0;\ cov\ (\varepsilon^2, \varepsilon^3) \neq 0;\ cov(\varepsilon^2, \varepsilon^4) \neq 0;\ cov(\varepsilon^3, \varepsilon^4) \neq 0$$

In interpreting the SUR model, the logic is similar to the first model, except that the independent variables now represent students' baseline characteristics in TL dimensions. For

instance, the first regression explores how much change in Worldview is explained by the baseline characteristics in EpiCapacity, Self, and Ontology, while controlling for demographic variables of sex, race, and program type. It is worth noting that T1 variables could not be included in the first SUR model due to potential collinearity issues with the T2-T1 variables (Schroeder et al., 2027).

Limitations

The purpose of this research is not to explore TL from a first-person perspective, which is the conventional approach in TL empirical literature. However, this means that some contextual and personal nuances may be left out. For example, qualitative studies often focus on meaning-making about international education experiences, which is not explored in this research. Quantitative research generally falls short in capturing participants' perspectives compared to qualitative research. Nevertheless, this research is part of an emerging effort to quantify TL assessment and advance the field with new perspectives.

The secondary data used in this research has limitations. Information on the data collection process and sampling method is lacking, and the random sampling assumption was not tested. However, the survey instrument is administered only by certified individuals, who are instructed to debrief the instrument before and after administering it. The quality of these debriefing sessions is unclear, and low-quality sessions could have confused participants. Despite this, the survey includes two built-in reliability scales to detect irresponsible entries, and all observations included in this research are above the suggested reliability threshold recommended by the BEVI.

The data were collected from an American-centric population, with less than twenty individuals who self-identified as non-Americans. The racial and gender breakdowns of the

respondents in this research reflect the American context for studying abroad. The majority (n=1210; 64%) of the respondents in this research are White, followed by Asian (n=317; 17%) and Black (n=139; 7%). The majority are females (61%) then males (39%). While the findings are primarily based on American students, the goal is to understand the meaning of TL in general.

During composite variable calculation, it may be logical to assume that BEVI scales do not equally contribute to the TL dimensions. However, differential weighing was not used due to insufficient literature support. Averaging the scale scores could be a potential limitation, but it is currently the best strategy. Future studies could focus on exploring the relationship between individual TL dimensions and its constituent BEVI scales for a more 'zoomed-in' exploration.

Summary

The data in this research come from international education programs in the United States. I calculated composite variables representing TL dimensions using scale data from the BEVI. To improve the accuracy of the regression analysis, I added program type, race, and sex as control variables. In the subsequent chapter, I discuss the regression findings in detail.

CHAPTER FOUR: FINDINGS

My primary research question examines the interdependence between changes in transformative learning (TL) dimensions. Given the multidimensional nature of TL (Hoggan, 2016), changes in one dimension are likely to affect other dimensions (Acheson et al., 2022). However, there is a lack of empirical evidence to support this interdependence. The findings of this study reveal that TL is indeed an interdependent change network for students participating in international education programs.

The secondary research question aims to understand the association between changes in TL dimensions and the baseline characteristics of TL. It is crucial to account for students' baseline characteristics as not all students change in the same direction and to the same extent from international education programs. (Wang et al., 2020). The results demonstrate that specific baseline characteristics of TL are significantly associated with changes in TL dimensions.

To answer these research questions, I have analyzed time series and disaggregated data (n=1893) from international education programs using Stata 16 software. In this chapter, I present three sections. First, I provide descriptive statistics to help readers understand the variable distributions and justify the use of regression. Second, I discuss the statistical findings for the two research questions. Third, I illustrate the results of two sensitivity tests to demonstrate appropriate decision-making in re-coding one variable and using multivariate regression to analyze the data.

Descriptive Statistics

In this section, I discuss the distributions of the (a) TL variables and (b) control variables before showing their (c) correlation coefficients.

Transformative Learning Variables

Three main observations are as follows. First, the means for TL variables indicate that students experience a mild change overall. However, this result warrants further statistical investigation to understand the interdependence between those dimensions. Second, the means for TL variables also suggest that students tend to experience a negative direction of change, returning to lower levels in TL dimensions after their international education experience. This finding underscores the complexity of student change in international education. Third, the maximums and minimums for TL variables indicate that individual students experience drastic changes in TL dimensions, either positive or negative. This finding emphasizes the importance of recognizing and accounting for individual differences when evaluating the impact of international education.

Table 2

Transformative Learning Variables (T1)

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Worldview (T1)	1893	56.8	56.4	19.8	3.6	96.4
EpiCapacity (T1)	1893	57.9	58.8	20.5	5.0	98.0
Self (T1)	1893	47.3	46.5	18.1	.3	99.2
Ontology (T1)	1893	61.9	62.3	17.9	8.8	98.5

Note. Descriptive statistics for T1 TL variables.

Table 2 presents 1893 observations for pre-test TL variables, labeled as T1 variables moving forward. The means of T1 variables range from approximately 47 to 57, sitting around the middle of the BEVI scale range (0-100), as expected. The standard deviations range around 20. The minimums are close to 0, and the maximums are almost 100, which aligns with the

BEVI scale range. Appendix D: Histograms Transformative Learning Variables (T1) shows the histograms that visually demonstrate the data distribution for the T1 variables. These variables exhibit a symmetric normal distribution, with a few bins above the standard bell curve. However, Worldview, EpiCapacity, and Ontology show some mild left (negative) skewness, suggesting a few extreme values on the left tail stretch out the distribution. Overall, the majority of the observations occupy regions around the center, indicating a generally consistent data distribution.

Table 3

Transformative Learning Variables (T2)

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Worldview (T2)	1893	56.4	55.8	19.8	1.2	96.0
EpiCapacity (T2)	1893	54.1	53.5	21.2	1.0	97.8
Self (T2)	1893	47.5	46.5	17.8	.2	99.2
Ontology (T2)	1893	60.6	61.0	18.0	1.8	98.0

Note. Descriptive statistics for T2 TL variables.

Table 3 presents the descriptive statistics for the post-test TL variables, referred to as T2 variables in this study. The means for all T2 variables range from approximately 47 to 60, which is similar to the range observed for the T1 variables. The standard deviations for the T2 variables are also around 20, and the minimums and maximums are almost identical to the T1 variables. The distributions of the T2 variables are depicted in Appendix E: Histograms Transformative Learning Variables (T2). While the distributions for Worldview and Ontology are slightly left-skewed, Self shows a mild degree of right-skewness. EpiCapacity has a more symmetrical distribution. Most observations for all T2 variables are situated around the center, indicating no

extreme changes for the majority of students. However, one noticeable difference between the T1 and T2 distributions is the presence of at least one exceptionally high histogram bin above the normal bell curve for each T2 variable. This suggests that some students experience significant changes after their international education experience.

Table 4

Transformative Learning Variables (T2-T1)

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Worldview (T2-T1)	1893	-.4	0.4	12.0	-76.6	53.6
EpiCapacity (T2-T1)	1893	-3.8	-2.3	15.5	-76.0	56.8
Self (T2-T1)	1893	.2	0.2	14.4	-79.2	88.2
Ontology (T2-T1)	1893	-1.3	-0.5	13.8	-73.8	79.5

Note. Descriptive statistics for the difference between T2 and T1 TL variables.

Table 4 presents the TL variables that represent the difference between T2 and T1 (denoted as T2-T1). The means for three out of four T2-T1 variables are close to zero, indicating that, on average, students exhibit mild changes in the TL dimensions after participating in international education programs. This is expected, given the short-term duration of the programs. However, the means are slightly negative, suggesting that students tend to revert to lower levels in the TL dimensions, which is intriguing in the negative direction for those changes.

The minimum and maximum values of the T2-T1 variables deserve attention. For instance, the highest absolute minimum value is 79.2, and the maximum value is 88.17. These large values suggest that some individuals have experienced significant changes in the four TL variables, but such changes are not widespread. The range for T2-T1 variables is between -100

and 100, which means that the large minimums and maximums indicate that some students have almost switched their position on the variable scale from one end to the other. However, these extreme values are individual-specific and not generalizable.

The histograms for the T2-T1 variables are much more narrowly distributed than those for T1 and T2 variables. Please see Appendix F: Histograms Transformative Learning Variables (T2-T1). The high degree of symmetry suggests that students are evenly divided between the negative and positive directions of change. The narrow distribution is mainly due to the scale range, which is twice that of the T1 and T2 variables. The histograms exhibit positive kurtosis, indicating that most observations are densely distributed around the center, with the density decreasing substantially toward each end of the horizontal axis. Two of the four histograms (Worldview and EpiCapacity) appear left-skewed, corresponding to the minimum and maximum values, as the minimums for these variables tend to be higher in absolute value than their maximums. However, given the sample size and the overall normal data distribution, kurtosis and skewness are not a concern.

Control Variables

To enhance the internal validity of the study and limit the influence of confounding variables (Schroeder et al., 2016), I included three categorical control variables. Statistically, the control variables partition out the variance not explained by the independent variables. The following table reports the frequency and percentage for each category in the control variables.

Table 5 shows that program type is a binary variable, with a relatively even distribution between the two categories. The study abroad category has 1081 observations, accounting for 57% of the total, while the global curriculum category has 812 observations, accounting for 43%.

Table 5

Program Type

	Freq.	Percent
Study abroad	1081	57
Global curriculum	812	43
Total	1893	100

Note. Descriptive statistics for the control variable program type.

Table 6 presents the distribution of the binary variable sex. The sample is not as evenly distributed as the program type variable. Specifically, there are 739 observations (39%) in the male category and 1154 observations (61%) in the female category.

Table 6

Sex

	Freq.	Percent
Male	739	39
Female	1154	61
Total	1893	100

Note. Descriptive statistics for the control variable sex.

Table 7 shows the initial categorical breakdown for the race variable, which includes nine categories. Some categories have significantly smaller sample size, including American Indian/Alaskan Native (n=8, 0.4%), Hispanic/Latino (n=61, 3%), Native Hawaiian/Pacific Islander (n=2, 0.1%), Multiracial (n=34, 2%), and Unknown (n=37, 2%). Due to their considerably smaller sample sizes, a re-coding of the race variable was performed, combining all

those categories into the category Other. The resulting breakdown of the re-coded race variable is shown in Table 8. I conducted a sensitivity test to evaluate the impact of the re-coding on the analytical results, and it showed no effect (later in this chapter).

Table 7

Original Race Categories

	Freq.	Percent
Black/African-American	139	7
American Indian/Alaskan Native	8	0.4
Asian	317	17
White	1210	64
Hispanic/Latino	61	3
Other	85	4
Native Hawaiian/Pacific Islander	2	0.1
Multiracial	34	2
Unknown	37	2
Total	1893	100

Note. Descriptive statistics for the control variable race in its original categories.

Table 8 displays the distribution of race among the study participants, which now has four categories after combining. The largest group is comprised of White students (n=1210, 64%), followed by Asian students (n=317, 17%), with Other (n=227, 12%) and Black students (n=139, 7%) representing smaller percentages of the sample. It is worth noting that the sample is not representative of the overall population in terms of racial diversity, as the proportion of

White students is much higher than that of Asian, Black, or Other students. Nevertheless, this variable was included to partition out potential influence of race on the TL variables.

Table 8

Combined Race Categories

	Freq.	Percent
Black/African-American	139	7
Other	227	12
Asian	317	17
White	1210	64
Total	1893	100

Note. Descriptive statistics for the control variable race in its combined categories.

Correlations

Table 9 presents correlation coefficients among all variables analyzed in the research questions, providing initial insights into the interdependence between TL variables and showing the co-varying relationships between them. The following key findings emerged from the analysis:

In the top-left section of Table 9 shows positive coefficients among the T2-T1 variables, indicating that as the value of one variable increases, the others also tend to increase, or vice versa. The moderate (r=0.312, 0.434, and 0.577) and strong (r=0.770 and 0.778) coefficients suggest that these changes are moderate to extensive. The only exception is the correlation coefficient between Self and Worldview, which is weak (r=0.054). All coefficients are also statistically significant.

Moving to the bottom-right section, the coefficients among the T1 variables are also positive, indicating that as the value of one variable increases, the others also tend to increase, or vice versa. The coefficients are moderate (r=0.263, 0.473, 0.558, and 0.649) to strong (r= 0.816 and 0.835), suggesting that students' baseline characteristics in TL dimensions are correlated. All coefficients are also statistically significant.

