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Using Mixed Methods to Study First-Year College Impact on Liberal Arts Learning Outcomes

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Abstract

This study details the collection, analysis, and interpretation of data from a national multi-institutional longitudinal mixed methods study of college impact and student development of liberal arts outcomes. The authors found three sets of practices in the quantitative data that corroborated with the themes that emerged from the qualitative data: academic challenge, diversity experiences, and supportive relationships aided the transition in the first year. The authors discuss these relationships and their mechanisms for fostering student learning in the first year of college.

Keywords

college impact, learning outcomes, first-year students

Mixed methods designs, those that combine qualitative and quantitative approaches into the methodology of a single- or multiphased research study (Creswell & Plano Clark, 2007; Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 1998), have become popular in evaluation and a host of other research areas (Creswell, 2009; Creswell & Plano Clark, 2007; Creswell, Plano Clark, Gutmann, & Hanson, 2003; Greene & Caracelli, 1997; Tashakkori & Teddlie, 2003). Mixed methods designs, however, have been the rare exception in college impact research, which includes studies of how student experiences influence college outcomes. The majority of this literature uses either a quantitative or a qualitative approach. Qualitative methods tend to provide an understanding of a focused phenomenon within a specific context, for example, how students' meaning making of college experiences affect development (Kuh, Kinzie, Schuh,

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Whitt, & Associates, 2005; Kuh, Schuh, & Whitt, & Associates, 1991). Quantitative methods tend to identify broad relationships between or among phenomena, without the ability to finely detect the mechanisms at the heart of such relationships, for example, the influence of student–faculty interaction on students' satisfaction with their university experience (Kuh & Hu, 2001).

We assert that mixed methods research provides a more complete and nuanced basis for understanding postsecondary education's influence on student learning outcomes, because it illuminates both broad relationships between college experiences and learning outcomes and how particular aspects of those relationships influence student learning. Mixed methods research can provide a significant contribution to the college impact literature by providing an explanation for student learning based on how students make meaning of their college experiences (Creswell, 2009; Creswell & Tashakkori, 2008).

This article details findings from the first year of the Wabash National Study of Liberal Arts Education (WNS), a multi-institutional, longitudinal study examining the institutional practices and conditions that affect outcomes associated with a liberal arts education (Center of Inquiry in the Liberal Arts at Wabash College, n.d.). In this article, we describe the general design criteria of a mixed methods approach and situate the present study in terms of those design criteria. Next, we discuss the quantitative methods and findings, followed by a description of the qualitative methods and the findings. We conclude by integrating the findings from both methods, discussing what we learned about how institutional practices and conditions foster the development of liberal arts outcomes.

Designing the Wabash National Study as a Mixed Methods Project

A team consisting of quantitative and qualitative researchers designed the WNS to illuminate the conditions, experiences, and outcomes that constitute a liberal arts education. The research team identified seven liberal arts outcomes: (a) effective reasoning and problem solving, (b) well-being, (c) inclination to inquire and lifelong learning, (d) intercultural effectiveness, (e) leadership, (f) moral character, and (g) integration of learning (see King, Kendall Brown, Lindsay, & VanHecke, 2007, for more information). The team agreed that the research must be longitudinal to capture change over time. They also agreed that a mixed methods study would be advantageous for several reasons.

First, collecting both quantitative and qualitative data within a single research study helps neutralize the limitations of each method by capitalizing on the strengths of the other method (Creswell et al., 2003; Creswell & Plano Clark, 2007; Greene & Caracelli, 1997). Moreover, because social phenomena (such as student development) are highly complex, multiple methods provide additional tools to reveal and understand these complexities (Creswell et al., 2003; Greene & Caracelli, 1997). Finally, the team believed the mixed methods approach would strengthen the weight of the conclusions if the findings were cross-validated through triangulation. Based on this reasoning, the team continued to make decisions concerning the implementation of a mixed methods study reflecting the design criteria described in the following section.

Design Criteria of Mixed Methods Research

Although a host of researchers has classified mixed methods designs into various typologies (see Creswell & Plano Clark, 2007, and Teddlie & Tashakkori, 2003, for details), Creswell et al. (2003) identified four design criteria that greatly informed the approach taken in the current study: (a) the implementation of data collection, (b) the priority given to one method over another, (c) the stage of the research process in which the multiple methods are integrated,

and (d) the theoretical perspective used to ground the study and situate the findings. In the following sections, we define these criteria and describe the present study in terms of each criterion.

Theoretical perspectives. Theoretical perspective refers to the explicit (formal) and implicit (informal) meaning-making frameworks researchers use in inquiry. We open with a discussion of theoretical perspectives because decisions regarding the theoretical perspectives of the quantitative and qualitative components were of foremost importance in the planning stage of the present study.

The quantitative research team used theories of college impact (Astin, 1977, 1993; Pascarella, 1985; Weidman, 2006), which suggest students' experiences and attributes prior to college must be taken into account as well as their experiences in college, if one is to accurately measure the achievement of college outcomes. This conceptual framework is consistent with Astin's (1993) Input, Environment, Outcome model. Because students come to college with varying precollege characteristics, experiences, motivation, and commitment, the college environment must provide a host of opportunities (e.g., programs, pedagogies, socialization) to meet students' diverse needs in order to maximize student learning. From this perspective, student learning is primarily influenced by two key factors: (a) the amount of time and effort students spend in curricular and educationally purposeful cocurricular experiences and (b) the extent to which colleges and universities have created and organized educationally purposeful opportunities and services to meet the needs of a growing and diverse student population (Astin, 1985, 1993; Kuh et al., 2005; Pascarella & Terenzini, 1991, 2005). With this framework as a guide, the quantitative portion of the WNS included measures of students' precollege characteristics in all analyses, which enabled the identification of unique effects of students' experiences in contributing to learning outcomes associated with a liberal arts education.

