

# The link between high-impact practices and student learning: some longitudinal evidence

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**Abstract** The current paper used data from the Wabash National Study of Liberal Arts Education—a longitudinal, pretest/posttest design—to estimate the effects of participation in the ten “high-impact” educational practices put forth and endorsed by the Association of American Colleges and Universities (AAC&U) on a variety of liberal arts educational outcomes. The high-impact practices included in the study were: first-year seminars, academic learning communities, writing-intensive courses, active and collaborative learning, undergraduate research, study abroad, service learning, internships, and capstone courses/experiences. Findings from ordinary least squares regression analyses suggested that active and collaborative learning as well as undergraduate research had broad-reaching positive effects across multiple liberal arts learning outcomes, such as critical thinking, need for cognition, and intercultural effectiveness. Several other high-impact practices—including study abroad, internship, service learning, and capstone course/experience—had more narrowly focused positive effects on student learning. Overall, this study’s findings support AAC&U’s advocacy of high-impact practices as pathways to student success.

**Keywords** Learning outcomes · Liberal arts education · High-impact practices · College impact · Active and collaborative learning · Undergraduate research

## Introduction

In recent years, various sources have expressed widespread concern surrounding whether undergraduate students are learning enough in college and whether institutions of higher education are teaching foundational skills effectively (Arum and Roksa 2011). The Association of American Colleges and Universities (AAC&U) has called for postsecondary institutions to embrace four essential learning outcomes for student success in the

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twenty-first century, including “knowledge of human cultures and the physical and natural world, intellectual and practical skills, personal and social responsibility, and integrative learning”—outcomes designed to ensure that students gain the knowledge, skills, capacities, and competences to engage locally and globally, to solve significant problems, and to interact with diverse others (National Leadership Council for Liberal Education & America’s Promise 2007, p. 3). AAC&U argues that these outcomes—designed around “work, life, and citizenship”—meet the needs of students and society in a complicated and unpredictable world (National Leadership Council for Liberal Education & America’s Promise 2007, p. 2).

Empirical research has explored the degree to which students are achieving these and other essential liberal learning outcomes in college. The Wabash National Study of Liberal Arts Education (WNS) is “a multi-institution, multi-year, longitudinal study designed to identify the academic and non-academic collegiate experiences that foster liberal learning” (Pascarella and Blaich 2013, p. 7). To date, scholars have utilized WNS data to identify numerous practices that contribute to college students’ cognitive and affective outcomes. Studies of deep learning, for example, have found that reflective learning is positively associated with critical thinking skill growth and that higher-order, integrative, and reflective learning is positively associated with need for cognition and principled/post-conventional moral reasoning growth (Nelson Laird et al. 2011; Pascarella and Blaich 2013).

Similar to deep learning approaches, several studies have found a significant relationship between good practices and various liberal arts educational outcomes. Good practices were first proposed by Chickering and Gamson (1987) as principles for good practices within undergraduate education. Chickering and Gamson’s (1987) seven principles included: “contact between students and faculty,” “reciprocity and cooperation among students,” “active learning,” “prompt feedback,” “time on task,” “high expectations,” and “respects diverse talents and ways of learning” (p. 2). These good practices have been vetted as positively affecting undergraduate student learning and growth (Chickering and Gamson 1987; Chickering and Reisser 1993; Pascarella and Terenzini 2005).

Several studies have examined how these good practices affect student learning and growth in a variety of contexts. Braxton et al. (1998) found that specific academic disciplines—those with low paradigmatic influence—tend to foster good practices within teaching on a more consistent and higher level than other disciplines. Seifert et al. (2010) examined the effects of good practices within varying institutional contexts. Findings suggested that liberal arts colleges foster good practices more than other institutional types after controlling for a variety of precollege factors (Seifert et al. 2010). Further, Seifert et al. (2012) found that several good practices have conditional or interaction effects for different subpopulations of students. While research suggests that academic discipline, type and context of institution, and precollege factors all affect good practices within undergraduate education, the role that these good practices play within co-curricular experiences in college has not been examined in great detail.

