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Impacts of Good Practices on Cognitive Development, Learning Orientations, and Graduate Degree Plans During the First Year of College

Ty M. Cruce Gregory C. Wolniak Tricia A. Seifert Ernest T. Pascarella

This study estimated separately the unique effects of three dimensions of good practice and the global effects of a composite measure of good practices on the cognitive development, orientations to learning, and educational aspirations of students during their first year of college. Analyses of longitudinal data from a representative sample of colleges and universities were conducted, and net of a battery of confounding influences, measures of good practices were positively related to a number of first-year outcomes. The magnitude of the effects of these good practices differed by the pre-college characteristics of the students and by the type of institution attended.

In a project sponsored by the American Association for Higher Education, the Education Commission of the States, and the Johnson Foundation, Chickering and Gamson (1987) synthesized the existing evidence on the impact of college on students and categorized it into seven broad principles for good practice in undergraduate education. These seven principles are: (a) encouraging student–faculty contact, (b) encouraging cooperation among students, (c) encouraging active learning, (d) giving prompt feedback to students, (e) emphasizing time on task, (f) communicating high expectations, and

(g) respecting diverse talents and ways of learning. The influence of Chickering and Gamson’s seven principles on the field of higher education has been extensive. In addition to the broad dissemination of the principles to colleges and universities in the U.S. and Canada (Chickering & Ehrmann, 1996; Chickering & Gamson, 1999; Gamson, 1991), there has been widespread assessment of these good practices for policy-making and research. In 1989, Chickering, Gamson, and Barsi, with support from the Johnson Foundation, constructed the “Inventories of Good Practice in Undergraduate Education” as a means for faculty and administrators to assess the extent to which individual practices and campus policies align with the seven principles (Gamson, 1991). These good practices also have been assessed using indicators from previously existing surveys such as the College Student Experiences Questionnaire (Kuh, Pace, & Vesper, 1997; Kuh & Vesper, 1997). More recently, surveys such as the National Survey of Student Engagement (NSSE) and the Faculty Survey of Student Engagement (FSSE) have measured the extent to which students are engaged in these good practices and the extent to which faculty expect students to be engaged in these good practices (Kuh,

Ty M. Cruce is a research analyst at the Center for Postsecondary Research at Indiana University; Gregory C. Wolniak is a senior research and policy analyst at the Human Capital Research Corporation in Evanston, IL; Tricia A. Seifert is a doctoral research assistant in the Student Affairs Administration and Research Program at the University of Iowa; and Ernest T. Pascarella is the Mary Louise Petersen Chair in Higher Education and Co-director of the Center for Research on Undergraduate Education at the University of Iowa. This investigation was conducted as part of the National Study of Student Learning (NSSL), which was supported by Grant No. R117G10037 from the U.S. Department of Education to the National Center on Postsecondary Teaching, Learning, and Assessment.

2001; National Survey of Student Engagement, 2003).

A large body of evidence exists to support the predictive validity of Chickering and Gamson's (1987) principles for good practice in undergraduate education. Even in the presence of controls for important confounding influences, various measures of these principles for good practice are significantly and positively linked to desired aspects of cognitive and non-cognitive growth during college, and career and personal benefits after college (Astin, 1993; Chickering & Reisser, 1993; Kuh, Schuh, Whitt, & Associates, 1991; Pascarella & Terenzini, 1991, 2005; Sorcenelli, 1991). Recent examples of individual studies supporting the predictive validity of indicators of specific good practices in undergraduate education include the following: student-faculty contact (Anaya, 1999; Frost, 1991; Kuh & Hu, 1999; Terenzini, Springer, Yaeger, Pascarella, & Nora, 1994); cooperation among students (Cabrera, Crissman, Bernal, Nora, Terenzini et al., 2002; Johnson, Johnson, & Smith, 1998a, 1998b; Qin, Johnson, & Johnson, 1995; Whitt, Edison, Pascarella, Nora, & Terenzini, 1999); active learning (Grayson, 1999; Hake, 1998; Kuh, Pace, & Vesper, 1997; Lang, 1996; Murray & Lang, 1997); academic effort/time on task (Astin; Ethington, 1998; Hagedorn, Siadat, Nora, & Pascarella, 1997; Johnstone, Ashbaugh, & Warfield, 2002; Watson & Kuh, 1996); prompt feedback to students (d'Apollonia & Abrami, 1997; Feldman, 1997); high expectations (Arnold, Kuh, Vesper, & Schuh, 1993; Astin, 1993; Bray, Pascarella, & Pierson, 2004; Whitmire & Lawrence, 1996); and diversity experiences (Kitchener, Wood, & Jensen, 2000; Pascarella, Palmer, Moye, & Pierson, 2001; Terenzini et al.; Umbach & Kuh, 2003).

Although collectively these and other studies provide evidence supporting the

predictive validity of Chickering and Gamson's (1987) principles for good practice in undergraduate education, there are several limitations to this body of research. First, the effects of a single good practice (e.g., student-faculty interaction) are often studied in isolation, thus potentially biasing the estimates of the effects upward by not accounting for the confounding influence of other good practices. Second, studies of the effects of these good practices are often limited to students within a single institution or within a small sample of institutions. Consequently, the generalizability of the results of these studies is limited to students at similar institution types. Finally, studies of the effects of good practices sometimes rely on self-reported gains and do not provide stringent statistical controls for the pre-college background and development of the students. Cautions against the use of self-reported gains in place of pre- and post-measures have been noted elsewhere (Pascarella, 2001). Pre-college measures allow for statistical adjustment for self-selection into college and present a baseline from which to measure gains. Without pre-college measures, one cannot adequately differentiate the effects of an institution's good practices from the effects of the students' pre-college development.