The qualitative component of the WNS is grounded in the constructive-developmental tradition, specifically, the theory of self-authorship (Baxter Magolda, 2001; Kegan, 1994), to explore the intersections between the liberal arts outcomes and meaning making. This tradition, which is rooted in Piaget's (1950) work on cognitive structures, holds that humans actively construct their perspectives by interpreting their experiences (i.e., constructivism) and that these constructions form meaning-making structures that evolve over time (i.e., developmentalism). Kegan (1994) portrays development as ''the evolution of consciousness, the personal unfolding of ways of organizing experience that are not simply replaced as we grow but subsumed into more complex systems of mind'' (p. 9). In any given construction, people are aware of and have control over some aspects of their meaning making (which one can thus ''make object'') and are unaware of other aspects (to which one is subject). Assessing meaning making requires going beyond the content of respondents' meaning making to accessing the basis for individuals' interpretations of meaning because these reasons make up the structure of how they make sense of their experience (Charmaz, 2003; Fontana & Frey, 2000; King, 1990). Major college student development theories use constructivist interviews to solicit this complex dynamic (e.g., Baxter Magolda, 1992; Belenky, Clinchy, Goldberger, & Tarule, 1986; King & Kitchener, 1994; Perry, 1970). Recognizing that individuals make meaning of their experience through a combination of their personal characteristics and context, many college student development theorists use grounded formal theory (Charmaz, 2006; Strauss & Corbin, 1994) to analyze meaning making (e.g., Abes & Jones, 2004; Baxter Magolda, 2001; Pizzolato, 2003; Torres & Hernandez, 2007). In the WNS, we used an in-depth interview and grounded formal theory analysis (for further details, see Baxter Magolda & King, 2007).

From these perspectives, the researchers sought to understand three features of students' experiences: (a) student characteristics as they enter college (e.g., Who are the students when they arrive on campus? What was their high school experience like? What are their expectations for college?), (b) the college experiences students had and how they interpreted them (e.g., How did

they make meaning of their interactions with faculty and peers both in and outside the classroom? To what extent did they feel supported academically and socially?), and (c) students' development of the dispositions, skills, and abilities associated with a liberal arts education. The research team approached the study using college impact and student development theories to understand what teaching practices, programs, and institutional structures support liberal arts education (Center of Inquiry in the Liberal Arts at Wabash College, n.d.; Baxter Magolda & King, 2007).

Implementation. Implementation of data collection refers to the sequence used to collect both quantitative and qualitative data. Concurrent or simultaneous data collection occurs when the researcher gathers data using both methods at the same time; sequential data collection takes place when the researcher uses different methods to collect data for a study at different times (Creswell et al., 2003). The present study employed a concurrent data collection strategy in that we conducted interviews with students in their first year of college as close as possible to the date of their completing the quantitative survey and assessment measures. Because of staffing considerations associated with a multi-institutional study, there was a greater lag time between qualitative and quantitative data collection at some campuses than at others, but all interviews occurred near the start of the first term on all campuses.

Collecting the data concurrently allowed students to report their experiences in two different ways. This provided the research team with data to examine the extent to which facets of the college experience, identified by students in the qualitative interviews, overlapped with or was distinct from facets of the college experience specified in the quantitative survey. This data collection strategy is consistent with the complementarity purpose of mixed methods research in which researchers use different methods to elaborate, enhance, and clarify the results of one method with the results of the other method. Although other mixed methods purposes exist,[1] the rationale for the complementarity purpose is ''to increase the interpretability, meaningfulness, and validity of the constructs and inquiry results by both capitalizing on inherent method strengths and counteracting inherent biases in methods and other sources'' (Greene, Caracelli, & Graham, 1989, p. 259). For the purpose of the present study, collecting two types of data as close to the same time as possible allowed researchers to construct an enriched and deeper understanding of the practices and conditions that contribute to students' development of liberal arts outcomes.

Priority. Priority refers to the decision to emphasize either qualitative or quantitative methods over the other. According to Creswell et al. (2003), the process of prioritizing a particular method may be informed by (a) how the researcher introduces the study, (b) the use of literature in grounding the study, (c) the statement of purpose for the study and the commensurate research questions, and (d) how data are collected, analyzed, interpreted, and presented. The present study gave both methods equal priority, thus avoiding methodological preferences that can inhibit meaningful integration of the findings (Bryman, 2007).

Consistent with suggestions by Tashakkori and Creswell (2007), we established an equal level of priority by articulating an integrative purpose for the study, which was the exploration and elaboration of the conditions and experiences that facilitate students' development of liberal arts outcomes (King et al., 2007). Our research questions also reflected equal priority: What are the practices and conditions associated with development of liberal arts outcomes and what is the underlying mechanism that makes the use of these practices effective? The present study also established equal priority through the responsibility for data collection and analysis, with each research team responsible for the method for which they had the greatest expertise, thus avoiding the challenge of insufficient expertise in one of the data collection and analysis methods leading to unequal priority (Creswell & Plano Clark, 2007).

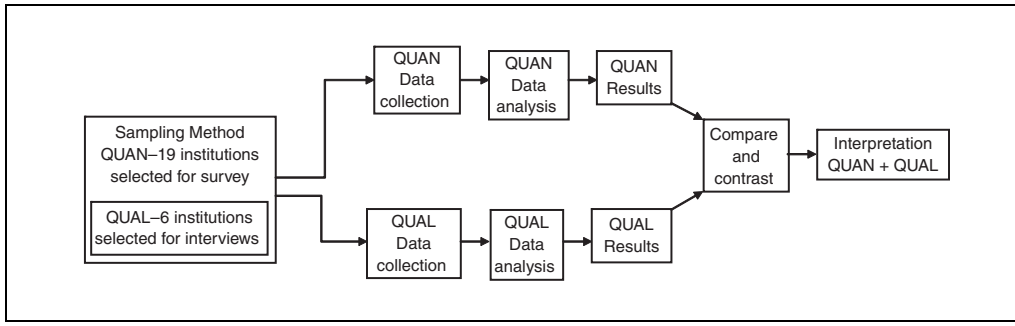

Figure 1. Triangulation design: Concurrent approach with complementarity purpose (Creswell & Plano Clark, 2007)

Integration. Integration refers to the extent to which researchers combine qualitative and quantitative methods within one or more steps in the inquiry process. Integration can take place at the stage of developing research questions in which researchers pose an integrated research question or some questions suited for quantitative methods along with other questions consistent with the use of qualitative approaches (Creswell & Plano Clark, 2007; Tashakkori & Creswell, 2007). In the present study, we integrated the quantitative and qualitative methods at the point of articulating an integrated research purpose, selecting a sampling design, and during data interpretation.

