Assessing Postsecondary Students' Orientation toward Lifelong Learning

by

Philip Arcuria

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Approved November 2011 by the
Graduate Supervisory Committee:

Marilyn Thompson, Chair
Samuel Green
Roy Levy

ARIZONA STATE UNIVERSITY

December 2011

ABSTRACT

Institutions of higher education often tout that they are developing students to become lifelong learners. Evaluative efforts in this area have been presumably hindered by the lack of a uniform conceptualization of lifelong learning. Lifelong learning has been defined from institutional, economic, socio-cultural, and pedagogical perspectives, among others. This study presents the existing operational definitions and theories of lifelong learning in the context of higher education and synthesizes them to propose a unified model of college students' orientation toward lifelong learning. The model theorizes that orientation toward lifelong learning is a latent construct which manifests as students' likelihood to engage in four types of learning activities: formal work-related activities, informal work-related activities, formal personal interest activities, and informal personal interest activities. The Postsecondary Orientation toward Lifelong Learning scale (POLL) was developed and the validity of the resulting score interpretations was examined. The instrument was used to compare potential differences in orientation toward lifelong learning between freshmen and seniors.

Exploratory factor analyses of the responses of 138 undergraduate college students in the pilot study data provided tentative support for the factor structure within each type of learning activity. Guttman's λ_2 estimates of the learning activity subscales ranged from .78 to .85. Follow-up confirmatory factor analysis using structural equation modeling did not corroborate support for the hypothesized four-factor model using the main student sample data of 405 undergraduate students. Several alternative reflective factor structures were explored. A two-factor model representing factors for Instructing/Presenting and Reading learning activities produced marginal model-data fit and warrants further investigation.

The summed POLL total scores had a relatively strong positive correlation with global interest in learning (.58), moderate positive correlations with civic engagement and participation (.38) and life satisfaction (.29), and a small positive correlation with social desirability (.15). The results of the main study do not provide support for the malleability of postsecondary students' orientation toward lifelong learning, as measured by the summed POLL scores. The difference

between freshmen and seniors' average total POLL scores was not statistically significant and was negligible in size.

This thesis is dedicated to:

My amazing daughter, Victoria. May your love for learning never cease.

&

Ma chérie, l'amour de ma vie.

ACKNOWLEDGMENTS

I am deeply indebted to my chair, Dr. Marilyn Thompson, for her unending guidance and support on this project. She is an exemplar of her field and provided a perfect mixture of expert guidance, friendly encouragement, and soft but effective nudging when necessary. I could not have asked for a better guide on this journey. I also greatly appreciate the support and insight of Drs. Sam Green and Roy Levy. I feel privileged to have had the opportunity to work with such wonderful researchers and people.

I would also like to thank my neighbors for tolerating my unkempt yard all the weekends I was immersed in writing rather than battling the legions of weeds colonizing my lawn; the San Francisco 49ers, my favorite N.F.L. football team, for graciously fielding subpar teams the last couple of years so as not to further tempt me to put down my studies and evaporate three hours in front the television watching football; my family and friends who have called and emailed countless times and are still waiting for a reply; and lastly, to my significant other and our daughter for putting up with the periodic crankiness of a sleep-deprived graduate student.

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LIFELONG LEARNING

In the 1970's a major paradigm shift occurred in the field of education that resulted in an expanded conceptualization of education as an ongoing, never-ending process. The once commonly held belief that education ended upon completion of one's formal undergraduate education in his/her mid 20's was replaced with a new view of education as a lifelong process (Candy, 2000). The perspective was articulated by the United Nations Educational, Scientific and Cultural Organizations' (UNESCO) watershed report, *Learning To Be: The World of Education Today and Tomorrow* (Faure et al., 1972). The report called on the international educational community to strive to develop education that:

1. last[s] the whole life of each individual;
2. lead[s] to the systematic acquisition, renewal, upgrading and completion of knowledge, skills and attitudes made necessary by the constantly changing conditions in which people now live;
3. promote[s], as its ultimate goal, the self-fulfillment of each individual;
4. [is] dependent for its successful implementation on people's increasing ability and motivation to engage in self-directed learning activities; and
5. acknowledge[s] the contribution of all available educational influences, including formal, non-formal and informal. (Cropley, 1979, p. 3)

The term "lifelong learning" has become a ubiquitous theme throughout the educational community. This is especially true among colleges and universities where lifelong learning has become an oft-touted educational outcome of postsecondary education. Institutions of higher education now strive to develop students as lifelong learners. This can be seen in the Association of American Colleges and Universities' (AACU) 2007 report, *College Learning for the New Global Century*, which lists lifelong learning as an "essential learning outcome" (p. 3) of a postsecondary liberal education. The prevalence of lifelong learning as a postsecondary outcome is also evidenced at the local level in the mission statements of colleges and universities. I reviewed the mission statements and related documentation of 100 American postsecondary

academic institutions randomly selected from the list of Council for Higher Education Accreditation member institutions. The selected institutions included a wide variety of colleges and universities, ranging from small specialized and two-year institutions to large research universities. Forty percent (40%) of the mission statements that were reviewed stated lifelong learning as an institutional outcome. The mission statement of Richland College provides an example that is indicative of the claims that were found across institutions:

> Richland College identifies and meets the educational needs, primarily of adults, in our principal geographic service area of northeast Dallas, Richardson, and Garland, Texas. To this end, Richland College offers courses, programs, and services to enable students to achieve their educational goals and *become lifelong learners* [emphasis added] and global citizens, building sustainable local/world community. We empower employees to model excellence in their service to students, colleagues, and community (http://www.richlandcollege.edu/thunderdoc/index.php#mission).

Although lifelong learning has become a catch phrase within the educational community, it remains to some degree a nebulous construct that lacks a global definition (Medel-Anonuevo, Ohsako, & Mauch, 2001; Pillary, Wilss, & Boulton-Lewis, 2006; Walters, 2006). It has been defined from institutional (e.g., Walters, 2006), economic (e.g., Gorard & Selwyn, 2005; Medel-Anonuevo et al., 2001), socio-cultural (e.g., Evison, 2006), and pedagogical (e.g., Trigwell, 2006) perspectives, among others. This creates a void between postsecondary institutions' stated expectations (i.e., that students will leave an institution as "lifelong learners") and their ability to define, measure, and evaluate whether or not those expectations are being realized.

The purpose of this study was threefold:

1. To synthesize the disparate corpus of research into an integrated model of postsecondary students' orientation toward lifelong learning;

2. To develop and validate an instrument to measure one's orientation toward lifelong learning as an outcome of postsecondary education; and

3. To examine whether seniors have higher levels of orientation toward lifelong learning compared to freshmen, as would be expected if the construct is positively influenced by formal postsecondary educational experiences.

Lifelong Learning

Despite the lack of consensus on what represents lifelong learning, there is broad agreement that the construct involves multiple forms of learning that take place across the entire lifespan (Abukari, 2005; Bolhuis, 2003; Bryce, 2004; Candy, 2000; Deakin Crick, Broadfoot, & Claxton, 2004; Friesen & Anderson, 2004; Hager, 2004; Livingstone, 2001; Smith & Spurling, 2001; Tuijnman, 2003). Livingstone (2001) outlined four such types of learning: formal education, non-formal education, informal education, and self-directed learning. Formal education represents instructor-led learning activities that have a formally recognized curriculum (e.g., tax courses taken as part of a baccalaureate degree in accounting). Non-formal education comprises less formal instructor-led learning activities that have an agreed upon curriculum, but are primarily driven by the learner's interests (e.g., a workshop on how to file a personal tax return). Informal education covers learning activities without a structured curriculum in which the instructor serves as a mentor or guide rather than as a facilitator (e.g., having a friend teach you how to file a personal tax return). The fourth form of learning, self-directed learning, involves neither a structured curriculum nor an instructor and is initiated by the learner (e.g., reading a book on how to file a personal tax return). These four forms of learning combined cover a potentially endless set of learning activities. As Bolhuis (2003) noted:

> In lifelong learning, there is no demarcation line that separates learning from other activities. Rather learning flows from a variety of activities, for example, observing how other people do something, discussing with others, asking someone, looking up information, trying something for oneself and learning from trial and error, reflecting upon all the previous activities. (p. 337)

Over the years several large complex-sample surveys have been administered to gauge adult participation in various types of learning activities (e.g., Creighton & Hudson, 2002; Gorard & Selwyn, 2005; Livingstone, 2001). One ongoing measure in the United States is the *Adult*

Education National Household Education Surveys (NHES) administered by the National Center for Education Statistics (NCES). The NCES has administered the survey six times since 1991, most recently in 2005. Together this family of surveys has netted estimates on how frequently adults engage in various types of learning activities, such as basic skills (e.g., GED preparation) and English language courses, college/university degree programs, vocational/technical diploma programs, professional apprenticeships, other work-related education and training, and learning activities engaged in out of personal interest. Researchers utilizing NHES data have typically grouped the activities along two dimensions: formal (i.e., instructor-led) versus informal (i.e., no instructor involved) activities, and work-related versus personal interest (i.e., self-directed) activities (Kim, Hagedorn, Williamson, & Chapman, 2004; Kleiner, Craver, Hagedorn, & Chapman, 2005; NCES, 2008). These groupings conceptually overlap with the categorizations provided by Livingstone (2001), while making the distinction between learning activities that are work-related and those that are for personal interest. Table 1 summarizes the types of learning activities surveyed by each version of the Adult Education NHES.

Table 1

Types of Educational Activities Surveyed by NHES by Administration Year

	Administration Year					
Type of Educational Activity	1991	1995	1999	2001	2003	2005
Informal work-related				x	x	x
Formal work-related	x	x	x	x	x	x
Informal personal interest					x	
Formal personal interest	x	x	x	x		x

Other similar surveys have been administered abroad, such as the *Participation in Adult Education and Training in Finland* survey (Bloomqvist, Niemi, & Ruuskanen, 1998), the *National (UK) Adult Learning Survey* (Beinhart & Smith, 1998), the *General Social Survey in Canada*

(www.statcan.gc.ca), and the Canadian *New Approaches to Lifelong Learning* (NALL, 1998) survey.

The results of surveys such as these serve as indicators of adult participation in various forms of educational activities believed to collectively represent lifelong learning. However, for the most part, these surveys were developed from an atheoretical vantage point. That is, these surveys can be viewed as measures of the behavioral outputs of lifelong learning, but they do not explicitly view educational activities as manifest variables of an underlying latent construct of lifelong learning, nor do they attempt to define or expand the theoretical underpinnings of lifelong learning.

Within the context of postsecondary education, the construct of lifelong learning has been theorized and operationalized in various ways. Perhaps the most thorough attempt to define lifelong learning as an educational outcome was undertaken by Candy, Crebert, & O'Leary (1994). In the early 1990's, the researchers conducted a study commissioned by the Australian Higher Education Council to, "…identify whether and in what ways the content, structure, teaching modes and assessment procedures of undergraduate degrees, and the activities of student report services, are designed to lead to the formation of attributes which both enable and encourage graduates to become lifelong learners." (Higher Education Council, 1993, p. 2, as cited by Candy, 2000). As part of this effort, Candy et al. (1994) reviewed 600 publications, the mission statements of all the public universities in Australia, the curricula of 13 undergraduate programs that had been nominated by several sources as exemplifying, "…a commitment to the principles of lifelong learning" (p. 108), as well as various educationally oriented student services departments (e.g., library, study skills services, etc.). For each of the selected academic programs, the researchers interviewed first- and third-year students in the program, faculty, alumni, employers, and the support staff in an attempt to elucidate further the construct of lifelong learning.

Candy et al. (1994) and Candy (1991, 2000) identified six characteristics of a lifelong learner:

- An inquiring mind full of curiosity and love for learning that is also critical and engages in self-evaluation.

- An ability to decompartmentalize learning and see the interconnectedness of various fields of study.
- A high level of information literacy skills (e.g., being able to locate needed information from a variety of sources and critically examine it).
- A sense of personal agency (i.e., a positive self-concept, and strong organizational skills).
- A strong set of meta-learning skills, such as an awareness of what learning strategies are most helpful in a given situation.
- Interpersonal skills that enable the learner to interact effectively with others.

Although these provide a characterological outline of lifelong learners, Candy et al. (1994) cautioned against over-interpreting them as a definitive mold by stating:

> [T]hese attributes will be embodied in different people in varying degrees and combinations, according not only to their individual backgrounds and fields of study, but also according to their construction of the demands of each particular learning situation. Thus, there is no such thing as a 'one size fits all' profile of the lifelong learner; these characteristics are only generic or context-free to a limited extent. (p. 44)

Nearly a decade after the work of Candy et al. (1994), Deakin Crick, Broadfoot, & Claxton (2004) constructed the Effective Lifelong Learning Inventory (ELLI) aimed at assessing one's orientation toward and capacity for lifelong learning. The authors developed the measure based on prior research related to an array of learning dimensions ranging from learning dispositions to self-esteem, as well as suggestions from academics and policy makers deemed appropriate subject-matter experts. The final 72-item self-report measure was purported to assesses students' dispositions toward seven dimensions of "learning power" (p. 267) believed to represent lifelong learning: growth orientation, meaning making, curiosity, fragility and dependence (i.e., the antithesis of resilience), creativity, learning relationships, and strategic awareness. In their original study, Deakin Crick et al. (2004) used confirmatory factor analysis (CFA) to fit a seven-factor model. The model accounted for a little over a third of the variance in

responses. The authors then used exploratory factor analysis (EFA; presumably principle components analysis, although the estimation method was not explicitly stated) to examine the underlying dimensionality of the measure. The authors identified 16 components based on the eigenvalues greater than one criterion, accounting for 51.1% of the variance. Inspection of the scree plot provided support for seven components. Based on the scree plot and prior theoretical beliefs, the authors conducted a follow-up CFA with seven factors. The seven-factor CFA accounted for 35.3% of the variance in the measures. In the end, the authors decided to construct seven subscales using the 16 components, stating that:

> …the forced seven factors accounted for only 35% of the variance, whilst the exploratory factor analysis with eigenvalues over one accounted for 51.1% of the variance. Thus the construction of the scales was undertaken using items from all 16 factors, but utilizing them on scales that represented the seven theorized dimensions of learning derived from the factor analysis that forced seven factors. Within the 16 factors there were factors that theoretically differentiate aspects of key dimensions of learning from the first analysis, and there were sets of factors that were theoretically related, thus supporting the reduction of 16 factors into seven scales representing the seven theorized dimensions of learning. (Deakin Crick et al., 2004, p. 253)

The authors did not report factor analyzing the reconstituted seven scales to provide empirical support for its underlying dimensionality. Accordingly, interpretation of the empirical results may have been biased by an a priori theorization that the instrument must assess seven factors.

Deakin Crick and Yu (2008) further examined the validity and reliability of the ELLI. The study examined the responses of 10,496 individuals, ages 5 to 19+ (exact ages were not reported), from 413 classrooms in 122 institutions. The authors conducted an exploratory factor analysis of the responses to the 72 items and applied varimax rotation (the authors did not indicate whether they performed a principal components analysis [PCA] or a principal axis factoring [PAF]; it was assumed they performed a PCA given their continual reference to “components”, however, this assumption may not be accurate). Using eigenvalues greater than one as the criterion, the

authors stated that the items loaded onto 14 components that accounted for 49.1% of the variance of the responses. Visual inspection of scree plots by the authors provided support for nine components, accounting for 28.7% of the variance. They used this evidence to support the validity and stability of the ELLI. It is unclear how the authors arrived at this conclusion since the presented empirical data supported 9-14 components rather than the seven the authors claim the instrument represents. Additionally, it is unknown why the authors chose to use EFA and not CFA given that the purpose of the study was to support prior theoretical beliefs that the measure assessed seven factors. Although the authors should be commended for attempting to provide support for the theoretical structure of the measure, the results, as presented, did not support the theorized seven dimension structure of the ELLI.

The authors also examined the internal consistency of the items for each of the seven dimensions. Estimates of coefficient alpha for the entire sample ranged from 0.72 (learning relationships) to 0.85 (strategic awareness). The authors also conducted a cross-sectional analysis of mean disposition scores across six age groups (5-7, 7-11, 11-14, 14-16, 16-19, 19+). Generally speaking, the mean scores trended downward between age groups 5-7 to 14-16 and then increased between ages 14-16 to 19+. The exceptions were trends for the dimensions of learning relationships and fragility and dependence. The scores for learning relationships decreased until the 16-19 age group before increasing among adults (19+). The scores on fragility and dependence trended downward across all age groups. Unfortunately, the results presented by the authors did not provide the magnitude of the differences in mean scores between age groups and, more importantly, whether the differences were substantially meaningful. The study also did not mention whether the multilevel nature of the data (i.e., students clustered with classrooms, which were in turn clustered within institutions) was accounted for in the analysis. Without this additional level of information, it is difficult to make interpretations of the hypothesized developmental differences related to the dimensions purported to be measured by the ELLI.

Deakin Crick and Yu (2008) stated that the ELLI had four purposes: (a) to provide educators with individual and group profiles of students' strengths and weaknesses on the seven dimensions of learning power to improve pedagogical practices and student learning in the

classroom, (b) to provide students with a profile on their learning orientations in order to increase greater self-awareness and self-directed learning, (c) to serve as a tool to evaluate educational institutions, and (d) to be used as a research tool to assess dispositions of learning powers across populations. Unfortunately, published information (i.e., Deakin Crick, Broadfoot, & Claxton, 2004; Deakin Crick & Yu, 2008; www.ellionline.co.uk) did not provide sufficient support for the validity of using ELLI scores for these purposes. This is especially true for the focal population of the current study—postsecondary learners. As Deakin Crick and Yu (2008) note, "…the adult population is not representative because [the adult respondents] were almost all teachers or trainers who did their own learning profiles in order to learn how to support their students in strengthening their own learning" (p. 392). The authors mentioned they are currently piloting a version of the ELLI for adults; however, at this time, the ability to reliably and validly use the results of ELLI to assess the lifelong learning of postsecondary learners has not been established.