Given these limitations of the current body of research, the purpose of this study is to expand the understanding of the relationship between Chickering and Gamson's (1987) principles for good practice and a number of cognitive and non-cognitive student outcomes by analyzing longitudinal data from a diverse sample of institutions that participated in the National Study of Student Learning (NSSL). Two research questions guided the study. First, what are the unique (or net) effects of these good practices on students' cognitive development, orientations to learning, and graduate

degree plans during the first year of college? Second, are the net effects of good practices general or conditional? That is, are the effects similar in magnitude across student pre-college characteristics or institutional type (general effects) or do they vary in magnitude for different kinds of students, or in different institutional contexts (conditional effects)?

Conceptual Framework

In estimating the effects of good practices in undergraduate education, we were guided by a number of conceptual models of college impact (e.g., Astin, 1993; Chickering & Reisser, 1993; Pascarella, 1985; Weidman, 1989). These models posit that the impact of college on nearly any student outcome is the result of multiple influences. At a minimum, these multiple influences include: (a) student demographic and pre-college characteristics, (b) organizational or structural characteristics of the institution attended, (c) students' academic experiences, and (d) students' non-academic experiences. We estimated the net effects of each of our dimensions of good practices within the context of such a generic conceptual model. Thus, in estimating the net influences of good practice dimensions on any dependent measure, we took into account not only student demographic and pre-college characteristics (e.g., race, socioeconomic background, pre-college scores on each dependent measure), but also institutional characteristics (e.g., institutional type), other college academic experiences (e.g., full- or part-time enrollment, coursework taken), and other college non-academic experiences (e.g., work responsibilities, place of residence). Because it takes into account an extensive set of potential influences on the outcomes considered, such an approach is likely to lead to a conservative estimate of the net impacts of good practice dimensions (e.g., Bray et al.,

2004). At the same time, the conceptual framework permits a greater generalizability with respect to a comprehensive understanding of the developmental impact of good practices.

In operationalizing good practices, we were guided by the research on the predictive validity of different dimensions of good practices reviewed above. Indeed, many of the operational definitions of good practices employed in this investigation were either adapted or taken directly from the studies previously cited (e.g., Bray et al., 2004; Cabrera et al., 2002; Feldman, 1997; Hagedorn et al., 1997; Pascarella, Edison, Nora, Hagedorn, & Braxton, 1996; Terenzini et al., 1994; Whitt et al., 1999). Additional contributions of this particular study to the field are the introduction of statistical controls for an extensive battery of student pre-college characteristics and other confounding influences during the first year of college, and the use of parallel pre- and post-measures to assess student gains in both cognitive and non-cognitive areas.

METHOD

Institution Sample

The institutional sample comprised 18 four-year colleges and universities and 5 two-year colleges that are located in 16 states throughout the country. Institutions were chosen from the National Center for Education Statistics Integrated Postsecondary Education Data System to represent differences in colleges and universities nationwide on such characteristics as institutional type and control (e.g., private and public research universities, private liberal arts colleges, comprehensive universities, historically Black colleges, and community colleges), size, location, commuter versus residential character, and ethnic distribution of the undergraduate study body. This

sampling technique provided a sample of institutions with a wide range of selectivity—from some of the most selective institutions in the country to institutions that were essentially open-admission. The 18 four-year institutions included: 5 liberal arts colleges, 4 research I or research II universities, 7 regional (comprehensive) universities, and 2 historically Black colleges. The student population from the 23 institutions approximated the national population of undergraduates by ethnicity, gender, and age.

Student Sample and Instruments

The individuals in the sample were students who had been followed during their first year of college as participants in the NSSL, a federally funded longitudinal investigation of factors influencing learning, cognitive development, and other college outcomes. The initial sample of 3,895 students was selected randomly from the incoming first-year class at each participating institution. Students in the sample were told that they would be participating in a longitudinal study of student learning and that they would receive a cash stipend for their participation in each phase of the data collection.

The first data collection was conducted in the fall of 1992 as the students were entering college. The data collected included an NSSL pre-college survey that gathered information on student demographic characteristics and pre-college experiences, and educational aspirations and expectations about college. Participants also completed the reading comprehension, mathematics knowledge, and critical thinking tests of the Collegiate Assessment of Academic Proficiency (CAAP) developed by ACT (American College Testing Program, 1990). Each of the three tests consisted of multiple-choice items and was 40 minutes long.

Follow-up Data Collection

In the spring of 1993 each participant completed the same three CAAP tests as well as the College Student Experiences Questionnaire (CSEQ; Pace, 1990) and an NSSL follow-up questionnaire on their first year of college. The CSEQ and the NSSL questionnaires gathered extensive information about each student's classroom and non-classroom experiences during the preceding school year. Usable data on the follow-up were available for 2,474 students from the original sample of 3,895 (a 63.5% response rate). This included 2,212 students from four-year institutions (72.8% response rate) and 262 students from community colleges (44.3% response rate). Because of attrition from the sample and a differential response rate by sex, ethnicity, and institution, a sample weighting algorithm was developed. This weighting algorithm was designed to adjust for potential response bias by sex, ethnicity, and institution. The responses of the follow-up participants within each institution were weighted up to the institution's end-of-first-year population by sex (male or female) and race/ethnicity (African American, White, Hispanic, or other). The weighted sample was 55% female, 45% male, 59% White, and 41% non-White.