However, the bottom-left section shows negative coefficients between the T2-T1 and T1 variables, indicating that as the value of one variable increases, the others tend to decrease, or vice versa. The coefficient sizes range from small (e.g., -0.013 and -0.077) to moderate (e.g., -0.383 and -0.414), suggesting they are not strongly correlated. Nearly all coefficients are statistically significant.

The scatterplots in Appendix G support these findings, with strong linear relationships among the T2-T1 and T1 variables themselves, but relatively weak correlations between the T2-T1 and T1 variables. Nonetheless, the coefficients between them are all statistically significant. Additionally, a potential explanation for their negative coefficient is that there is a possible ceiling effect where students with higher baseline TL characteristics experience fewer changes in TL dimensions.

Control variables demonstrate only weak correlations among themselves and with a few T1 variables, suggesting very little to no concern for confounding effect for the regression analysis.

Table 9

Correlation Coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Worldview T2-T1	1.000										
(2) EpiCapacity T2-T1	0.577***	1.000									
(3) Self T2-T1	0.054**	0.434***	1.000								
(4) Ontology T2-T1	0.312***	0.770***	0.778***	1.000							
(5) Worldview T1	-0.302***	-0.128***	-0.076***	-0.102***	1.000						
(6) EpiCapacity T1	-0.143***	-0.327***	-0.242***	-0.295***	0.649***	1.000					
(7) Self T1	-0.013	-0.157***	-0.414***	-0.295***	0.263***	0.558***	1.000				
(8) OntologyT1	-0.077***	-0.260***	-0.346***	-0.383***	0.473***	0.835***	0.816***	1.000			
(9) Program type	0.025	-0.001	0.020	0.004	-0.311***	-0.195***	-0.009	-0.094***	1.000		
(10) Sex	0.005	-0.007	-0.075***	-0.059***	0.271***	0.303***	0.191***	0.299***	-0.199***	1.000	
(11) Race (combined)	-0.030	-0.016	0.025	-0.007	-0.011	-0.035	-0.196***	-0.063***	-0.003	-0.074***	1.000

*** p<0.01, ** p<0.05, * p<0.1

Note. Correlation coefficients among all variables analyzed in this study.

Statistical Findings

In this section, I present the findings for the two research questions, which are analyzed using Seemingly Unrelated Regression (SUR) due to the high interrelatedness of TL dimensions (Acheson et al., 2022). The research questions are:

- Primary: To what extent are changes in TL dimensions interdependent?
- Secondary: How are baseline TL characteristics associated with changes in TL dimensions?

To evaluate the results, I discuss two aspects:

First, I discuss the coefficient of determination (r^2) to assess the extent to which the independent variables explain the variation in the dependent variables (Schroeder, Sjoquist & Stephan, 2016, p. 19). The range for r^2 is 0 to 1, with higher values indicating better model fitness or stronger explanatory power of the independent variables. However, since evaluating regression requires more than just r^2, I also discuss regression coefficients.

Second, I discuss regression coefficients (r) in terms of their significance levels, sizes, and directions. The conventional significance level of p=0.05 is used in social science research (Schroeder et al., 2016). The regression coefficients are critical in illuminating the interdependence between TL dimensions because they estimate the effect of each variable while holding the other variables constant (Schroeder et al., 2016, pp. 22-23). First, I evaluate the TL variables, followed by the control variables.

Primary Question: Interdependence

The results from the SUR model for this research question suggest that changes (T2-T1) in TL dimensions are highly interdependent, as indicated by the significant r^2 values.

Specifically, the r^2 values are 0.350 for Worldview, 0.708 for EpiCapacity, 0.659 for Self, and 0.814 for Ontology. These values suggest that changes in TL dimension are highly explanatory of each other, indicating the presence of an interdependent change network. For instance, the r^2 value for EpiCapacity indicates that variations in Worldview, Self, and Ontology together are explanatory for 66% of changes in EpiCapacity. Similarly, the larger r^2 value for Ontology indicates that changes in Worldview, EpiCapacity, and Self together are explanatory for over 80% of changes in Ontology. Even the modest r^2 value for Worldview suggests that changes in other TL dimensions effectively explain 35% of its variation. To further explore the interdependence between TL dimensions, the regression coefficient for each independent variable is examined next.

Table 10

Regression Coefficient: Primary Question

VARIABLES	(1) Worldview (T2-T1)	(2) EpiCapacity (T2-T1)	(3) Self (T2-T1)	(4) Ontology (T2-T1)
Worldview (T2-T1)		0.580***	-0.069***	-0.136***
		(0.014)	(0.019)	(0.013)
EpiCapacity (T2-T1)	0.846***		-0.525***	0.578***
	(0.021)		(0.020)	(0.009)
Self (T2-T1)	-0.092***	-0.480***		0.618***
	(0.026)	(0.019)		(0.008)
Ontology (T2-T1)	-0.387***	1.130***	1.322***	
	(0.036)	(0.018)	(0.017)	
Program type	0.346	0.140	0.576	-0.324
	(0.459)	(0.380)	(0.398)	(0.272)
Sex	-0.551	0.648*	0.086	-0.286
	(0.457)	(0.378)	(0.395)	(0.270)
Black/African-American	1.702**	-1.754**	-1.525**	1.215**
	(0.856)	(0.709)	(0.741)	(0.507)
Other	-0.401	-0.034	-0.329	0.194
	(0.684)	(0.566)	(0.593)	(0.405)

Table 10 (cont'd)

Asian	-1.030*	0.920*	-0.003	-0.313
	(0.602)	(0.498)	(0.521)	(0.356)
Constant	2.580***	-2.489***	-0.302	1.000***
	(0.470)	(0.386)	(0.409)	(0.278)
Observations	1,893	1,893	1,893	1,893
R-squared	0.350	0.708	0.659	0.814

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note. Regression coefficients for the variables studied in the primary question.

The regression coefficients measure how changes in one TL dimension (independent variable) are associated with changes in another TL dimension (dependent variable), while controlling for other variables. As a result, they provide insight into the interdependent nature of TL dimensions. In the SUR model used for the primary research question, all T2-T1 variables serve as both dependent and independent variables, revealing the interdependence of changes across dimensions.

Table 10 displays the regression coefficients for the primary question, and it is clear that TL dimensions are interdependent with one another. When Worldview is the dependent variable, the coefficient for EpiCapacity is positive ($r=0.846$, $p<0.0001$), while the coefficients for Self ($r=-0.092$, $p<0.0001$) and Ontology ($r=-0.387$, $p<0.0001$) are negative. When EpiCapacity is the dependent variable, the coefficients for Worldview ($r=0.580$, $p<0.0001$) and Ontology ($r=1.130$, $p<0.0001$) are positive, while the coefficient for Self is negative ($r=-.480$, $p<0.0001$). When Self is the dependent variable, the coefficients for Worldview ($r=-0.0692$, $p<0.0001$) and EpiCapacity ($r=-0.525$, $p<0.0001$) are negative, while the coefficient for Ontology is positive ($r=1.322$, $p<0.0001$). When Ontology is the dependent variable, the coefficients for EpiCapacity ($r=0.578$,

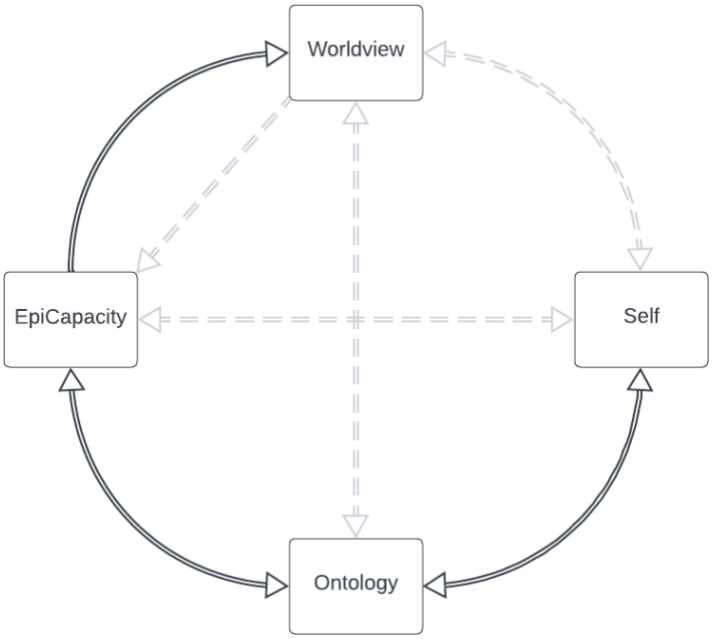
p<0.0001) and Self (r=0.618, p<0.0001) are positive, while the coefficient for Worldview is negative (-0.136, p<0.0001).

Overall, the results indicate that TL dimensions are highly interdependent, and changes in one dimension are likely to involve a simultaneous change network across all dimensions.

The pattern of interdependence between TL dimensions is highlighted in the regression coefficients, where one regressor often has a larger coefficient value for each dependent variable. This indicates that a one-unit change in that regressor corresponds to the most change observed in the dependent variable. Figure 1 provides a visual representation of this pattern. However, it is important to note that the arrows in Figure 1 do not represent feedback loops or causality but are used to emphasize the interdependence between TL dimensions.

Figure 1

An Interdependent Network of Change



Note. All arrows darkened or faded represent statistically significant regression coefficients.

The darkened arrows in Figure 1 represent the largest regressor to the TL dimension it points to. For example, Ontology and Self are the largest regressors of each other, meaning they carry the largest regression coefficient to each other, thus explaining the largest proportion of variance in the regression. This relationship is also observed between Ontology and EpiCapacity. Additionally, EpiCapacity is the largest regressor to Worldview, indicating that change in EpiCapacity explains the largest proportion of variance in Worldview, making them highly interdependent.

On the other hand, the faded arrows in Figure 1 represent smaller coefficients, indicating that they have less impact on the dependent variable. Despite their smaller coefficient values, all regression coefficients are statistically significant ($p<0.0001$).

The interdependent change network illustrated in Figure 1 has important implications for the international education literature. For instance, constructs associated with student changes in Worldview, such as intercultural competence and global mindset, are commonly studied by scholars. However, this study reveals that changes in Worldview are only one part of a change network, and more research is needed to explore the interdependence between TL dimensions. These implications are further discussed in the following chapter.

Regarding the three control variables, the study finds that there is no statistically significant difference between male and female students and between study abroad and global curriculum with regards to student changes in TL dimensions. However, there is a significant difference between Black and White students.

For the variable program type, the coefficients indicate the difference between study abroad (reference group) and global curriculum regarding student change in TL dimensions. None of the four coefficients are statistically significant at a p-value cutoff of 0.05, meaning

there is no significant difference between the two program types when it comes to experiencing changes in TL dimensions.

For the variable sex, the coefficients indicate the difference between males (reference group) and females regarding student change in TL dimensions. None of the four coefficients are statistically significant at a p-value cutoff of 0.05, meaning there is no significant difference between males and females when it comes to experiencing changes in TL dimensions.

For the variable race, the coefficients indicate the differences between White (reference group) and other racial categories of Black/African-American, Asian, and Other in terms of student change in TL dimensions. Only the coefficient for Black/African-American is statistically significant across the four regressions, meaning there is a significant difference between how White and Black students experience changes in TL dimensions.

In summary, the findings highlight the interdependent nature of TL dimensions and the need for further research to explore this interdependence. It also sheds light on the differences in how different racial groups experience changes in TL dimensions.

Secondary Question: Baseline Characteristics

The SUR model for this question examines the relationship between the T1 TL and T2-T1 variables. Overall, the findings suggest that specific baseline characteristics of students in TL are significantly related to changes in the TL dimensions. However, the r^2 values in this model were lower compared to the previous question, with values of -0.010 (Worldview), 0.025 (EpiCapacity), 0.082 (Self), and 0.065 (Ontology), indicating a lower predictive power for the model.

It's worth noting that the second SUR model (with Worldview as the dependent variable) had a negative r^2 value, which requires further examination. While r^2 is commonly used to

evaluate univariate regression, caution must be exercised when examining its value in a multivariate model like SUR, where residuals are correlated across multiple regressions. In this case, the r^2 value of -0.010 is negative but close to 0, so it's not a concern. Nonetheless, to draw conclusions about baseline TL characteristics, the regression coefficients in Table 22 must be scrutinized.