The concept of lifelong learning was measured from a different perspective by the developers of the College Student Experiences Questionnaire (CSEQ; Gonyea, Kish, Kuh, Muthiah, & Thomas, 2003). The instrument's Capacity for Life-Long Learning (CLLL) index operationalized lifelong learning as a composite of 14 "estimate of gains" (p. 5) items. More specifically, the index included items related to perceived gains in a student's ability to: think analytically; acquire, synthesize, and understand new information; write clearly and effectively; collaborate with others; analyze quantitative problems; utilize technologies; be self aware; adapt to change; and engage in self-directed learning. The items reflect student perceptions of how much their knowledge and skills have increased during their college experience. The response scale for the items was *very much*, *quite a bit*, *some*, and *very little*.

According to the *College Student Experiences Questionnaire: Norms for the Fourth Edition* (Gonyea, et al., 2003), the CLLL was composed of select items from each of CSEQ's five Estimated Gains factors: Gains in Personal Development, Gains in Science & Technology, Gains in General Education, Gains in Vocational Preparation, and Gains in Intellectual Skills. Gonyea et al. (2003) provide validity and reliability evidence for the Estimated Gains factors themselves, but little validity or reliability evidence was provided for the CLLL index composed of elements of

those factors. It is reasonable to argue that the knowledge and skills covered by the CLLL represent life-long learning; however, only face validity and intuitive appeal were tacitly offered by the authors to substantiate this claim.

Mayhew, Wolnaik, & Pascarella (2008) operationalized lifelong learning as part of an examination of the relationship between undergraduate students' educational practices (e.g., active learning) and their orientations toward lifelong learning. Based on prior research (e.g., Cacioppo, Petty, Feinstein, & Jarvis,1996; McCombs, 1991; Smith & Spurling, 2001), the authors viewed one's "need for cognition" (p. 338) as a proxy for one's orientation toward lifelong learning; that is, lifelong learning was operationally defined as "an individual's motivation to perform a cognitively challenging task" (p. 339). Based on this perspective, the researchers used the Need for Cognition Scale (Cacioppo & Petty, 1982) to measure a student's orientation toward lifelong learning.

The Need for Cognition Scale (NCS) includes 34 items aimed at gauging a person's "tendency to engage in and enjoy thinking" (Cacioppo & Petty, 1982, p. 116). The scale includes both positively worded items (e.g., "I would prefer complex to simple problems") and negatively worded items ("Thinking is not my idea of fun"). Subjects are asked to respond to each statement using a nine-point Likert scale ranging from *very strongly disagree* to *very strongly agree*. The items were initially selected based on their ability to discriminate between subjects presumed to be working in low need-for-cognition jobs (i.e., assembly line workers) and subjects presumed to be working in high need-for-cognition jobs (i.e., university faculty members).

Through a series of well-planned studies, Cacioppo & Petty (1982) found the scale to have a stable single-factor structure with high internal consistency (coefficient alpha = .87). They also provided evidence of content and construct validity. More specifically, the scale was shown to have a moderate positive correlation with ACT scores (r = .39), a weak positive correlation with a measure of cognitive style (r = .19), a weak negative correlation with a measure of dogmatism (r = -.27), and no significant association with measures of test anxiety (r =.02) or social desirability (r = .08).

Cacioppo, Petty, & Kao (1984) later developed a short version of the Need for Cognitive Scale. The authors found that the 18 items with the largest absolute factor loadings from the original factor analysis in Cacioppo & Petty (1982) had a similar single-factor structure to the long form, and high internal consistency (coefficient alpha = .90). The 18-item short form was also highly correlated with the long form (r =.95). Sadwoksi (1992) similarly found the short version of the Need for Cognition Scale to have a single-factor structure and high internal consistency (coefficient alpha = .86).

Although theoretical overlap can be observed between these conceptualizations of lifelong learning in the context of postsecondary education, they appear to have been created in isolation of each other. Surprisingly, the studies reviewed contain no shared references. There is also a segregation between instruments developed to assess the characterological elements of lifelong learning (e.g., Effective Lifelong Learning Inventory, Capacity for Life-Long Learning index, and Need for Cognition Scale) and those developed to measure the engagement in lifelong learning activities (e.g., Adult Education National Household Education Surveys). This has contributed to lifelong learning's current state as a polymorphous and nebulous super-construct that covers an almost boundless array of sub-constructs and learning activities.

Toward a Unified Model of Lifelong Learning

In order for lifelong learning to become a measurable outcome of postsecondary education, a unified theory is needed that synthesizes the antecedents of lifelong learning along with its behavioral outputs. Creating a unified model of lifelong learning presents several challenges. The first challenge is how to take a construct that, by definition, spans one's entire life, and measure it during a single developmental time span (i.e., at the start of, during, and upon completion of a postsecondary education). For most, postsecondary education is an event that occurs in early to mid adulthood. At that point, a person is presumably still developing toward becoming a "lifelong learner," a developmental goal to which institutions hope they are contributing. Therefore, the undergraduate years may appear to be an inappropriate time to assess someone's status as a lifelong learner. The true outcomes of lifelong learning would be more appropriately assessed later in one's lifespan rather than as an in-process measure. Accordingly,

and given the postsecondary educational aim of fostering the development of lifelong learners, a unified model is needed for postsecondary students' *orientation* toward lifelong learning. More specifically, a model that specifies a person's proclivity to engage in learning activities that are believed to be indicative of lifelong learners is needed.

The second and greater challenge is how to best synthesize the disparate research on lifelong learning related to postsecondary education. All of the aforementioned research appeared to have taken place independently of each other. None of the studies examined shared even a single citation or built off each other in a concerted attempt to build a synergistic theory of lifelong learning. One possible solution is to propose a model that includes all of the characterological traits, dispositions, and skill sets posited by each researcher to represent lifelong learning. This approach is not practical because it would result in an overly broad model with more than a dozen related skills and psychological constructs. Such a broad model would not help ameliorate the notion of lifelong learning as an overly ethereal construct that cannot be operationally defined or measured. A broad theorization would also fail to address the need to provide institutions of higher education with a practical tool to assess their claims of developing students into lifelong learners. Instead, a more pragmatic approach is needed that brings together a parsimonious set of constructs and skills that multiple researchers have independently theorized or operationalized to be related to lifelong learning.

A proposed unified model of postsecondary orientation toward lifelong learning aimed at surmounting these challenges is presented in Figure 1. The model theorizes that orientation toward lifelong learning is a latent construct that is influenced, in part, by one's degree of inquisitiveness, relational awareness (Candy et al., 1994; Deakin Crick, et al., 2004), information literacy skills (Candy et al., 1994; Gonyea, et al., 2003), interpersonal skills (Candy et al., 1994; Deakin Crick, et al., 2004; Gonyea et al., 2003), and meta-learning skills (Candy et al., 1994; Deakin Crick, et al., 2004). Inquisitiveness encapsulates both curiosity (Candy et al., 1994; Deakin Crick, et al., 2004) and the related construct "need for cognition" (Mayhew et al., 2007).

Orientation toward lifelong learning, in turn, is viewed as a construct evidenced by students' likelihood of engagement in four types of learning activities—formal work-related

activities, informal work-related activities, formal personal interest activities, and informal personal interest activities—that are posited to represent behaviors of lifelong learners.

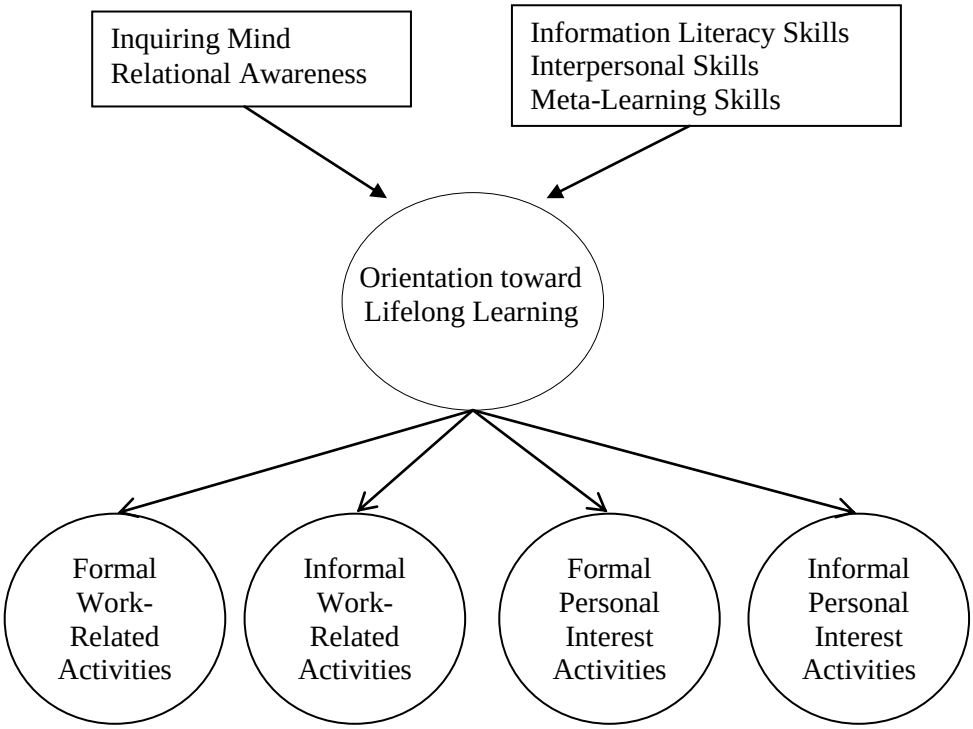

Figure 1. A theorized model of postsecondary students' orientation toward lifelong learning. The rectangles represent the hypothesized characterological antecedents of one's orientation toward lifelong learning. The four circles at the bottom of the figure represent categories of learning activities believed to be indicative of lifelong learners.

A Scale or an Index?

Articulating the theorized relationship between a construct and its indicators (typically survey or test items in social science research) is a crucial and often overlooked prerequisite to determining the most appropriate method for measuring a construct. A scale represents a reflective model that assumes item responses are effect indicators of an underlying latent construct (DeVellis, 2003). In other words, a scale assumes that the item responses are manifestations of a shared source/construct. This translates into the expectation that there will be a high degree of association (shared variance) between the item responses. This is a fundamental assumption that guides how researchers explore the validity and reliability of scale interpretations. For example, researchers commonly use coefficient alpha as an estimate of the internal consistency of a set of items (not

without criticism; see Green & Yang, 2009; Sijtsma, 2009). Typically, a coefficient alpha value of .70 or greater is seen as providing evidence that a scale has an acceptable level of internal consistency. Given that coefficient alpha is essentially the ratio of shared variance to total variance, scales seek to maximize shared variance and minimize unique variance. Exploratory factor analysis using principle axis factoring and reflective confirmatory factor analysis procedures are based on the same model: the common factor model. Using these procedures to evaluate the validity of item responses is only appropriate if a researcher believes the relationship between the items and the construct is a reflective one.

In contrast to a scale, an index represents a formative model that assumes item responses "cause" a construct (Diamantopoulos & Winklhofer, 2001; Jarvis, MacKenzie, & Podsakoff, 2003). From this perspective, a construct is a composite of the items. In other words, an index does not assume that the item responses stem from a common source. As a result, most commonly used analytic techniques that are based on reflective assumptions (i.e., corrected item-total correlations, internal consistency guidelines, principle axis factoring) are not appropriate for evaluating the reliability and validity of index responses. Diamantopoulos & Winklhofer (2001) suggested alternative approaches for evaluating the validity and reliability, such as using a multiple indicators and multiple causes (MIMIC) model to examine a hypothesized causal relationship between the index and reflective model, and examining indicator collinearity to cull indictors with high levels of multicollinearity.

Jarvis et al. (2003) provide a list of probing questions to help researchers determine whether the relationship between a construct and its item responses is reflective (i.e., a scale) or formative (i.e., an index). First, they encourage researchers to consider the directionality of the relationship. As previously stated, scales view item responses as the effects of a construct, whereas indices rest on the belief that a construct is the effect of the items. Second, an assumption about the interchangeability of items should be determined. Scales view items as roughly interchangeable. Removing an item does not change the overall meaning of the construct. In contrast, indices do not require items to be interchangeable. Often the removal of an index item changes the very nature of the construct since it is a direct function of the items. Third, items on a

scale are expected to covary since they are believed to stem from a common cause. This is not a necessity for items on an index. Index items may or may not be expected to covary depending on the nature of the construct. In some cases, the best representation of a formative construct may be items that have little to no covariation. Lastly, the representation of the items in a nomological network provides evidence of whether they represent a scale or an index. Items on a scale should share proximal space on the nomological network. In other words, all the items on a scale should have roughly the same hypothesized or actual relationship with other phenomena. This is not the case for index items. Each item on an index may have a different hypothesized or actual relationship with other phenomena.

In the current study, the relationship between the POLL and its items was posited to be reflective. The items were believed to (a) be effect indicators of the POLL, (b) be roughly interchangeable within each learning activity category, (c) covary, and (d) share a common nomological network. In sum, I viewed the POLL as a scale.

Correlates of Orientation toward Lifelong Learning

Correlates of the proposed postsecondary orientation toward lifelong learning construct were examined to explore the convergent and discriminant validity of the scale and to better define the nomological network in which the construct resides. Prior research has shown civic engagement and volunteerism to be positively related to education level (Driskell, Lyon, & Embry, 2008; Park & Smith, 2000; Ruiter & De Graaf, 2006). Since level of education can be viewed as an intuitive proxy for one's orientation toward lifelong learning, the hypothesis was made that the construct would positively correlate with civic engagement. A person's orientation toward lifelong learning was also assumed to positively correlate with life satisfaction. Although the relationship between these two constructs is largely unstudied, it seems reasonable that the two would be positively related since both represent prosocial behaviors that are developmental in nature. Lounsbury, Levy, Park, Gibson, & Smith (2009) provided tentative support for this hypothesis. They found a significant positive relationship between measures of self-directed learning, readiness, and life satisfaction. From a discriminant validity perspective, Cacioppo and Petty (1982) found "need for cognition" to be uncorrelated with measures of test anxiety and social

desirability. As a result, it was hypothesized that social desirability would be uncorrelated with one's orientation toward lifelong learning since a hypothesized antecedent of the factor (i.e., inquisitiveness) is theoretically related to need for cognition. The relationship between the construct of interest and test anxiety was not examined in an attempt to minimize the number of scales respondents would be asked to complete. The decision was made to focus on social desirability as a discriminant comparison instead of test anxiety since the former represents a more global construct. Lastly, I constructed a five-item global interest in learning scale aimed at assessing students' overall interest in learning. It was hypothesized that responses on the global interest learning scale would have a strong positive correlation with students' likelihood to engage in learning activities (i.e., their orientation toward lifelong learning).

Purpose of the Study

The primary purpose of this study was to develop a unified theory of orientation toward lifelong learning as a first step toward substantiating whether students are developing into lifelong learners, as many institutions claim in their educational mission statements. A critical step in this process was to develop an instrument that measures postsecondary students' orientation toward lifelong learning and to provide empirical evidence of the instrument's reliability and interpretive validity.

Additionally, the study aimed to test the substantive hypothesis was that seniors would, on average, have a greater orientation towards lifelong learning than freshmen. This addresses the central assumption of postsecondary institutions that orientation toward lifelong learning is a malleable disposition that can be positively influenced by a formal postsecondary education. If this is indeed true, then it would be expected that students who have received a greater degree of formal educational experiences (i.e., seniors) would have higher levels of orientation toward lifelong learning than those who have received a lesser degree of formal education (i.e., freshmen).

Chapter 2

SCALE DEVELOPMENT AND PILOT STUDY METHODS

Scale Development

The following section details the development of the Postsecondary Orientation toward Lifelong Learning (POLL) scale, the Global Interest in Learning Scale (GILS) and the modification of the Civic Engagement and Participation index prior to their use in the main study.

Postsecondary Orientation toward Lifelong Learning scale (POLL). The Postsecondary Orientation toward Lifelong Learning Scale (POLL) is a 24-item self-report measure designed to measure students' likelihood of engaging in a variety lifelong learning activities. The measure is composed of four subscales. The first subscale includes six items related to formal (activities led by an instructor) work-related learning activities (e.g., taking a college-level course to strengthen your professional skills). The second subscale includes six items pertaining to informal (activities not led by an instructor) work-related activities (e.g., reading books, magazines, or journals for professional development). The third subscale is composed of six formal personal interest learning activities (e.g., attending a presentation at a conference, workshop, and/or trade show on a non-work related topic). The final subscale includes six items related to informal personal interest learning activities (e.g., reading "how to" books not related to work). Collectively, the items represent the hypothesized behavioral manifestations of lifelong learners. The goal was to have items that are of most interest to postsecondary educational institutions that tout lifelong learning development as an educational outcome. The institutional research, evaluation, and assessment offices and related personnel are typically the main actors charged with operationally defining, assessing, and evaluating institutional educational claims such as lifelong learning. Accordingly, these professionals were regarded as the de facto experts on the behaviors indicative of lifelong learners that institutions aim to foster in their students. This was especially necessary since the research on lifelong learning is so disparate and, accordingly, there is no unified body of experts on the subject.

The item development process consisted of multiple steps. The first step consisted of compiling a list of 43 learning activities that I believed, based on prior research and face validity,

represented a mixture of the four learning activity categories. Next, a questionnaire was sent to a listserv of postsecondary institutional assessment and evaluation professionals at a variety of U.S. colleges and universities. The questionnaire defined lifelong learning, provided the context for the research project, and listed the 43 learning activities. The reviewers were asked to (a) classify each learning activity in one of the four aforementioned learning categories (i.e., formal work-related activities, informal work-related activities, formal personal interest activities, and informal personal interest activities), and (b) rate the degree to which they felt each item represented an activity that is indicative of a "lifelong learner", on a scale from 1 (w*eakly represents*) to 5 (*strongly represents*). A total of six reviewers completed the questionnaire.

The reviewers' responses were reviewed to see if there was sufficient agreement on the classification of each learning activity. Sufficient agreement was defined as four or more of the six evaluators selecting the same classification that I ascribed to the activity when the items were developed. Thirty-seven of the original 43 items met this threshold. On three of the remaining items, four or more of the reviewers agreed on the classification, but their classification differed from my original classification. In these instances, the consensus classification of the reviewers was retained as the final classification for the activity. The classifications of the final three activities were not fully consistent among at least four of the reviewers. I reviewed these items and a final determination was made as to the most appropriate category in which to classify each learning activity. The review of these items also led to changing the wording of select items to make more explicit the type of learning activity represented.