We have discussed how the integrated research purpose established equal priority within the present study. Additionally, by selecting 19 institutions that varied on a host of institutional characteristics and that provided detailed responses and evidence of their commitment of fostering development of liberal arts outcomes, the sampling design integrated the two methods in such a way that two complementary databases were generated. The variation among institutions in our sample provided the quantitative research team with data of suitable breadth, whereas the detailed responses from students selected for the qualitative portion provided the necessary depth for examining the phenomena (Teddlie & Yu, 2007).

Consistent with concurrent complementarity designs (Greene et al., 1989), we integrated our results by examining both qualitative themes and statistical trends (Creswell et al., 2003; Creswell & Plano Clark, 2007). For example, we were simultaneously interested in what college experiences were associated with students' development of intercultural effectiveness (identified through quantitative analysis) and using the themes from the narrative data to elaborate the mechanism within the experiences that contributed to this development (identified through qualitative analysis). Integrating data from each method allowed us to examine relationships between experiences measured two ways (those based on prior literature and specified in the survey instrument and those students identified as meaningful) and changes in the learning outcomes.

We have described how our decisions in relation to theoretical perspectives, data collection, priority, and integration are consistent with the triangulation design, convergence model with a complementarity purpose (Creswell & Plano Clark, 2007). We provide a diagram depicting this model in Figure 1. Through comparing and corroborating quantitative and qualitative findings (Creswell & Plano Clark, 2007), the present study adds specifically to the higher education and student development literature by providing a comprehensive understanding of the in- and out-of-classroom practices, programs, and institutional structures that foster liberal arts outcomes and adds to the mixed methods literature by providing a clear example of how meaningfully integrating findings from quantitative and qualitative approaches yields a nuanced understanding of the impact of college. The next sections of the article describe, in more detail,

the qualitative and quantitative methods and findings, followed by a discussion in which we integrate the findings.

Method: Quantitative Component[2]

Sample

All students in the sample were first-year, full-time students at 19 colleges and universities located in different regions of the United States. More than 60 institutions applied to participate in the WNS. In addition to institutional applications, in which institutions described the programs and practices they had in place to foster liberal arts outcomes, we purposefully selected institutions to represent a variety of characteristics including 2-year and 4-year, size, location, type, control, academic selectivity, and patterns of student residence. Three of the participating institutions were research universities, three were regional universities, two were community colleges, and eleven were liberal arts colleges, according to the 2007 Carnegie Classification of Institutions.

The quantitative research team employed three different sampling methods to survey approximately equal-sized groups at institutions that ranged from very small to quite large. At the small liberal arts colleges, we invited all students in the first-year class to participate in the study. At the largest institution in the study, students from the incoming class in the College of Arts and Sciences were invited at random to participate. For the other large institutions, students from the incoming class were invited at random to participate in the study. Students at all institutions received letters from their president on institutional letterhead describing that the purpose of the study was to gain information to improve the undergraduate student experience and inviting them to participate. The invitation directed students to a website where they could register for the study, or students could choose to complete an enclosed registration form and mail it in the self-addressed stamped envelope to ACT, formerly known as American College Testing programs. Students who chose to participate received a $50 monetary stipend for each wave of data collection and assurance that information they provided would be confidential. Of the 16,570 who were invited to participate in the study, 4,501 registered and completed the first data collection for a 27% response rate. Because ACT estimates that approximately one third to one half of the sample did not receive the invitation letter, this is likely a lower-bounds estimate of the actual response rate.

Data Collection

In the early fall of 2006, WNS collected initial data from 4,501 students at the 19 institutions. The 1-hour data collection period included a WNS precollege survey that sought information on student demographic characteristics, family background, and high school experiences. At the same time, students completed pretest measures of the liberal arts outcomes. At a 2-hour follow-up data collection in spring 2007, WNS collected college experience data using the National Survey of Student Engagement (Kuh, 2001) and the WNS Student Experiences Survey. These instruments were designed to capture student engagement in, and exposure to, empirically vetted good practices in undergraduate education (Astin, 1993; Chickering & Gamson, 1987; Kuh et al., 1991; Kuh et al., 2005; Pascarella & Terenzini, 1991, 2005). Students also completed posttest measures of liberal arts outcomes.

Of the sample from which we collected data in fall 2006, 3,081 students participated in the spring 2007 follow-up data collection, constituting a 68.5% response rate. Follow-up participants were weighted according to the first-year undergraduate population at their institution based on gender (male or female), race (Caucasian, African American/Black, Hispanic/Latino, Asian/Pacific Islander, or other), and ACT (or equivalent score) quartile. Although using weights in

this manner creates a sample more similar to the population from which it was drawn, it cannot adjust for nonresponse bias. The weighted sample comprised 46% men and 82% White students. Seven percent of students in the weighted sample identified as Asian/Pacific Islander, whereas 4% identified as African American, 5% identified as Latino/a, and 2% identified in categories other than the aforementioned. The average ACT score of the weighted sample was 24.92 with a standard deviation of 4.85.

Dependent Variables

The study used eight empirically vetted quantitative measures to assess development on the liberal arts outcomes. We detail the operationalization of each outcome in the following sections.