Table 11

Regression Coefficient: Secondary Question

VARIABLES	(1) Worldview (T2-T1)	(2) EpiCapacity (T2-T1)	(3) Self (T2-T1)	(4) Ontology (T2-T1)
Worldview T1		0.076***	0.017	0.064***
		(0.018)	(0.021)	(0.019)
EpiCapacity T1	0.014		-0.015	-0.078***
	(0.024)		(0.029)	(0.019)
Self T1	-0.032	0.048		-0.032*
	(0.028)	(0.030)		(0.017)
Ontology T1	0.030	-0.123***	-0.104***	
	(0.040)	(0.031)	(0.027)	
Program type	0.694	0.813	0.417	0.243
	(0.590)	(0.742)	(0.677)	(0.653)
Sex	-0.150	0.113	-0.860	-1.093*
	(0.599)	(0.748)	(0.678)	(0.652)
Black/African-American	2.321**	-0.121	-2.513**	-0.281
	(1.097)	(1.369)	(1.221)	(1.190)
Other	-0.310	0.392	1.461	1.666*
	(0.874)	(1.091)	(0.977)	(0.949)
Asian	0.940	2.241**	-0.021	0.788
	(0.779)	(0.960)	(0.876)	(0.847)
Constant	-2.125**	-3.547**	6.889***	1.438
	(1.062)	(1.390)	(1.299)	(1.176)
Observations	1,893	1,893	1,893	1,893
R-squared	-0.010	0.025	0.082	0.065

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note. Regression coefficients for the variables studied in the secondary question.

The second SUR model analyzes the relationship between T1 variables and the T2-T1 variables, revealing that certain baseline characteristics of TL (T1) are significantly associated with changes in the TL dimensions (T2-T1). This finding suggests that who students were before the experience matters for how much they change from international education.

Table 11 contains the regression coefficients. They are a mix of positive and negative, indicating no particular pattern. However, certain T1 variables are statistically significantly associated with T2-T1 variables. When Worldview is the dependent variable, coefficients for EpiCapacity (0.014, p=0.549) and Ontology (0.030, p=0.444) are positive, while the coefficient for Self (r=-0.032, p=0.262) is negative. When EpiCapacity is the dependent variable, the coefficients for Worldview (r=0.076, p<0.0001) and Self (r=0.048, p=0.116) are positive, while the coefficient for Ontology (r=-0.123, p<0.0001) is negative. When Self is the dependent variable, the coefficients for EpiCapacity (r=-0.015, p=0.608) and Ontology (r=-0.104, p<0.0001) are negative, while the coefficient for Worldview is positive (r-=0.017, p=0.422). When Ontology is the dependent variable, the coefficients for EpiCapacity (r=-0.079, p<0.0001) and Self (-0.032, p=0.059) are negative, while the coefficient for Worldview is positive (0.064, p=0.001).

Notably, students' baseline characteristics in Worldview are a significant regressor to change observed in EpiCapacity and Ontology. Baseline characteristics in Ontology are a significant regressor to change observed in EpiCapacity and Self. Baseline characteristics in EpiCapacity are a significant regressor to change observed in Ontology. These findings imply that educators and researchers should account for student diversity and baseline characteristics when fostering growth in areas where TL is part of the learning goal.

The three control variables reveal that there are statistically significant differences between Asian and White, and between Black and White students. This means Asian and Black students experience a different extent of change in TL dimensions compared to White students when examining the influence from baseline TL characteristics.

For the variable program type, none of the coefficients for the four regressions are statistically significant at the p-value cutoff of 0.05, indicating no statistically significant difference between the two program types when examining how baseline characteristics in TL dimensions impact change in TL dimensions.

For the variable sex, none of the coefficients for the four regressions are statistically significant at the p-value cutoff of 0.05, meaning there is no statistically significant difference between males and females when examining how baseline characteristics in TL dimensions impact change in TL dimensions.

For the variable race, the racial category of Asian is statistically significant ($r=2.241$, $p=0.020$) when EpiCapacity is the dependent variable. Black/African-American is statistically significant when the dependent variable is Worldview ($r=2.321$, $p=0.034$) and Self ($r=-2.513$, $p=0.040$), respectively. This suggests that there are statistically significant differences between White and Asian students and between White and Black students for specific TL dimensions when examining how baseline characteristics of TL impact change in those dimensions.

In summary, the findings highlight the importance of considering student diversity and baseline characteristics in fostering growth in areas where TL is part of the learning goal. Educators and researchers should take these findings into account when designing programs and curriculum. These implications will be further discussed in the discussion chapter.

Sensitivity Tests

I conducted two sensitivity tests to ensure the reliability of the statistical findings. The purpose of these tests was to demonstrate that the results remain robust despite combining categories within a control variable or using a different statistical model.

The first test involved comparing two different ways of coding the race variable. The results indicate that there were only marginal differences between the two methods, suggesting that re-coding the race variable into fewer categories did not affect the analytical outcome significantly.

The second test involved comparing the results obtained from multivariate and univariate regression models. I compared the direction and magnitude of regression coefficients, p-values, and r^2 values. The results revealed that the multivariate model produced different outcomes than the univariate regression, highlighting the importance of using a multivariate regression like SUR when the dependent variables are conceptually related, as is the case in this study (Raykov & Marcoulides, 2008).

Combined Racial Categories

To address the issue of very small sample sizes in some categories of the race variable—(e.g., Native Hawaiian/Pacific Islander (n=2), American Indian/Alaskan Native (n=8)—I recoded it into two different sets of categories: a 9-category and a 4-category variable. I then conducted a sensitivity test to assess the impact of this recoding on the statistical findings.

The r^2 values for the first SUR model are nearly identical between the two ways of coding the race variable: Worldview (0.356 versus 0.350), EpiCapacity (0.709 versus 0.708), Self (0.659 versus 0.659), and Ontology (0.815 versus 0.814). The second SUR model also shows very

similar r^2: Worldview (0.0002 versus -0.010), EpiCapacity (0.027 versus 0.025), Self (0.087 versus 0.082), and Ontology (0.068 versus 0.065).

Moreover, all regression coefficients remained in the same direction, with minimal changes in size, and their p-values were identical after re-coding the race variable. For example, in the first SUR model where Worldview was the dependent variable, the coefficient for EpiCapacity changed from 0.839 to 0.846; the coefficient for Self changed from -0.093 to -0.092; and the coefficient for Ontology changed from -0.379 to -0.387. All the independent TL variables across the four regressions retained the same statistical significance ($p<0.0001$).

Similarly, among the control variables, the coefficients for program type and sex changed slightly from 0.267 to 0.346 and from -0.594 to -0.551, respectively, while the coefficients for all racial categories remained identical. For instance, the coefficients for Black/African-Americans and Asians changed from 1.732 to 1.702 and from -1.038 to -1.030, respectively. The significance levels for the three control variables also remained unchanged after re-coding the race variable.

Interdependent Dimensions

The purpose of using a multivariate method such as SUR is to account for the potential interdependence between multiple dependent variables. In this research, the TL dimensions are conceptualized as interdependent, and hence, the dependent variables represent TL dimensions in the two SUR models.

The r^2 values in the first SUR model are 0.350 (Worldview), 0.708 (EpiCapacity), 0.659 (Self), and 0.814 (Ontology). However, in univariate regressions, the r^2s are 0.388 (Worldview), 0.746 (EpiCapacity), 0.679 (Self), and 0.838 (Ontology). The r^2 value s from the second SUR model are -0.010 (Worldview), 0.025 (EpiCapacity), 0.082 (Self), and 0.065 (Ontology),

whereas the univariate regressions yield the r^2 values ranging from 0.031 (Worldview), 0.086 (EpiCapacity), 0.135 (Self) to 0.126 (Ontology). These differences suggest that the multivariate regression results in different model fitness than univariate regression.

All p-values associated with the TL variables in the first SUR model are statistically significant ($p<0.0001$), which remains the same in univariate multiple regressions. As the p-values are already extremely small, the analytical software may not display changes to the decimal places allowed. However, the control variables in the first SUR model exhibit a slight variation in p-values between SUR and univariate regressions, with most of them being statistically insignificant ($p>0.05$).

In contrast, the p-values for the second SUR model fluctuate significantly between SUR and univariate regressions. For example, EpiCapacity is an insignificant predictor ($p=0.549$) in the second SUR model when regressed to Worldview. However, in univariate regression, EpiCapacity becomes a significant predictor ($p<0.0001$). Similarly, Self is an insignificant predictor ($p=0.116$) when regressed to EpiCapacity in the second SUR model, but it becomes significant ($p<0.0001$) in univariate regression. However, most of the control variables are statistically insignificant predictors.

The regression coefficients' direction and size vary between SUR and univariate regression, with the changes being more prominent in the second SUR model. For instance, when EpiCapacity is regressed to Worldview in the second SUR model, the coefficient is $r=0.014$; however, this coefficient changes to 0.148 in univariate regression. Similarly, when Ontology is regressed to EpiCapacity in the second SUR model, the coefficient changes from -0.123 to -0.368 in univariate regression. Likewise, when Ontology is regressed to Self in the second SUR model, the coefficient changes from -0.104 to -0.373 in univariate regression.

In conclusion, the use of SUR models provides a better approach to accounting for the interdependence between TL variables, which are understood as interdependent dimensions. The results obtained from the two SUR models in this research show statistically significant differences from those obtained through univariate regression. Hence, the utilization of SUR models is preferred since they provide a more accurate representation of the interdependent nature of the TL dimensions.

Summary

The research findings suggest that TL in international education is an interdependent network of change across multiple dimensions, with changes across all TL dimensions significantly explaining the variations in each other. The findings also highlight that certain students' baseline characteristics in TL dimensions play a significant role in explaining changes in TL dimensions. I encourage international education scholars to study TL as an interdependent change network beyond intercultural competence and global mindset, which are commonly researched in international education scholarship. I also urge scholars to include information about students' baseline characteristics in their analysis of TL from international education. These findings have implications for understanding how students change from shared learning experiences such as international education and how these changes are related across multiple dimensions of TL. I elaborate on these findings in the final chapter.

CHAPTER FIVE: DISCUSSION

I start with a research summary before discussing the research and practical implications contributing to understanding and assessing transformative learning (TL). I wrap up the chapter with a reflection on future directions. The key takeaway of this research is that TL is an interdependent change network that involves changes in multiple dimensions. Specifically, change in each TL dimension occurs in concurrency with changes across all dimensions.

Research Summary

To identify the dimensions of TL, I employed an existing framework (TL typology) and operationalized those dimensions using a pre-validated instrument (Beliefs, Events, and Value Inventory, or BEVI). Using the instrument scales, I calculated composite variables to represent the TL dimensions. Because TL theory emphasize on simultaneous changes in multiple dimensions of learners (O'Sullivan et al., 2002), I wanted to study the interdependence between changes across TL dimensions. Also, because I am interested in potential TL in international education, I analyzed data from short-term international education programs involving 1,893 students using seemingly unrelated regression (SUR). My study aimed to answer two research questions.

Primary question: *To what extent are changes in TL dimensions interdependent?* I focused on the interdependence between TL dimensions as previous literature has suggested that TL is multidimensional (Hoggan, 2016) and changes in one aspect of self can have ramifications on other aspects (Acheson et al., 2022). Despite such suppositions, the current literature lacks empirical evidence of the relationship between TL dimensions. Therefore, my investigation about the interdependence between TL dimensions is particularly illuminating.

Secondary question: *To what extent are changes in TL dimensions associated with baseline characteristics of TL?* To add nuance to understanding changes in TL dimensions from international education, I explored the association between TL dimensions and baseline characteristics of TL. Accounting for baseline characteristics is crucial because researchers cannot assume that all students will change in the same direction and to the same extent from international education without considering their pre-existing qualities or attributes (Wang et al., 2020). While pre-test data is commonly examined in social science studies, few scholars have applied them to study TL dimensions.

The most significant finding from this research is that TL is best understood and studied as an interdependent change network that encompasses multiple interdependent dimensions that extend beyond traditional constructs like intercultural competence, global mindset, and related concepts. The study reveals that changes in one dimension have a substantial impact on other dimensions, highlighting the interplay between students' evolving sense of self, worldview, knowledge evaluation, and experiential understanding.

From a conceptual perspective, it is essential for scholars to embrace a comprehensive approach that acknowledges the diverse dimensions of TL. Focusing solely on constructs such as intercultural competence, global citizenship, and global mindset, which are prevalent in current TL and international education literature, provides only a partial view of the larger change network associated with TL. By expanding their understanding of TL, scholars and practitioners can develop a more holistic perspective on the potential impact of international education, therefore informing future research and practice in the field more effectively.