After the learning activities were given a final classification, the reviewers' ratings on the degree to which each learning activity was indicative of a lifelong learner were averaged and ranked highest to lowest. The decision was made to select the seven items in each learning activity category that had the highest average ratings. Seven was chosen as a pragmatic compromise between selecting enough items to sufficiently represent each category, while keeping the overall instrument to a manageable length. The result was a 28-item version of the POLL scale. Following a pilot of the instrument (as discussed in a subsequent section) the scale was reduced to 24 items, six per learning activity category.

The instructions for the final POLL scale directed students to select the likelihood they would engage in each of the activities at some point after they graduate. A five-point response scale was used: 1 (*very unlikely*), 2 (*unlikely*), 3 (*neither unlikely nor likely*), 4 (*likely*), and 5 (*very likely*).

Global Interest in Learning Scale. I developed a Global Interest in Learning Scale (GILS) to assess students' overall interest in learning. It was hypothesized that the construct of "interest in learning" would have a strong positive correlation with students' orientation toward lifelong learning and, thus, would serve as a construct to help explore the convergent validity of the POLL score interpretations. The GILS consisted of the following five self-report items:

1. I consider myself a lifelong learner.
2. I try to learn something new every day.
3. I frequently try to learn new skills that will help advance me professionally.
4. I frequently try to learn new skills simply for my own personal development.
5. I love to learn.

Participants were prompted to select their level of agreement with each statement using a five-point Likert-type response scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neither agree nor disagree*), 4 (*agree*), and 5 (*strongly agree*). Similar to the POLL, the GILS was viewed as a scale.

Civic Engagement and Participation index (CEP). Driskell, Lyon, & Embry (2008) developed the Civic Engagement and Participation instrument. The instrument lists 14 types of organizations (e.g., "charitable organization or group," "sports, hobby, or leisure club/group") and prompts respondents to indicate their level of participation in each one. The response scale includes four levels of participation: *I belong*, *I contribute*, *I volunteer*, and/or *I hold a leadership position*. I found the response categories difficult to interpret. For example, it is unclear what distinguishes someone who "belongs" to an organization versus someone who "contributes" to it, or from someone who "volunteers" for the organization. It was also unclear if the categories were intended to be ordinal in nature. For these reasons, I constructed an alternate response scale for the measure. The revised scale included four ordinal categories:

I am not a member (1);

I am a member, but do not actively participate in the organization (2);

I am a member and actively participate in the organization (3);

I am a member, actively participate, and serve in a leadership role in the organization (4).

Participants were instructed to select the response option that best describes their level of participation in a given organization. The response levels were coded 1 to 4. The list of organizational categories originally created by Driskell et al. (2008) was also modified to add clarity and to better fit the purpose of the current study. The revised instrument included 11 closed-ended items and an open-ended item for participants to list other organizations in which they are engaged.

Driskell et al. (2008) did not articulate whether they viewed the instrument as a scale or an index. In the absence of any theoretical rationalization from the original authors, I viewed respondents' engagement and participation in the list of organizations as an index of civic engagement and participation. This guided the statistical procedures that were used to analyze the response data.

Participants

The three measures were piloted with a simple random sample of 2,000 undergraduate students. The sampling frame included sophomores and juniors from across the United States enrolled in either an online-delivered undergraduate program or a campus-based undergraduate program. Although the modality of instruction varied among students, there were no formal differences in the curriculum, course materials, level of faculty credentials, or program requirements between the two modalities. Only sophomores and juniors were selected to be in the sampling frame in order to preserve the desired subgroups, freshmen and seniors, for the main study using the finalized instruments. A total of 138 students completed at least some portion of the instruments for a response rate of 6.9%. The median time students spent completing the items on both instruments was five minutes. The mean age of the participants was 45.06. Fifty-five percent (55%) of the participants were female. Sixty-nine percent (69%) of the participants were White or Caucasian; 12% Black or African-American; 9% Hispanic; 6% Asian, Pacific Islander or Native Hawaiian; 1% American Indian or Alaskan Native; and 3% were classified as Other.

Procedures

The 2,000 randomly selected students were sent a single email notice with a link to the instruments (compiled into sections of one overall survey form) asking them to voluntarily complete the measures. The participating university's institutional research department sent out all of the email notices. Students were informed in the email message that participation was voluntary and confidential. Completion of any part of the survey was considered consent to participate. Select demographic data on the respondents (age, gender, and race/ethnicity) were pulled from the participating institution's preexisting student database systems in order to save respondents the burden of having to report the data during the current study. Any information that could be used to identify the participants was removed from the data file by the participating institution's institutional research department and replaced with randomly generated unique student identifiers. All participant interactions were approved by the institutional review board (IRB) of the participating institution as well as by the IRB of the institution I was attending as a doctoral student. Both IRBs ruled that the current research study was exempt from IRB approval. A copy of the recruitment and consent letter that was sent to students (via email) in the sampling pool is in Appendix A.

Analyses

The results of the pilot study were examined using preliminary data analyses, internal consistency estimates, and factor analyses. A description of each series of procedures follows.

Preliminary data analyses. The distributions of responses of each scale were examined using univariate visual depictions (e.g., histograms, box plots, normal probability plots) and descriptive statistics (means, standard deviations, skewness, and kurtosis) of the data. Items with skewness values greater |2| or kurtosis values greater than |7| were flagged for further review and possible transformation in subsequent analyses (Finney & DiStefano, 2006; Tabachnick & Fidell, 2007). The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances. Cases with significant Mahalanobis distances ($\alpha = .001$) were removed when it was deemed appropriate to do so. The degree and hypothesized causes of missing data were also explored and adjudicated. The Kaiser-Meyer-Olkin (KMO)

measure of sampling adequacy was examined to determine the appropriateness of factor analyzing the data (when relevant). A KMO value greater than .6 was used to provide support for factor analyzing the data (Tabachnick & Fidell, 2007). The bivariate correlations between items were also examined to detect the presence of multicollinearity, singularity, or trivial correlations.

Internal consistency estimates. The corrected item-total correlations (CITC; DeVellis, 2003) were calculated for the items on each subscale of the POLL: formal work-related learning activities, formal personal interest learning activities, informal work-related learning activities, and informal personal interest learning activities. Items with CITCs markedly below the mean CITC for a given subscale were considered for removal.

The coefficient alpha estimates were also calculated for the POLL subscales. Since coefficient alpha estimates are biased when the strict assumptions of essential tau-equivalence (Sijtsma, 2009) and uncorrelated errors (Green & Yang, 2009) are not met, I also calculated Guttman's λ_2 as a less biased and readily available (via SPSS) estimate of reliability. Estimates > .70 were viewed as evidence the subscale had an adequate level of reliability (DeVellis, 2003). The reliability estimates were also calculated for the GILS. They were not calculated for the CEP since it was treated as an index and not a scale.

Exploratory factor analysis. A series of exploratory factor analyses using principal axis factoring were conducted using SPSS version 19 to explore the underlying dimensionality of the POLL items. First, the factor structure of each subscale was analyzed. The subscales were hypothesized to have single-factor structures. However, promax (oblique) rotation was employed in order to allow for the potential of a correlated multi-factor structure for each subscale. Such an analysis can be seen as a more prudent and realistic exploratory approach than imposing an orthogonal model from the outset (Bandalos & Boehm-Kaufman, 2009; Norris & Lecavalier, 2010; Preacher & MacCallum, 2003; Worthington & Whittaker, 2006).

The following criteria were used to determine the number of factors to retain: (1) visual inspection of scree and parallel analysis plots, (2) examination of the pattern coefficients, structure coefficients, and factor correlations, and (3) interpretability of the factor(s). A parallel analysis using principal axis factoring and the 95th percentile criterion with 1,000 raw data permutations

was conducted for each EFA as an empirical aid to determining the number of factors to retain (Crawford et al., 2010; Horn, 1965; O'Connor, 2000). It was also desired that the retained model would have pattern coefficients > |.40| for each item, at least three items per factor, and no items having pattern coefficients > |.30| on more than one factor. Most importantly, the pattern and structure coefficients and factor correlations of the retained factors needed to be interpretable based on prior theory.

Next, a series of exploratory factor analyses using principal axis factoring and promax (oblique) rotation were conducted on all 24 items. In addition to the previously listed criteria, the evaluation of each EFA model followed an iterative process. First, the most complex factor model supported by the scree plot and/or parallel analysis results was estimated with all 24 items. Next, items were flagged for possible deletion if they did not meet the following criteria:

Criterion 1: The item had at least one pattern coefficient > |.40|.

Criterion 2: The item did not have pattern coefficients > = |.30| on two or more factors.

Criterion 3: The item had a communality estimate >= .40.

Criterion 4: The item estimates supported the interpretation of the factor.

Criterion 5: The difference between an item's largest pattern coefficient and the item's second largest pattern coefficient was > .15.

The most egregious item was removed. The model was then re-estimated. The iterative process continued one item at a time until all remaining items in the model fit the five criteria. The process was then repeated for each model (e.g., a four-factor model, then a three-factor model, etc.).

Chapter 3

PILOT STUDY RESULTS

POLL Preliminary Analyses

The descriptive statistics for Postsecondary Orientation toward Lifelong Learning scale items are presented in Table 2. The item means ranged from 2.96 (Item 17) to 4.51 (Items 23 & 27). The skewness ranged from -1.88 (Item 23) to .01 (multiple), with the responses for all items except for two being negatively skewed (Item 17 and Item 21). The kurtosis values were from -.80 (Item 4) to 5.08 (Item 23). Overall, the departures from normality were not severe enough to warrant transforming the data. The amount of missing data was 1% or less for all items. It was assumed that the data were missing at random (Rubin, 1976). No missing data imputation techniques were utilized since the amount of missing data was negligible. Listwise deletion was used instead. The polychoric correlations between the items are presented in Table 3.

POLL Internal Consistency Estimates

The corrected item-total correlations were calculated for the items in each subscale (i.e., formal work-related learning activities, formal personal interest learning activities, informal work-related learning activities, and informal personal interest learning activities). Five items had CITCs that were markedly less than the mean corrected item-total correlation for the subscale. These items were reviewed, resulting in the removal of one item per subscale (Items 8, 10, 23, and 12). The fifth item (Item 23) asked students their likelihood to "attempt to publish scholarly work related to your profession." I felt the content of this item was important enough to retain the item in spite of its low relative CITC value. The item deletions resulted in six items per subscale.

The coefficient alpha estimates for the revised six-item subscales ranged from .76 to .87, whereas the Guttman's λ_2 estimates ranged from .76 to .79. The coefficient alpha, Guttman's λ_2, and average corrected item-total correlations for the subscales are presented in Table 4.

Table 2

Descriptive Statistics for POLL Pilot Test Items

Item	*N*	*M*	*SD*	Skewness	Kurtosis
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	139	4.05	1.07	-1.17	0.94
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	139	4.42	0.85	-1.66	2.59
3. Read books, magazines, or journals for professional development	137	4.45	0.81	-1.84	4.14
4. Serve as an instructor of a webinar/lecture related to work	139	3.60	1.26	-0.54	-0.80
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	138	4.42	0.83	-1.79	3.85
6. Attend an instructor-led webinar/lecture related to work	137	4.35	0.88	-1.28	0.81
7. Actively contribute to a professional listserv or online community	138	3.52	1.12	-0.57	-0.28
8. Pursue a professional certification or licensure of some type (ex: teaching certification, CPA license, Registered Nurse license, etc.)	138	3.77	1.11	-0.50	-0.72
9. Join a professional listserv or online community	138	3.73	1.08	-0.70	-0.05
10. Seek any type of non-professional certification led by an instructor (ex.: CPR, “black belt” in a martial art, etc.)	138	3.50	1.20	-0.32	-0.64
11. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	139	3.29	1.17	-0.20	-0.73
12. Read "self-help" books	139	3.79	1.07	-0.81	0.08
13. Attend a presentation at a work-related conference, workshop, and/or trade show	138	4.26	0.86	-1.24	1.49
14. Serve a leadership role in a personal interest club related to a hobby	139	3.42	1.12	-0.20	-0.73
15. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	139	3.77	1.05	-0.66	-0.01
16. Pursue a graduate (ex: master’s, doctorate) or professional degree (ex: M.D., J.D.)	139	3.78	1.21	-0.71	-0.45
17. Serve as an instructor for a webinar/training not related to work	139	2.96	1.14	0.01	-0.69
18. Read books, magazines, or journals for pleasure	138	4.38	0.83	-1.43	2.02
19. Read "how to" books not related to work	138	4.09	0.89	-0.89	0.81
20. Take guided tours of museums or historic sites	139	4.04	0.99	-0.94	0.33
21. Attempt to publish scholarly work related to your profession	139	2.98	1.17	0.01	-0.61
22. Talk with others in order to learn more about an issue or product not related to work	138	4.25	0.77	-1.13	2.03
23. Seek help or guidance from a colleague when you have a work-related question or problem	138	4.51	0.71	-1.88	5.08
24. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	138	4.40	0.73	-1.35	2.81
25. Take a college-level course to strengthen your professional skills	137	4.29	0.88	-1.39	2.02
26. Attend an instructor-led webinar/training not related to work	138	3.55	1.17	-0.44	-0.53
27. Learn new skills on your own that can help you advance professionally	139	4.51	0.64	-1.13	0.94
28. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	139	3.64	1.08	-0.49	-0.29

Table 3

Polychoric Correlations of POLL Pilot Test Items

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1																											
2	.29																										
3	.19	.73																									
4	.72	.39	.40																								
5	.16	.65	.78	.46																							
6	.48	.47	.49	.53	.57																						
7	.44	.35	.35	.59	.50	.50																					
8	.90	.11	.35	.22	.34	.21	.33																				
9	.16	.36	.44	.31	.45	.37	.60	.39																			
10	.36	.40	.43	.38	.34	.31	.34	.48	.40																		
11	.61	.30	.29	.53	.28	.39	.41	.30	.32	.28																	
12	.26	.32	.26	.20	.20	.22	.28	.90	.34	.24	.50																
13	.52	.44	.54	.49	.57	.64	.48	.27	.54	.44	.40	.45															
14	.43	.25	.43	.53	.36	.46	.46	.24	.34	.36	.55	.34	.45														
15	.39	.37	.40	.39	.39	.43	.45	.28	.41	.45	.55	.45	.61	.68													
16	.27	.70	.29	.34	.32	.29	.45	.50	.40	.29	.48	.24	.28	.47	.35												
17	.41	.19	.21	.58	.26	.32	.49	.19	.41	.36	.63	.33	.43	.61	.57	.43											
18	.24	.51	.45	.26	.40	.41	.20	.22	.20	.36	.17	.20	.34	.17	.38	.19	.22										
19	.22	.61	.43	.29	.36	.36	.32	.23	.27	.45	.31	.42	.35	.41	.49	.18	.40	.64									
20	.22	.41	.46	.27	.45	.50	.36	.20	.22	.31	.23	.19	.46	.37	.37	.16	.19	.45	.50								
21	.18	.11	.26	.42	.30	.27	.30	.40	.39	.18	.38	.90	.25	.36	.22	.38	.37	-.50	.16	.19							
22	.30	.29	.18	.22	.24	.47	.33	.20	.32	.28	.24	.29	.41	.31	.39	.22	.31	.47	.46	.33	.25						
23	.25	.33	.38	.29	.44	.51	.31	.27	.19	.22	.25	.18	.40	.22	.37	.24	.23	.46	.36	.40	.80	.54					
24	.29	.40	.45	.43	.45	.54	.35	.37	.39	.49	.44	.28	.52	.39	.46	.36	.37	.36	.45	.40	.30	.51	.52				
25	.23	.23	.41	.40	.38	.47	.33	.32	.40	.29	.42	.30	.39	.38	.45	.49	.31	.21	.16	.33	.36	.35	.40	.44			
26	.39	.35	.36	.44	.40	.63	.50	.26	.39	.42	.54	.44	.53	.64	.75	.41	.63	.45	.51	.51	.36	.53	.49	.61	.59		
27	.38	.32	.46	.39	.45	.55	.47	.33	.53	.38	.44	.36	.60	.34	.50	.41	.49	.43	.38	.41	.30	.39	.53	.57	.53	.68	
28	.12	.15	.26	.27	.23	.26	.37	.34	.26	.34	.44	.20	.22	.57	.55	.36	.42	.24	.33	.38	.36	.20	.25	.36	.56	.60	.48

Table 4

Internal Consistency Estimates for the POLL Subscales

Learning Activities Subscale	Number of Items	Coefficient Alpha	Guttman's λ_2	Avg. CITC
Formal work-related	6	.78	.79	.54
Formal personal interest	6	.87	.87	.67
Informal work-related	6	.77	.78	.54
Informal personal interest	6	.76	.76	.50

Note. CITC= Corrected Item-Total Correlation.

POLL Exploratory Factor Analysis

An exploratory factor analysis was conducted for each subscale based on the subject-matter experts' categorizations of the items. A series of EFAs were also estimated on the entire set of 24 items. The results follow.

Formal work-related learning factor. The ratio of the largest to smallest item variances was 1.47. The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances, χ^2 (6) = 22.46, $p < .001$. Three of the cases had significant Mahalanobis distances and were not included in the analyses. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the grouping of items was .75.

A visual inspection of the scree plot provided support for a one-factor model. The parallel analysis provided support for a two-factor model. As a result, both one- and two-factor solutions were explored. Only one of the factors in the two-factor model met the previously mentioned criterion of having three or more items with pattern coefficients > |.40|. The single factor solution was therefore retained. The pattern/structure coefficients for the one-factor solution are presented in Table 5. All of the estimates were > .40. The factor accounted for 37.76% of the common variance among the items.

Formal personal interest learning factor. The ratio of the largest to smallest item variances was 1.12. The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances, χ^2 (6) = 22.46, $p < .001$. One case had a significant Mahalanobis distance and was not included in the analyses. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the grouping of items was .86.