While the above studies have demonstrated the effectiveness of good teaching practices and deep approaches to learning, AAC&U has named ten “high-impact” educational practices based on research suggesting positive benefits to students. These ten educational practices include: (1) first-year seminars and experiences, (2) common intellectual experiences, (3) learning communities, (4) writing-intensive courses, (5) collaborative assignments and projects, (6) undergraduate research, (7) diversity/global learning, (8) service learning and community based learning, (9) internships, and (10) capstone courses and projects. Specifically, these high-impact practices are suggested to lead to greater

engagement and retention among undergraduate students—in other words, to help ensure that students are getting the most out of college (Brownell and Swaner 2010; Kuh 2008).

According to Kuh (2008), high-impact practices are effective because they require dedication and a substantial time commitment from students; require students to communicate with classmates and professors about meaningful topics; expose students to diverse ideas and people of different backgrounds; provide students with regular assessments of their work; enable students to apply their knowledge within and beyond the classroom walls; and possess a powerful potential to change the course of students' lives. Although these practices are proposed to promote academic and personal development among undergraduate students, little empirical research has been conducted to test this conjecture.

Most of the research that has been conducted has evaluated the impacts of individual practices to varying degrees, rather than studying the high-impact practices as a whole. Padgett et al. (2013) found that participation in first-year seminars was associated with an increase in students' need for cognition. Numerous studies have found a wide range of outcomes associated with participation in learning communities, including an increase in critical and higher-order thinking (Inkelas et al. 2006; Pike et al. 2010), openness to difference and appreciation of diversity (Inkelas et al. 2006; Pike 2002; Pike et al. 2010), and high academic performance (Zhao and Kuh 2004). Studies have also linked collaborative assignments to greater openness towards diversity (Cabrera et al. 2002) and growth in personal development (Umbach and Wawrzynski 2005). The existing literature on undergraduate research further suggests positive benefits to students regarding persistence to graduation and enrollment in graduate school (see Astin 1993; Kuh 2008; Pascarella and Terenzini 2005) as well as positive cognitive-related outcomes (see Bauer and Bennett 2003; Elgren and Hensel 2006; Kinzie 2010). Diversity and global learning have been tied to numerous college outcomes as well, including gains in active and critical thinking skills and cognitive development (Gurin et al. 2002; Pascarella et al. 2014), commitment to socially responsible leadership (Nelson Laird et al. 2005; Parker and Pascarella 2013), civic engagement (Bowman 2011), and development of intercultural competence (Salisbury et al. 2013). Finally, numerous studies have found that participation in service learning and community-based learning is positively associated with a variety of diversity outcomes, including increasing students' awareness of diversity (Simons and Cleary 2006), openness to diversity (Jones and Abes 2004), multicultural competence (Einfeld and Collins 2008), global perspective-taking (Engberg and Fox 2011), and intercultural effectiveness (Kilgo 2012), as well as civic engagement-related outcomes, including increasing students' commitments to socially responsible work (Jones and Abes 2004), political awareness and civic and community engagement (Simons and Cleary 2006), and feelings of civic and social responsibility (Brownell and Swaner 2010; Einfeld and Collins 2008; Engberg and Fox 2011; Pascarella and Terenzini 2005). On the other hand, limited empirical research has been conducted to date on liberal educational outcomes associated with several high-impact practices, including common intellectual experiences, writing-intensive courses, internships, and capstone courses and projects (Brownell and Swaner 2010).

The current study is based on a conceptual framework that underlaid the WNS using the model of liberal arts outcomes developed by King et al. (2007), designed to “embody the central principles of a liberal arts education” (p. 3). This comprehensive model includes seven liberal arts learning outcomes: (1) integration of learning, (2) inclination to inquire and lifelong learning, (3) effective reasoning and problem solving, (4) moral character, (5) intercultural effectiveness, (6) leadership, and (7) well-being. Given AAC&U's advocacy of high-impact practices for better-quality undergraduate learning, it is essential to test the relationship between high-impact practices and enhanced liberal arts educational outcomes.

The purpose of the current study is to examine the relationships between high-impact practices and liberal arts educational outcomes in order to determine whether evidence supports the connection between high-impact practices and increased undergraduate learning. Specifically, this study examines nine high-impact practices on five liberal arts outcomes. The research question guiding the study is: what are the effects of participation in the high-impact practices of (1) first-year seminars, (2) academic learning communities, (3) writing-intensive courses, (4) active and collaborative learning, (5) undergraduate research, (6) study abroad, (7) service learning, (8) internship, and (9) capstone course/experience on a variety of liberal arts outcomes, including: critical thinking, moral reasoning, inclination to inquire and lifelong learning, intercultural effectiveness, and socially responsible leadership?