Although applying sample weights in this way corrects for differential attrition in the samples we analyzed by sex, ethnicity, and institution, it cannot adjust for non-response bias. However, we conducted several additional analyses to examine differences in the characteristics of students who participated in all years of the NSSL and those who dropped out of the study. The dropouts consisted of two groups: (a) those individuals who dropped out of the institution during the study, and (b) those who persisted at the institution but dropped out of the study. Initial participants who left their respective institutions had

somewhat lower levels of pre-college cognitive test scores (as measured by fall 1992 scores on the CAAP reading comprehension, mathematics, and critical thinking modules), socioeconomic background, and academic motivation than their counterparts who persisted in the study. Yet students who remained in the study and those who dropped out of the study but persisted at the institution differed in only small, chance ways with respect to pre-college cognitive test scores, age, race, and socioeconomic background (Pascarella, Edison, Nora, Hagedorn, & Terenzini, 1998).

Dependent Variables

The dependent variables for this study were three standardized measures of the students' cognitive development (i.e., reading comprehension, mathematics knowledge, and critical thinking skills), five measures of the students' orientations to learning (i.e., openness to diversity and challenge, learning for self-understanding, internal locus of attribution for academic success, preference for higher-order cognitive tasks, and positive attitude toward literacy), and a measure of the students' educational aspirations (i.e., graduate degree plans). The three cognitive development measures were each 40-minute, multiple choice tests taken from the CAAP. The CAAP was developed by ACT to measure general education skills and competencies acquired during the first two years of college. Reliabilities of the tests range from .76 to .87 (American College Testing Program, 1990). Fuller operational definitions of the three cognitive measures can be found in Pascarella et al. (1996) and Whitt et al. (1999). The five measures of students' orientations to learning have been employed as dependent measures in several other studies of college impact. Their average reliabilities range from .65 to .83.

Fuller detailed operational definitions can be found in Pascarella, Wolniak, Seifert, Cruce, and Blaich (2005); Pierson, Wolniak, Pascarella, and Flowers (2003); Wolniak, Pierson, and Pascarella (2001); and Whitt, Edison, Pascarella, Terenzini, and Nora (2001). Students' educational aspirations were coded: 1 = Master's degree or higher, 0 = Bachelor's degree or lower.

Independent Variables

In selecting and creating the independent variables, we were guided by Chickering and Gamson's (1987) principles for good practice in undergraduate education and by research on effective teaching and influential peer interactions in college (Pascarella & Terenzini, 1991, 2005; Whitt et al., 1999). From the data available on the end-of-first-year CSEQ and NSSL follow-up questionnaires, we created 19 individual measures or scales of good practices that may be grouped by the seven principles:

1. Student-faculty contact: faculty interest in teaching and student development, quality of non-classroom interactions with faculty;
2. Cooperation among students: instructional emphasis on cooperative learning, course-related interaction with peers, quality of interactions with students, non-course-related interactions with peers;
3. Active learning/time on task: academic effort/involvement, instructor use of high-order questioning techniques, emphasis on high-order examination questions, essay exams in courses, computer use;
4. Prompt feedback: instructor feedback to students;
5. Time on task: instructional clarity, instructional organization/preparation;
6. High expectations: course challenge/

effort, number of textbooks or assigned readings, number of term papers or other written reports;

7. Respect for diverse talents and ways of learning: scholarly/intellectual emphasis, cultural and interpersonal involvement.

These nineteen measures of good practices were then submitted to principal components analysis, which yielded three meaningful components or dimensions of good practice from which we developed summative scales using those items with loadings of .40 or higher. The first measure, Effective Teaching and Interaction with Faculty, comprised faculty interest in teaching and student development, instructor use of high-order questioning techniques, instructor feedback to students, instructional skill/clarity, instructional organization and preparation, course challenge/effort, quality of student–faculty non-classroom interactions, and college scholarly/intellectual emphasis. The second measure, Interactions with Peers, comprised instructional emphasis on cooperative learning, course-related interaction with peers, non-course-related interactions with peers, quality of interactions with other students, and cultural and interpersonal involvement. The final measure, Challenge/High Expectations, comprised academic effort/involvement, number of essay exams in courses, emphasis on high-order examination questions, using computers, number of textbooks or assigned readings, and number of term papers or other written reports. In addition to these three good practice dimensions, we created a composite of the 19 good practice measures in order to examine the global effects (i.e., the sum of the unique and shared effects) of these good practices on the outcomes of interest. Detailed operational definitions and psychometric properties of the independent variables can be

found in Pascarella, Wolniak, Cruce, and Blaich (2004).