A visual inspection of the scree plot provided support for a one-factor model. The parallel analysis also provided support for a one-factor model. A one-factor solution was retained as a result. The pattern/structure coefficients for the one-factor solution are presented in Table 5. All of the estimates were > .40. The factor accounted for 53.39% of the common variance among the items.

Informal work-related learning factor. The ratio of the largest to smallest item variances was 1.83. The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances, χ^2 (6) = 22.46, p = .001. Three cases had significant Mahalanobis distances and were not included in the analyses. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the grouping of items was .69.

A visual inspection of the scree plot provided support for a one-factor model. The parallel analysis provided support for a two-factor model. Both one- and two-factor solutions were explored due to the discrepancy between the scree plot and the parallel analysis results. Only one of the factors in the two-factor model met the criterion of having three or more items with pattern coefficients > |.40|. The single factor structure solution was therefore retained. The pattern/structure coefficients for the one-factor solution are presented in Table 5. All of the estimates were > .40. The factor accounted for 37.41% of the common variance among the items.

Informal personal learning factor. The ratio of the largest to smallest item variances was 1.35. The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances, χ^2 (6) = 22.46, p = .001. Three cases had significant Mahalanobis distances and were not included in the analyses. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the grouping of items was .80.

A visual inspection of the scree plot provided support for a one-factor model. The parallel analysis also provided support for a one-factor model. A one-factor model was retained. The pattern/structure coefficients for the one-factor solution are presented in Table 5. All of the estimates were > .40. The factor accounted for 37.56% of the common variance among the items.

EFA of all 24 POLL items. Examination of the scree plot based on an analysis of all 24 items provided support for a one-factor model, whereas the results of a parallel analysis using principal axis factoring and the 95th percentile criterion with 1,000 raw data permutations suggested up to a four-factor solution. Based on these results, models with one through four factors were analyzed. The resulting four- and three-factor models were not retained because following promax rotation each had at least one factor with fewer than three items with loadings > |.40|. The final two-factor model was comprised of 14 items that could be interpreted as representing factors of high commitment (e.g., pursuing a graduate degree) and low commitment (e.g., reading books, magazines, or journals for professional development) learning activities. The factors accounted for 41.88% of the shared item variance. The correlation between the factors was .494. The one-factor model included all 24 items. The factor accounted for 32.23% of the common variance among the items. The pattern coefficients for the two- and one-factors solutions are presented in Table 6.

Global Interest in Learning Scale Preliminary Data Analyses

The descriptive statistics for Global Interest in Learning Scale items are presented in Table 7. The item means ranged from 4.31 (Item 2) to 4.59 (Item 3). All items were negatively skewed with values ranging from -2.13 (Item 1) to -0.91 (Item 4). The kurtosis values were from 0.46 (Item 5) to 6.44 (Item 1). Overall, the departures from normality were not severe enough to warrant transforming the data. The amount of missing data was less than 2% for all items. It was assumed that the data were missing at random. No missing data imputation techniques were utilized since the amount of missing data was negligible. Listwise deletion was used instead.

Table 5

Pattern Coefficients and Common Variance Explained by POLL Subscales

Formal Work-Related Learning	
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	0.72
4. Serve as an instructor of a webinar/lecture related to work	0.71
6. Attend an instructor-led webinar/lecture related to work	0.60
10. Attend a presentation at a work-related conference, workshop, and/or trade show	0.68
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)	0.40
21. Take a college-level course to strengthen your professional skills	0.51
Common variance explained	37.76%
Formal Personal Interest Learning	
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	0.65
11. Serve a leadership role in a personal interest club related to a hobby	0.76
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	0.78
14. Serve as an instructor for a webinar/training not related to work	0.73
22. Attend an instructor-led webinar/training not related to work	0.80
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	0.66
Common variance explained	53.39%
Informal Work-Related Learning	
3. Read books, magazines, or journals for professional development	0.71
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	0.83
7. Actively contribute to a professional listserv or online community	0.51
8. Join a professional listserv or online community	0.61
18. Attempt to publish scholarly work related to your profession	0.42
23. Learn new skills on your own that can help you advance professionally	0.49
Common variance explained	37.41%
Informal Personal Interest Learning	
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	0.58
15. Read books, magazines, or journals for pleasure	0.73
16. Read "how to" books not related to work	0.73
17. Take guided tours of museums or historic sites	0.53
19. Talk with others in order to learn more about an issue or product not related to work	0.55
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	0.52
Common variance explained	37.56%

Table 6

Pattern Coefficients for One- and Two-Factor POLL EFA Results

Item	One-Factor Model	Two-Factor Model	
		Low Commitment Activities	High Commitment Activities
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	0.53	0.09	0.50
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	0.50	0.83	-0.14
3. Read books, magazines, or journals for professional development	0.59	0.81	0.02
4. Serve as an instructor of a webinar/lecture related to work	0.61	0.15	0.61
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	0.60	0.82	0.004
6. Attend an instructor-led webinar/lecture related to work	0.58	0.53	0.18
7. Actively contribute to a professional listserv or online community	0.58	—	—
8. Join a professional listserv or online community	0.51	—	—
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	0.60	-0.04	0.77
10. Attend a presentation at a work-related conference, workshop, and/or trade show	0.63	—	—
11. Serve a leadership role in a personal interest club related to a hobby	0.61	—	—
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	0.69	—	—
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)	0.50	-0.04	0.60
14. Serve as an instructor for a webinar/training not related to work	0.57	-0.14	0.75
15. Read books, magazines, or journals for pleasure	0.46	0.51	0.03
16. Read "how to" books not related to work	0.53		
17. Take guided tours of museums or historic sites	0.43	0.52	0.01
18. Attempt to publish scholarly work related to your profession	0.44	-0.03	0.52
19. Talk with others in order to learn more about an issue or product not related to work	0.44	—	—
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	0.60	—	—
21. Take a college-level course to strengthen your professional skills	0.60	0.14	0.47
22. Attend an instructor-led webinar/training not related to work	0.74	—	—
23. Learn new skills on your own that can help you advance professionally	0.64	—	—
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	0.53	0.07	0.47

Note. "—" indicates items that were removed from the model because the did not meet the item retention criteria outlined in Chapter 2.

Table 7

Descriptive Statistics for Global Interest in Learning Scale Items

Item	*N*	*M*	*SD*	Skewness	Kurtosis
1. I consider myself a lifelong learner.	131	4.59	0.68	-2.13	6.44
2. I try to learn something new every day.	131	4.31	0.79	-1.20	1.88
3. I frequently try to learn new skills that will help advance me professionally.	131	4.44	0.67	-1.09	1.31
4. I frequently try to learn new skills simply for my own personal development.	131	4.44	0.66	-0.91	0.47
5. I love to learn.	129	4.47	0.70	-1.10	0.46

Global Interest in Learning Scale Internal Consistency Estimates

Corrected item-total correlations were calculated for the items. None of the CITCs displayed large departures from the mean corrected item-total correlation (.71) for the scale. The coefficient alpha and Guttman's λ_2 estimates for the five items were both .88.

Global Interest in Learning Scale Exploratory Factor Analysis

The ratio of the largest to smallest item variances was 1.43. The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances, χ^2 (5) = 20.52, $p < .001$. Four cases had a significant Mahalanobis distance and were not included in the factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the grouping of items was .83.

A visual inspection of the scree plot provided support for a one-factor model. The parallel analysis provided support for a two-factor model. Since there were only five items, it is not possible to have two factors that met the criterion of having a minimum of three items per factor. Only a one-factor solution was estimated, as a result. The pattern/structure coefficients for the one-factor solution are presented in Table 8. All of the estimates were > .40. The factor accounted for 60.54% of the common variance among the items.

Table 8

Factor Loadings for Global Interest in Learning Scale Items

1. I consider myself a lifelong learner.	0.72
2. I try to learn something new every day.	0.80
3. I frequently try to learn new skills that will help advance me professionally.	0.84
4. I frequently try to learn new skills simply for my own personal development.	0.84
5. I love to learn.	0.68

Civic Engagement & Participation Index Preliminary Data Analyses

Descriptive statistics for Civic Engagement and Participation items are presented in Table 9. Item means ranged from 1.20 (Item 4) to 2.07 (Item 3). All items were positively skewed with the values ranging from .41 (Item 5) to 3.21 (Item 4). Kurtosis values were from -1.31 (Item 5) to 9.40 (Item 4). Items 1, 4, and 8 had skewness values > |2|, and Items 4 and 8 had kurtosis values > |7|. The non-normal distributions of these items were primarily due to the fact that the vast majority of respondents indicated they did not participate in the organizations. Specifically, the percentages of respondents who indicated they *did not* participate in arts or cultural organization (Item 1), a racial or ethnic organization (Item 4), or a school fraternity, sorority, or alumni association (Item 8) were 74.6%, 89.9%, and 86.9%, respectively. These items were flagged for potential removal. The level of missing data ranged from 6% to 9%. However, the majority of the missing data appeared to have been the result of respondent fatigue. Eight of the 139 respondents answered the POLL items but abandoned the instrument prior to answering any of the Civic Engagement and Participation index items. The level of missing data based on the 131 respondents that answered at least one question on the CEP scale ranged from 1% (multiple) to 5% (Item 12), and was assumed to be missing at random. No missing data imputation techniques were utilized since the amount of missing data for the CPE items was relatively low. Listwise deletion was used as a result.

Table 9

Descriptive Statistics for Civic Engagement and Participation Index Items

Item	*N*	*M*	*SD*	Skewness	Kurtosis
1. Arts and cultural organization	130	1.38	0.77	2.20	4.27
2. An elementary, middle, or high school organization	130	1.43	0.89	1.86	2.06
3. Charitable organization or group	128	2.07	1.12	0.48	-1.23
4. Ethnic or racial organization	129	1.20	0.64	3.21	9.39
5. Internet-based community or group	126	1.93	0.97	0.41	-1.31
6. Neighborhood group or association	131	1.56	0.87	1.33	0.62
7. Political party, club, or association	130	1.65	0.74	0.67	-0.86
8. School fraternities, sororities, or alumni association	130	1.22	0.61	2.98	8.35
9. Sports team, hobby, or leisure club/group	128	1.74	1.06	1.06	-0.37
10. Trade union or professional association	129	1.50	0.79	1.43	1.07
11. Youth groups or organizations	127	1.43	0.96	2.00	2.39
12. Other group/organization	124	1.48	0.93	1.72	1.51

Civic Engagement and Participation Index Internal Consistency Estimates and Exploratory Factor Analysis

Corrected item-total correlations were not calculated for the items since the CEP was treated as an index that did not necessitate high correlations between items. The assumed formative nature of the instrument also precluded the use of exploratory factor analysis using principle axis factoring. A pragmatic item selection process was utilized instead. The low response rate from the pilot study (6.9%) was disconcerting given that the main study was slated to include two additional scales (to be discussed later). It was reasoned that the increase in response burden would result in an even lower response rate for the instruments in the main study. Since the Civic Engagement & Participation index was important but not the central focus of the current study, the decision was made to impose the practical constraint of reducing the index to five items. The items selected were the ones that were most relevant to the target population and had acceptable levels of normality. The retained items were Item 2 (elementary, middle, or high school organization), Item 3 (charitable organization or group), Item 6 (neighborhood group or association), Item 9 (sports team, hobby, or leisure club/group), and Item 11 (youth groups or organizations).

Civic Engagement & Participation Index Qualitative Responses

As previously mentioned, the CEP included one open-ended item that allowed participants to list other organizations they are engaged in at some level. Religious and military/veteran organizations were the most frequently listed organizations. As a result, the following items were added to the CEP even though it increased the length of the measure from five to seven items: “religious or spiritual organization” (Item 6), and “military or veterans group” (Item 7).

Summary

The main purpose of the pilot study was to field test the instruments I developed or modified. The results of the pilot led to revisions to all three of the instruments that were evaluated. The result was a 24-item Postsecondary Orientation toward Lifelong Learning scale, a 5-item Global Interest in Learning Scale, and a 7-item Civic Engagement and Participation index. All three measures were used without further modification in the main research study. Copies of the final POLL, GILS, and CEP instruments are provided in Appendices B, C, and D, respectively.

Chapter 4

MAIN STUDY METHODS

Participants

A simple random sample (SRS) of 2,500 undergraduate freshmen and a SRS of 2,500 undergraduate seniors from a large national university were invited to complete the selected measures. The sample was drawn from the same institution that participated in the pilot study. Freshmen were defined as undergraduate students who had completed less than 30 degree-applicable credits. Seniors were defined as undergraduate students who had completed more than 90 degree-applicable credits. A total of 145 freshmen and 260 seniors completed the measures in the study, for participation rates of 5.8% and 10.4%, respectively. The combined response rate was 8.1%. The grade-point average, average age, gender, and race/ethnicity proportions for the entire sample and subsamples (i.e., freshmen and seniors) are presented in Table 10. The table also includes the percent of online versus on-ground students in the respective groups. All freshmen were enrolled in online programs of study. The demographic characteristics of the samples of freshmen and seniors were compared to their respective populations in Chapter 5.

Measures

The main study included five measures: Postsecondary Orientation toward Lifelong Learning scale (POLL), Civic Engagement and Participation index (CEP), Global Interest in Learning Scale (GILS), Satisfaction with Life Scale (SWLS), and the Social Desirability Scale-16 (SDS-16). The POLL, CEP, and GILS were modified or developed by the author. As described in Chapters 2 and 3, the measures were piloted prior to use in the current study. Copies of the final POLL, GILS, and CEP instruments are provided in Appendices A, B, and C, respectively. A description of the remaining measures and their psychometric properties is listed below.

Table 10

Demographic Variables for the Samples of Freshmen and Seniors

	Freshmen		Seniors		Total Sample	
	N	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)
GPA	120	3.14 (.75)	260	3.43 (.45)	380	3.34 (.58)
Age	145	35.29 (10.97)	260	39.85 (10.26)	405	38.22 (10.73)
	N	%	*N*	%	*N*	%
Gender						
Female	111	76.6	175	67.3	286	70.6
Male	34	23.4	85	32.7	119	29.4
Race Ethnicity						
White/Caucasian	82	68.3	132	62.3	214	64.5
American Indian or Alaskan Native	2	1.7	5	2.4	7	2.1
Asian American, Pacific Islander, or Native Hawaiian	1	0.8	7	3.3	8	2.4
Black/African American	21	17.5	33	15.6	54	16.3
Hispanic	12	10.0	29	13.7	41	12.3
Other	2	1.7	6	2.8	8	2.4
Modality						
Online	145	100	188	72.3	333	82.2
On-Ground[a]	0	0	72	27.7	72	17.8

Note. [a]All freshmen were enrolled in an online program of study.

Life satisfaction. Life satisfaction was measured using the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is a widely used measure of life satisfaction (Pavot & Diener, 2007). The instrument consists of five positively-worded satisfaction statements, e.g., "In most ways my life is close to my ideal." Participants were asked to rate their level of agreement using a 7-point Likert-type scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The responses are intended to be summed to create a total "life satisfaction" score ranging from 5 to 35 (Diener, Lucas, & Oishi, 2005). The summed score was used in all subsequent analyses. The instrument has been shown to have coefficient alpha estimates ranging from .79 to .89 (Pavot & Diener, 2007).

Social desirability. As previously mentioned, Cacioppo & Petty (1982) used the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1964) to examine the relationship between social desirability and need for cognition. The MCSDS presented two limitations to its use in the current study. Its 33-item length made it impractical to use in combination with the other measures. The resulting aggregate number of items would have put a large response burden on students. Additionally, the wording of the items have been criticized as being outdated (Stöber, 2001). Stöber's (1999) 17-item Social Desirability Scale-17 (SDS-17) instrument was used as a shorter, more current measure of social desirability. The measure has been shown to have acceptable internal consistency estimates of reliability (coefficient alpha > .80) and a correlation of .68 with the MCSDS full form (Stöber, 2001). Blake, Valdiserri, Neuendorf, & Nemeth (2006) also provided validity evidence for use of the SDS-17 to assess social desirability among U.S. undergraduate students, both via paper-and-pencil and online administrations. The SDS-17 lists 10 prosocial statements, e.g., "In traffic I am always polite and considerate of others", and seven non-desirable (reverse coded) statements, e.g., "I sometimes litter." Respondents are asked to indicate whether each statement describes them (a response of "true"; scored as 1) or not (a response of "false"; scored as zero). One of the 17 statements pertains to a respondent's past drug use, "I have tried illegal drugs (for example, marijuana, cocaine, etc.)." Asking students about their drug use creates additional ethical considerations. The decision was made to remove the item as an additional safeguard since the instrument was only tangentially related to the overall thesis of the study. Stöber (2001) found the item to have a minimal impact on the reliability of the measure, indicating that removal of the item might not have a large impact on the psychometric properties of the overall instrument. The remaining 16 items were used in the present study. The scale is referenced in this study as the SDS-16 to indicate one item was removed. The responses to the items were summed to create a scaled score of social desirability ranging from zero to 16. The summed score was used in all subsequent analyses.

Procedures

The simple random samples of freshmen and seniors were contacted via email and were asked to voluntarily complete a web-based version of the aforementioned instruments. The students also received one reminder notice. The notices were sent approximately one week apart. The participating university's institutional research department sent out all of the email notices. Students were informed that participation was voluntary and confidential. Completion of any part of the survey was considered consent to participate. Select demographic data on the respondents (age, gender, race/ethnicity, modality of instruction, and class rank) were pulled from the participating institution's preexisting student database systems in order to save respondents the burden of having to report the data during the current study. Any information that could be used to identify the participants was removed from the data file by the participating institution's institutional research department and replaced with randomly generated unique student identifiers. All participant interactions were approved by the institutional review board (IRB) of the participating institution as well as by the IRB of the institution I was attending as a doctoral student. Both IRBs ruled that the current research student was exempt from IRB approval. A copy of the recruitment and consent letter that was sent to students (via email) in the sampling pool is in Appendix A.

Analyses

The results of respondents were examined using preliminary data analyses, internal consistency estimates, and factor analyses. The representativeness of the sample was also investigated. A description of each series of procedures follows.