## Methods

### Samples

#### *Institutional sample*

The overall sample in the study consisted of incoming first-year students at 17 four-year colleges and universities located in 11 different states from 4 general regions of the United States: Northeast/Middle-Atlantic, Southeast, Midwest, and Pacific-Coast. Institutions were selected from more than 60 colleges and universities responding to a national invitation to participate in the Wabash National Study of Liberal Arts Education (WNS). Funded by the Center of Inquiry in the Liberal Arts at Wabash College, the WNS is a large, longitudinal investigation of the effects of liberal arts colleges and liberal arts experiences on the cognitive and personal outcomes theoretically associated with a liberal arts education. The institutions were selected to represent differences in colleges and universities nationwide on a variety of characteristics including institutional type and control, size, selectivity, location, and patterns of student residence. However, because the study was primarily concerned with the impacts of liberal arts colleges and liberal arts experiences, liberal arts colleges were purposefully over-represented.

The selection technique produced a sample with a wide variety of academic selectivity, from some of the most selective institutions in the country to some that essentially used open admissions practices. There was also substantial variability in undergraduate enrollment, from institutions with entering classes that averaged 2,975 students (all four-year research universities), to institutions with entering classes that averaged 439 students (all liberal arts colleges). According to the 2007 Carnegie Classification of Institutions, three of the participating institutions were considered research extensive universities, three were comprehensive regional universities that did not grant the doctorate, and 11 were baccalaureate liberal arts colleges. All of the liberal arts colleges were private, and five of the six research universities and comprehensive institutions were public. One of the research extensive universities was private.

#### *Student sample*

The individuals in the sample were first-year, full-time undergraduate students participating in the WNS at each of the 17 institutions in the study. The initial sample was selected in two ways. First, for the larger institutions, it was selected randomly from the

incoming first-year class at each institution. The only exception to this was at the largest participating institution in the study, where the sample was selected randomly from the incoming class in the College of Arts and Sciences. Second, for a number of the smallest institutions in the study—all liberal arts colleges—the sample was the entire incoming first-year class. The students in the sample were invited to participate in a national longitudinal study examining how a college education affects students, with the goal of improving the undergraduate experience. They were informed that they would receive a monetary stipend for their participation in each data collection, and were also assured in writing that any information they provided would be kept in the strictest confidence and never become part of their institutional records.

## Data collection

### *Initial data collection*

The initial data collection was conducted in the late summer/early fall of 2006, with 4,193 students from the 17 institutions. This first data collection lasted between 90–100 minutes. In order to increase the likelihood that students would take the data collection as seriously as possible they were paid a stipend of \$50 each for their participation. The data collected included a WNS precollege survey that sought information on student demographic characteristics, family background, high school experiences, political orientation, and life/career plans. Students also completed a series of instruments selected for the WNS that measured dimensions of cognitive and personal development theoretically associated with a liberal education. One of these was the 40-minute critical thinking test of the Collegiate Assessment of Academic Proficiency (CAAP), and another, requiring almost the same time to complete, was the Defining Issues Test-2 (DIT-2). In order to minimize the time required by each student in the data collection, the CAAP critical thinking test and the DIT-2 were each randomly assigned to half the sample at each of the 17 participating institutions. The other dependent measures in the study were completed by all participating students. All dependent measures are described in detail below.

### *Follow-up data collection*

The follow-up data collection on which this study is based was conducted in spring 2010 (approximately four academic years later). This data collection took about 2 hours and participating students were again paid a stipend of \$50 each to enhance their motivation to take the assessment seriously. Two types of data were collected. The first type of data was based on questionnaire instruments that collected extensive information on students' college experiences. This included information on exposure to, or participation in, many of the high-impact and good practices identified in the existing literature. Two instruments were used to collect this data: the National Survey of Student Engagement (NSSE) and the Student Experiences Survey developed specifically for the WNS. The second type of data collected consisted of follow-up (or posttest) measures of instruments measuring dimensions of cognitive and personal development that were first completed in the initial data collection. Information on students' college experiences was collected prior to information on the posttest measures. The entire data collection (2006 and 2010) was administered and conducted by ACT, Inc. (formerly the American College Testing Program). A preliminary follow-up data collection was also conducted by ACT, Inc., after the first year of college (spring 2007). A small number of participants in the 2010 data collection did not participate in

the 2007 follow-up. A control for this, in the form of a dummy variable indicating participation/non-participation in the 2007 data collection, was built into all analyses.