Effective reasoning and problem solving. We used the critical thinking module from the Collegiate Assessment of Academic Proficiency developed by ACT (1991). The critical thinking test measures a student's ability to evaluate, clarify, analyze, and extend arguments.

Moral character. We assessed the outcome dimension of moral character with the Defining Issues Test 2, which measures moral judgment or reasoning (Rest, Narvaez, Thoma, & Bebeau, 1999). The Defining Issues Test 2 produces two scores that represent an individual's use of higher order moral reasoning (i.e., that one's reasons are grounded in ethical principles), the P-score and the N2-Score. The N2-Score also measures the extent to which one rejects ideas because they are simplistic or biased (Bebeau & Thoma, 2003).

Leadership. The study assessed this outcome dimension with the 68-item, Revised Version II of the Socially Responsible Leadership Scale, which was developed specifically to measure leadership in college students. The instrument has eight scales corresponding to the eight dimensions of Astin's Social Change Model of Leadership Development (Astin et al., 1996). The eight scales are consciousness of self, congruence, commitment, collaboration, common purpose, controversy with civility, citizenship, and change.

Well-being. We used the 54-item Scales of Psychological Well-Being (SPWB; Ryff, 1989; Ryff & Keyes, 1995). This instrument measures six dimensions of psychological well-being: self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy (Keyes, Shmotkin, & Ryff, 2002; Ryff, 1989; Ryff & Keyes, 1995).

Intercultural effectiveness. WNS assessed this outcome with two measures. The 15-item, short form of the Miville–Guzman Universality–Diversity Scale measures an individual's universal–diverse orientation, which is an understanding and acceptance of similarities and differences among people (Fuertes, Miville, Mohr, Sedlacek, & Gretchen, 2000; Miville et al., 1999). The instrument has a total scale score and three subscale scores: (a) diversity of contact, defined as one's interest in participating in diverse, intentionally focused social and cultural activities; (b) relativistic appreciation, defined as one's appreciation of both similarities and differences in people and the impact of these in one's self-understanding and growth; and (c) comfort with differences, defined as one's comfort with diverse individuals.

WNS also used the seven-item Openness to Diversity/Challenge scale to measure intercultural effectiveness. It measures openness to cultural and racial diversity as well as the extent to which one enjoys being challenged by different perspectives (Pascarella, Edison, Nora, Hagedorn, & Terenzini, 1996).

Inclination to inquire and lifelong learning. WNS operationally represented this outcome with two measures. The 18-item Need for Cognition Scale assesses whether an individual likes to engage in cognitive activity and reflect on information to make meaning of it (Cacioppo, Petty, Feinstein, & Jarvis, 1996). A 6-item measure, the Positive Attitude Toward Literacy Scale, was also used to measure inclination toward lifelong learning. The PATL assesses students'

enjoyment of reading poetry, literature, scientific matter, and historical material as well as expressing ideas in writing.

Independent Variables

Controls. We collected extensive data representing background experiences and characteristics to control for confounding influences in our models. In this analysis, we included gender, race/ethnicity, parental education, precollege academic preparation, high school involvement, and precollege academic motivation. We also included institutional type, whether the student lived on campus, amount of time worked, and number of courses taken in the traditional arts and science disciplines. Perhaps most important, we included a pretest score for each outcome. As previously noted, students completed the pretests during the first data collection at the beginning of the year and completed the posttests at the end of that year during the second data collection. Because randomized experiments are typically not feasible in college impact studies, employing statistical controls and pretest measures of the outcome tends to be the best way to separate the effects of the student's personal characteristics and precollege experiences from the effects of college experiences, thereby providing a better estimate of the net effects of attending college (Astin & Lee, 2003; Pascarella, 2006).

Good practices in undergraduate education. Guided by past research that suggests particular good practices in undergraduate education are associated with personal and intellectual growth (Astin, 1993; Chickering & Reisser, 1993; Cruce, Wolniak, Seifert, & Pascarella, 2006; Kuh et al., 1991; Kuh et al., 2005; Pascarella et al., 2006; Pascarella & Terenzini, 1991, 2005; Pascarella, Wolniak, Seifert, Cruce, & Blaich, 2005), we selected academic and nonacademic experiences that may contribute to development on liberal arts outcomes during the first year of college. To measure these ''good practices,'' WNS selected and adopted empirically vetted scales and items from the National Study of Student Learning (Cruce et al., 2006; Pascarella et al., 2005) and the National Survey of Student Engagement (Pascarella et al., 2006).

We examined the good practice scales used in previous research (Cruce et al., 2006; Pascarella et al., 2005; Pascarella et al., 2006) to determine if an underlying factor structure existed. This analysis confirmed six factors that are statistically and conceptually sound: (a) good teaching and high-quality interactions with faculty, (b) diversity experiences, (c) academic challenge and high expectations, (d) frequency of interactions with faculty/professional staff, (e) cooperative learning, and (f) influential interactions with peers.

Four good practice scales were included in this analysis (see Quantitative Findings section) and warrant further description. The *good teaching and high-quality interactions with faculty* scale includes 23 survey questions that reflect the extent to which students perceive faculty: (a) are genuinely interested in students, (b) have positive nonclassroom interactions with students, (c) provide prompt feedback on student performance, (d) are interested in teaching, (e) are well organized, and (f) provide clear instruction. The nine-item *diversity experiences* scale is a measure of the frequency with which students have had serious discussions with individuals different from themselves and whether they have attended culturally diverse lectures or workshops. The *academic challenge and high expectations* scale consists of 31 survey questions concerning students' perceptions that faculty ask challenging questions and their coursework requires them to integrate information from various sources and experiences. This scale also includes questions regarding the frequency with which exams and assignments require (a) higher-order thinking; (b) the amount of reading, writing, and preparation required for courses; and (c) the level of effort students expend on coursework. Finally, the nine-item *influential interactions with peers* scale reflects students' perception of the degree to which they have (a) developed close relationships with other students, (b) whether their development has been positively