Preliminary data analyses. The distributions of responses of each scale were examined using univariate visual depictions (e.g., histograms, box plots, normal probability plots) and descriptive statistics (means, standard deviations, skewness, and kurtosis) of the data. Items with skewness values greater |2| or kurtosis values greater than |7| were flagged for further review and possible transformation in subsequent analyses (Finney & DiStefano, 2006; Tabachnick & Fidell, 2007). The multivariate normality of the data was investigated by conducting chi-square significance tests of Mahalanobis distances. Cases with significant Mahalanobis distances (α

= .001) were removed when it was deemed appropriate to do so. The degree and hypothesized causes of missing data were also explored and adjudicated. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was examined to determine the appropriateness of factor analyzing the data (when relevant). A KMO value > .6 was used to provide support for factor analyzing the data (Tabachnick & Fidell, 2007). The bivariate correlations between items were also examined to detect the presence of multicollinearity, singularity, or trivial correlations.

Internal consistency estimates. Coefficient alpha estimates were also calculated for the POLL subscales and the GILS. As mentioned in Chapter 2, coefficient alpha estimates are biased when the strict assumptions of uncorrelated errors and tau-equivalence are not met (Green & Yang, 2009; Sijtsma, 2009). In light of this, I also calculated Guttman's λ_2 as an unbiased and readily available (via SPSS) estimate of internal consistency reliability. Estimates > .70 were viewed as evidence the subscale had an adequate level of internal consistency (DeVellis, 2003).

Confirmatory factor analyses. A series of confirmatory factor analyses using structural equation modeling were conducted using Mplus 6.11. The models were estimated using weighted least square means and variances adjusted (WLSMV) estimation given the ordinal nature of the data. Unless noted otherwise, the metric for each measurement model was established by fixing one item loading per factor to one. Additionally, the error variances of the items were assumed to be uncorrelated. Model fits for the SEM-based procedures were evaluated using a chi-square statistic, the comparative fit index (CFI), the weighted root mean residual (WRMR), and root mean square error of approximation (RMSEA). Based on current conventions, a model was viewed to fit the sample data well if the CFI >= .95, WRMR <= .90, and the RMSEA < .06 (Hu & Bentler, 1999; McDonald & Ho, 2002; Schreiber, Nora, Stage, Barlow, & King, 2006). A nonsignificant chi-square test was also desired but was not seen as a requirement for concluding a model fit the data adequately given that it is a test of perfect fit and is very sensitive to sample size. Item fit was evaluated by examining the size and significance of the estimated loadings for each item.

Validity evidence. The convergent and discriminant validity of the responses to the POLL and GILS were examined in relation to the responses to the Civic Engagement &

Participation index, Satisfaction with Life Scale, and the Social Desirability Scale-16. It was hypothesized that the POLL would have a strong positive correlation with the GILS and a moderate positive correlation with life satisfaction and civic engagement. The relationship between POLL and social desirability was also explored as potential evidence of the discriminant validity of the POLL score interpretations. It was hypothesized that there would be little to no relationship between the two variables.

Mean comparisons. The study sought to test the substantive hypothesis that seniors would have higher latent means on the POLL than freshmen. Three conditions must be satisfied in order to facilitate the comparison of latent means in an SEM framework (Thompson & Green, 2006). First, there must be good model-data fit for each subgroup of the sample. Second, the factor loadings need to be invariant (or at least partially invariant) across subgroups. Lastly, the equivalence of the indicator intercepts across subgroups must be demonstrated. The respondent data for the POLL and GILS were analyzed to see if it met all three of the criteria. In the event that all three criteria were not satisfied, non-latent mean comparisons of freshmen and seniors' summed raw POLL and GILS scores will be conducted using independent samples *t* tests.

Chapter 5

MAIN STUDY RESULTS

Sample Representativeness

One of the goals of this research project was to use the sample data to make inferences about the orientation toward lifelong learning in the population of undergraduate freshmen and seniors at the participating institution. To that end, the characteristics of the freshmen and seniors in the sample were compared to the characteristics of the population of freshmen and seniors at the participating institution. More specifically, the mean age, mean grade point average (GPA), gender, race/ethnicity, and modality of instruction (percentage of students enrolled in an online versus an on-ground program) proportionalities of the sample and respective populations were compared. At the request of the participating institution, the population sample sizes (i.e., the number of freshmen and seniors in attendance at the participating institution at the time of the study) were omitted from the publication of the results. The degrees of freedom for the statistical test were also not reported since they can be used to derive the population totals. Small differences between the subsample and population characteristics would provide support for making inferences about the latter based on the results of the former. Conversely, large differences between the characteristics of the groups would diminish the ability to make valid interferences about the population based on the results of the sample.

Freshmen. The mean and median ages for freshmen who completed the survey items were 35.29 and 33.97, respectively. The mean age of the freshmen respondents (N = 145, M = 35.29, SD = 10.97) was significantly higher than the mean age for the population of freshmen at the participating institution (M = 32.12, SD = 9.17), t(omitted) = 4.16, $p < .001$. The effect size of the difference was a little larger than one-third of a pooled standard deviation, d = 0.35.

A chi-square goodness-of-fit was conducted to compare the gender of freshmen who completed the survey items (76.6% female, 23.4% male) to the gender of the population of freshmen at the participating institution (72.9% female, 27.1% male). The distributions were not significantly different χ^2(1, N = omitted) = 0.98, p = .323.

A chi-square goodness-of-fit was conducted to compare the race/ethnicity classifications of freshmen who completed the survey items to the race/ethnicity classifications of the population of freshmen at the participating institution (Table 11). The distributions were not found to be significantly different $\chi^2(5, N = \text{omitted}) = 9.91$, $p = .078$. However, the expected sample sizes for American Indian or Alaskan Native; Asian, Pacific Islander, or Native Hawaiian; and Other were less than 5. The three groups were combined to represent Other and the comparison between the sample and population race/ethnicity classifications were re-examined. The race/ethnicity classifications were significantly different $\chi^2(3, N = \text{omitted}) = 9.49$, $p = .023$. These results represent the fact the sample had a higher proportion of White or Caucasian respondents and a lower proportion of Black or African-American respondents compared to the population.

Table 11

Comparison of Sample and Population Race/Ethnicity for Freshmen

	Race/Ethnicity		
	Sample	Population	Difference
White or Caucasian	68.3%	55.5%	12.8%
American Indian or Alaskan Native	1.7%	1.3%	0.4%
Asian, Pacific Islander or Native Hawaiian	0.8%	1.4%	-0.6%
Black or African-American	17.5%	29.5%	-12.0%
Hispanic	10.0%	10.8%	-0.8%
Other	1.7%	1.5%	0.2

The mean grade point average (GPA) for freshmen who completed the survey items (n = 120, $M = 3.14$, $SD = 0.75$) was significantly higher than the mean GPA for the population of freshmen at the participating institution ($M = 2.68$, $SD = 0.93$), $t(\text{omitted}) = 5.41$, $p < .001$. The effect size of the difference was almost half of a pooled standard deviation, $d = 0.49$.

Seniors. The mean and median ages for seniors who completed the survey items were 39.85 and 38.45, respectively. The mean age of the senior respondents ($N = 260$, $M = 39.85$, $SD = 10.26$) was significantly higher than the mean age for the population of seniors at the participating institution ($M = 36.70$, $SD = 8.96$), $t(\text{omitted}) = 5.65$, $p < .001$. The effect size of the difference was a little more than one-third of a pooled standard deviation, $d = 0.35$.

A chi-square goodness-of-fit was conducted to compare the gender of seniors who completed the survey items (67.3% female, 32.7% male) to the gender of the population of seniors at the participating institution (67.5% female, 32.5% male). The distributions were not found be significantly different, $\chi^2(1, N = \text{omitted}) = .004$, $p = .947$.

A chi-square goodness-of-fit was conducted to compare the race/ethnicity classifications of seniors who completed the survey items to race/ethnicity classifications of the population of seniors at the participating institution (Table 12). The distributions were found to be significantly different $\chi^2(5, N = \text{omitted}) = 11.813$, $p = .037$. The sample had a higher proportion of White or Caucasian students and a lower proportion of Black or African-American students compared to the population.

Table 12

Comparison of Sample and Population Race/Ethnicity for Seniors

	Race/Ethnicity		
	Sample	Population	Difference
White or Caucasian	62.3%	53.7%	8.6%
American Indian or Alaskan Native	2.4%	1.1%	1.3%
Asian, Pacific Islander or Native Hawaiian	3.3%	4.3%	-1.0%
Black or African-American	15.6%	22.9%	-7.3%
Hispanic	13.7%	14.3%	-0.6%
Other	2.8%	3.6%	-0.8%

The mean grade-point average (GPA) for seniors who completed the survey items (n = 260, $M = 3.43$, $SD = 0.45$) was significantly higher than the mean GPA for the population of seniors at the participating institution ($M = 3.25$, $SD = 0.49$), $t(\text{omitted}) = 5.91$, $p < .001$. The effect size of the difference was a little more than one-third of a pooled standard deviation, $d = 0.37$.

A chi-square goodness-of-fit test was conducted to compare the modality distribution of seniors who completed the survey items (72.3% online, 27.7% on-ground) to the modality distribution of the population of seniors at the participating institution (66.0% online, 34.0% on-ground). The distributions were found be significantly different $\chi^2(1, N = \text{omitted}) = 4.61$, $p = .032$.

The sample of seniors had a higher proportion of online students compared to the population of seniors.

POLL Preliminary Data Analyses

The descriptive statistics for Postsecondary Orientation toward Lifelong Learning scale items are presented in Table 13. The item means ranged from 3.03 (Item 18) to 4.56 (Item 23). The skewness ranged from -1.92 (Item 23) to 0 (Item 14), with the responses for all items except for Item 14 being negatively skewed. The kurtosis values were from -.80 (Item 18) to 6.02 (Item 23). Overall, the departures from normality were not severe enough to warrant transforming the data. The amount of missing data was 1% or less for all items and was assumed to be missing at random. No missing data imputation techniques were utilized since the amount of missing data was negligible. Listwise deletion was used instead. The polychoric correlations of the items are presented in Table 14.

GILS Preliminary Data Analyses

The descriptive statistics for Global Interest in Learning Scale items are presented in Table 15. The item means ranged from 4.38 (Item 2) to 4.59 (Item 1). The skewness ranged from -1.71 (Item 1) to -1.14 (Item 3). The kurtosis values were from 1.74 (Item 3) to 3.82 (Item 1). The departures from normality were not severe enough to warrant transforming the data. The amount of missing data was 1% or less for all items and was assumed to be missing at random. No missing data imputation techniques were utilized since the amount of missing data was negligible. Listwise deletion was used instead. The polychoric correlations of the items are presented in Table 16.

POLL Internal Consistency Estimates

The coefficient alpha and Guttman's λ_2 estimates for the each subscale are listed in Table 17.

Table 13

Descriptive Statistics for POLL Items

Item	*N*	*M*	*SD*	Skewness	Kurtosis
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	403	3.63	1.18	-0.69	0.94
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	404	4.26	0.99	-1.51	2.59
3. Read books, magazines, or journals for professional development	402	4.34	0.87	-1.67	4.14
4. Serve as an instructor of a webinar/lecture related to work	402	3.39	1.19	-0.41	-0.80
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	403	4.23	0.97	-1.57	3.85
6. Attend an instructor-led webinar/lecture related to work	402	4.01	1.06	-1.23	0.81
7. Actively contribute to a professional listserv or online community	400	3.39	1.13	-0.34	-0.28
8. Join a professional listserv or online community	401	3.47	1.16	-0.43	-0.72
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	401	3.20	1.16	-0.16	-0.05
10. Attend a presentation at a work-related conference, workshop, and/or trade show	402	4.01	0.98	-1.20	-0.64
11. Serve a leadership role in a personal interest club related to a hobby	402	3.59	1.15	-0.57	-0.73
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	400	3.64	1.10	-0.68	0.08
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)	403	4.05	1.14	-1.14	1.49
14. Serve as an instructor for a webinar/training not related to work	398	3.07	1.18	0.00	-0.73
15. Read books, magazines, or journals for pleasure	403	4.47	0.81	-1.89	-0.01
16. Read "how to" books not related to work	403	4.07	1.01	-1.09	-0.45
17. Take guided tours of museums or historic sites	403	4.09	0.95	-1.02	-0.69
18. Attempt to publish scholarly work related to your profession	404	3.03	1.21	-0.01	2.02
19. Talk with others in order to learn more about an issue or product not related to work	402	4.26	0.82	-1.33	0.81
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	402	4.38	0.82	-1.67	0.33
21. Take a college-level course to strengthen your professional skills	403	4.35	0.85	-1.62	-0.61
22. Attend an instructor-led webinar/training not related to work	404	3.59	1.05	-0.49	2.03
23. Learn new skills on your own that can help you advance professionally	404	4.56	0.65	-1.92	5.08
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	402	3.81	1.10	-0.71	2.81

Table 14

Polychoric Correlations among POLL Items

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																							
2	.32																						
3	.38	.73																					
4	.68	.28	.37																				
5	.44	.72	.74	.43																			
6	.55	.50	.56	.56	.74																		
7	.53	.40	.47	.58	.61	.65																	
8	.49	.51	.56	.53	.60	.62	.86																
9	.67	.28	.36	.59	.35	.41	.54	.50															
10	.63	.52	.58	.46	.64	.74	.49	.55	.55														
11	.47	.35	.42	.41	.46	.42	.50	.50	.64	.54													
12	.45	.47	.52	.41	.55	.51	.44	.45	.66	.64	.67												
13	.39	.24	.31	.37	.27	.30	.34	.33	.29	.32	.31	.29											
14	.52	.21	.27	.69	.36	.42	.62	.53	.71	.39	.59	.56	.42										
15	.11	.54	.55	.12	.50	.33	.26	.34	.16	.37	.33	.4	.19	.9									
16	.28	.49	.60	.32	.48	.44	.37	.40	.35	.40	.37	.52	.26	.37	.59								
17	.20	.43	.52	.27	.37	.42	.40	.40	.32	.40	.43	.42	.25	.26	.46	.54							
18	.40	.23	.38	.46	.41	.40	.59	.56	.57	.40	.47	.39	.36	.56	.11	.29	.36						
19	.42	.43	.43	.31	.49	.43	.39	.37	.41	.55	.50	.57	.25	.32	.49	.52	.51	.35					
20	.34	.53	.47	.33	.52	.42	.38	.42	.33	.48	.38	.44	.19	.31	.43	.48	.38	.38	.71				
21	.31	.32	.41	.25	.44	.45	.35	.35	.20	.45	.3	.35	.50	.28	.34	.42	.34	.38	.51	.51			
22	.36	.41	.44	.41	.45	.51	.47	.44	.56	.51	.55	.69	.35	.58	.28	.49	.47	.53	.54	.46	.50		
23	.37	.45	.55	.32	.56	.49	.42	.49	.39	.59	.47	.44	.32	.36	.43	.55	.49	.33	.59	.60	.64	.49	
24	.24	.33	.37	.27	.40	.29	.42	.39	.43	.32	.55	.51	.23	.46	.30	.42	.48	.46	.50	.39	.56	.61	.47

Table 15

Descriptive Statistics for GILS Items

Item	*N*	*M*	*SD*	Skewness	Kurtosis
1. I consider myself a lifelong learner.	389	4.59	0.63	-1.71	3.82
2. I try to learn something new every day.	389	4.38	0.72	-1.17	2.00
3. I frequently try to learn new skills that will help advance me professionally.	389	4.48	0.65	-1.14	1.74
4. I frequently try to learn new skills simply for my own personal development.	389	4.48	0.65	-1.25	2.37
5. I love to learn.	388	4.54	0.63	-1.33	2.48

Table 16

Polychoric Correlations among GILS Items

Item	1	2	3	4
1. I consider myself a lifelong learner.				
2. I try to learn something new every day.	.76			
3. I frequently try to learn new skills that will help advance me professionally.	.68	.73		
4. I frequently try to learn new skills simply for my own personal development.	.75	.72	.80	
5. I love to learn.	.81	.78	.70	.74

Table 17

Internal Consistency Estimates for the POLL Subscales

Subscale	Number of Items	Coefficient alpha	Guttman's λ_2
Formal work-related learning activities	6	.81	.82
Formal personal interest learning activities	6	.83	.85
Informal work-related learning activities	6	.77	.78
Informal personal interest learning activities	6	.81	.81

GILS Internal Consistency Estimates

The coefficient alpha and Guttman's λ_2 estimates for the five-item Global Interest in Learning Scale were both .89.

POLL First-Order Confirmatory Factor Analysis Models

Confirmatory factor analysis was conducted to evaluate the model-data and item fits of the theorized four-factor POLL model (Figure 2). Items 1 (formal work-related learning factor), 11

(formal personal interest learning factor), 3 (informal work-related learning factor), and 2 (informal personal interest learning factor) were constrained to 1 to set the metric of each factor. None of the items were permitted to cross load across factors. The correlations among the factors were estimated.

The model did not fit the data well, $\chi^2(246, N = 404) = 1665.42$, $p < .001$; CFI = .88; RMSEA = .12 (90% confidence interval = .11 to .13); WRMR = 2.06. All factor loadings exceeded .40 and were significant ($p < .05$). A review of the modification indices revealed potential residual correlations between several pairs of items. Upon examination of the item content, it became evident that there was a need to allow the residuals of items that represented similar contexts to correlate with each other. The current model (Figure 2) defines a learning activity by two global characteristics: (a) whether the activity is led by an instructor (i.e., formal) or not (i.e., informal), and (b) whether the activity is engaged in for work or personal interest. The items were written by selecting a learning activity (e.g., attending a conference), holding one of the characteristics constant (e.g., informal) while varying the other characteristic (e.g., work-related vs. personal interest) to produce symmetrical items. For example, Item 10 asks a student's likelihood to "attend a presentation at a work-related conference, workshop, and/or trade show" while Item 12 asks his/her likelihood to "attend a presentation at a conference, workshop, and/or trade show on a non-work related topic." This resulted in pairs of items that share the same learning context (e.g., presentation at a conference, workshop, and/or trade show). It is reasonable to assume that a person might be likely to attend a conference simply because he/she enjoys attending conferences regardless of whether it was for work or for personal interest. Based on this line of reasoning, the model was re-estimated this time allowing correlations between the residual variances of items that share the same learning context. Table 18 lists the item residuals that were allowed to covary. The model fit improved, $\chi^2(238, N = 404) = 1154.35$, $p < .001$; CFI = .92; RMSEA = .10 (90% confidence interval = .09 to .10); WRMR = 1.65, but was still less than desirable. All of the parameter estimates were significant ($p < .05$) and are displayed in Table 19. The factor correlations are presented in Table 20. Due to the strong correlations among the factors, particularly between the formal and informal work-related factors ($r = .94$), a three-factor model

was estimated that included the formal personal interest learning factor, informal personal learning factor, and a new factor that combined the formal and informal work-related factors. The model fit was marginal, $\chi^2(241, N = 404) = 1176.21$, $p < .001$; CFI = .92; RMSEA = .10 (90% confidence interval = .09 to .10); WRMR = 1.69. The one- and two-factor models based on the pilot data EFA results were also estimated. The single-factor model included all 24 items. The model-data fit was poor, $\chi^2(252, N = 404) = 2131.62$, $p < .001$; CFI = .84; RMSEA = .14 (90% confidence interval = .13 to .14); WRMR = 2.44. Lastly, the 14-item two-factor model based on the pilot data EFA results that represented low- and high-commitment learning activities was estimated. It also produced poor model-data fit, $\chi^2(78, N = 404) = 853.147$, $p < .001$; CFI = .86; RMSEA = .16 (90% confidence interval = .15 to .17); WRMR = 2.33.