Control Variables

Consistent with the guiding conceptual framework, the control variables employed in the study included the following categories: demographic and pre-college characteristics (i.e., age, sex, ethnicity, parents' education, parents' income, secondary school grades, high school involvement, a measure of pre-college academic motivation, college choice, the respective pre-college CAAP module score, the respective pre-college orientation to learning score, and pre-college educational degree plans), institutional attributes (i.e., a set of dummy variables that indicated whether the college attended was a research university, regional university, liberal arts college, historically Black college, or community college), college academic experiences (i.e., cumulative credit hours completed and patterns of coursework taken in five different areas), and college nonacademic experiences (i.e., hours worked off-campus and on- or off-campus residence). Detailed operational definitions of all variables in the study are available from the fourth author on request.

Analyses

The analyses were carried out in two stages. In the first stage, we used ordinary least squares or logistic regression to estimate two models of the unique effects of the three good practice dimensions on the measures of the students' cognitive development, orientations to learning, and educational aspirations. The first model, a reduced form equation, estimated the total effects of these good practice dimensions while statistically controlling for the students' background, pre-college characteristics (i.e., cognitive development, learning orientations, and educational aspirations), and the type of

institution attended. The second model estimated the direct effects of these good practice dimensions while statistically controlling for the variables included in the first model and the students' other academic and nonacademic experiences during the first year of college. The same two models were then re-estimated using the composite of the 19 good practice measures in place of the three good practice dimensions.

In the second stage of the analyses, we estimated models to test for the presence of conditional (or interaction) effects. These conditional effects measure the extent to which the influence of the good practice dimensions (or composite) on the students' cognitive development, learning orientations, and educational aspirations differed by the characteristics of the student or of the institution attended. To estimate these conditional effects, we entered a series of cross-product variables into the direct effects equation. A statistically significant increase in explained variance (R^2 change) or in model fit (likelihood ratio) associated with the entry of the set of cross-product terms would indicate that the net effects of the good practice dimensions (or composite) differed for certain sub-samples of students. Conditional effects were tested by the students' gender, ethnicity, pre-college cognitive development, pre-college orientations to learning, pre-college educational aspirations, and by the type of institution attended.

All stages of this analysis were based on weighted sample estimates, adjusted to the actual sample size to obtain correct standard errors. Given a large sample size, an alpha level of .01 was used in all tests of statistical significance. Depending on the continuous or categorical nature of the dependent variable, a beta coefficient or odds ratio is provided for all statistically significant effects. The beta

coefficient represents the standard-deviation change in the dependent variable given a one-standard-deviation change in the good practice dimension or in the composite of the good practice measures. For example a beta coefficient of .50 is interpreted as a half-standard-deviation increase in the dependent variable given a one-standard-deviation increase in the independent variable. The odds ratio, which normally represents a change in the odds of success given a one-unit change in the independent variable, was recalculated to represent a change in the odds of success given a one-standard-deviation change in the independent variable. For example, an odds ratio of 1.50 is interpreted as a 50% increase in the odds of success given a one-standard-deviation increase in the independent variable.

RESULTS

Good Practice Dimensions

Table 1 summarizes the net effects of the three good practice dimensions on end-of-first-year cognitive development, orientations to learning, and graduate degree plans. As the table illustrates, Effective Teaching and Interaction with Faculty had a significant total and direct effect on reading comprehension, critical thinking skills, openness to diversity and challenge, and internal locus of attribution for academic success. Interaction with Peers had a significant total and direct effect on mathematics knowledge, openness to diversity and challenge, learning for self-understanding, and preference for higher-order cognitive tasks. Finally, Challenge/High Expectations had a significant total and direct effect on students' positive attitude toward literacy and a significant total effect on the students' plans for obtaining a graduate degree. After other academic and nonacademic experiences during the first year of college were introduced into

TABLE 1.
Estimated Effects of Good Practice Dimensions on First-Year Outcomes

Dependent Variable	Controlling for Students' Pre-College Characteristics and Institutional Type ^a		Also Controlling for Other First-Year Experiences ^b	
	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)
Effective Teaching and Interaction with Faculty				
<i>Cognitive Development</i>				
Reading Comprehension	.015**	.077	.014**	.073
Mathematics Knowledge	-.001		.001	
Critical Thinking Skills	.008*	.041	.007*	.037
<i>Orientations to Learning</i>				
Openness to Diversity and Challenge	.065**	.083	.066**	.085
Learning for Self-Understanding	.007		.008	
Internal Locus of Attribution for Academic Success	.071**	.166	.069**	.161
Preference for Higher-Order Cognitive Tasks	.002		.002	
Positive Attitude Toward Literacy	.008		-.0001	
<i>Educational Aspirations</i>				
Plans for a Graduate Degree	.008		.008	
Interaction with Peers				
<i>Cognitive Development</i>				
Reading Comprehension	-.008		-.003	
Mathematics Knowledge	.014*	.046	.010*	.034
Critical Thinking Skills	.004		.004	
<i>Orientations to Learning</i>				
Openness to Diversity and Challenge	.191**	.167	.211**	.185
Learning for Self-Understanding	.063**	.123	.064**	.125
Internal Locus of Attribution for Academic Success	-.031		-.029	
Preference for Higher-Order Cognitive Tasks	.029*	.067	.032*	.075
Positive Attitude Toward Literacy	.020		.028	
<i>Educational Aspirations</i>				
Plans for a Graduate Degree	.015		.007	
Challenge/High Expectations				
<i>Cognitive Development</i>				
Reading Comprehension	-.004		-.009	
Mathematics Knowledge	-.001		.001	
Critical Thinking Skills	.005		.001	
<i>Orientations to Learning</i>				
Openness to Diversity and Challenge	.011		.009	
Learning for Self-Understanding	.007		.011	
Internal Locus of Attribution for Academic Success	.009		.004	
Preference for Higher-Order Cognitive Tasks	.016		.016	
Positive Attitude Toward Literacy	.095**	.135	.112**	.158
<i>Educational Aspirations</i>				
Plans for a Graduate Degree	.025**	(1.115) ^c	.013	