From an empirical perspective, it becomes evident that comprehending the TL gestalt requires examining its constituent parts in relation to one another rather than in isolation.

Scholars, educators, and practitioners of TL should adopt a holistic model and assessment approach to grasp and facilitate learner change. This entails embracing a broader range of theoretical perspectives in TL research, going beyond the scope of perspective transformation alone (Hoggan, 2016). Additionally, it is vital to employ ecologically valid assessments, such as the BEVI, to evaluate this interdependent change network accurately (Shealy, 2006). The following sections elaborate on the conceptual, methodological, and practical implications of this research to the broader field of TL and international education.

Conceptual Implications: Transformative Learning Dimensions

The concept of TL has been used to describe different types of change but lacks a clear conceptual boundary, which hinders its effectiveness in explaining transformation (Hoggan 2006; ITLC, 2022). Moreover, there is a discrepancy between how TL scholars and international education scholars approach TL (Pang et al., 2023). I address these issues by providing a conceptual clarification of TL that identifies its key dimensions and explores their interrelationship, making them integral to the unique concept of TL.

To distinguish TL, I recommend using the TL typology (Hoggan, 2016) to outline four key dimensions: Worldview, Self, Ontology, and EpiCapacity. The relationship between TL dimensions illuminates how individuals' changing viewpoints about the world (Worldview) are interdependent with their evolving senses of self (Worldview), ways to construct and evaluate knowledge (EpiCapacity), and inclinations about existence in the world (Ontology). Future scholars are advised to consult these dimensions to improve their research on TL.

Although TL has long been recognized as multidimensional (Acheson et al., 2022; Hoggan, 2016; O'Sullivan et al., 2002), there is a lack of empirical evidence investigating the

relationship among dimensions. This study provides a statistical foundation for assessing the relationship between TL dimensions.

Interdependence Between Dimensions

As the field of international education continues to expand, it is critical for scholars to broaden their conceptualization of TL. In particular, I encourage international education scholars to expand their conceptualization of TL to encompass an interdependent change network, rather than focusing solely on constructs such as intercultural competence and global citizenship. While these constructs may relate to the TL dimension of Worldview, both theoretically and empirically, they represent only a small part of the transformative potential of international education (e.g., Acheson et al., 2022; Wandschneider et al., 2015; Wang et al., 2020).

For example, through regression analysis I found that changes in TL dimensions are highly interdependent, emphasizing the need for a more holistic approach to understanding TL. That is because changes in Worldview are strongly associated with changes in EpiCapacity, indicating that individuals' understanding of the world is interdependent to their ability to evaluate and construct knowledge ($p<0.0001$). Similarly, changes in EpiCapacity are strongly related to changes in Ontology, highlighting the interdependence between individuals' knowledge system and their mental and emotional inclinations about existence in the world ($p<0.0001$). Furthermore, changes in Ontology are most strongly associated with changes in Self, emphasizing the interdependence between individuals' evolving self-concepts and their existential inclinations.

Based on the statistical finding of this research, I define interdependence as *the strong association between changes in each TL dimension and changes across all other dimensions*. I emphasize that the interdependence between TL dimensions makes TL outstanding from

constructs such as intercultural competence and global citizenship, which are popularly studied in international education literature as TL.

The main idea here supported by other research (e.g., Acheson et al., 2022; Wandschneider et al., 2015; Wang et al., 2020) is that international, multicultural, and TL are complex and multifaceted phenomena that cannot be fully understood by focusing solely on constructs like "intercultural competence" and "global citizenship." Instead, a more holistic approach is needed that takes into account the interdependence of various aspects of learning, growth, and development that contribute to the transformative potential of international education. By exploring the various dimensions of TL outlined in the typology, scholars can gain a more comprehensive understanding of the interconnected network of changes that comprise TL.

In summary, a more comprehensive approach to TL is needed in the field of international education to fully appreciate the transformative potential of such experiences. By recognizing the interdependence between the multiple dimensions of TL, scholars can gain a more complete understanding of the network of changes that occur within individuals and their transformative impact.

Beyond Perspective Transformation

The existing literature on TL in international education contains high-quality conceptualizations but lacks cohesiveness among existing theoretical perspectives. This lack of cohesiveness makes it difficult to fully understand TL and develop a durable and consensus-based foundation for the field and profession (Hoggan, 2016). To address this issue, scholars should integrate theoretical and empirical perspectives that are demonstrably robust, rather than inventing new but disconnected models and methods.

While perspective transformation is a commonly discussed concept in international education, consciousness expansion is often overlooked but sheds light on the deeper aspects of change. Affective change, curiosity, patience, confidence, and adaptability are some of the noticeable student changes in international education that are beyond cognitive development. The proposed TL typology brings cohesiveness to the two theoretical perspectives of TL explored in this study through the TL dimensions outlined. The typology integrates both perspective transformation and consciousness expansion, highlighting the multidimensional nature of TL and emphasizing that changes in each dimension are interdependent.

Regression results from this research show that TL dimensions from the typology are interdependent, indicating that no TL dimensions should be examined in isolation (high r^2 values). For instance, changes in Worldview, EpiCapacity, and Self together account for over 80% of the variation observed in Ontology. This suggests that changes in each TL dimension are interdependent, and scholars cannot understand change in one dimension without considering changes in the others. Thus, it is crucial to study TL as a network of interdependent changes utilizing both theoretical perspectives.

Scholars should be cautious not to limit TL to cognitive-based critical reflection, as it may fail to capture noncognitive aspects of TL. By integrating existing theoretical perspectives rather than developing them in silos, TL scholars can bring clarity over what constitutes TL in international education. The proposed TL typology can help scholars better understand the interdependent changes in TL and underscores the importance of studying TL as an interdependent change network utilizing both theoretical perspectives.

In summary, TL theory has developed into a metatheory encompassing numerous theoretical perspectives, which creates a challenge for TL and international education scholars to

find a consensual way of approaching TL. By integrating existing theoretical perspectives rather than developing them in silos, TL scholars can bring cohesiveness to the field and develop a durable and consensus-based foundation for the field and profession.

Methodological Implications: Assessment and Instrument

This study addresses a gap in the field of TL assessment, as the current literature has primarily focused on qualitative research, leaving a lack of quantitative evidence for TL assessment. Additionally, the limited number of quantitative studies in the field have narrowly described TL as changes in global citizenship and intercultural competence, for example, and fail to comprehensively operationalize TL theory. To address this limitation, this study recommends using the Belief, Events, and Values Inventory (BEVI) as a psychometrically sound tool for assessing diverse types of change related to TL dimensions in the TL typology.

The BEVI is a suitable choice for assessing TL quantitatively, as it captures the multidimensional and iinterdependent nature of human identity and self. Its scales assess various types of change, and researchers can use it to assess diverse types of change related to TL dimensions in the typology. The BEVI predicts change based on demographic, background, and life experiences, as well as exposure to learning, growth, and developmental experiences, making it conceptually congruent with the types of learner change highlighted under TL dimensions. The study operationalizes TL theory by using the TL typology and connecting its dimensions to two unique theoretical perspectives of TL, and statistical results reveal an interwoven network of change among TL dimensions.

While acknowledging the limitations of any quantitative instrument, the use of the BEVI provides researchers and practitioners with a structured approach to measure changes in individuals and a valuable quantitative tool to obtain evidence of TL. Existing instruments

assessing TL often fall short of their capacity to capture diverse types of change associated with TL dimensions, for various reasons (e.g., limited quantitative operationalization of one or more TL constructs; not expanding beyond Mezirow's initial conceptualizations). To address this issue, the study advocates for a more flexible approach by using the BEVI that assesses diverse types of change and is grounded in the TL typology.

In conclusion, the BEVI is a valuable instrument for assessing TL, providing a psychometrically sound tool to study and understand TL in new ways. The study's literature review highlights the need for more research in quantitative evidence for TL assessment, and the use of the BEVI can help fill this gap by providing a structured approach to measure changes in individuals and a comprehensive understanding of TL's multidimensional and interdependent nature.

Baseline Characteristics

To gain a more accurate understanding of how educational experiences impact learners, quantitative researchers should incorporate pre-test (T1) variables into their analysis of TL dimensions. By including students' baseline (T1) variables in TL dimensions, researchers can gain insight into how effectively the learning experience has impacted learners with respect to the assessment focus. In this study, I utilized T1 variables representing the dimensions of TL to obtain information about students' baseline characteristics of TL, as has been done in previous research (Wang et al., 2020).

My secondary research question explored the extent to which T1 variables are associated with T2-T1 variables. The statistical results indicate that baseline characteristics in Worldview and Ontology are significant ($p<0.0001$) in explaining change in EpiCapacity. This means that changes happened to students' ways of knowledge construction and evaluation are strongly

associated with their pre-existing understanding about the world and their pre-existing inclinations for existence in the world (Ontology T1). Pre-existing means before the international learning experience.

Similarly, the results show that baseline characteristics in Ontology explain changes in Self, indicating that students' evolving sense of self is strongly associated with their pre-existing inclinations for existence in the world (Ontology T1, $p<0.0001$). Likewise, change in Ontology is primarily explained by baseline characteristics in Worldview and EpiCapacity. In other words, students' changing inclinations to experience the world are strongly associated with their pre-existing perspectives about the world (Worldview T1, $p<0.0001$), and their previous ways of knowledge construction and evaluation (EpiCapacity T1, $p<0.0001$).

These findings highlight the importance of considering students' specific baseline TL characteristics in understanding their changes in TL dimensions during their international education experiences. My statistical findings add a layer of nuance to previous findings about the interdependent change network for TL. I argue that students' baseline characteristics are essential for correctly interpreting changes in TL dimensions resulting from international learning experience (Wang et al., 2020). This finding also gains support from literature that students bring different characteristics to the learning setting that influence how they experience the learning environment and derive different learning outcomes (Renn & Reason, 2021).

Baseline characteristics are particularly important for international education. For example, students with extensive previous international travel experiences may have a much broader worldview, causing them to encounter fewer novel experiences than those who go abroad for the first time. Therefore, researchers cannot assume that all students will change in the same direction and to the same extent from international education experiences without

accounting for their baseline characteristics measured at the beginning of the learning experience (Wang et al., 2020).

Statistical Considerations

To effectively analyze the interdependence between the dimensions of TL in quantitative research, I recommend using multivariate statistical procedures. Current studies in international education often use univariate statistical techniques such as the t-test and ANOVA to compare student groups for learning dimensions across time, groups, and academic subjects (Savicki & Price, 2021; Tarrant et al., 2014; Tarrant & Lyons, 2012). However, when analyzing TL dimensions, multivariate techniques such as MANOVA are preferable because they account for the interdependence between TL dimensions (e.g., Wandshneider et al., 2015). This interdependent is conceptually supported by the literature and empirically supported by the regression findings from the current study (Hoggan, 2016; O'Sullivan et al., 2002).

In this study, I used a multivariate regression procedure to study the interdependence between TL dimensions. This approach accounted for the proportion of variance due to the interaction between related dependent variables, producing different analytical results than univariate regression. Seemingly Unrelated Regression (SUR) was also used to address statistically significant correlations between TL variables. The sensitivity result in chapter shows that there are statistically significant differences between the results produced from SUR and univariate regression.

I recommend future scholars studying the multidimensional nature of TL also use multivariate procedures to avoid studying each TL dimension as an individual construct using discrete statistical models. Ignoring the interdependence between dimensions could potentially lead to misleading analytical results. Therefore, it is crucial to consider the interdependent nature

of TL and to use appropriate statistical techniques when analyzing the dimensions of TL in quantitative research.

I focus on studying the interdependence between TL dimensions, so I use a multivariate regression procedure. I showed a sensitivity test in the last chapter that multivariate regression produces different analytical results than univariate regression by accounting for the proportion of variance due to the interaction between related dependent variables (Raykov & Marcoulides, 2008). To address the statistically significant correlations between TL variables, I used Seemingly Unrelated Regression (SUR) (See Appendix C: Transformative Learning Dimensions Correlations).

Future scholars analyzing the multidimensional nature of TL should also use multivariate procedures to avoid studying each of the TL dimensions as individual constructs using discrete statistical models. Ignoring the interdependence between dimensions could potentially lead to misleading analytical results. Therefore, it is important to also consider the interdependent nature of TL and to use appropriate statistical techniques when analyzing the dimensions of TL in quantitative research.