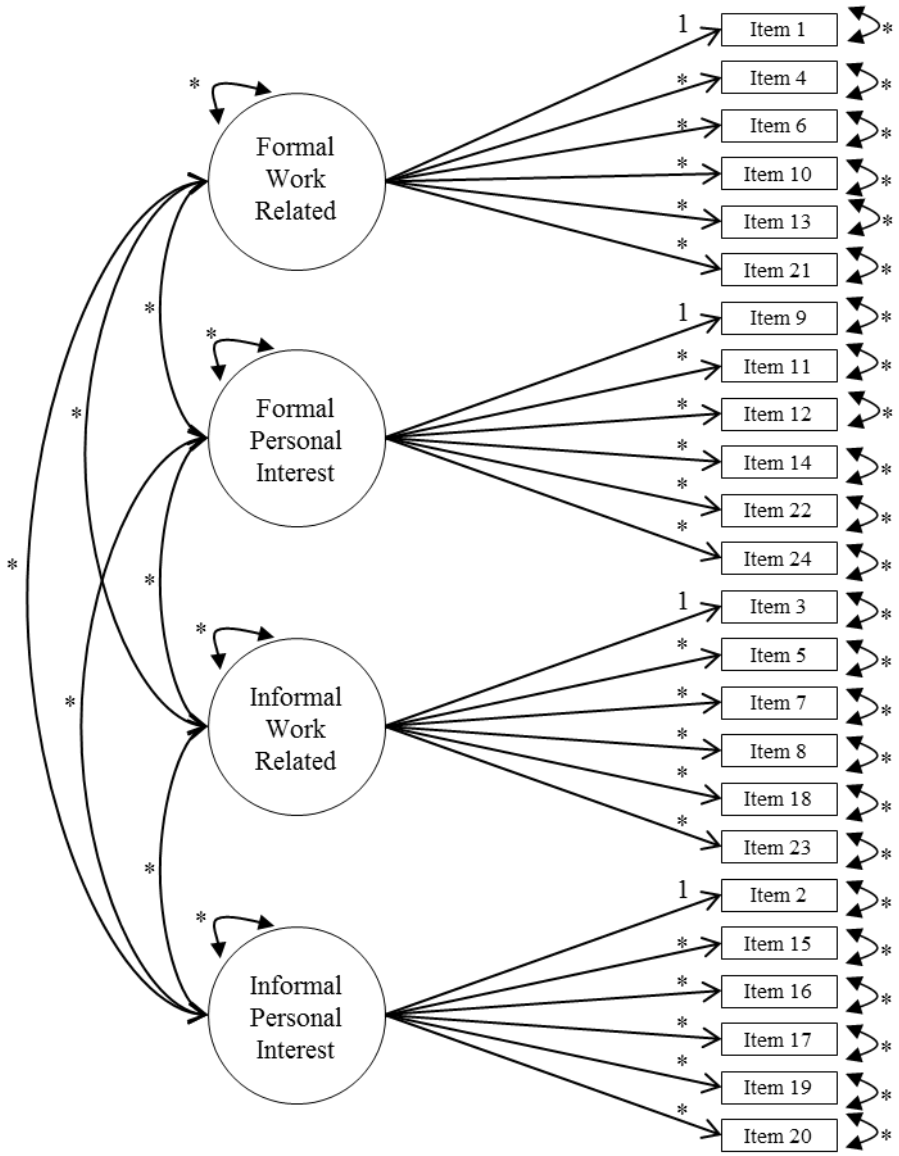

Figure 2. The hypothesized first-order reflective factor model of postsecondary students' orientation toward lifelong learning. The circles represent latent factors and the rectangles represent items on the Postsecondary Orientation toward Lifelong Learning scale. The model was constrained to have uncorrelated residuals variances. An asterisk (*) represents a parameter that was estimated.

Table 18

Items in Modified First-Order POLL Model Allowed to Covary Based on Shared Learning Context

Learning Context	Items
Present, lead, or facilitate at a conference, workshop, and/or trade show	1, 9
Reading-based activities	2, 3, 5
Serve as an instructor of a webinar/lecture	4, 14
Listserv or online community-based activities	7, 8
Attend a presentation at a conference, workshop, and/or trade show	10, 12
Take a college-level course	21, 24

Note. Items 6 and 22 also shared a learning context but had a non-significant error covariance that, accordingly, was constrained to zero.

POLL Bifactor Confirmatory Factor Analysis Model

The POLL can be viewed as having a global second-order latent construct that accounts for the variance among the four learning activity factors. Although this conceptualization has intuitive appeal, Chen, West, & Sousa (2006) found the bifactor model to be preferable to a second-order model when modeling a "general" factor and domain-specific factors. Of most interest to the current study, the bifactor model provides the ability to: (a) evaluate the magnitude of the relationship between the learning activity factors and the items while also estimating the relationship between the items and the general POLL factor, and (b) compare the latent means of the learning activity factors and the general POLL factor for independent groups of respondents (i.e., freshmen and seniors). Both the second-order and bifactor models share a similar belief that item responses are manifestations of both a general factor (i.e., POLL) and domain-specific factors (i.e., learning activity factors). Best practice dictates that a bifactor model should only be estimated if the first-order model displays acceptable model-data fit (Jöreskog, 1979; Mulaik & Millsap, 2000; as cited by Chen et al., 2006). The bifactor model was estimated as an exploratory exercise using the hypothesized four learning activity factors and one general factor, although caution is warranted because the fits for the first-order models were marginal or poor. The bifactor model is represented in Figure 3. The parameter estimates for Items 1, 2, 3, 11 were constrained to one to set the scale of the factors in the model. Correlations among the item residuals and between the factors were set to zero. The model failed to converge after 10,000 iterations. A series of modifications were made to the model in hopes of producing an estimable model. The maximum

likelihood estimator (MLM) was also used to see if it would lead to convergence. None of the attempts were successful.

Table 19

Parameter Estimates for First-Order POLL Model with Correlated Errors

	Unstd. Estimate	Std. Estimate
Formal Work-Related Learning Factor		
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	1.00	0.71
4. Serve as an instructor of a webinar/lecture related to work	1.00	0.71
6. Attend an instructor-led webinar/lecture related to work	1.18	0.84
10. Attend a presentation at a work-related conference, workshop, and/or trade show	1.17	0.83
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)	0.70	0.50
21. Take a college-level course to strengthen your professional skills	0.90	0.64
Formal Personal Interest Learning Factor		
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	1.00	0.79
11. Serve a leadership role in a personal interest club related to a hobby	0.99	0.79
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	1.04	0.82
14. Serve as an instructor for a webinar/training not related to work	0.97	0.77
22. Attend an instructor-led webinar/training not related to work	1.02	0.81
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	0.84	0.67
Informal Work-Related Learning Factor		
3. Read books, magazines, or journals for professional development	1.00	0.71
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	1.08	0.77
7. Actively contribute to a professional listserv or online community	1.06	0.75
8. Join a professional listserv or online community	1.04	0.74
18. Attempt to publish scholarly work related to your profession	0.93	0.66
23. Learn new skills on your own that can help you advance professionally	1.05	0.74
Informal Personal Interest Learning Factor		
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	1.00	0.69
15. Read books, magazines, or journals for pleasure	0.89	0.61
16. Read "how to" books not related to work	1.09	0.75
17. Take guided tours of museums or historic sites	0.99	0.68
19. Talk with others in order to learn more about an issue or product not related to work	1.18	0.81
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	1.11	0.76

Note. Unstd. = unstandardized estimates. Std. = standardized estimates. All estimates were significant ($p < .001$).

Table 20

Factor Correlations for Modified First-Order POLL Model with Correlated Errors

	FW	FP	IW
Formal work-related learning factor (FW)			
Formal personal interest learning factor (FP)	.74		
Informal work-related learning factor (IW)	.94	.84	
Informal personal interest learning factor (IP)	.70	.71	.83

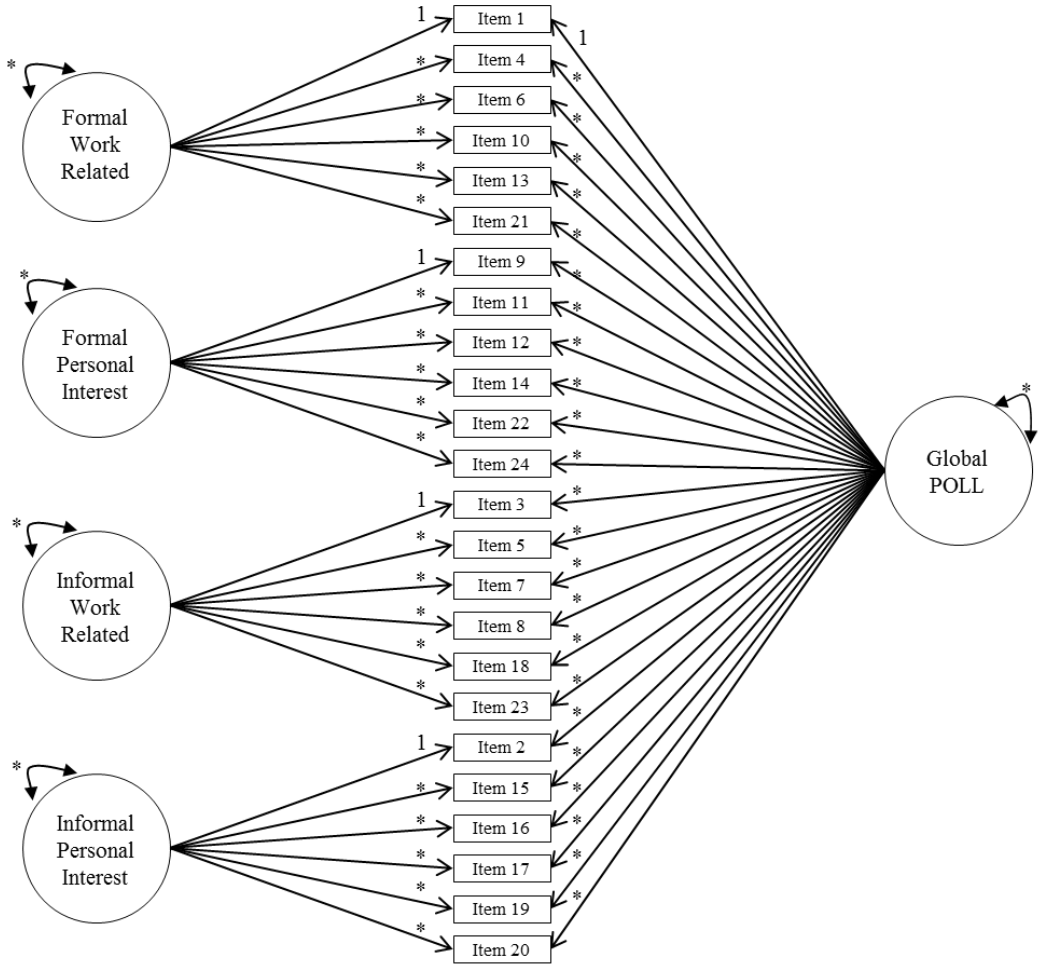

Figure 3. A bifactor reflective factor model of postsecondary students' orientation toward lifelong learning. The circles on the left represent latent factors for each type of learning activity. The circle on the right represents a global factor of orientation toward lifelong learning. The rectangles represent items on the Postsecondary Orientation toward Lifelong Learning scale. The residual variances were constrained to be uncorrelated and were omitted due to space limitations. An asterisk (*) represents a parameter that was estimated.

POLL Exploratory Factor Analyses

A series of exploratory factor analyses using principal axis factoring and promax (oblique) rotation were conducted on the main study sample POLL data given the fact that neither the first-order nor the bifactor POLL models fit the data well or, in the case of the bifactor model, failed to converge. Examination of the scree plot based on an analysis of all 24 items provided support for a one-factor model, while the results of a parallel analysis using principal axis factoring and the 95th percentile criterion with 1,000 raw data permutations suggested up to a nine-factor solution (a parallel analysis based on random normal data produced the same results). As a result, models with one through eight factors were analyzed. A nine-factor solution was not analyzed because it would have resulted in at least one factor having less than three items. As stated earlier, only factors with at least three items with loadings > |.40| would be retained. Similar to the process used in the pilot study, the evaluation of each EFA model followed an iterative process. First, the eight-factor model was estimated with all 24 items. Next, items were flagged for possible deletion if they did not met the following criteria:

Criterion 1: The item had at least one pattern coefficients > |.40|.

Criterion 2: The item did not have pattern coefficients > = |.30| on two or more factors.

Criterion 3: The item had a communality estimate >= .40.

Criterion 4: The item estimates supported the interpretation of the factor.

Criterion 5: The difference between an item's largest pattern coefficient and the item's second largest pattern coefficient was > .15.

An item that did not meet one or more of the criteria was removed. The model was then re-estimated. The iterative process continued one item at a time until all items in the model fit the five criteria. The process was then repeated for the seven-factor EFA model. The process continued until all eight models had been evaluated.

The eight-, seven-, six-, five-, and four-factor solutions did not converge, had less than three items on one or more factor, and/or were not interpretable. The final three-factor model was comprised of 10 items that represented factors for Instructing/Presenting, Reading, and Course-

Taking learning activities. The factors accounted for 59.67% of the common variance among the items. The pattern coefficients and factor correlations are presented in Tables 21 and 22.

Table 21

Patterns Coefficients for the Three-Factor POLL Model

	Factor		
Item	Instructing/ Presenting	Reading	Course taking
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	0.75	0.15	-0.14
4. Serve as an instructor of a webinar/lecture related to work	0.86	0.06	-0.16
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	0.74	-0.06	0.13
14. Serve as an instructor for a webinar/training not related to work	0.72	-0.14	0.22
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	-0.03	0.81	< 0.01
3. Read books, magazines, or journals for professional development	< 0.01	0.75	0.08
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	0.07	0.78	0.03
21. Take a college-level course to strengthen your professional skills	-0.09	0.18	0.51
22. Attend an instructor-led webinar/training not related to work	0.16	0.07	0.63
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	-0.06	-0.04	0.83

Note. Promax rotation.

Table 22

Factor Correlations for the Three-Factor POLL Model

Factor	Instructing/Presenting	Reading
Reading	.43	
Course taking	.56	.46

The two-factor solution represented seven items covering factors for the Instructing/Presenting and Reading learning activities. The factors accounted for 61.95% of the shared item variance. The pattern coefficients are presented in Table 23. The correlation between the two factors was .45. The one-factor solution represented all 24 items and accounted for 37.44% of their shared variance. The pattern/structure coefficients are presented in Table 24.

Table 23

Patterns Coefficients for Two-Factor POLL Model

Item	Factor	
	Instructing/ Presenting	Reading
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	0.68	0.10
4. Serve as an instructor of a webinar/lecture related to work	0.79	< 0.01
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	0.79	-0.01
14. Serve as an instructor for a webinar/training not related to work	0.81	-0.07
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	-0.06	0.83
3. Read books, magazines, or journals for professional development	0.01	0.79
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	0.06	0.79

Table 24

Pattern Coefficients for the One-Factor POLL Model

1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show	0.61
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events	0.58
3. Read books, magazines, or journals for professional development	0.65
4. Serve as an instructor of a webinar/lecture related to work	0.59
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession	0.69
6. Attend an instructor-led webinar/lecture related to work	0.69
7. Actively contribute to a professional listserv or online community	0.69
8. Join a professional listserv or online community	0.70
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic	0.66
10. Attend a presentation at a work-related conference, workshop, and/or trade show	0.71
11. Serve a leadership role in a personal interest club related to a hobby	0.68
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic	0.70
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)	0.43
14. Serve as an instructor for a webinar/training not related to work	0.63
15. Read books, magazines, or journals for pleasure	0.40
16. Read "how to" books not related to work	0.56
17. Take guided tours of museums or historic sites	0.53
18. Attempt to publish scholarly work related to your profession	0.60
19. Talk with others in order to learn more about an issue or product not related to work	0.61
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue	0.56
21. Take a college-level course to strengthen your professional skills	0.51
22. Attend an instructor-led webinar/training not related to work	0.69
23. Learn new skills on your own that can help you advance professionally	0.58
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)	0.56

POLL Follow-up Confirmatory Factor Analysis

Confirmatory factor analyses using structural equation modeling were conducted on the three-, two-, and one-factor models elicited via the EFA results. One item per factor was fixed to one to set the metric of the model. All three models were analyzed using weighted least square means and variances adjusted (WLSMV) estimation (the one-factor model was the same model estimated based on the pilot study EFA results). The model fit statistics are presented in Table 25. Although none of the models met all of the model fit criteria, the two-factor model was marginally acceptable with slightly higher than desired RMSEA and WRMR values.