table continues

TABLE 1. *continued*

- ^a Equations also include measures of the following pre-college characteristics: age; sex; race; parents' education; parents' income; secondary school grades; high school involvement in studying, socializing with friends, talking with teachers outside of class, exercising or playing sports, studying with friends, volunteer work, and extracurricular activities; academic motivation; college choice; a parallel pre-college measure of each first-year outcome; measures of institutional type; and all other good practice dimensions.
- ^b Equations include all variables shown in superscript "a" plus measures of full-time/part-time status; on- or off-campus residence; hours worked per week off-campus; and number of first-year courses taken in five areas (i.e., arts and humanities, social sciences, mathematics, natural sciences, and technical/pre-professional).
- ^c Odds ratios were recalculated to represent the change in odds of success given a one-standard deviation change in the independent variable [i.e., $\exp(\beta_x * SD_x)$].
- * $p < .01$. ** $p < .001$.

TABLE 2.
Estimated Effects of Composite Good Practices in Undergraduate Education on First-Year Outcomes

Dependent Variable	Controlling for Students' Pre-College Characteristics and Institutional Type ^a		Also Controlling for Other First-Year Experiences ^b	
	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)
Cognitive Development				
Reading Comprehension	.005*	.054	.004*	.035
Mathematics Knowledge	.003*	.032	.002	
Critical Thinking Skills	.006*	.059	.005*	.046
Orientations to Learning				
Openness to Diversity and Challenge	.083**	.202	.089**	.215
Learning for Self-Understanding	.022**	.119	.024**	.129
Internal Locus of Attribution for Academic Success	.021**	.094	.023**	.103
Preference for Higher-Order Cognitive Tasks	.013*	.085	.014**	.090
Positive Attitude Toward Literacy	.042**	.157	.041**	.154
Educational Aspirations				
Plans for a Graduate Degree	.015**	(1.190) ^c	.010**	(1.123) ^c

- ^a Equations also include measures of the following pre-college characteristics: age; sex; race; parents' education; parents' income; secondary school grades; high school involvement in studying, socializing with friends, talking with teachers outside of class, exercising or playing sports, studying with friends, volunteer work, and extracurricular activities; academic motivation; college choice; a parallel pre-college measure of each first-year outcome; and measures of institutional type.
- ^b Equations include all variables shown in superscript "a" plus measures of full-time/part-time status; on- or off-campus residence; hours worked per week off-campus; and number of first-year courses taken in five areas (i.e., arts and humanities, social sciences, mathematics, natural sciences, and technical/pre-professional).
- ^c Odds ratios were recalculated to represent the change in odds of success given a one-standard deviation change in the independent variable [i.e., $\exp(\beta_x * SD_x)$].
- * $p < .01$. ** $p < .001$.

the model, the effect of Challenge/High Expectations on graduate degree plans became statistically non-significant.

Collectively, the results in Table 1 suggest that, after taking into account other important confounding influences on the students' cognitive development, learning orientations, and graduate degree plans, many of the unique effects of the good practice dimensions on student gains in these areas are statistically significant, but relatively small. With the exception of the students' openness to diversity and challenge, there is very little overlap in the unique effects of the good practice dimensions on the student outcomes studied. This finding suggests that each good practice dimension is not equally important in fostering student success within different cognitive and psychosocial areas. Yet, the fact that many of these effects persist in the presence of the other good practice dimensions provides us with clearer evidence that each good practice dimension does offer a unique contribution, even if this contribution is neither consistent across student outcomes nor sizable in magnitude.

Given our inclusion of the parallel pre-college measures of our outcome variables and the large number of pre-college and first year controls into the model, we anticipated that the estimates of the effects of the good practice dimensions would be conservative. An additional explanation for the number of statistically non-significant effects and for the relatively small magnitudes of statistically significant effects is the moderately strong correlations among the three good practice dimensions ($r = .40-.48$). The three good practice dimensions were entered into the models simultaneously, and thus the shared impact of these dimensions on the outcomes was not represented by the model coefficients. To account for both the unique and shared

variance among the three dimensions, a composite of the 19 good practice measures was introduced into the total and direct effects models in place of the three good practice dimensions. Table 2 provides a summary of the results of these models.

Composite Good Practices

As Table 2 illustrates, the composite good practice measure had a significant total and direct effect on reading comprehension and critical thinking skills, and had a significant total effect on mathematics knowledge during the first year of college. After statistically controlling for other academic and non-academic experiences during the first year, however, the effect of the composite good practices on mathematics knowledge became statistically non-significant. The composite good practice measure also had a significant total and direct effect on all of the measures of the students' orientations to learning and on the students' plans to obtain a graduate degree.