Of the original sample of 4,193 students who participated in the late summer/early fall 2006 testing, 2,212 participated in the spring 2010 follow-up data collection, for a response rate of 52.8 percent. These students represented approximately 10 % of the total population of incoming first-year students at the 17 participating institutions. Of these 2,212 students, useable 2010 data for the current study's analyses was available for 883 students on the CAAP critical thinking test, 899 students on the DIT-2 (recall that these two instruments were randomly assigned to half the sample at each institution) and between 1,820 and 1,845 students on the other dependent measures. If students were missing significant information on important independent or dependent variables, we considered the cases unusable. To provide at least some adjustment for potential response bias by sex, race, academic ability, and institution in the samples analyzed, a weighting algorithm was developed. Using information provided by each participating institution on sex, race, and ACT (or SAT equivalent) score, 2010 follow-up participants were weighted up to each institution's fourth-year undergraduate population by sex, race (person of color/white), and ACT (or equivalent SAT) quartile. These variables were selected for weighting because the sample had a bias by sex, white students, and high ACT/SAT scores. While applying weights in this manner has the effect of making the samples analyzed more representative of the institutional populations from which they were drawn by sex, race, and ACT score, such weighting of the samples cannot adjust completely for non-response bias.

### Dependent measures

Dependent measures for the current study consist of seven measures encompassing various dimensions of liberal arts outcomes. These outcomes were chosen based on the conceptual framework of King et al. (2007) and include: critical thinking, moral reasoning, inclination to inquire and lifelong learning, intercultural effectiveness, and socially responsible leadership. The outcomes are summed scales that combine standardized items. Further information on all the measures within the current study—including validity data—can be found at <http://www.liberalarts.wabash.edu/study-instruments/>.

#### *Critical thinking*

Critical thinking was measured by the CAAP. The CAAP is a 32-item scale developed by the American College Testing Program (ACT) measuring the ability of students to analyze, assess, and extend arguments. The CAAP has internal reliability consistencies ranging from 0.81 to 0.82 (ACT 1991) and correlates .75 with the Watson–Glaser Critical Thinking Assessment. We chose the CAAP Critical Thinking Test because of wide use as a standardized measure of critical thinking skills (Pascarella and Terenzini 2005).

#### *Moral reasoning*

Moral reasoning was measured by the N2 score of the DIT-2. The DIT-2 is a 12-item scale that measures principled or post-conventional moral reasoning by evaluating students' responses to multiple social dilemmas. The DIT-2 has internal consistency reliabilities ranging from 0.74 to 0.77 (Rest et al. 1999). Once again, we chose the Defining Issues Test because of its wide use as a measure of principled moral reasoning and the fact that it is

linked positively and significantly to measures of actual ethical and principled behavior (Pascarella and Terenzini 1991, 2005).

#### *Inclination to inquire and lifelong learning*

Inclination to inquire and lifelong learning was measured using two scales: Need for Cognition and Positive Attitude toward Literacy (PATL). The first measure was the Need for Cognition Scale (NCS), an 18-item scale measuring students' "tendency to engage in and enjoy effortful cognitive activity" (Cacioppo et al. 1996, p. 197). The NCS has internal consistency reliabilities ranging from 0.83 to 0.91 (Cacioppo et al. 1996). The second measure for inclination to inquire and lifelong learning was the PATL scale. The PATL is a six-item scale measuring the reported levels of pleasure students take in a variety of literary activities, such as writing and reading literature and poetry. The PATL has an internal consistency reliability of 0.71.

#### *Intercultural effectiveness*

Intercultural effectiveness was measured using two scales: Miville-Guzman Universality-Diversity Scale (M-GUDS) and Openness to Diversity/Challenge. The first measure was the short form of the M-GUDS, a 15-item scale measuring Universality-Diversity Orientation (UDO), which is "an awareness and potential acceptance of both similarities and differences in others that is characterized by interrelated cognitive, behavioral, and affective components" (Fuertes et al. 2000, p. 158). The M-GUDS has an internal consistency reliability of 0.85. The second measure for intercultural effectiveness was the Openness to Diversity/Challenge scale (ODC), a seven-item scale measuring students' enjoyment in interacting with diverse individuals and being challenged by varying values and perspectives (Pascarella et al. 1996). The ODC has internal consistency reliabilities ranging from 0.83 to 0.87.