Table 25

Model Fit Statistics for the Three-, Two-, One-Factor POLL Models

	3-Factor Model	2-Factor Model	1-Factor Model
χ^2	184.30	68.34	2131.62
df	32	13	252
p	< .001	< .001	< .001
RMSEA	0.11	0.10	0.14
90% RMSEA CI	[0.09, 0.12]	[0.08, 0.13]	[0.13, 0.14]
CFI	.96	.98	.84
WRMR	1.15	0.92	2.44

Note. RMSEA = root mean square error of approximation; CFI = comparative fit index; WRMR = weighted root mean residual.

GILS First-Order Confirmatory Factor Analysis Model

A confirmatory factor analysis was conducted on the hypothesized GILS (Figure 4) supported by the EFA results of the pilot data. The model-data fit indices provided mixed results. The model did not perfectly fit the data, $\chi^2(5, 390) = 33.81$, $p < .001$, and it produced a larger than desirable RMSEA value (.12, 90% confidence interval = .09 to .16). However, the CFI (.99) and WRMR (.70) both provided support that the model adequately fit the data. At the item level, all of the factor loadings were significant and the standardized values were all greater than .8. The factor loadings are presented in Table 26.

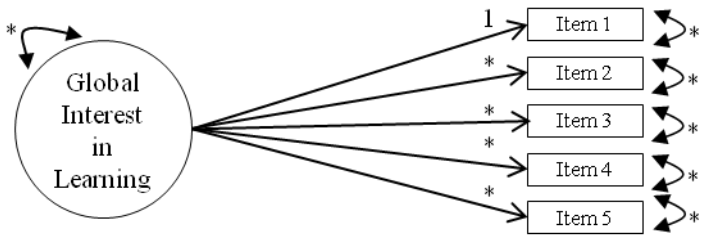

Figure 4. The hypothesized first-order reflective factor model of global interest in learning. The circle represents a latent factor and the rectangles represent items on the Global Interest in Learning Scale. The model was constrained to have uncorrelated residuals variances. An asterisk (*) represents a parameter that was estimated.

Table 26

Item Parameter Estimates for One-Factor GILS Model

	Unstd. Estimate	Std. Estimate
1. I consider myself a lifelong learner.	1.00	0.87
2. I try to learn something new every day.	0.99	0.86
3. I frequently try to learn new skills that will help advance me professionally.	0.97	0.85
4. I frequently try to learn new skills simply for my own personal development.	1.00	0.88
5. I love to learn.	1.01	0.88

Note. Unstd. = unstandardized estimates. Std. = standardized estimates. All estimates were significant ($p < .001$).

Validity Evidence

The convergent and discriminant validity of the responses to the POLL were examined in relation to the responses to the Global Interest in Learning Scale, Civic Engagement & Participation index, Satisfaction with Life Scale, and the Social Desirability Scale-16. Since none of the POLL factor models displayed adequate fit, the responses to all of the POLL items were summed to create a non-latent index of postsecondary students' orientation toward lifelong learning. The factor GILS scores were used since the combined model provided some evidence of good model-data fit (i.e., CFI = .99, WRMR = .70). The bivariate correlations between the variables are provided in Table 27.

Table 27

Correlations between Postsecondary Orientation toward Lifelong Learning, Global Interest in Learning, Life Satisfaction, Civic Engagement & Participation, and Social Desirability Scores.

	POLL	GILS	SWLS	CEP
Global Interest in Learning Scale - Factor Score	.58*			
Satisfaction with Life Scale - Summed Score	.29*	.31*		
Civic Engagement & Participation - Summed Score	.38*	.33*	.32*	
Social Desirability Scale - Summed Score	.15*	.29*	.18*	.14*

Note. POLL = Postsecondary Orientation toward Lifelong Learning scale. GILS = Global Interest in Learning Scale. SWLS = Satisfaction with Life Scale. CEP = Civic Engagement and Participation Index.
*$p < .05$.

Latent Mean Comparisons

The lack of a POLL model with adequate fit prevented the comparison of latent mean scores between freshmen and seniors. As an alternative line of inquiry, the factorial invariance of the GILS scale was examined as a precursor to comparing the latent Global Interest in Learning Scale means between freshmen and seniors. For the first step, the fit of the GILS model was examined for each subgroup. Model fit indices provided inconsistent evidence regarding fit of the model to the data for freshmen, $\chi^2(5, N = 144) = 12.53$, p .028; CFI = .99; RMSEA = .11 (90% confidence interval = .03 to .18); WRMR = 0.48, as well as for seniors, $\chi^2(5, N = 260) = 33.73$, $p < .001$; CFI = .99; RMSEA = .15 (90% confidence interval = .11 to .20); WRMR = 0.78. As a result, the conservative choice was made not to pursue comparisons of the latent Global Interest in Learning Scale means since the model-data fit was questionable and varied by subgroups.

Mean Comparisons of Scale Scores

The mean POLL summed score for freshmen was 91.15 (SD = 16.38) compared to a mean score of 93.25 (SD = 15.16) for seniors. The difference in mean scores was not significant, $t(404) = -1.28$, $p = .203$. The mean GILS summed score for freshmen was 22.18 (SD = 3.02) versus a mean summed score of 22.49 (SD = 2.68) for seniors. The mean scores were not significantly different, $t(388) = -1.05$, $p = .295$.

Chapter 6

DISCUSSION

Since the 1970's lifelong learning has grown from a nascent idea to an omnipresent term used throughout the field of higher education. Many institutions of higher education now see it as part of their mission to help develop students into "lifelong learners." Although such a claim is laudable and has intuitive appeal, the construct of lifelong learning remains overly diffuse and devoid of uniform meaning. The current study proposed a unified model for postsecondary students' orientation toward lifelong learning in an attempt to work towards addressing this challenge. The model views orientation toward lifelong learning as latent construct that is observable by measuring students' likelihood of engaging in four types of learning activities—formal work-related activities, informal work-related activities, formal personal interest activities, and informal personal interest activities—that are posited to represent behaviors of lifelong learners. This study sought to develop an instrument, the Postsecondary Orientation toward Lifelong Learning scale, that included indicators for assessing one's latent orientation toward lifelong learning.

The validity of the POLL score interpretations can be viewed an evidentiary argument supported by an accumulation of evidence from multiple sources (Kane, 2009). Using this framework, the evidence supporting the valid use of the POLL results to measure students' orientation towards lifelong learning was mixed. The development of the instrument provided support that items were appropriate indicators for the construct. There was a high degree of agreement between the subject-matter experts' (SME) classifications of the items by type of learning activity. Additionally, the mean SME rating of the degree to which they felt each item represented an activity indicative of a "lifelong learner" was high, ranging from 3.50 to 4.80 (on a five-point scale; 1 = w*eakly represents*, 5 = *strongly represents*) for the items used on the final instrument.

Exploratory factor analyses of the pilot study data provided tentative support for the factor structure *within* each type of learning activity. The learning activity subscales were also found to have acceptable levels of internal consistency (Guttman's λ_2 estimates ranged from .78

for informal work-related activities to .85 for formal personal interest activities), a necessary but not sufficient condition of validity. However, the follow-up SEM-based CFA analysis of the hypothesized four factors (Figure 2) using the sample data from the main study indicated that the model-data fit was poor. Additional EFA and CFA models were explored, including a bifactor model with a general POLL factor and individual learning activity factors. Although most of the models did not fit the data well, did not converge, or were uninterpretable, three revised models produced marginally acceptable model-data fit. The first model included all 24 items and kept the original four-factor structure but allowed for errors of pairs of items that represented learning in similar contexts (e.g., *reading* for work and *reading* for fun) to covary. The second model comprised 24 items and had three factors that included a formal personal interest learning factor, an informal personal learning factor, and a combined formal and informal work-related factor. The third model included seven items that together represented an instructing/presenting learning activities factor and a reading-based learning activities factor. All three models warrant further investigation.

The convergent and discriminant validity evidence of the POLL responses was also mixed. The original intent was to examine the convergent and discriminant validity of the latent POLL scores. The lack of a well-fitting CFA model prevented this type of analysis. As an alternative, all 24 POLL items were added together to create a non-latent summed score of postsecondary students' orientation toward lifelong learning. There was some convergent validity evidence for the use of the summed POLL scores. The total POLL scores had a relatively strong positive correlation with global interest in learning (.58) and moderate positive correlations with civic engagement and participation (.38) and life satisfaction (.29). This is in line with prior research that found positive correlations between civic engagement and volunteerism and education level (Driskell, Lyon, & Embry, 2008; Park & Smith, 2000; Ruiter & De Graaf, 2006) and research that demonstrated a significant positive relationship between measures of self-directed learning and life satisfaction (Lounsbury, Levy, Park, Gibson, & Smith, 2009).

The correlation between the summed POLL scores and social desirability was statistically significant but small in magnitude (.15). This hypothesis was tested to provide evidence for

discriminant validity of the POLL based on Cacioppo & Petty's (1982) finding of a small (.08), non-significant correlation between need for cognition (a construct postulated to be an antecedent to one's orientation toward lifelong learning) and social desirability. Although the association of the summed POLL and social desirability scores was significantly different from zero, it was encouraging that the size of the relationship between to the summed POLL scores and social desirability was smaller in magnitude than the relationship between the POLL scores and the convergent validity covariates. In hindsight, one possible explanation for this small, positive relationship is that perhaps students felt inclined to respond to the POLL in socially desirable ways. Future research should explore the discriminant validity of the POLL scale using other variables supported by prior research, such as test anxiety.

The Validity of the POLL Measurement Model

All of the validity evidence was holistically digested in attempt to answer a central question of this study: can the results of the POLL scale be used to make valid inferences of the postsecondary students' orientation toward lifelong learning? Evidence regarding the hypothesized reflective four-factor model was mixed. Support for the integrity of the four learning activity domains was provided by theory, by expert raters' indications of the fit and importance of the items for the intended construct, by internal consistency estimates of reliability, and by unidimensional EFAs within each domain. However, the CFA models reflecting the hypothesized four-factor model of the POLL did not fit the data as well as desired.

The exact causes of the lack of model fit are unknown. It may be that the fundamental assumption that the relationship between the construct and item responses is incorrect. That is, the "true" relationship may, at least in part, be formative rather than reflective. For example, postsecondary orientations toward lifelong learning may be conceptualized as a composite of the items. In other words, the construct could be viewed as an indicator of postsecondary students' orientation toward lifelong learning rather than it being seen as the underlying cause driving students to want to engage in various learning activities. This is similar to how a nation's Gross Domestic Product is seen as an indicator of the nation's financial growth rather than as an underlying entity that is the cause of the growth.

Another possible explanation for observed lack of fit of the model may be due to the complex wording of the items. By design, the items varied on two dimensions: (1) work-related versus personal interest learning activities and (2) formal (i.e., instructor-led) versus informal learning activities. The validity of the measurement model rests on the belief that these dimensions represent the major axes that should be used to group items into factors. Although this approach was based on prior research of learning activities (e.g., Kim, Hagedorn, Williamson, & Chapman, 2004; Kleiner, Craver, Hagedorn, & Chapman, 2005; NCES, 2008), none of this earlier research included empirical evaluations of the validity of the categories. It is quite possible that the classifications are as valid as the country boundaries carved out by world leaders in Yalta after World War II. That is, they made sense to those outside of the system (i.e., researchers) but do not accurately represent true demarcation lines for distinguishing between different types of learning activities. Perhaps future developments to improve the POLL should include assessing the performance of items that are simpler in design. For example, it may be more effective to ask respondents a single item about their likelihood to attend a conference rather than asking them the question in multiple forms in an attempt to elucidate distinctions between work and personal interest conferences and formal and informal conferences presentations. This approach would result in there being unique rather than parallel learning activity items for each of the four types of learning categories. Another suggestion is that interviews be conducted with students as part of the pilot testing process to better understand how they interpret the items. This may be important in light of recent research that critically questions the assumption that respondents are able to uniformly interpret educational survey items (e.g., Porter, 2011).

The hypothesized model in this study did not include any of the postulated characterological antecedents of postsecondary students' orientation toward lifelong learning. Practical constraints excluded these variables from being examined the current study. Future studies should examine those variables in combination with the hypothesized behavioral outputs of lifelong learning. This may produce a model that more accurately represents the correlation structure of student responses to the existing or future versions of the POLL scale. Another consideration for future research is to evaluate a model that distinguishes each dimension of the

items (formal vs. informal and work vs. personal) at the factor level. The model would include four factors: formal learning activities, informal learning activities, work-related learning activities, and personal interest learning activities. Items would be permitted to cross-load on the two factors that underlie the characteristics of each item. For example, items that corresponded to formal work-related learning activities would be allowed to load on both the formal learning activities and work-related activities factors.

The Validity of the POLL Score Interpretations

It is also worth considering whether the results of the simple summed scores of the POLL scale represent a valid measure of postsecondary orientation toward lifelong learning. The design process and convergent validity evidence indicate that the summed POLL scale scores may be a valid measure of postsecondary students' orientation toward lifelong learning. However, this needs to be investigated further. Central to this investigation is the need to reevaluate whether the POLL represents a scale or an index. The fact the data provided support for the use of the summed scores but not for use of the latent measurement model indicates that the instrument may be more appropriately theorized as an index.

Unfortunately, the results of this study do not provide support for the malleability of postsecondary students' orientation toward lifelong learning, as measured by the summed POLL scores. The difference between freshmen and seniors' average summed POLL scores was not statistically significant and was negligible in size. Although this result is not encouraging, it should not be viewed as a definitive conclusion on the ability to help develop students into lifelong learners as many institutions aim to do. There are several possible explanations for the lack of a meaningful difference between freshmen and seniors' scores. First is the already mentioned issue of possible model misspecification. Second is the fact the current study focused on the assessment of one's *orientation* towards lifelong learning rather than try to assess one's current status as a "lifelong learner," as discussed in the introduction of this paper. It is possible that students' perceptions of the learning activities they are likely to engage in after they graduate is fairly fixed for freshmen and seniors, but that their actual engagement those behaviors over a set period of time in the past (e.g., the prior 6 months) is different between the two groups. Future

research should seek to evaluate the distinction between students' actual engagement in various learning activities and their likelihood for engaging in them, and whether these differences vary between freshmen and seniors.

Another possible factor is the unknown gestation period and growth of lifelong learning over the lifespan. It is possible that higher education does increase a person's proclivity toward lifelong learning but that the effect does not manifest itself until later in life. An interesting investigation would be to examine the difference in POLL responses between incoming freshmen and alumni who have been out of school for as significant amount of time (e.g., 10 years). Alternatively, it is possible that one's orientation toward lifelong learning is malleable earlier in life but becomes fairly fixed as we progress through life. If this is the case, it would explain the current results since the average ages of freshmen and seniors in this study were 35 and 40, respectively. Additional research should be conducted with more traditionally aged freshmen and seniors to see if there are larger differences in their orientations toward lifelong learning.

The lack of a difference between freshmen and seniors' scores may be an artifact of the design of the study. The study was not experimental or longitudinal in nature. It is possible that ordinary postsecondary experiences are not enough to increase students' orientation toward lifelong learning. A "treatment" of some sort, such as a specialized curriculum, targeted institutional experiences, or a relationship with a mentor, may be needed to foster an ongoing love of learning. It is also possible that a cross-sectional analysis of the construct, such as the one used in this study, masks change in the construct over time. A longitudinal examination and a more robust experimental design should be considered in the future to address these questions.

Perhaps the most likely explanation for the non-meaningful difference between freshmen and seniors' POLL scores is that people who enroll in a postsecondary institution are, at least in part, probably already lifelong learners. In other words, a postsecondary education may not create lifelong learning; lifelong learners may be forged prior to then and attend a college or university in a quest to help satiate their appetite for learning. The high average POLL scores for both freshmen and seniors provide some credence to this theory. Additional research is needed that compares the

POLL scores of people in college with those who chose to never attend college in an attempt to reveal potential difference between the groups.

Global Interest in Learning Scale

As previously mentioned, the original intent of the GILS scale was to serve as a complement to the POLL scale. I developed it to provide another measure that could be used to evaluate the convergent validity of the POLL scale. Since the GILS was not the focal point of the study, it was developed based solely on face validity and without the input of subject-matter experts. That said, the EFA and CFA analyses provide some support for the hypothesized measurement model of the GILS. The GILS factor scores had a relatively strong correlation (r = .58) with the POLL summed scores and moderate positive correlations with life satisfaction (r = .31) and civic engagement and participation (r = .33) and social desirability (r = .29). This indicates that students who have greater levels of interest in learning may also be more satisfied with life and have higher levels of civic engagement. It also suggests that students may be inclined to answer items about their interest in learning in social desirable ways. Although the examination of the GILS was not the central focus of this study, the results provide tentative support for its use as a global measure of postsecondary students overall interesting in learning. Additional research should be conducted to further evaluate and validate the instrument and the resulting score interpretations.

Limitations

There were several limitations to the study, in addition to those already mentioned, that affect the interpretations and inferences based on the results. First, the sample of freshmen and seniors were, on average, slightly older, had higher GPAs, and had a higher proportion of White/Caucasian students than their respective populations at the participating institution. Second, the institution from which the sample was drawn caters to a student body that may not be representative of most higher education institutions. For example, the mean age of freshmen at the institutions was 32 years of age. The institution also offers it academic programs in both online and on-campus formats. Third, only 5.8% of freshmen and 10.4% seniors who were contacted by email to participate in the study completed the POLL. It is possible that non-respondents are

qualitatively different than respondents in their orientation toward lifelong learning. It is reasonable to argue that students who have higher levels of orientation toward lifelong learning would be more drawn to participate in an educational study on learning than students who have lower levels of orientation toward lifelong learning. The low response rates also resulted in a relatively small sample size. Additionally, the current study was only conducted at single institution. The results of this study should not be generalized to the entire populations of freshmen and seniors across all U.S. postsecondary institutions. Finally, the current study did not aim to assess the hypothesized characterological and skill-based antecedents of postsecondary students' orientation toward lifelong learning. This remains an area for future research.