Overall, the global effects of the composite measure were somewhat larger than the net effects of the three good practice dimensions, suggesting some shared variance among the three dimensions on the student outcomes. The global effects of the composite good practices measure, however, were still relatively small in magnitude. Again, these conservative estimates are most likely due to our inclusion into the model of the parallel pre-college measures of our outcome variables and a large number of pre-college and first year controls. Consistent with the findings of the net effects of the three good practice dimensions, the magnitudes of the effects of the composite good practices on the measures of the students' orientations to learning were somewhat larger than the magnitudes of the effects on the measures of the students' cognitive development.

Conditional Effects

Tests for the presence of conditional effects of the three good practice dimensions on the cognitive development, learning orientations, and educational aspirations of students produced significant R^2 increases (or likelihood ratios) for six of the nine analyses conducted: reading comprehension, mathematics knowledge, critical thinking skills, learning for self-understanding, positive attitude toward literacy, and plans for a graduate degree. Tests for the presence of conditional effects of the composite good practices on the outcomes produced significant R^2 increases for two of the nine analyses conducted: mathematics knowledge and positive attitude toward literacy. As these results suggest, the three good practice dimensions are better indicators than the composite good practices measure of the differential effects of good educational practices on student outcomes. Table 3 provides a summary of the results. In all cases, the nature of the conditional effects were determined by disaggregating the sample either by different categories of a nominal variable (e.g., ethnicity) or above and below the mean on a continuous variable (e.g., pre-college learning for self-understanding) and re-estimating the effects of the three good practices dimensions (or composite) on the outcomes of interest. Given a large sample size, an alpha level of .01 was used in all tests of statistical significance.

As Table 3 illustrates, there were four cases in which the effect of a good practice dimension or the good practices composite on a particular student outcome differed by the students' score on the parallel pre-college measure. Overall, there was a slight compensatory effect of the good practices on the cognitive development of students who entered college below average on these

measures. Effective Teaching and Interaction with Faculty had a positive effect on the first-year reading comprehension of students who were below the mean on the pre-college measure, whereas Interaction with Peers had a positive effect on the critical thinking skills of students who entered college below the mean on this measure. Interestingly, although none of the good practice dimensions had an effect on the first-year mathematics knowledge of students who entered college below average in this cognitive area, the good practices composite had a positive effect on the mathematics knowledge of these students. The effects of these good practices on the cognitive development of students who were above average on the pre-college measures were not statistically significant. Finally, Effective Teaching and Interaction with Faculty had a positive effect on the learning for self-understanding of students who entered college at or above the mean on the measure, although the effect of this good practice for students entering college below the mean on the measure was non-significant.

The effects of the good practice dimensions and composite good practices also differed by the type of institution attended. These results also suggest a compensatory effect of good practices on the cognitive development and learning orientations of students attending institutions where the mean levels of these pre-college measures were often lower. Effective Teaching and Interaction with Faculty had a significant effect on the odds of aspiring toward a graduate degree for students only at research universities, whereas Interaction with Peers had a positive effect on the mathematics knowledge of students only at community colleges. Challenge/High Expectations and the good practices composite, however, had a positive effect on the positive attitude toward literacy of students at all

TABLE 3.
Estimated Conditional Effects of Good Practices in Undergraduate Education on First-Year Outcomes^a

Dependent Variable	Effective Teaching and Interaction with Faculty		Interaction with Peers		Challenge/High Expectations of Faculty		Composite Good Practices	
	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)
Cognitive Development								
<i>Reading Comprehension</i>								
Men	.007							
Women	.019**	.096						
Above Mean of Pre-College Reading Comprehension	.004							
Below Mean of Pre-College Reading Comprehension	.025**	.163						
<i>Mathematics Knowledge</i>								
Men	-.012*	-.058	.021*	.068			-.003	.125
Women	.081*	.042	.002				.085**	
Above Mean of Pre-College Mathematics Knowledge								
Below Mean of Pre-College Mathematics Knowledge			.034*	.134				
Community College			-.021					
Historically Black College			-.012					
Liberal Arts College			.003					
Regional Institution			.005					
Research University								
<i>Critical Thinking Skills</i>								
Above Mean of Pre-College Critical Thinking Skills			-.001					
Below Mean of Pre-College Critical Thinking Skills			.019*	.089				
Orientations to Learning								
<i>Learning for Self-understanding</i>								
Above Mean of Pre-College Learning for Self-Understanding	.034**	.115						
Below Mean of Pre-College Learning for Self-Understanding	-.012							

table continues

TABLE 3. *continued*
 Estimated Conditional Effects of Good Practices in Undergraduate Education on First-Year Outcomes^a

Dependent Variable	Effective Teaching and Interaction with Faculty		Interaction with Peers		Challenge/High Expectations of Faculty		Composite Good Practices	
	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)	<i>b</i>	Beta (Odds Ratio)
Orientations to Learning								
<i>Positive Attitude Toward Literacy</i>								
Men	-.021				.177**	.244		
Women	.036*	.070			.042		.057**	.204
Student of Color	.060*	.113					.026*	.099
White Student							.049**	.210
Community College	-.032				.165**	.269	.099**	.313
Historically Black College					.256**	.278	.008	
Liberal Arts College					.055		.052**	.188
Regional Institution					.084*	.114		
Research University					.121*	.151	.047*	.157
Educational Aspirations								
<i>Plans for a Graduate Degree</i>								
Community College	-.027							
Historically Black College	-.108							
Liberal Arts College	.005							
Regional Institution	.016							
Research University	.054*	(1.284) ^b						

^a Equations include controls for all "main-effects" variables indicated in footnote "b" of Tables 2 and 3.