#### *Socially responsible leadership*

Socially responsible leadership was measured using the overall mean for the Socially Responsible Leadership Scale (SRLS). The SRLS is a 68-item scale measuring the eight areas of the Social Change Model: Consciousness of Self, Congruence, Commitment, Collaboration, Common Purpose, Controversy with Civility, Citizenship, and Change (see Astin et al. 1996; Dugan 2006). The SRLS overall mean scale has an internal consistency reliability of 0.92.

#### *Independent measures*

The current study had nine independent variables of interest. Seven variables were dichotomous (participation versus no participation): first-year seminar, academic learning community, undergraduate research, study abroad, service learning, internship, and capstone course/experience. The variable for writing-intensive courses was also dichotomous, but was coded students reported writing at least one 20-page paper during the academic year versus did not report writing a 20-page paper. Finally, active and collaborative learning (a measure taken from the NSSE) was included as a continuous measure ( $\alpha = 0.57$ ). While active and collaborative learning possessed a lower reliability than is commonly accepted, it was important to include in this study because of its salience as a

high-impact practice. As the results will indicate, despite its low reliability, this scale had some of the most consistent and broad-based positive effects on liberal arts outcomes of any high-impact practice.

### Covariates/control variables

A number of conceptual models have been offered to guide scholars in understanding the impact of college experiences on students (e.g., Astin 1993; Pascarella 1985; Pascarella and Terenzini 1991, 2005). These models suggest that, to accurately estimate the net or unique causal effect of any single college experience or set of college experiences, one needs also to take into account three other sets of influences: the individual capabilities, characteristics, and experiences students bring to postsecondary education, the characteristics of the institution attended, and other college experiences that may influence or covary with the influence in question. This general framework guided the selection of covariates or control variables.

Student precollege characteristics and experiences included: a precollege (fall, 2006) measure of each dependent variable; ACT (or SAT equivalent) score as provided for each student in the sample by each participating institution; sex; race (student of color/white); parental education (parents averaged a bachelor's degree or higher/parents averaged less than a bachelor's degree); a measure of students' precollege academic motivation; and three measures of high school involvement (volunteer involvement, working for pay, and involvement in extracurricular activities). Institutional type was operationalized by two dummy variables: attended a research university and attended a regional university, with attendance at a liberal arts college always coded 0. Other college experiences were represented by: students' hours of on- and off-campus work per week; whether or not a student was a member of a fraternity or sorority; and academic major field of study (coded 1 = humanities or social sciences major, 0 = other major). This variable was dichotomized because specific majors were not comparable across institutions.

### Analyses

Descriptive statistics were computed for all of the independent variables of interest. Participation rates ranged from 30.65 % having participated in an academic learning community to 72.80 % having participated in a first-year seminar. The remaining dichotomized high-impact practices had participation rates of: 34.72 % in undergraduate research, 43.33 % in study abroad, 53.12 % in service learning, 69.76 % in internship, 51.11 % in capstone course/experience, and 59.97 % in writing-intensive courses. The sample mean for active and collaborative learning was 51.66 on a 0–100 point scale.

The analyses were conducted using ordinary least squares (OLS) regression. Regressions were computed for each dependent measure on the high-impact practices plus all the covariates/control variables specified above. All continuous dependent and independent variables were standardized. Thus, the coefficients reported in the results section can be considered effect sizes. For continuous independent variables, the coefficients represent that part of a standard deviation change in the dependent variable for every one standard deviation increase in the independent variable, all other influences in the equation held constant. For categorical independent variables, the coefficients represent that part of a standard deviation change in the dependent measure for every one unit increase in the independent variable, all other influences held constant.

Although many of the high-impact practices are non-experimental dummy variables (i.e., coded 1 or 0), regression analyses were chosen rather than propensity score matching as the basic analytical approach for two reasons. First, a convincing body of evidence indicates that propensity score matching and regression yield essentially the same effect estimates, particularly—as in the present study—when a pretest measure of the outcome is specified in the analytic model (e.g., Foster et al. 2009; Hanson et al. 2012; Padgett et al. 2010; Pascarella et al. 2013; Salisbury et al. 2013; Shadish et al. 2008; Shah et al. 2005). Second, concerns arose with estimating the unique cognitive impacts of individual high-impact practices that could not be attributed to other college academic and non-academic experiences. Thus, the conceptual model included other college experience variables (including other high-impact practices) that are not, strictly speaking, the selection-type variables appropriate for use in propensity score matching approaches.