Table 1. The Estimated Effects of Good Practices on Liberal Arts Outcomes

	R^2	Good Teaching and High-Quality Interactions With Faculty ($\alpha = .92$)	Academic Challenge and High Expectations ($\alpha = .88$)	Diversity Experiences ($\alpha = .80$)	Influential Interactions With Peers ($\alpha = .85$)
Effective reasoning and problem solving					
CAAP Critical Thinking ($\alpha = .81$)	.71				
Moral reasoning					
DIT2 N2 score ($\alpha = .81$)	.56				
Leadership					
Consciousness of Self ($\alpha = .80$)	.43		.13		.11
Congruence ($\alpha = .86$)	.33	.10	.13		
Commitment ($\alpha = .84$)	.32	.18	.11		
Collaboration ($\alpha = .81$)	.37		.14		.15
Common Purpose ($\alpha = .83$)	.35	.13	.12		.10
Controversy with Civility ($\alpha = .77$)	.39	.13	.10	.11	.06
Citizenship ($\alpha = .88$)	.47		.12	.06	.05
Change ($\alpha = .82$)	.45		.11	.09	.12
Well-being					
Self-Acceptance ($\alpha = .86$)	.55	.11	.09		.18
Life Purpose ($\alpha = .82$)	.45	.13	.10		.12
Positive Relations with Others ($\alpha = .83$)	.54	.07	.05		.34
Personal Growth ($\alpha = .79$)	.40	.12	.09		.14
Environmental Mastery ($\alpha = .82$)	.54	.11	.09		.17
Autonomy ($\alpha = .81$)	.51		.08		
Intercultural effectiveness					
MGUDS Total score ($\alpha = .85$)	.54	.12		.20	
Relativistic Appreciation ($\alpha = .79$)	.38	.13	.10	.15	
Diversity of Contact ($\alpha = .80$)	.57	.05		.24	
Comfort with Difference ($\alpha = .78$)	.31			.09	
Openness to Diversity ($\alpha = .87$)	.51	.08	.14	.20	
Inclination to inquire and lifelong learning					
Positive Attitude toward Literacy ($\alpha = .65$)	.59	.07	.07	.09	
Need for Cognition ($\alpha = .90$)	.60		.11	.05	

Note: CAAP = Collegiate Assessment of Academic Proficiency. The table shows statistically significant effect sizes at $p < .05$ or less. Controls included a parallel pretest at Time 1, gender, race/ethnicity, average parental education, precollege academic ability, high school involvement, precollege academic motivation, institutional type, whether the student lived on campus, total amount worked, and number of traditional arts and science courses taken.

influenced by other students, (c) whether they can relate to other students, and (d) the extent to which students participate in cocurricular activities. We provide all internal consistency information for the dependent measures and good practice scales in Table 1.

Analyses

We used multiple regression to estimate the effects of the good practices on each of the outcomes. We regressed each dependent variable—23 measures representing six outcomes—on the controls, appropriate parallel pretest, and good practice scales. Because we first sampled institutions and then students within those institutions, we used statistical means to account for the

design effect (Groves et al., 2004). This adjusts the standard errors in recognition of the correlated residuals that result from the nested nature of the data.

Quantitative Findings

Our findings suggest that good teaching and high-quality interactions with faculty, diversity experiences, academic challenge and high expectations, and influential interactions with peers are associated with development on several of the outcomes. None of the good practices had a negative association with any of the outcomes. Table 1 presents all results statistically significant at $p < .05$. The b coefficients can be interpreted as effect sizes and indicate the amount of a standard deviation change in the outcome score for a standard deviation change in the independent good practice variables.

The effect sizes were quite small, ranging from .05 to .18 of a standard deviation with one exception: a standard deviation change in influential interaction with peers was associated with a .34 standard deviation increase in positive relations with others, a measure of well-being. We postulate that the effect sizes were small because we have created conservative regression models. Consistent with past pretest–posttest research (Astin & Lee, 2003), the pretest accounts for the largest proportion of variance explained in all the regression models. Additionally, we included the four good practice scales in a way that identifies each scale's unique influence on outcome development, which masks the shared variation in the outcome measure explained by the group of good practice scales. Although the effects of the good practices on each of the outcomes in the first year were quite small, students who experienced these good practices in their first year of college achieved greater development on liberal arts outcomes than their peers who did not experience these good practices.

The good teaching and high-quality interactions with faculty scale was positively associated with 14 measures representing four outcomes: leadership, well-being, intercultural effectiveness, and inclination to inquire and lifelong learning. Likewise, the academic challenge and high expectations scale was positively related to 18 measures representing those four outcomes. The diversity experiences scale had an influence on 10 measures representing the leadership, intercultural effectiveness, and inclination to inquire and lifelong learning outcomes. Finally, the influential interactions with peers scale was associated with 11 measures representing two outcomes, leadership and well-being. Taken together, these results demonstrate the positive relationship these four good practices (good teaching and high-quality interactions with faculty, academic challenge and high expectations, diversity experiences, and influential interactions with peers) have in promoting student development on four liberal arts outcomes desired from undergraduate education (leadership, well-being, intercultural effectiveness, and inclination to inquire and lifelong learning).

Although it is beyond the design of the quantitative portion of the study to demonstrate a causal relationship, given the conservative nature of our model, the quantitative results clearly illustrate broad relationships between college experiences and liberal arts outcomes for more than 3,000 students at 19 institutions. We believe this is a starting place for understanding which practices can be most influential.

Method: Qualitative Component[3]

Institutional and Interview Sample

The WNS research team identified six colleges and universities from the 19 participating institutions to also participate in the interview phase of the study. These institutions were selected to

reflect a range of institutional types, a geographically diverse institutional sample, and to yield a sufficiently diverse student body to increase the likelihood of obtaining an adequate sample of students of color. The six institutions included four small private liberal arts colleges representing several geographic regions of the United States, one medium sized private research institution in the midwest, and one large regional public institution in the west. Two are Hispanic-serving institutions, one is an all-male college, one is an all-female college, and one enrolls approximately 50% African American and 50% White students.