^b Odds ratios were recalculated to represent the change in odds of success given a one-standard deviation change in the independent variable [i.e., $\exp(\hat{a} * SD_{\hat{x}})$].

p* < .01. *p* < .001.

institution types but liberal arts colleges.

Finally, the effects of the good practice dimensions and the composite good practices measure differed by the students' gender and ethnicity. Although Effective Teaching and Interaction with Faculty had a significant effect on the first-year reading comprehension, mathematics knowledge, and positive attitude toward literacy of females, the effects of this good practice dimension on the reading comprehension and positive attitude toward literacy of males were non-significant, and, in the case of mathematics knowledge, the effect of this good practice dimension was significant and negative. That the effect of this good practice dimension on the mathematics knowledge of students was statistically significant and in the opposite direction for females and males may also explain why its general effect was statistically non-significant (see Table 2). Interaction with Peers had a significant effect on the first-year reading comprehension of males, whereas the Challenge/High Expectations of faculty had a significant effect on the first-year positive attitude toward literacy of males. For both student outcomes, the effects of these good practices were statistically non-significant for females. With regard to ethnicity, Effective Teaching and Interaction with Faculty and the good practices composite both had a significant positive effect on the positive attitude toward literacy of students of color. The effect of Effective Teaching and Interaction with Faculty on the positive attitude toward literacy of White students was non-significant, whereas the effect of the good practices composite was positive and significant but roughly half the size of the effect for students of color.

DISCUSSION

The primary purpose of this study was to estimate the effects of good practices in

undergraduate education on the cognitive development, orientations to learning, and educational aspirations of students during their first year of college. Analyses of longitudinal data from 23 institutions located in 16 states from around the country were conducted. The longitudinal data permitted us to introduce statistical controls for an extensive battery of student pre-college characteristics and other confounding influences during the first year of college. The results of our analyses suggest several conclusions.

First, our study presents consistent evidence that these principles for good practices in undergraduate education have a significant positive impact on the cognitive development, learning orientations, and educational aspirations of students, at least during the first year of college. Gains during the first year in these three areas were not merely a function of such characteristics of the students as academic ability, academic motivation, secondary school achievement, or family background, nor were they merely a function of the type of institution attended or of other confounding college experiences such as the number of credit hours taken, on- or off-campus residence, or the number of hours worked off-campus. Though relatively small in magnitude, the statistically significant positive effects of the three good practice dimensions and of the good practices composite almost always persisted in the presence of controls for these other influences.

Second, our study provided evidence that the ties are stronger between these principles for good practice and the students' orientations to learning than between the principles for good practice and the students' cognitive gains. Although the betas for the direct effects of the three good practice dimensions on the measures of cognitive development ranged between .034 and .073, the betas for direct

effects of these dimensions on students' learning orientations ranged between .075 and .185. The strength of these relationships is not much different when estimating the global effects of the composite good practices on these outcomes (i.e., a range of .035 to .046 for cognitive development measures and a range of .090 to .215 for learning orientations measures). A growing body of theoretical writing and empirical evidence suggests that the dimensions along which students are oriented or disposed to the process of learning can have potential long-term impacts on more direct indicators of cognitive growth and, indeed, in some ways may be considered legitimate indicators of the cognitive and intellectual impact of college in their own right (Baxter Magolda, 1992; Chickering & Reisser, 1993; Facione, Sanchez, Facione, & Gainen, 1995; King & Kitchener, 1994; Pascarella & Terenzini, 1991, 2005; Perry, 1970, 1981).

Third, our study provided evidence that these good practices have a compensatory effect for those students who enter college below the average on a particular measure of cognitive ability or orientation to learning. As far as we know, this is the first large study of the impact of good practices to uncover the presence of such compensatory influences. Thus, although the focus of attention has typically been on the general impact of good practices for all students, our findings suggest that good practices may be particularly important for those students who enter postsecondary education with the least educational capital. Beyond evidence of specific compensatory effects, however, our findings also underscore an additional important consideration in understanding the complexity of college impact. Specifically, the same experience or intervention may frequently have a different impact for different kinds of students. As the American under-

graduate student body becomes increasingly diverse we should probably expect conditional effects of the type we uncovered in this investigation to be the rule rather than the exception (Pascarella & Terenzini, 1998).

Finally, other research (Pascarella, Cruce, Umbach, Wolniak, Kuh, Carini, Hayek, Gonyea, & Zhao, 2006) using NSSL data and NSSE data suggests that good practices in undergraduate education are essentially independent of the academic preparation of the students enrolled. Although recent analyses of a subsample of the NSSL data suggest that some small liberal arts colleges may maximize good practices in undergraduate education irrespective of their academic selectivity, residential character, or full-time nature of their student bodies (Pascarella, Wolniak, Cruce, & Blach, 2004), the current study suggests that students at other institution types (i.e., research universities, regional universities, historically Black colleges, and community colleges) may have more to gain during the first year of college from these good practices than students at liberal arts colleges.