All analyses were based on weighted sample estimates, adjusted to the actual sample size for correct standard errors. Because the regression models were detailed and had more variables than individual sampling units (i.e., 17 institutions), procedures to statistically adjust artificially smaller standard errors for the nesting or clustering effect in the data could not be employed. Consequently, a more stringent alpha level ( $p < .025$ ,  $p < 0.01$ , and  $p < 0.001$  rather than  $p < .05$ ) was used for statistical significance to reduce the probability of a Type I Error—rejecting a true null hypothesis (Raudenbush and Bryk 2001).

A correlation matrix to check for multicollinearity was computed for all independent variables.<sup>1</sup> The correlations among the independent variables were relatively low. None of the correlations were above 0.45. The three largest correlations were parent education and ACT composite score ( $r = 0.36$ ), research university and ACT composite score ( $r = 0.37$ ), and service learning and active and collaborative learning ( $r = 0.43$ ). The correlation between service learning and active and collaborative learning is not surprising, since one of the seven items on the active and collaborative learning mean scale is the same item used to measure service learning. While service learning and active and collaborative learning was the highest correlation among independent variables, these were the only high-impact practices correlated at higher than 0.25. To further test for multicollinearity, the variance inflation factors (VIF) were computed for each of the models. The overall VIF for the models ranged from 1.40 to 1.27, which is below the recommended VIF limit of 10.00 (Stevens 2002). To further examine the role of multicollinearity in the estimations within the models, a second set of analyses were also conducted within the current study. In the second set of analyses, separate series of OLS regressions for each dependent measure were computed, with the high-impact practices being included in models individually from the other high-impact practices variables.

## Results

Table 1 summarizes the results of the more conservative estimate of the effects of each of the individual high-impact practices, which takes into account not only the impacts of all the control variables but also the influence of all of the other high-impact practices. As Table 1 indicates, net of all other influences, only two high-impact practices, active and collaborative learning and undergraduate research, had significant unique impacts on a majority of the seven fourth-year outcomes. Both high-impact practices had significant

<sup>1</sup> The correlation matrix is available upon request to the first author.

**Table 1** More conservative estimated effects of high-impact practices on liberal arts educational outcomes

	Critical thinking (CAAP) <i>n</i> = 883 $\beta$	Moral reasoning (DIT-2) <i>n</i> = 899 $\beta$	Positive attitude toward literacy (PATL) <i>n</i> = 1,845 $\beta$	Need for cognition (NCS) <i>n</i> = 1,841 $\beta$	Intercultural effectiveness (M-GUDS) <i>n</i> = 1,820 $\beta$	Intercultural effectiveness (ODC) <i>n</i> = 1,845 $\beta$	Socially responsible leadership (SRLS) <i>n</i> = 1,838 $\beta$
First-year seminar	-0.0264	-0.0079	0.0640	-0.0386	-0.0670	0.0109	-0.0264
Academic learning community	-0.1113	0.0995	0.0732	0.0053	0.0482	-0.0117	-0.0320
Writing-intensive courses	-0.0205	-0.0249	0.0301	-0.1078	0.0944	-0.0266	-0.0701
Active and collaborative learning	0.0632*	0.0515	0.0372	0.2064***	0.1153***	0.1763***	0.0162***
Undergraduate research	0.1493**	0.1198	0.1800***	0.1621***	0.1376***	0.1167**	0.0452
Study abroad	-0.0197	-0.0821	0.0355	0.0224	0.2093***	0.1048*	0.0677
Service learning	-0.0367	-0.0573	-0.0115	-0.0987*	0.0273	-0.0370	-0.0049
Internship	0.0275	0.0039	0.0375	0.1148**	0.0882*	0.0566	0.1013*
Capstone course/experience	-0.1446**	0.0168	0.0689	0.1489***	0.0071	0.0037	0.0227
R <sup>2</sup>	0.63	0.43	0.42	0.43	0.45	0.34	0.23