We selected interview participants from the students at the six institutions who completed the quantitative survey component of the study and indicated their willingness to participate in an interview. Men and students of color were oversampled to obtain a more balanced distribution by gender and race/ethnicity. The study team interviewed 315 students early in the fall of 2006. The participating students were first-year, full-time, traditional-age undergraduate students; 34 of these students identified as African American, 35 as Hispanic, and 32 as Asian/Pacific Islander. Additionally, 32 were born in countries other than the United States. The sample was 54% female.

Data Collection

The WNS Interview (Baxter Magolda & King, 2007) is designed to elicit information about the practices and conditions that foster growth on the seven outcomes and growth toward self-authorship or the internal capacity to generate one's beliefs, identity, and social relations (Baxter Magolda, 2001; Kegan, 1994). It is organized in three segments, which are constructed ''in situ''—as the conversation unfolds. The opening segment focuses on how students' entering characteristics (i.e., ways of constructing knowledge, self, relationships, personal history) affect achievement of or development toward the liberal arts outcomes and self-authorship. The second, and primary, portion of the interview addresses the educational experiences that students regard as key to their growth and why these particular experiences are relevant. Interviewers seek to understand how students make meaning of these educational experiences and to elicit detailed information about experiences that enabled the student to develop the capacities associated with the liberal arts outcomes and self-authorship. The third segment elicits the respondents' synthesis of their experiences and trends in their meaning making.

Trained interviewers conducted in-depth one-on-one interviews on each campus. Interviews lasted 60 to 90 minutes, were audio recorded, and transcribed verbatim. Participants received a stipend of $30.

Data Analysis

The qualitative research team analyzed the transcribed interviews in two phases, the first of which was used for this article. The Phase 1 summary writing process has several goals, each reflecting a corresponding element of the summary: (a) to identify all experiences the student named as important, (b) describe each experience, (c) describe the effect of each experience on the student, (d) identify the relationship of the effect to liberal arts outcomes, (e) note institutional role (if any) in the experience, and (f) to offer illustrative quotes from the student in support of these observations (Baxter Magolda & King, 2008). Phase 2 of this process is designed to assess the student's level of developmental meaning making guided by self-authorship theory (Baxter Magolda, 2001; Kegan, 1994). Members of the WNS qualitative research team wrote summaries for both phases for each transcript; we recorded information from all six elements listed above and across all dimensions of development on a spreadsheet. (Findings based on these

developmental assessments are reported in Baxter Magolda, King, Taylor, & Perez, 2008; Baxter Magolda, King, Taylor, & Wakefield, 2009; King, Baxter Magolda, Perez, & Taylor, 2009.)

Next, the research team examined the summaries to extract information about campus practices and conditions reflected in the student's experience; here, we sought to identify those practices and conditions that, according to the student reports, enabled or inhibited the development of one or more of the seven liberal arts outcomes. Examples of campus practices include a cocurricular program, course, pedagogy, residential program, student activity, linked courses, and common instructional practices. Such practices were often (but not always) designed with the intent to foster outcome development. Similarly, examples of campus conditions that have potential to promote liberal arts outcomes include attributes of a living environment, perceptions of the intellectual environment, aspects of the peer culture, leadership opportunities, and student reactions to administrative decisions.

The research team analyzed students' significant experiences identified in Phase 1 summaries separately for each institution and then grouped the practices or conditions into themes for each campus. We next constructed a spreadsheet that listed the themes from all six campuses and examined the clusters of themes to identify those that were observed on more than one campus; we refer to these as ''cross-institutional themes.'' Two research team members independently reviewed the collective thematic descriptions and associated verbatim student comments and identified cross-institutional themes they observed. They then compared their themes and found a high degree of overlap in the assignment of campus themes to cross-institutional themes. Last, they reached consensus about which of these themes best captured the clusters of practices and conditions.

Qualitative Findings

Six themes emerged from the cross-institutional analysis ratings: (a) challenging courses, (b) experiences with diverse peers, (c) transition to college intellectual and community life, (d) understanding and meeting academic demands, (e) sense of belonging on campus, and (f) campus values. The first three of these correspond closely with three of the quantitative good practices (i.e., academic challenge and high expectations, diversity experiences, and good teaching and high-quality interaction with faculty, respectively). We discuss these themes in more depth in an effort to explore convergence and the mechanisms underlying convergent findings. We next describe each of these and offer an example of a student statement from the interviews that illustrates each theme.

Challenging Courses

Many significant experiences students reported focused on being challenged by various types of instructional demands. These included (a) engaging in sustained analysis of texts and ideas that required ''digging in'' to the material (e.g., through in-depth reading), (b) exploring new ideas, (c) encountering diverse and conflicting perspectives, (d) participating in substantive discussions that focused on reasons for their own and others' views, (e) showing understanding of multiple perspectives, (f) being expected to search for better evidence to substantiate beliefs, (g) applying course material to daily life, and (h) having opportunities to see and experience course-related issues first hand (Baxter Magolda, King, & Drobney, 2009). Keynes's experience illustrates this kind of academic challenge:

> I had no idea before coming [here] that a passage can actually be interpreted in so many different ways . . . my professor always used to tell me, . . . even if you write a passage,

> look at each line and think how can it be more related to your passage. So all those precise reading and learning and critical thinking, I think all those things will help me a lot.

Keynes valued being challenged by an instructor to engage in ''precise reading and learning and critical thinking'' in his own writing. Others shared Keynes' surprise at what could be gained by closer reading and found this type of learning attractive. These academic challenges deepened students' learning and enhanced their motivation to learn.