Practical Implications

The concept of interdependence in the context of TL has significant implications for educational theory, research, and practice in general, particularly in the field of international education. I focus on two broad implications.

Learning Design and Student Support

First, the concept of "interdependence" challenges scholars to go beyond the traditional focus on intercultural competence and global citizenship and adopt a more comprehensive approach that acknowledges the complex and interacting interplay between multiple dimensions

of TL. In doing so, educators can design learning experiences that promote students' ongoing development and growth in all dimensions of TL, not just in areas of change associated with changing worldviews (Acheson et al., 2021). The findings on TL being an interdependent change network provides an opportunity for us to deepen our understanding of the very nature of learning, which has important implications for the design and delivery of any intervention that intends to facilitate change in how we experience self, others, and the larger world (Shealy, 2016; Shealy et al, 2023).

To effectively incorporate the concept of interdependence into designing TL learning experiences, educators need to create opportunities that enable students to reflect on diverse areas such as their evolving sense of self (Self), ways of constructing and evaluating knowledge (EpiCapacity), and inclinations about existence in the world (Ontology). For example, educators could utilize activities such as assignment papers (Smith et al., 2014), journal entries (Curtin et al., 2013), as well as videos and blogs (Dunn et al., 2014) to promote critical reflection on dimensions of TL. On their own, it might be challenging for students to realize the connections between different dimensions of self, learning, and the world, therefore educators need to be intentional and explicit with their pedagogical designs and be patient in explaining the values of their learning activities. The goal is to help students become aware of how their international experiences could impact their worldviews, and more importantly the interdependence between changing worldviews and other TL dimensions by providing students with an intellectually stimulating and supportive space for deep conversations.

Additionally, I suggest that international learning experiences need to be designed with a long-term perspective in mind to support and encourage students' ongoing development beyond the immediate learning experience. TL is a difficult but worthy student change to foster. This

implies that TL might not occur immediately after concluding the international learning experience. Instead, more profound changes in TL dimensions could occur down the road. For example, a recent study shows that individuals who previously studied abroad continue to make contributions towards the global common good both locally and globally, through activities such as philanthropy, social entrepreneurship, and volunteering in their career (Jon & Fry, 2021).

In other words, the concept of interdependence in TL implies a process of life-long learning where students continually reconstruct their understanding of past international experiences, applying to current situations, thereby shaping their ongoing interpretation of life experiences. Research indicates that post-study abroad services, which involve opportunities for critical reflection and articulation of their studying abroad experiences, can help students make meaningful connections between their international experiences and their broader academic and career aspirations (West, 2014).

To provide students with opportunities for continuous reflection on their international learning, instructors should collaborate with campus units that provide regular academic and social support to build a global learning community for returnees of international learning experiences. For example, service units could organize unpacking and re-entry workshops for study abroad returnees, creating a space for them to share their learning and feelings from their international experiences among peers with similar experiences. Service units could also offer similar social and co-learning opportunities between study-abroad returnees and alumni.

Overall, the concept of TL as an interdependent change network among its core dimensions has important implications for pedagogical design and long-term student development. By addressing multiple dimensions of TL and offering continuous support for international education, educators and practitioners can help students develop a more nuanced

understanding of international education and self-discovery, leading to more profound and long-lasting student change (Acheson et al., 2021; Shealy et al, 2023).

Identity and Self Formation

The findings presented in this research shed light on the structural factors that influence our engagement with self and others, leading to more productive and generative interactions (Shealy, 2016; Shealy et al., 2023). These insights have practical implications for interventions aimed at creating change in the world by understanding the nature and process of transformation sought by change makers. A notable example is the overarching theme of the 2022 International Transformative Learning Conference: "Embracing Transformation as a Rarity" (see Appendix H). The findings of this study directly relate to several sections of the conference theme, such as acknowledging the struggle of TL, the reorganization of internal systems for enhanced meaning and purpose, and the time and energy required for TL.

The research findings align closely with the questions and aspirations raised in the conference theme. Specifically, they illuminate key aspects of internal systems that influence the functionality of thoughts, behaviors, and emotions, resulting in a deeper sense of self-awareness, or TL. Moreover, they have implications for cognitive, emotional, behavioral, and spiritual development within different levels of TL and education in general.

This study demonstrates the interdependence among various components of self and identity formation, revealing how awareness of self relates to life history, meaning-making, and emotional capacity. Understanding this interconnected complexity is crucial for designing interventions that are truly transformative and impactful. Without conceptual understanding and empirical assessment of the interdependent change network, we cannot fully comprehend human functioning or assess the transformative potential of our interventions in international education

and other potentially high-impact educational contexts (Acheson et al., 2021, Shealy, 2016; Wandschneider et al., 2015).

These insights have immediate practical relevance in the real world, extending beyond academic discourse. Initiatives and movements aiming to promote change, from local endeavors like Drug Abuse Residence Education (DARE) to global initiatives like the Sustainable Development Goals (SDGs), must consider human complexity to effectively facilitate TL (Shealy et al., 2023). Therefore, this study's aspiration is to illuminate the interdependent change network and apply this knowledge to design educational experiences that better understand and account for human complexity, enabling us to be more effective agents of change.

In conclusion, this research provides practical insights that directly inform the aspirations of conferences like the International Transformative Learning Conference. By comprehending and addressing the complexity of human experience, we can enhance the effectiveness of movements and initiatives seeking to facilitate transformation and create meaningful change.

Future Directions

To advance the field of TL, it is essential to build upon existing conceptual, empirical, and applied models and methods. For example, the BEVI system calculates an aggregated Full Scale score as a single indicator of the self-structure. Previous research has explored how learners differ within a cohort based on their placement in the lowest, middle, or highest third of Full Scale scorers. These studies have demonstrated the empirical predictive power of TL-related constructs in relation to learners' self/identity structures (e.g., Acheson et al., 2022; Shealy, 2016; Wang et al., 2020; Wandschneider et al., 2015; Wiley et al., 2021). Future research should further investigate the association between the Full Scale Score and the TL dimensions examined

in this study. This exploration would allow us to refine the underlying theoretical dimensions integral to this work and compare different models within the TL framework.

Additionally, it is crucial for the TL field and profession to expand beyond the current dominant methodological and conceptual defaults, such as qualitative measurement and perspective transformation. The interdependent network of change model presented in this study, along with its corresponding quantitative assessment method, offers an ecologically valid approach to advance the field and profession of TL. By continuously refining our understanding of TL and the assessment methods employed, we can better facilitate and support learner change and growth in international education and other contexts.

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APPENDIX A: BEVI SCALES DEFINITIONS

1. **Basic Determinism**: prefers simple explanations for differences/behavior; believes people don't change/strong will survive; troubled life history (e.g., "AIDS may well be a sign of God's anger." "It's only natural that the strong will survive.").
2. **Basic Openness**: open and honest about the experience of basic thoughts, feelings, and needs (e.g., "I don't always feel good about who I am." "I have felt lonely in my life.").
3. **Identity Diffusion**: indicates painful crisis of identity; fatalistic regarding negatives of marital/family life; feels "bad" about self and prospects (e.g., "I have gone through a painful identity crisis." "Even though we expect them to be, men are not really built to be faithful in marriage.").
4. **Ecological Resonance**: deeply invested in environmental/sustainability issues; concerned about the fate of the earth/natural world (e.g., "I worry about our environment." "We should protect the land no matter who owns it.").
5. **Emotional Attunement**: emotional, sensitive, social, needy, affiliative; values the expression of affect; close family connections (e.g., "I don't mind displays of emotion." "Weakness can be a virtue.").
6. **Gender Traditionalism**: men and women are built to be a certain way; prefers traditional/simple views of gender and gender roles (e.g., "Women are more emotional than men." "A man's role is to be strong.").
7. **Global Resonance**: invested in learning about/encountering different individuals, groups, languages, cultures; seeks global engagement (e.g., "It is important to be well informed about world events." "I am comfortable around groups of people who are very different from me.").
8. **Meaning Quest**: searching for meaning; seeks balance in life; resilient/persistent; highly feeling; concerned for less fortunate (e.g., "I think a lot about the meaning of life." "I want to find a better sense of balance in my life.").
9. **Needs Closure**: unhappy upbringing/life history; conflictual/disturbed family dynamics; stereotypical thinking/odd explanations for why events happen as they do or why things are as they are (e.g., "I had a wonderful childhood." "Some numbers are more lucky than others.").
10. **Needs Fulfillment**: open to experiences, needs, and feelings; deep care/sensitivity for self, others, and the larger world (e.g., "We should spend more money on early education programs for children." "I like to think about who I am.").
11. **Physical Resonance**: receptive to corporeal needs/feelings; experientially inclined; appreciates the impact of human nature/evolution (e.g., "I am a free spirit." My body is very sensitive to what I feel.").
12. **Religious Traditionalism**: highly religious; sees self/behavior/events as mediated by God/spiritual forces; one way to the "afterlife" (e.g., "Without religion there can be no peace." "There is one way to heaven.").
13. **Self Awareness**: introspective; accepts complexity of self; cares for human experience/condition; tolerates difficult thoughts/feelings (e.g., "I am always trying to understand myself better." "I have problems that I need to work on.").

14. **Self Certitude**: strong sense of will; impatient with excuses for difficulties; emphasizes positive thinking; disinclined toward deep analysis (e.g., “You can overcome almost any problem if you just try harder.” “If you play by the rules, you get along fine.”).
15. **Socioemotional Convergence**: open, aware of self/other, larger world; thoughtful, pragmatic, determined; sees world in shades of gray, such as the need for self-reliance while caring for vulnerable others (e.g., “We should do more to help those who are less fortunate.” “Too many people don’t meet their responsibilities.”).
16. **Sociocultural Openness**: progressive/open regarding a wide range of actions, policies, and practices in the areas of culture, economics, education, environment, gender/global relations, politics (e.g., “We should try to understand cultures that are different from our own.” “There is too big a gap between the rich and poor in our country.”).

APPENDIX B: VALIDITY EVIDENCE: MATRICES OF CORRELATION

Table 12

T1 Plan variables and T1 Transformative Learning Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Current T1	1.000						
(2) Planed T1	0.528	1.000					
(3) PreviousT1	0.538	0.574	1.000				
(4) Worldview T1	0.246	0.400	0.342	1.000			
(5) EpiCapacity T1	0.142	0.318	0.226	0.649	1.000		
(6) Self T1	0.097	0.181	0.095	0.263	0.558	1.000	
(7) Ontology T1	0.114	0.246	0.156	0.473	0.835	0.816	1.000

Note. Correlation coefficients between T1 TL variables and numbers of T1 intercultural/international activities.

Table 13

T2 Plan Variables and T1 Transformative Learning Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Current T2	1.000						
(2) Planned T2	0.581	1.000					
(3) Previous T2	0.515	0.654	1.000				
(4) Worldview T1	0.227	0.314	0.318	1.000			
(5) EpiCapacity T1	0.166	0.219	0.204	0.649	1.000		
(6) Self T1	0.012	0.087	0.076	0.263	0.558	1.000	
(7) Ontology T1	0.086	0.125	0.113	0.473	0.835	0.816	1.000

Note. Correlation coefficients between T1 TL variables and numbers of T2 intercultural/international activities.

Table 14

T1 Plan Variables and T2 Transformative Learning Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Current T1	1.000						
(2) Planned T1	0.528	1.000					
(3) Previous T1	0.538	0.574	1.000				
(4) Worldview T2	0.232	0.388	0.332	1.000			
(5) EpiCapacity T2	0.151	0.300	0.217	0.703	1.000		
(6) Self T2	0.086	0.134	0.081	0.224	0.496	1.000	
(7) Ontology T2	0.106	0.219	0.140	0.492	0.827	0.800	1.000

Note. Correlation coefficients between T2 TL variables and numbers of T1 intercultural/international activities.

Table 15

T2 Plan Variables and T2 Transformative Learning Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Current T2	1.000						
(2) Planned T2	0.581	1.000					
(3) Previous T2	0.515	0.654	1.000				
(4) Worldview T2	0.242	0.350	0.354	1.000			
(5) EpiCapacity T2	0.182	0.270	0.256	0.703	1.000		
(6) Self T2	0.001	0.083	0.053	0.224	0.496	1.000	
(7) Ontology T2	0.092	0.164	0.133	0.492	0.827	0.800	1.000

Note. Correlation coefficients between T2 TL variables and numbers of T2 intercultural/international activities.