Covariates included within the model (Table 1): race, gender, parent education, precollege academic motivation, high school volunteer work, high school work for pay, high school involvement, ACT score, pretest outcome measure, institutional type, work in college, fraternity/sorority membership, academic major, and co-curricular involvement. These models also control for all other high-impact practices

\*  $p < 0.025$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

unique, positive effects on critical thinking, need for cognition, and both measures of intercultural effectiveness (the MGUDS and openness to diversity/challenge). Additionally, participation in undergraduate research was positively linked to four-year gains in PATL, while active and collaborative learning appeared to significantly enhance gains in socially responsible leadership. These estimated significant effects were modest in magnitude—ranging from .06 to .21 of a standard deviation.

As further shown in Table 1, participation in an internship had modest positive effects (.08–.12 of a standard deviation) on need for cognition, the MGUDS, and socially responsible leadership, while study abroad modestly enhanced (.10–.21 of a standard deviation) four-year growth in both measures of intercultural effectiveness (MGUDS and openness to diversity). The estimated effects of capstone courses were mixed, with a negative link to critical thinking, but positive net association with four-year gains in need for cognition. Six of the seven outcome measures were positively, if modestly, influenced by at least one high-impact practice. When all other factors were taken into account, however, moral reasoning (as measured by the DIT-N2 score) was unaffected by high-impact practices.

As indicated in the analyses section above, due to the possibility of multicollinearity among the high-impact practices influencing the results, a second set of analyses was conducted that estimated the effects of each high-impact practice controlling for all covariates, but not the other high-impact practices. This represents a somewhat less conservative estimate of the effects of each high-impact practice on the seven outcomes than that summarized in Table 1. The results of these less conservative analyses are summarized in Table 2. As Table 2 indicates, of the four high-impact practices that failed to have a positive impact on liberal arts outcomes in the more conservative analyses (i.e., first-year seminars, academic learning communities, writing-intensive courses, and service learning, see Table 2), three did, in fact, demonstrate modest, but significantly positive impacts in the less conservative analyses. Specifically, academic learning communities positively influenced both PATL and the MGUDS measure of intercultural effectiveness; writing-intensive courses enhanced gains on the MGUDS; and participation in service learning had positive estimated effects on the MGUDS, openness to diversity, and socially responsible leadership. The significant positive effects of these three high-impact practices in the less conservative regression specifications were modest in magnitude – ranging from .10 to .22 of a standard deviation. As further shown in Table 2, other high-impact practices demonstrated additional significant positive effects that were not evident in the more conservative analyses. Specifically, both undergraduate research and study abroad had significant positive estimated effects on socially responsible leadership; internships enhanced gains in openness to diversity; and capstone courses/experiences demonstrated additional positive influences on gains in PATL, the MGUDS, and socially responsible leadership. Once again, the estimated net effects were modest—ranging from .10 to .13 of a standard deviation.

## Discussion

The current study sought to examine the degree to which high-impact practices had a high impact on undergraduate student learning and development. Findings from the first set of analyses suggest that participation in several of the high-impact practices led to higher levels of attainment on a variety of liberal arts educational outcome measures. Two high-impact practices in particular—active and collaborative learning and undergraduate

**Table 2** Less conservative estimated effects of high-impact practices on arts educational outcomes

	Critical thinking (CAAP) $\beta$	Moral reasoning (DIT-2) $\beta$	Positive attitude toward literacy (PATL) $\beta$	Need for cognition (NCS) $\beta$	Intercultural effectiveness (M-GUDS) $\beta$	Intercultural effectiveness (ODC) $\beta$	Socially responsible leadership (SRLS) $\beta$
First-year seminar	-0.0275	-0.0184	0.0712	-0.0306	-0.0350	0.0338	0.0023
Academic learning community	-0.0077	0.0947	0.1053*	0.0768	0.1045*	0.0493	0.0467
Writing-intensive courses	-0.0357	-0.0116	0.0861	0.0541	0.2236***	0.1057	0.0988
Active and collaborative learning	0.0422	0.0431	0.0593**	0.2049***	0.1488***	0.1826***	0.2447***
Undergraduate research	0.1295*	0.1244	0.2084***	0.2381***	0.1833***	0.1603***	0.1147*
Study abroad	-0.0252	-0.0688	0.0701	0.0910	0.2518***	0.1544***	0.1338**
Service learning	0.0022	0.0012	0.0453	0.0636	0.1331***	0.1064***	0.1734***
Internship	0.0064	0.0253	0.0729	0.1890***	0.1524***	0.1111**	0.1600***
Capstone course/experience	-0.1184*	0.0577	0.1211**	0.2395***	0.1002*	0.0864	0.1022*