Experiences With Diverse Peers

Interacting with diverse peers was frequently central to the significant experiences students reported (King, Baxter Magolda, & Masse, 2008). Some of these experiences included the benefits of exposure to diverse peers, such as those who held different religious and political beliefs and those from different racial/ethnic backgrounds or sexual orientations. Others' experiences resulted from educators' efforts to deepen students' understanding of diversity issues (e.g., through workshops or programs). Students of color reported another cluster of related experiences; these focused on insights gained about their experiences with diverse peers through opportunities to examine their own social identities (e.g., through ethnically-based student organizations).

Ashley described her initial shock at meeting lesbian students on campus:

> I think the whole lesbian thing was like a . . . not a big shocker, because I'd read up on stuff and everything, and I'd gotten spiritually prepared, but I'd never encountered that before. I mean never, ever, ever, ever. . . . I don't feel threatened by it by any means, but I kind of feel to me it's wrong. . . . I want to say ''Stop, no, that's wrong'' but having the ability to step back and . . . you have to love that person and not the sin, and so it's kind of in that process of ''Okay, you're still a human being and you're still a person, so I can't treat you any way differently.''

Ashley's experience illustrates the tensions that sometimes arise from exposure to different perspectives and lifestyles and her internal debate as she decides how to interact with these new peers. These various forms of interactions with diverse others called students' assumptions about others into question and challenged them to rethink the meaning of their own and others' social identities.

Transition to College Intellectual and Community Life

A third theme reflected institutions' attempts to assist students to make a successful transition into collegiate intellectual and community life. These involved helping students meet collegiate academic expectations through first-year programs, courses that engaged students' imaginations through the examination of deep and enduring questions, and learning how to participate actively in discussions. Supportive campus communities were promoted through living learning communities, through a faculty culture of caring, and through the promotion of activities that developed school spirit and a sense of affiliation with the college. For example, Felicity reported:

> In [first year seminar] we're learning about emotional intelligence. That's helping me learn how to study better and that's going to help me from now until I graduate. And then, when I leave this school, it's showing me how I learn, so that way, if I'm learning something new with my job, I'm going to know how to learn that better or memorize it instead of just sitting there trying to hope that I remember it 2 weeks later. . . . I do study better in the quiet instead of with things going on around me and I've shown that through my grades [on a class exercise taking tests in] three different studying places.

By teaching about emotional intelligence and how this can be used to examine one's learning style and study skills, this first-year seminar helped Felicity examine her study habits so that she could be more successful in college. The fact that many students reported these kinds of experiences, among those they deemed significant in the interview, speaks to the important role of institutional efforts to support students' transition to college.

The approach used in the qualitative analyses reflects a ''bottom up'' strategy, whereby students identified their significant experiences, team members examined descriptions of these experiences to identify institutional practices or conditions, and then these practices and conditions were analyzed across institutions to yield the cross-institutional themes reported here. Thus, the identification of institutional practices that made a difference to students is grounded in those experiences students reported as significant rather than being determined a priori using criteria or definitions from other sources.

Integration of Findings

By directly comparing and contrasting the statistical results with student narratives (Creswell & Plano Clark, 2007), we found considerable overlap between the four good practices that emerged from the quantitative analysis and three of the six cross-institutional qualitative themes. Consistent with the complementarity purpose of mixed methods research (Greene et al., 1989), the interview data provided additional details about the nature of the four good practices, which better illustrates the mechanism by which these practices related to the outcomes (Creswell et al., 2003). We discuss the correspondence between the good practices and the narrative themes below and provide a visual representation of the integration of the findings in Table 2.

Students' stories about challenging courses yielded the characteristics they perceive as challenging: (a) delving into ideas in a meaningful way, (b) exploring new and multiple perspectives, and (c) learning to support one's perspective with evidence. They interpreted these as high expectations, yet appreciated their instructors' support in learning how to engage in this type and level of learning. Their comments enhance our understanding of items on the academic challenge and high expectations good practice scale, particularly those addressing the rigor of assignments, exams, and assignments that require higher order thinking and faculty asking challenging questions. Students' reports of increased interest in learning are consistent with the effect of those practices on the outcome of inclination to inquire and lifelong learning.

Similarly, students' stories about interactions with diverse peers offer additional details on the nature of the good practice, diversity experiences. The stories reveal that interacting with others, who are different from themselves, challenges students who have not yet considered multiple perspectives and sometimes leaves them questioning how to respond. Even those who were unsure how to proceed with these interactions were interested in learning more about diverse others (but were confused about how to do so; King et al., 2008). Their interpretations of these experiences are consistent with the relationships found between the diversity experiences and influential interaction with peers good practice scales and the inclination to inquire and lifelong learning and intercultural effectiveness outcomes. Students' reports of their experiences in the interviews are similar to their responses to items suggesting they have serious conversations with diverse peers and attend diversity programming. As noted in the discussion of the quantitative findings, the steps toward these outcomes are small but important; questioning one's assumptions about diverse others and perspectives and experiencing the uncertainty associated with development dissonance are beginning steps in reconstructing more complex assumptions.

The significant experiences that yielded the transition to college intellectual and community life qualitative theme share common elements with the good teaching and high-quality interactions with faculty good practice. These stories reveal that a culture of caring faculty is a strong

Table 2. Integrating the Quantitative and Qualitative Methods

Qualitative Themes	Good Practice Scales
Challenging courses theme identified:	**Academic challenge and high expectations:**
Delving into ideas in meaningful way	Rigor of assignments
Exploring new and multiple perspectives	Exams/assignment require higher order thinking
Learning to support ideas with evidence	Faculty asking challenging questions
Resulted in increased interest in learning	Resulted in inclination to inquire and lifelong learning
Interactions with diverse peers	**Diversity experiences/Influential interactions with peers**
Challenged students to consider multiple perspectives	Serious conversations with diverse peers
Unsure how to respond	Attend diversity programming
Yielded interest in learning more	Associated with inclination to inquire and lifelong learning and intercultural effectiveness
Transition to college intellectual and community life	**Good teaching and high-quality interactions with faculty/ Influential interactions with peers**
Culture of caring faculty	Faculty care about students and have positive out-of-class interactions
Faculty and staff helping students learn the skills needed to meet academic challenges	Faculty provide feedback promptly and are clear and organized in their teaching
Facilitated greater comfort in managing the campus environment	Students experience positive peer relationships that help navigate the college environment
	Associated with increased student well-being

component of the interaction that assists students in transitioning to college. This is consistent with the good teaching and high-quality interactions with faculty scale in which faculty genuinely care about and have positive nonclassroom interactions with students. The stories also emphasize faculty and staff helping students learn the skills needed to meet academic challenges. This resonates with the good practices of faculty providing prompt feedback, being interested in teaching, and being organized and giving clear instructions. Students reported feeling more comfortable in the campus environment as a result of these practices and conditions, a factor that is consistent with their well-being.