APPENDIX C: TRANSFORMATIVE LEARNING DIMENSIONS CORRELATIONS

Table 16

T1 Transformative Learning Variables

Variables	(1)	(2)	(3)	(4)
(1) Worldview T1	1.000			
(2) EpiCapacity T1	0.649	1.000		
(3) Self T1	0.263	0.558	1.000	
(4) Ontology T1	0.473	0.835	0.816	1.000

Note. Correlation coefficients between T1 TL variables.

Table 17

T2 Transformative Learning Variables

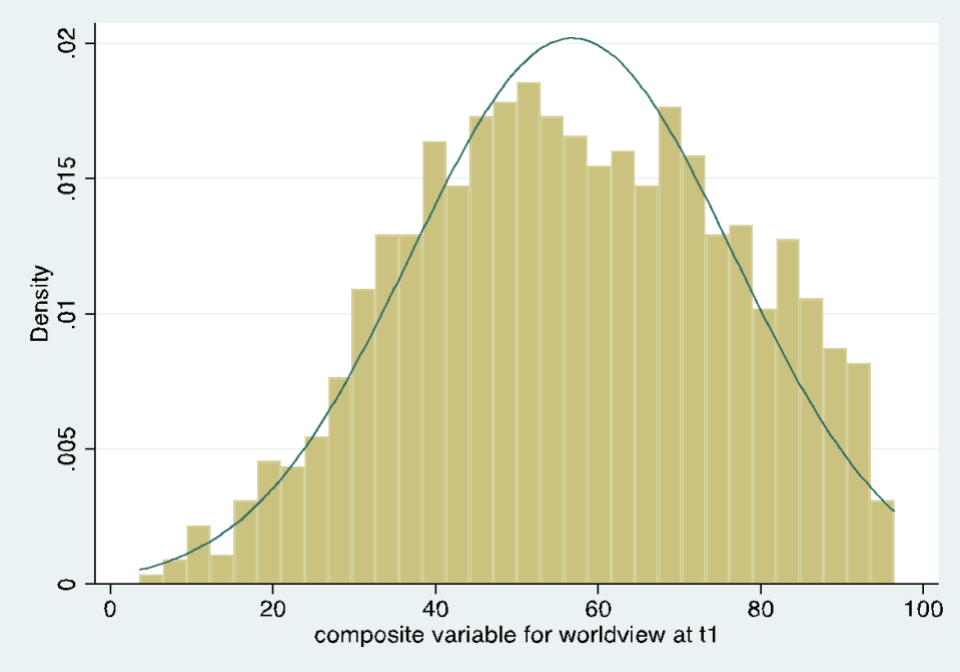
Variables	(1)	(2)	(3)	(4)
(1) Worldview T2	1.000			
(2) EpiCapacity T2	0.703	1.000		
(3) Self T2	0.224	0.496	1.000	
(4) Ontology T2	0.492	0.827	0.800	1.000

Note. Correlation coefficients between T2 TL variables.

APPENDIX D: HISTOGRAMS TRANSFORMATIVE LEARNING VARIABLES (T1)

Figure 2

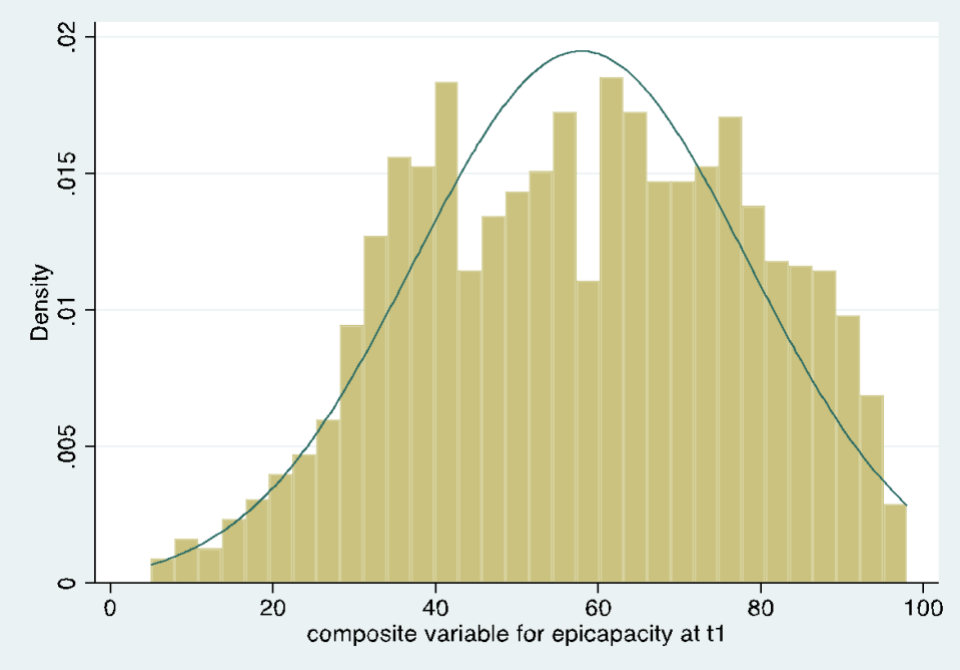
Histogram for Worldview at Pre-test



Note. A normal bell-curved distribution for the T1 (pre-test) Worldview variable.

Figure 3

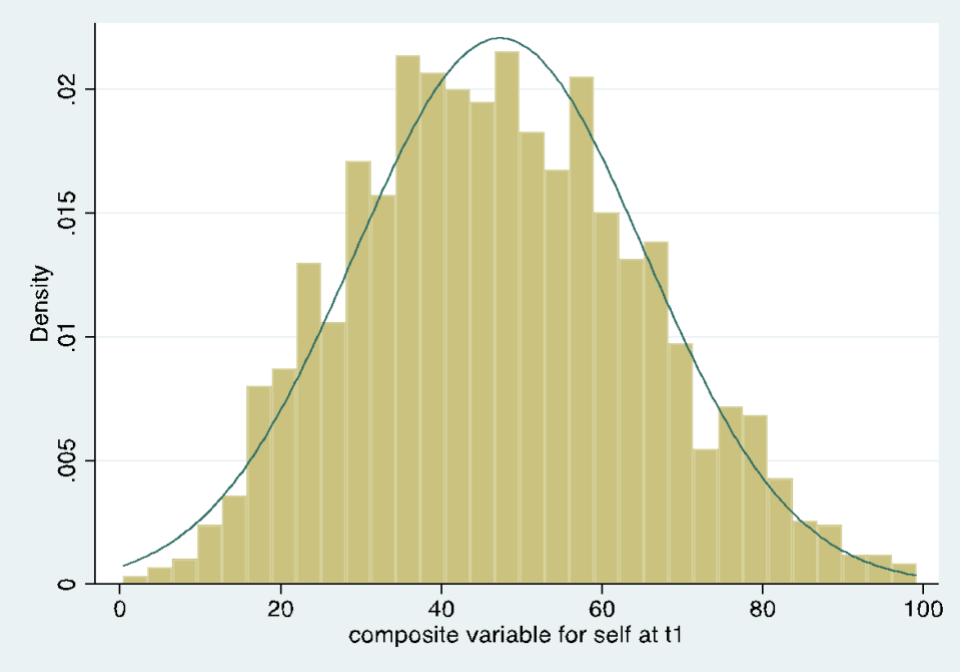
Histogram for EpiCapacity at Pre-test



Note. A normal bell-curved distribution for the T1 (pre-test) EpiCapacity variable.

Figure 4

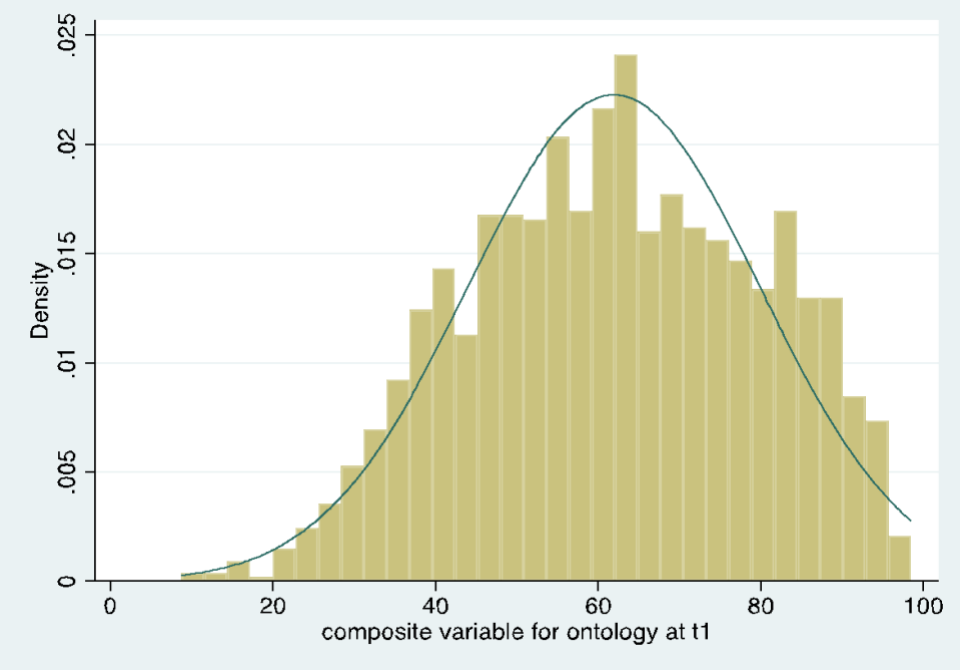
Histogram for Self at Pre-test



Note. A normal bell-curved distribution for the T1 (pre-test) Self variable.

Figure 5

Histogram for Ontology at Pre-test

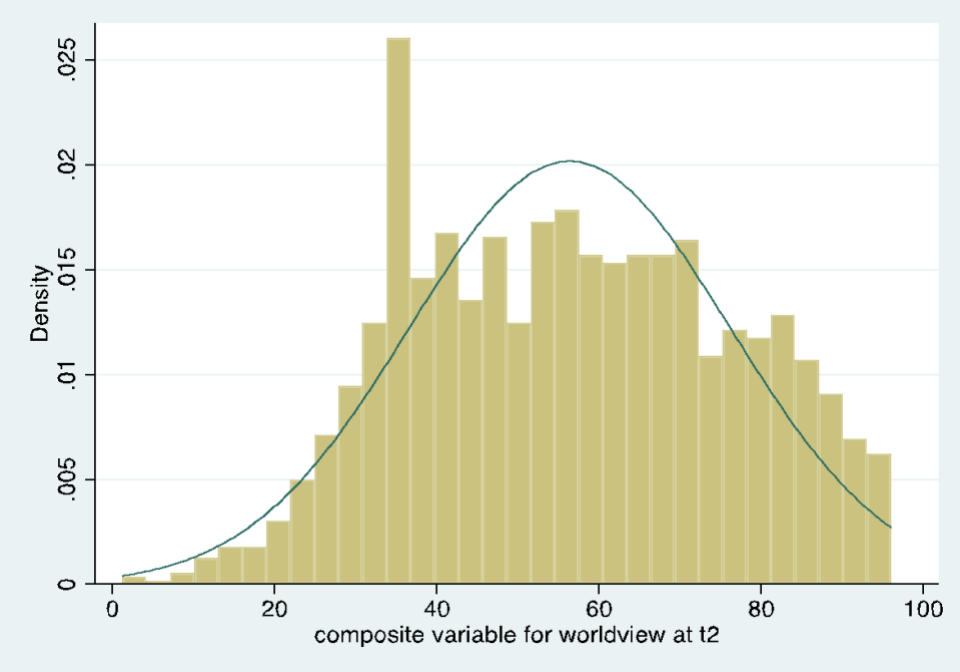


Note. A normal bell-curved distribution for the T1 (pre-test) Ontology variable.