Conclusion

Institutions of higher education often tout that they are developing students to become lifelong learners. However, little research has been conducted to substantiate this claim. This is presumably due to the absence of a uniform conceptualization of lifelong learning among postsecondary students and the availability of an instrument to measure it. This study sought to address those primary concerns by putting forth a hypothesized model of postsecondary students' orientation toward lifelong learning and by developing an instrument to measure its behavioral manifestations. The results of this study partially met these goals by providing some trace outlines on how to define and measure postsecondary students' orientation toward lifelong learning. Additional research is ultimately needed to determine if those tracing are the beginning sketches of a much needed solution to assessing lifelong learning as a critical outcome of a postsecondary education as many institutions assume and wish it to be.

REFERENCES

Abukari, A. (2005). Conceptualizing lifelong learning: A reflection on lifelong learning at Lund University (Sweden) and Middlesex University (UK). *European Journal of Education*, *40*(2), 143-154.

Association of American Colleges and Universities. (2007). *College learning for the new global century.* Washington, DC.

Bandalos, D. L. & Boehm-Kaufman, M. R. (2009). Four common misconceptions in exploratory factor analysis. In C. E. Lance & R. J. Vanderberg (Eds.), *Statistical and methodological myths and urban legends: doctrine, verity and fable in the organizational and social sciences* (pp. 61-87). New York: NY Routledge.

Beinhart, S., & Smith, P. (1998). *National Adult Learning Survey 1997*. Sudbury, Suffolk: Department for Education and Employment. Research Report No. 49.

Blake, B. F., Valdiserri, J., Neuendorf, K. A., Nemeth, J. (2006). Validity of the SDS-17 measure of social desirability in the American context. *Personality and Individual Differences*, *40*, 1625-1636.

Bloomqvist, I., Niemi, H., & Ruuskanen, T. (1998). *Participation in adult education and training in Finland 1995*. Helsinki: Statistics Finland.

Bolhuis, S. (2003). Towards process-oriented teaching for self-directed lifelong learning: a multidimensional perspective. *Learning and Instruction*, *13*, 327-347.

Bryce, J. (2004). Different ways that secondary schools orient to lifelong learning. *Educational Studies*, *30*(1), 53-64.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and* Social *Psychology*, *42*(1), 116-131.

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: the life and times of individuals varying in need for cognition. *Psychological Bulletin, 119*(2), 197-253.

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment for Need for Cognition. *Journal of Personality Assessment, 48*(3), 306-307.

Candy, P. C. (1991). *Self-direction for lifelong learning.* San Francisco, CA: Jossey-Bass.

Candy, P. C. (2000). Reaffirming a proud tradition: Universities and lifelong learning. *Active Learning in Higher Education, 1*(2), 101-125.

Candy, P. C., Crebert, R. G., & O'Leary, J. (1994). *Developing lifelong learners through undergraduate education*. Canberra: Australian Government Printing Services.

Chen, F. F., West, S. G., Sousa, K. H. (2006). A comparison of bifactor and second-order models of quality of life. *Multivariate Behavioral Research*, *41*(2), 189-225.

Crawford, A. V., Green, S. B., Levy, R., Lo, W. J., Scott, L., Svetina, D., & Thompson, M. S. (2010). Evaluation of parallel analysis methods for determining the number of factors. *Educational and Psychological Measurement, 70,* 885-90.

Creighton, S., & Hudson, L. (2002). Participation trends and patterns in adult education: *1991 to 1999* (NCES 2002–119). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Cropley, A. J. & Dave, R. H. (1978). *Lifelong Education and the Training of Teachers: Developing a Curriculum for Teacher Education on the Basis of Lifelong Education.* Oxford: Pergamon.

Crowne, D. P. & Marlowe, D. (1964) *The approval motive.* New York, NY: Wiley.

Deakin Crick, R., Broadfoot, P., & Claxton, G. (2004). Developing an effective lifelong learning inventory: the ELLI project. *Assessment in Education*, *11*(3), 247-272.

Deakin Crick, R. & Yu, Guoxing (2008). Assessing learning dispositions: is the Effective lifelong learning inventory valid and reliable as a measurement tool? *Educational Research, 50*(4), 387-402.

DeVellis, R. F. (2003). *Scale development: Theory and applications* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Diamantopoulos, A. & Winklhofer, H. M. (2001). Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research, 38*(2), 269–277.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71-75.

Diener, E., Lucas, R. E., & Oishi, S. (2005). Subjective well-being: The sciences of happiness and life satisfaction. In C. R. Snyder and S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 63-73). New York, NY: Oxford University Press.

Driskell, R. L., Lyon, L. & Embry, E. (2008). Civic engagement and religious activities: Examining the influence of religious tradition and participation. *Sociological Spectrum, 28*, 578–601.

Evison, R. (2006). Changing to learning cultures that foster lifelong learners. In P. Sutherland & J. Crowther (Eds.), *Lifelong learning: Concepts and contexts* (pp. 94-107). New York: Routledge.

Faure, E., Herrera, F., Kaddoura, A-R., Lopes, H., Petrovsky, A.V., Rahnema, M., and Champion Word, F., (Chair) (1972) *Learning to be: The world of education today and tomorrow*. Report of the International Commission on the Development of Education. Paris: Unesco.

Finney, S. J. & DiStefano, C. (2006). Nonnormal and categorical data in structural equation modeling. In G. R. Hancock & R. O. Mueller (Eds.), *Structural equation modeling: A second course* (pp. 269-314). Greenwich, CT: Information Age Publishing.

Friesen, N., & Anderson, T. (2004). Interaction for lifelong learning. *British Journal of Educational Technology*, *35*(6), 679-687.

Gorard, S., & Selwyn, N. (2005). What makes a lifelong learner? *Teachers College Record*, *107*(6), 1193-1216.

Gonyea, R. M., Kish, K. A., Kuh, G. D., Muthiah, R. N., & Thomas, A. D. (2003). *College student experiences questionnaire: Norms for the fourth edition*. Bloomington, IN: Indiana University Center for Postsecondary Research, Policy, and Planning.

Green, S. B. & Yang, Y (2009). Commentary on coefficient alpha: A cautionary tale. *Psychometrika, 74*(1), 121-135.

Hager, P. (2004). Lifelong learning in the workplace? Challenges and issues. *Journal of Workplace Learning, 16*(1/2), 22-32.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30*, 179-185.

Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, *Structural Equation Modeling, 6*(1), 1-55.

Jöreskog, K. G. (1979). A general approach to confirmatory maximum likelihood factor analysis, with addendum. In K. G. Jöreskog & D. Sörbom (J. Magidson, Ed.), *Advances in factor analysis and structural equation models* (pp. 21–43). Cambridge, MA: Abt Books.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indictors and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30,* 199-218.

Kane, M. (2009). Validating the interpretations and uses of test scores. In Lissitz, R. W. (Ed.), *The concept of validity* (pp. 39-64). Charlotte, NC: Information Age Publishing.

Kim, K., Hagedorn, M., Williamson, J., & Chapman, C. (2004). *Participation in adult education and lifelong learning: 2000–0*1 (NCES 2004–050). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Kleiner, B., Carver, P., Hagedorn, M., & Chapman, C. (2005). *Participation in adult education for work-related reasons: 2002-03*. (NCES 2006-040). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Livingstone, D. W. (2001). Adults' informal learning: Definitions, findings, gaps, and future *research* (NALL Working Paper # 21-2001). Toronto, Ontario: Centre for the Study of Education and Work. (ERIC Document Reproduction Service No. ED452390).

Lounsbury, J. W., Levy, J. J., Park, S., Gibson, L. W., & Smith, R. (2009). An investigation of the construct validity of the personality trait of self-directed learning. *Learning and Individual Differences, 19*, 411-418.

Mayhew, M. J., Wolnaik, G. C., & Pascarella, E. T. (2008). How educational practices affect the development of life-long learning orientations in traditionally-aged undergraduate students. *Research in Higher Education, 49*, 337-356.

McCombs, B. L. (1991). Motivation and life-long learning. *Educational Psychologist, 26*(2), 117-127.

McDonald, R. P., & Ho, M. R. (2002). Principles and practices in reporting structural equation analyses. *Psychological Methods, 7*(1), 64-82.

Medel-Anonuevo, C., Ohsako, T., & Mauch, W. (2001). *Revisiting lifelong learning for the 21st Century*. Hamburg, Germany: UNSECO Institute of Education.

Mplus (Version 6.11) [Computer software]. Los Angeles, CA: Statmodel.

Mulaik, S. A., & Millsap, R. E. (2000). Doing the four-step right. *Structural Equation Modeling*, *7*, 36–73.

Muthén L. K. & Muthén B. O. (2008-2010). *Mplus user's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén

National Center for Education Statistics (NCES). (2008, January). *Recent participation in formal learning among working-age adults with different levels of education* (Issue Brief NCES 2008-041). Washington, DC.

New Approaches to Lifelong Learning (NALL). (1998). Lifelong learning profiles: General summary of findings from the first Canadian *survey of informal learning*. www.nall.ca.

Norris, M. & Lecavalier, L. (2010). Evaluating the use of exploratory factor analysis in developmental disability psychological research. *Journal of Autism Development Disorders*, *40*, 8-20.

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instrumentation, and Computers*, *32*, 396-402.

Park, J. Z. & Smith, C. (2000). "To whom much has been given…": Religious capital and community voluntarism among churchgoing Protestants. *Journal for the Scientific Study of Religion*, *39*(3), 273-286.

Pavot, W. & Diener, E. (2007). The satisfaction with life scale and the emerging constructof life satisfaction. *The Journal of Positive Psychology*, *3*(2), 137-152.

Pillay, H., Wilss, L., & Boulton-Lewis, G. (2006). Work and learning: implications for lifelong learning in the workplace. In P. Sutherland & J. Crowther (Eds.), *Lifelong learning: Concepts and contexts* (pp. 219-229). New York, NY: Routledge.

Porter, S. R. (2011). Do college student surveys have validity? *The Review of Higher Education*, *35*(1), 45-76.

Preacher, K. J. & MacCallum, R. C. (2003). Repairing Tom Swift's electric factor analysis machine. *Understanding Statistics*, *2*(1), 13-43.

Rubin, D. B. (1976). Inference and missing data. *Biometrika*, *63*(3), 581-592.

Ruiter, S. & De Graaf (2006). National context, religiosity and volunteering: Results from 53 countries. *American Sociological Review*, *71*(2), 191-210.

Sadowski, C. J. (1992). An examination of the short Need for Cognition scale. *The Journal of Psychology*, *127*(4), 451-454.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, *99*(6), 323-337.

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, *74*(1), 107-120.

Smith, J., & Spurling, A. (2001). Understanding motivation for life-long learning. Leicester: NIACE. Statistics Canada (1999). Adult education and training in Canada: Report of the 1994 Adult Education and Training Survey. Ottawa: Statistics Canada.

Stöber, J. (1999). Die Soziale-Erwünschtheits-Skala-17 (SES-17): Entwicklung und ersteBefunde zu Reliabilität und Validität [The Social Desirability Scale-17 (SDS-17): Development and first results on reliability and validity]. *Diagnostica*, *45*, 173-177.

Stöber, J. (2001). The Social Desirability Scale-17 (SDS-17): Convergent validity, discriminant validity, and relationship with age. *European Journal of Psychological Assessment*, *17*, 222-232.

Tabachnick, B. G., and Fidell, L. S. (2007). *Using Multivariate Statistics*, 5th ed. Boston, MA: Allyn and Bacon.

Thompson, M. S. & Green, S. B. (2006). Evaluating between-group differences in latent variable means. In G.R. Hancock & R.O. Mueller (Eds.), *Structural equation modeling: A second course* (pp. 43-68). Greenwich, CT: Information Age Publishing.

Trigwell, K. (2006). An analysis of the relations between learning and teaching approaches. In P. Sutherland & J. Crowther (Eds.), *Lifelong learning: Concepts and contexts* (pp. 101-116). New York, NY: Routledge.

Tuijnman, A. (2003). Measuring lifelong learning for the new economy. *Compare*, *33*(4), 471-482.

Walters, S. (2006). Realizing a lifelong learning higher education institution. In P. Sutherland & J. Crowther (Eds.), *Lifelong learning: Concepts and contexts* (pp. 71-81). New York, NY: Routledge.

Worthington, R. L. & Whittaker, T. A. (2006). A content analysis and recommendations for best practices. *The Counseling Psychologist*, *34*, 806-834.

APPENDIX A

RECRUITMENT AND CONSENT FORMS

RECRUITMENT AND CONSENT FORM FOR THE PILOT STUDY

You are invited to participate in a research study at [name of participating university].

The [name of participating university] strives to provide its students with the best possible education. Towards that goal, the institution periodically conducts research projects to understand better its students and their needs. The current study seeks to obtain more information on students' level of engagement in various learning and civic engagement activities. This research project study is being conducted in conjunction with researchers at Arizona State University.

The purpose of this email is to provide you, a prospective research study participant, information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in this study. If you do not want to participate in this study at this time or any time in the future, please contact the co-investigator of the study, Phil Arcuria.

If you decide to participate, the survey will take approximately 10 minutes to fill out. You may skip questions, exit from the survey even after starting, or withdraw from the research at any time. Your participation in this study is completely voluntary; however, you must be 18 to participate. Your nonparticipation or withdrawal from this study will not affect your relationship with [name of participating university], your program standing, or your GPA in any way. There is no payment for your participation in this study. Your participation is your consent. The survey can be accessed through the following link [Link here]

By participating in this study, you have the possibility of benefiting research on the outcomes of postsecondary education. Approximately 1,300 [name of participating university] students will participate in this study.

The survey does not ask for your name. The data will only be reported in aggregate and the researchers will not identify you. The aggregate results of this research study may be used in reports, presentations, and publications.

Any questions you have concerning the research study or your participation in the study, before or after taking the survey, may be directed to Phil Arcuria or Dr. Marilyn Thompson.

Phil Arcuria, Co-Investigator Dr. Marilyn Thompson, Principal Investigator

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

We greatly appreciate your participation.

RECRUITMENT AND CONSENT FORM FOR THE MAIN STUDY

You are invited to participate in a research study at [name of participating university].

The [name of participating university] strives to provide its students with the best possible education. Towards that goal, the institution periodically conducts research projects to understand better its students and their needs. The current study seeks to obtain more information on students' level of engagement in various learning and civic engagement activities, as well as their overall level of satisfaction. This research project study is being conducted in conjunction with researchers at Arizona State University.

The purpose of this email is to provide you, a prospective research study participant, information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in this study. If you do not want to participate in this study at this time or any time in the future, please contact the co-investigator of the study, Phil Arcuria.

If you decide to participate, the survey will take approximately 15-20 minutes to fill out. You may skip questions, exit from the survey even after starting, or withdraw from the research at any time. Your participation in this study is completely voluntary; however, you must be 18 to participate. Your nonparticipation or withdrawal from this study will not affect your relationship with [name of participating university], your program standing, or your GPA in any way. There is no payment for your participation in this study. Your participation is your consent. The survey can be accessed through the following link [Link here]

By participating in this study, you have the possibility of benefiting research on the outcomes of postsecondary education. Approximately 1,300 [name of participating university] students will participate in this study.

The survey does not ask for your name. The data will only be reported in aggregate and the researchers will not identify you. The aggregate results of this research study may be used in reports, presentations, and publications.

Any questions you have concerning the research study or your participation in the study, before or after taking the survey, may be directed to Phil Arcuria or Dr. Marilyn Thompson.

Phil Arcuria, Co-Investigator Dr. Marilyn Thompson, Principal Investigator

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

We greatly appreciate your participation.

APPENDIX B

POSTSECONDARY ORIENTATION TOWARD LIFELONG LEARNING SCALE

Instructions:
Select how likely you are to engage in each of the following activities at some point after you graduate.

Response Scale:
Very Unlikely
Unlikely
Neither Likely nor Unlikely
Likely
Very Likely

Items:
1. Present, lead, or facilitate at a work-related conference, workshop, and/or trade show
2. Read newsletters, blogs, or newspapers to keep up-to-date on world events
3. Read books, magazines, or journals for professional development
4. Serve as an instructor of a webinar/lecture related to work
5. Read industry newsletters, blogs, or newspapers to stay current with the daily news related to your profession
6. Attend an instructor-led webinar/lecture related to work
7. Actively contribute to a professional listserv or online community
8. Join a professional listserv or online community
9. Present, lead, or facilitate at a conference, workshop, and/or trade show on a non-work related topic
10. Attend a presentation at a work-related conference, workshop, and/or trade show
11. Serve a leadership role in a personal interest club related to a hobby
12. Attend a presentation at a conference, workshop, and/or trade show on a non-work related topic
13. Pursue a graduate (ex: master's, doctorate) or professional degree (ex: M.D., J.D.)
14. Serve as an instructor for a webinar/training not related to work
15. Read books, magazines, or journals for pleasure
16. Read "how to" books not related to work
17. Take guided tours of museums or historic sites
18. Attempt to publish scholarly work related to your profession
19. Talk with others in order to learn more about an issue or product not related to work
20. Find out as much as you can about a controversial issue or topic before deciding how you stand on the issue
21. Take a college-level course to strengthen your professional skills
22. Attend an instructor-led webinar/training not related to work
23. Learn new skills on your own that can help you advance professionally
24. Take a college-level course related to a hobby or personal interest (not as a requirement of a degree program)

APPENDIX C

GLOBAL INTEREST IN LEARNING SCALE

Instructions:
Select your level of agreement with each statement listed below.

Response Scale:
Strongly Disagree
Disagree
Neither Agree nor Disagree
Agree
Strongly Agree

Items:
1. I consider myself a lifelong learner.
2. I try to learn something new every day.
3. I frequently try to learn new skills that will help advance me professionally.
4. I frequently try to learn new skills simply for my own personal development.
5. I love to learn.

APPENDIX D

CIVIC ENGAGEMENT & PARTICIPATION INDEX

Modified from Driskell, Lyon, & Embry, 2008

Instructions:
Select the response that most accurately reflects your level of membership in each of the organizational groups listed.

Response scale:
I am not a member.
I am a member, but do not actively participate in the organization.
I am a member and actively participate in the organization.
I am a member, actively participate, and serve in a leadership role in the organization.

Items:
1. An elementary, middle, or high school organization (ex: parent-teacher association, school board)
2. Charitable organization or group
3. Neighborhood group or association
4. Sports team, hobby, or leisure club/group
5. Youth groups or organizations
6. Religious or spiritual organization
7. Military or veterans group