POLICY IMPLICATIONS

The fact that the various good practices measures had a unique, positive impact on nearly all of the nine dimensions of student development that we investigated suggests that institutional impact is not just a function of human and financial resources and prestige, but rather the result of purposeful action. Many of the dimensions of good practices considered in this study are amenable to purposeful intervention or thoughtful planning. For example, such constituent variables as instructional skill/clarity, instructional organization and preparation, instructor use of higher-order questioning, instructional emphasis on cooperative learning, and instruc-

tor feedback to students are competencies and behaviors that faculty can learn. Similarly, such aspects of Challenge/High Expectations as use of essay exams and high-order exam questions, and number of reading and writing assignments are all aspects of an institution's academic culture that are subject to the influence of faculty decision—provided, of course, that the faculty are willing to accept the increased work load potentially involved with such approaches. The time and effort expended by faculty members to enhance their teaching competence comes at the expense of time and effort used in other, potentially more institutionally rewarded, areas, such as research. In order for faculty members to choose to increase their effectiveness in the classroom and interact more frequently with students, promotion and tenure may need to better reflect these good practices as institutional values.

Second, the finding that the unique contributions of the good practice dimensions were inconsistent across student outcomes and varied by student background presents further evidence of the need for multiple approaches to teaching and learning both inside and outside of the classroom. A synthesis of the research on the impacts of college conducted during the decade of the 1990s found that the implementation of a variety of instructional and learning approaches enhances the development of students well beyond traditional approaches alone (Pascarella & Terenzini, 2005). Indeed, our findings suggest that multiple approaches to teaching and learning will broaden the impact of these good practices with regard to both the groups of students who benefit from them and the cognitive and psychosocial areas in which the students develop. Moreover, given evidence of the compensatory effects of these good practices, applying multiple approaches to teaching and

learning may be an important supplement to other programmatic interventions (e.g., bridge programs, first-year seminars, or support services) that focus on the academic success and retention of students who enter college with less preparation. A greater emphasis on the implementation of these good practices within remedial programs could increase the effectiveness of these programs toward the academic adjustment of entering students.

A final policy implication derives from the fact that the estimated positive effects of the good practices composite were generally larger and more extensive than any of the three subscales of good practices (i.e., Effective Teaching and Interaction with Faculty, Interaction with Peers, Challenge/High Expectations). This suggests that what may really matter in terms of the quality of undergraduate education is an institutional ethos or culture that implements good practices, not as isolated programs or experiences, but rather in a broad-based and integrated manner. In this way such practices as experienced by students may be mutually reinforcing in their impact on growth during college. Thus, good practices in undergraduate education serve as a foundational component in creating the supportive social psychological environment, which has long been found to enhance student growth (Astin, 1993; Pascarella & Terenzini, 1991, 2005). Institutions that are committed to improving undergraduate education should consider the role that the integration of these good practices plays when creating such an environment.

LIMITATIONS

Clearly the results of this investigation are limited by the nature of the sample. The NSSL chose to study the effects of a wide range of student experiences, in substantial depth, over

time. This meant a limit on the number of institutions studied. Consequently, the findings may not be generalized to all institutions in the country. The findings of the study are limited also by our operational definitions of good practices in undergraduate education. Although we were guided by existing evidence on empirically vetted indicators of good practice dimensions, our operational definitions of variables were limited by the data we analyzed. Certainly there are other equally valid measures of good practices that might have yielded somewhat different results than the present investigation. Third, the findings are limited by attrition from the sample during the first year of the study. Despite our weighting of the sample to make it more representative of the population at the end of the first year, the potential for some selection bias is a clear limitation of the study.

Finally, the study is limited by the fact that the data were collected in the 1990s. Weighed against this, however, are the longitudinal nature of the NSSL data and the richness of the variables measured. We know of no other existing longitudinal data that permits one to introduce extensive controls for important confounding influences while at the same time provides such an extensive array of reliable and valid measures of good practices in undergraduate education. It is worth mentioning, however, that the National Study of Liberal Arts Education, a large-scale longitudinal study funded by the Wabash College Center of Inquiry in the Liberal Arts will begin in the fall of 2006. This new study will address many of the impacts of good practices estimated in the present investigation (Wabash College Center of Inquiry in the Liberal Arts, 2005), and it is with the findings of this new

longitudinal study that the possible changing nature of the impacts of good practices on student development can be better understood.

CONCLUSION

To our knowledge, this study provides the first test of both the unique and global effects of measures of the seven principles for good educational practice on the cognitive development, orientations to learning, and graduate degree plans of a sample of students that approximates the national population of college students, while providing stringent statistical controls for the students' pre-college cognitive development, learning orientations, graduate degree plans, and a number of other pre-college and college confounding influences. Two major conclusions can be derived from this study. First, overall good practices have a positive influence on the students' cognitive growth and orientations to learning, net of the students' pre-college development, learning orientations, and educational aspirations; the type of college that they attended; and their other academic and nonacademic experiences during the first year of college. Second, the effects of these good practices are more complex than our first conclusion suggests. Specific dimensions of good practices have differential effects on the developmental outcomes studied, and the magnitude of these effects also differs by the students' background characteristics and pre-college development, and by the institution attended.

Correspondence concerning this article should be addressed to Ty M. Cruce, National Survey of Student Engagement, Center for Postsecondary Research, Indiana University Bloomington, 1900 East Tenth Street, Eigenmann Hall Suite 419, Bloomington, IN 47406-7512; tcruce@indiana.edu

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