APPENDIX E: HISTOGRAMS TRANSFORMATIVE LEARNING VARIABLES (T2)

Figure 6

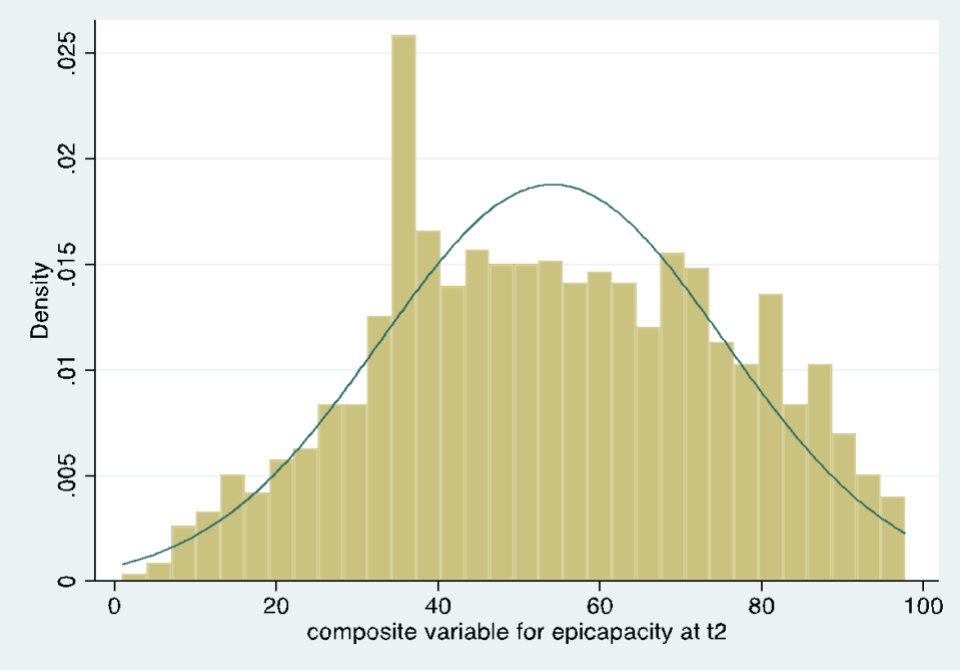
Histogram for Worldview at Post-test



Note. A normal bell-curved distribution for the T2 (post-test) Worldview variable.

Figure 7

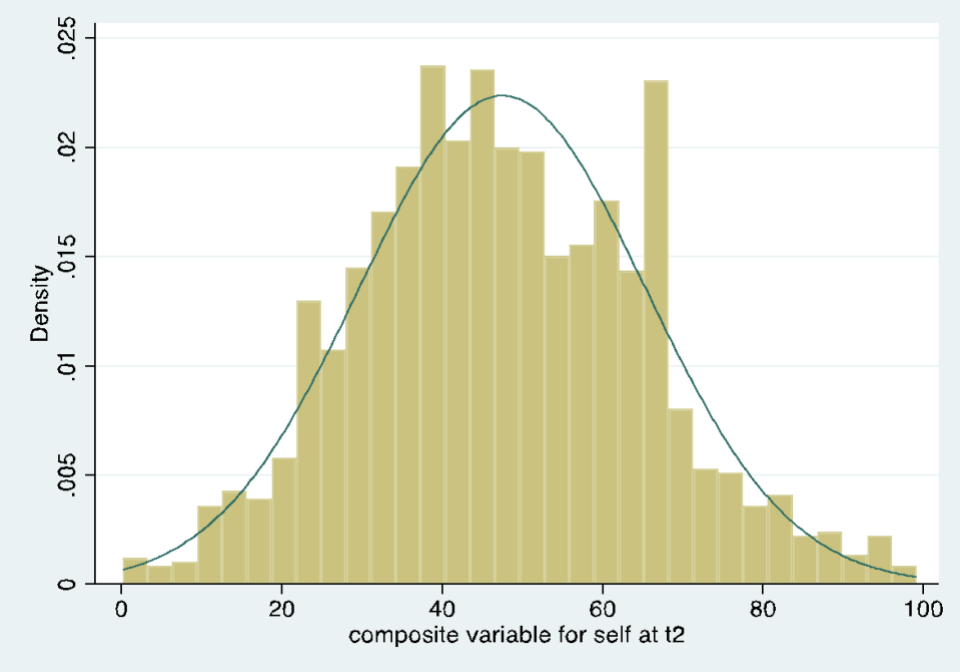
Histogram for EpiCacity at Post-test



Note. A normal bell-curved distribution for the T2 (post-test) EpiCapacity variable.

Figure 8

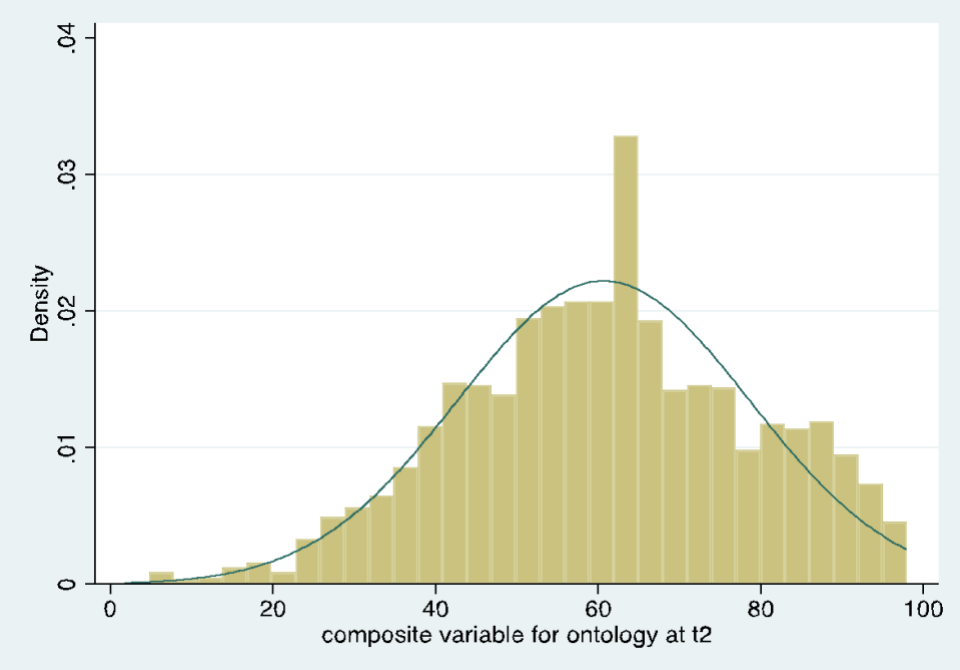
Histogram for Self at Post-test



Note. A normal bell-curved distribution for the T2 (post-test) Self variable.

Figure 9

Histogram for Ontology at Post-test

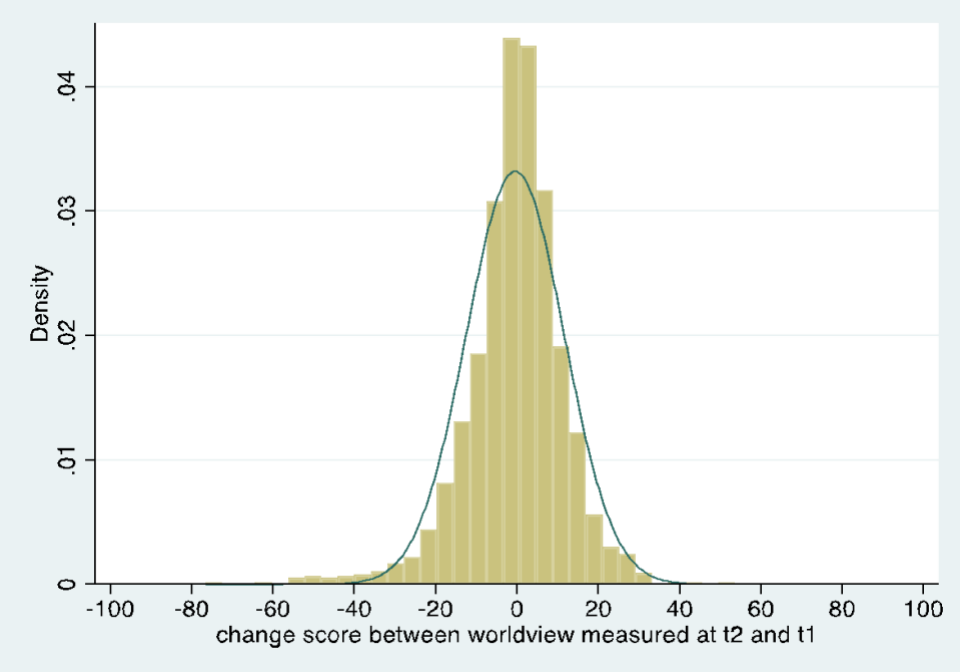


Note. A normal bell-curved distribution for the T2 (post-test) Ontology variable.

APPENDIX F: HISTOGRAMS TRANSFORMATIVE LEARNING VARIABLES (T2-T1)

Figure 10

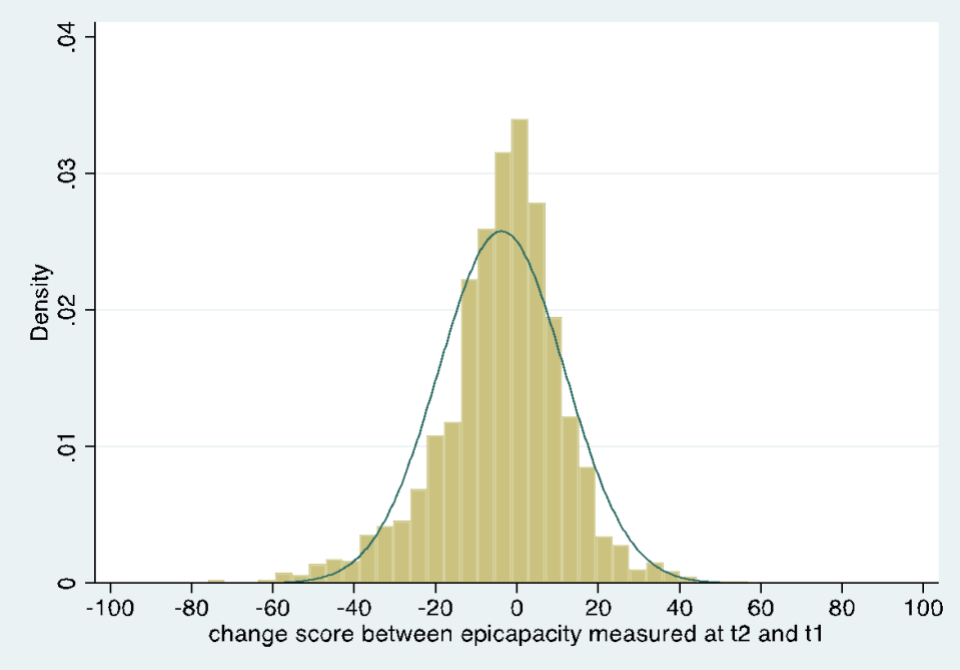
Histogram for Worldview Pre- and Post-test Difference Scores



Note. A normal bell-curved distribution for the T2-T1 (pre-and post-test) Worldview variable.

Figure 11

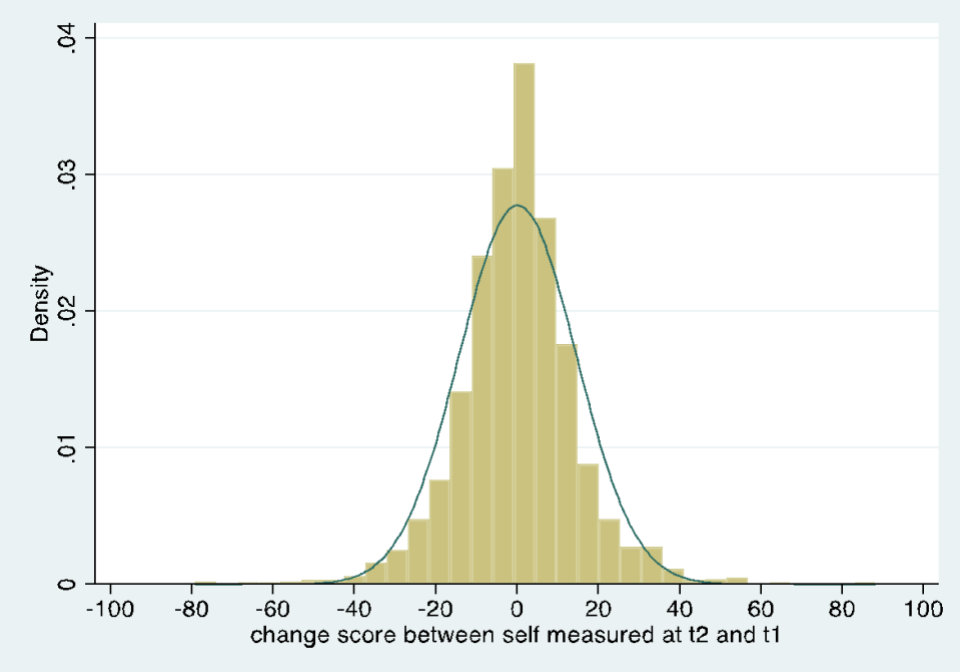
Histogram for EpiCapacity Pre- and Post-test Difference Scores



Note. A normal bell-curved distribution for the T2-T1 (pre-and post-test) EpiCapacity variable.