Achieving complementarity was not a difficult process in this study. The two research teams worked separately on their analyses and then shared our findings via a series of document exchanges and a conference call. We were surprised by the degree of overlap between the quantitative good practice scales and the themes from the qualitative interviews. A key decision point was determining which findings to present in more detail, specifically, whether to discuss in comparable detail the other three themes from the qualitative findings in the integration. To explore the mechanisms associated with good practices, we opted to focus on the convergent findings in more detail. One issue that challenges the complementarity of our findings is the varying nature of students' meaning-making processes. Because students vary in how they make meaning of different college experiences, their interpretation and the mechanism within the good practices are specific to students' meaning-making levels. Although discussion of this dynamic is beyond the scope of this article, it offers yet another layer of complexity in translating these findings into programmatic and policy recommendations. Acknowledging the developmental differences of students' meaning making processes, we find the extent to which the mechanisms identified in the various qualitative themes elaborate and enhance the response from specific items within the good practice scales strengthen the quality of the inferences from this study.

By integrating and interpreting results from both the statistical and the qualitative analysis, we triangulate the findings in a way that provides a comprehensive understanding of the in- and out-of-classroom practices, programs, and institutional structures that foster student development of liberal arts outcomes. The inferences from this study not only identify the relationship between experiences of good practice (e.g., academic challenge and high expectations) and outcome development (e.g., inclination to inquire and lifelong learning) but also the mechanism within that relationship (e.g., delving into ideas in a new and meaningful way and learning to support ideas with evidence). Through the integrated interpretation of two data sets, we were able to more fully understand both broad relationships and the mechanism underlying those relationships as they exist within context.

Limitations and Future Research

Although this study was designed to offset the limitations of one method with the strengths of another, it is not without its own limitations. The present study is limited by the resulting sample from our sample design and students' ability to understand and respond to questions both on the survey and in the interviews. We address each limitation in turn.

The sampling criteria for a quantitative study to be generalizable to a broader population may run at cross purposes with the sampling criteria for a qualitative study to yield the richest data. The present study used an integrated mixed methods sampling approach (Teddlie & Yu, 2007) to select institutions that (a) were committed to creating positive learning environments for students to develop the dispositions, skills, and abilities associated with a liberal arts education; (b) enrolled a diverse student body and differed on other institutional characteristics; and (c) varied in their approaches to a liberal arts education. Our resulting sample was limited both in terms of breadth and depth. Although our sample size is adequate, the response rate of those who were invited to participate in the study and those who chose to do so is lower than desirable. Because we did not conduct a nonresponse study and weighting the sample cannot adjust for nonresponse bias, we do not know the extent to which our data may be subject to this bias. In terms of maximizing the depth of the qualitative data, despite the institutions' interest and investment in promoting liberal arts outcomes, students who enrolled there were not necessarily consistently aware or able to articulate key features of their education in ways that illustrated underlying mechanisms.

A second limitation of the present study is the ability of students to understand and respond to the study's questions. We cannot be certain how students interpreted items on the survey or if these interpretations were stable across the sample. For example, did students know what was meant by ''learning community?'' To the extent students did not understand the questions asked on the survey, the validity of the responses are questionable. Similarly, the interviews relied on students to articulate and make meaning of their college experience. Some students eagerly responded to interviewer's questions, providing detailed descriptions and insightful analyses, whereas others were less engaged and provided responses that were more general and showed less reflective analysis. Despite repeated probing, some students were simply unable to articulate and make meaning of their experience in rich enough detail for the research team to distill the mechanisms that underlie the relationship between good practice and outcome development.

A combination of quantitative and qualitative findings reveals a fuller picture of how given educational practices are linked to effective learning, examining both what educators do (the practices they enact with students) and how different subgroups of students experience these practices and how these interactions vary across distinctive collegiate contexts. By looking at this question using an integrated methodological frame (Greene, 2008), we gain an understanding and elaboration of the mechanisms that operate within the broad relationships between

experiences of good practice and development of desired liberal arts outcomes. Although we used a triangulation concurrent approach with a complementarity purpose, we encourage future research to use other mixed method designs as a means to test the resiliency of the integrative results detailed in this study. We hope that continuing to integrate our quantitative and qualitative analyses over the course of this longitudinal study will provide the level of detail and nuance needed to improve campus practices for diverse students in diverse campus contexts.

Declaration of Conflicting Interests

The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

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Notes

1. Other mixed methods purposes include triangulation, development, initiation, and expansion. For a detailed discussion of each of these purposes, see Greene, Caracelli, and Graham (1989).
2. For a more detailed description of the quantitative methods and conceptual framework guiding the first year of WNS, see the Center for Research on Undergraduate Education website: http://www.education.uiowa.edu/crue/publications/documents/WNSResearchMethodsDraftMarch2008.pdf
3. This methods section is drawn from Research Methods and Sample, Years 1, 2, and 3, Interview Portion, Wabash National Study, accessible at http://www.soe.umich.edu/liberalartstudy, which offers a detailed discussion of the methods for the qualitative portion of the project.

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