Figure 12

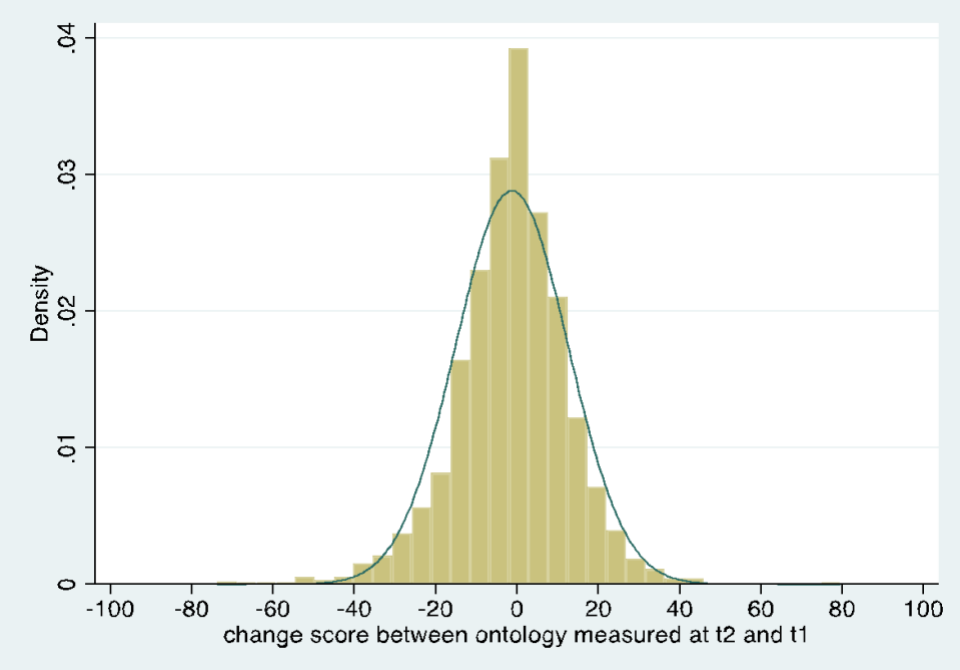
Histogram for Self Pre- and Post-test Difference Scores



Note. A normal bell-curved distribution for the T2-T1 (pre-and post-test) Self variable.

Figure 13

Histogram for Ontology Pre- and Post-test Difference Scores

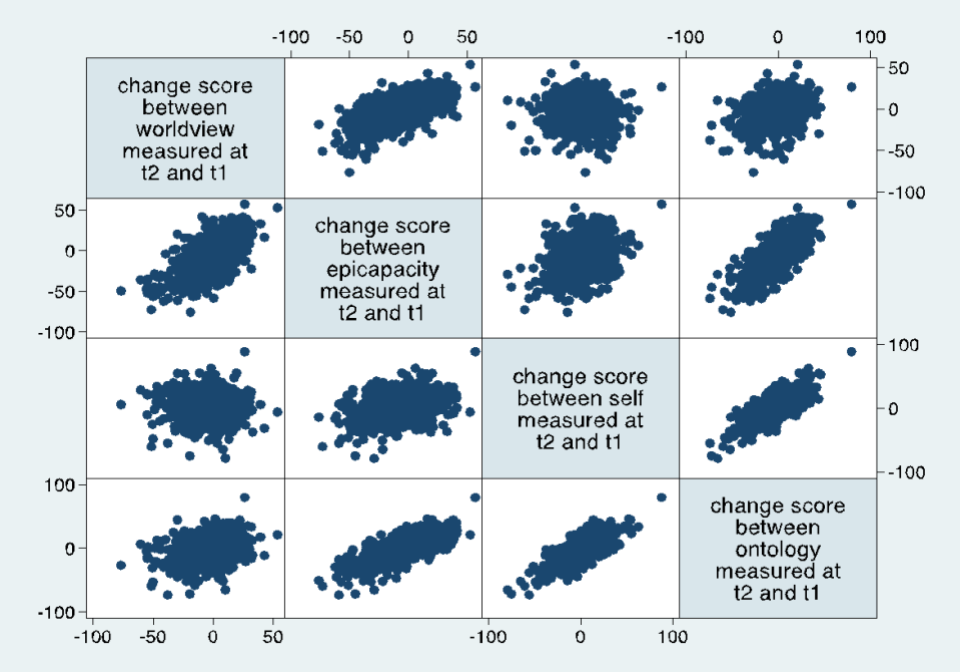


Note. A normal bell-curved distribution for the T2-T1 (pre-and post-test) Ontology variable.

APPENDIX G: SCATTERPLOTS TRANSFORMATIVE LEARNING VARIABLES

Figure 14

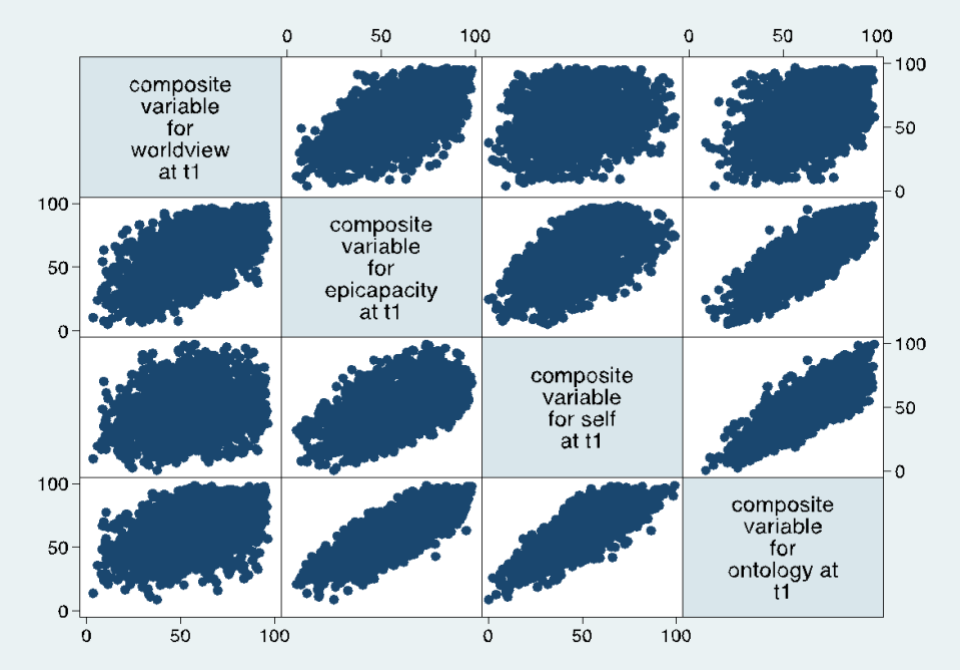
Scatterplots Among Difference Variables



Note. A collage of scatterplots for the T2-T1 (difference) transformative learning variables.

Figure 15

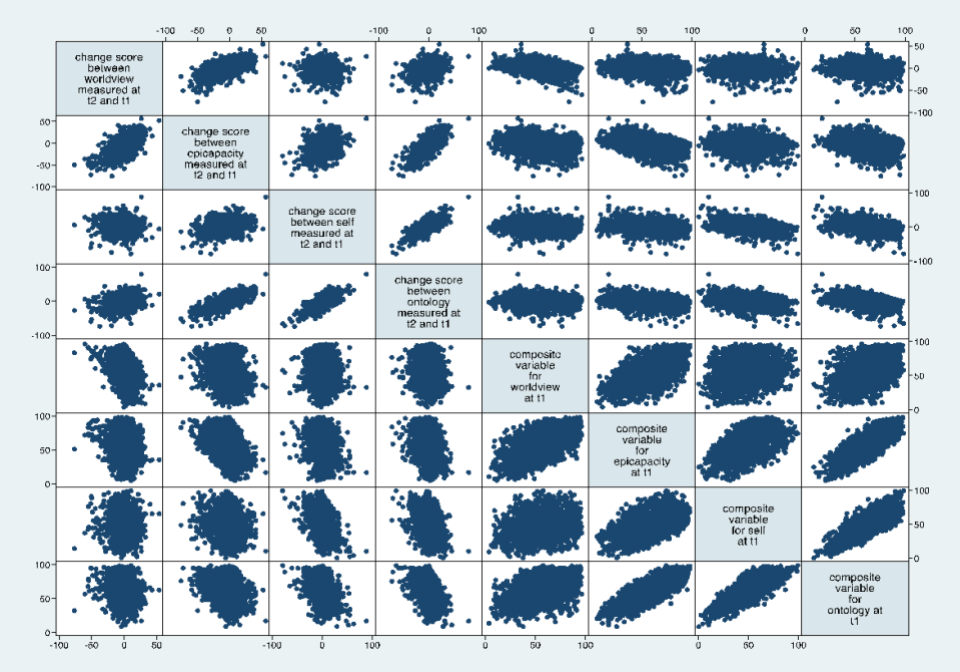
Scatterplots Among Pre-test Variables



Note. A collage of scatterplots for the T1 (pre-test) transformative learning variables.

Figure 16

Scatterplots Among Difference and Pre-test Variables



Note. A collage of scatterplots for the T2 (post-test) transformative learning variables.

APPENDIX H: EMBRACING TRANSFORMATION AS A RARITY

The following paragraphs are directly quoted from the conference website: https://itlc2022.intertla.org/conference-theme/

"At the center of this gathering is a shared interest in transformation, a word used frequently in today's world. A quick google search of the internet has almost 2 billion hits. You find it being employed by business consultants, community planners, life coaches, educators, health professionals…no sector is removed from individuals and organizations implying their work evokes radical change in the systems they touch. However, if everything results in transformation, it doesn't suggest a very high bar for this type of change. To quote an analogous statement from Harry Nilsson's Pointed Man, "A point in every direction is the same as no point at all". The word has become so ubiquitous to have almost no meaning.

However, what if we consider transformation as something more, something difficult, something that doesn't happen very often? What if we acknowledged the struggle of transformation as something to aspire toward but rarely obtained? What would that look like?

Theorists and practitioners who focus on this phenomenon have labeled significant and profound change as transformative learning. Transformative learning is an outcome which results in the reorganizing of the internal systems of an organism such that its combined thoughts, behaviors, and emotions are more authentic and functional within a given sociocultural and/or psychological contexts. This type of evolution creates a deeper sense of meaning and purpose, resulting in an enhanced sense of self or consciousness. This reorganization can occur within any organic system; an individual, group, organization, or community.

Ultimately, this is an outcome for which the genesis is not always obvious. A trigger event may allow the transformation to fully manifest itself, however, the years of work that preceded this materialization are often times hidden to the observer, and sometimes the organisms themselves. Since all organic systems strive for homeostasis, the resistance to transformation is usually high. The process takes a significant amount of time and energy. The results however are relatively permanent and benefit the person, organization, or community in the ways described above.

If transformative learning is the outcome, transformative education is the philosophy and process of facilitating this type of change. The philosophy of transformative education is to be cognizant of learning that rises to a level of systemic alternation and to create processes designed to facilitate this level of change. It is not easy, takes a significant amount of time, and often times isn't obvious until well after the change has occurred. For an individual, the results are a set of beliefs, actions, and emotions that are better aligned internally, provide more functionality externally, and ultimately bring forth a higher level of self-awareness. The same is true for the organization and the community, where the culture, rules, rewards, activities, and evaluations better serve the larger system and at the same time the individuals who are part of the organization or community.

In the 2022 International Transformative Learning Conference, it is our goal to revisit our origin, make meaning of where we are today, and conceptualize our future. During this process we will gather as a community of new and old to explore the multidimensional elements of transformation at the level of individual, organization, and community. At the same time, we will acknowledge and explore the various components of cognitive, emotional, behavior, and spiritual development within the various levels of transformational learning and transformational education."