The regressions take in to account all the control variables listed in Table 1, but do not control for the other high impact practices

\*  $p < 0.025$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

research—were especially beneficial to students. Lower levels of impact—some positive and some negative—were observed for study abroad, internship, service learning, and capstone course/experience. Additionally, three high-impact practices—first-year seminar, academic learning community, and writing-intensive courses—were not significant predictors of any of the liberal arts educational outcomes.

Active and collaborative learning and undergraduate research were consistently significant, positive predictors for nearly all of the liberal arts educational outcomes within both sets of analyses. This finding suggests that something inherent within these high-impact practices might be contributing to positive benefits for student learning. While the current study was not able to delineate factors within the high-impact practices contributing to these significant relationships, Kuh (2008) suggests several aspects of high-impact practices—such as exposure to diverse individuals and beliefs, interaction with faculty members outside of class, and prompt feedback, among others—that distinguish them from other educational experiences. Active and collaborative learning, as it is named, innately contains active and collaborative features aligned with the vetted good practices first proposed by Chickering and Gamson (1987). Undergraduate research, similarly, contains characteristics of good practices, such as student-faculty interaction outside of class. A lot of overlap exists between good practices and high-impact practices, however, that makes it difficult to distinguish clear boundaries between these practices and the effects they are having on student learning. Further, Kuh (2008) argues that high-impact practices, such as undergraduate research, allow students to integrate their learning across multiple levels and domains. While Kuh (2008) acknowledges that high-impact practices in general foster the exposure to good practices in undergraduate education, it is possible that several of these contributing factors of good practices are fundamental characteristics of active and collaborative learning and undergraduate research. Further, despite the relatively low reliability for active and collaborative learning, the findings for this measure were vast. With a stronger measure, these findings might have been even more pronounced.

Lower levels of impact—some positive and some negative—were observed for study abroad, internship, service learning, and capstone course/experience. Study abroad was a significant, positive predictor for intercultural effectiveness, as measured by both M-GUDS and ODC. Internship was a significant, positive predictor for inclination to inquire and lifelong learning as measured by NCS and socially responsible leadership. Capstone course/experience was a significant, positive predictor for inclination to inquire and lifelong learning as measured by NCS.

While active and collaborative learning and undergraduate research had positive effects across a broad array of liberal arts educational outcomes, the lower levels of impact observed among study abroad, internship, service learning, and capstone course/experience could suggest that some of the high-impact practices may influence student learning in a narrower way. For example, capstone course/experience was a significant, positive predictor of inclination to inquire and lifelong learning as measured by NCS, but it was not a significant predictor for any other outcome measures. This might suggest that certain high-impact practices may be potential pathways for student growth and development for different learning outcomes. On the other hand, a limitation of this study is that the variables used for these educational practices do not control for differences in facilitation and administration of these practices, which may vary widely from campus to campus. Future studies taking into account different modes of delivery may be able to parcel out the effectiveness of varying practices and contexts. For example, whereas study abroad programs fluctuate greatly, this study only considered whether a student had participated in study abroad—not the location in which the student studied, the program type, or the

program duration (Salisbury et al. 2013). In addition, numerous studies have found conditional, or interaction, effects associated with the effectiveness of different practices for different groups of students (see Pascarella and Blaich 2013; Pascarella and Terenzini 2005; Seifert et al. 2012). It is possible that these high-impact practices may have higher levels of effectiveness for different groups of students. Future studies should therefore explore the conditional effects associated with high-impact practices.

Additionally, three high-impact practices—first-year seminar, academic learning community, and writing-intensive courses—were not significant predictors of any of the liberal arts educational outcomes. Given the high participation rates in first-year seminars (72.80 % of the sample), it is possible that the failure to reach statistical significance is due to the low percentage of students not participating in this high-impact practice. Further, none of the high-impact practices included within the current model were found to be significant predictors of moral reasoning as measured by the N2 score of the DIT-2. This suggests that perhaps high-impact practices may not be designed to address growth in moral reasoning, although, it does appear that they may have consistent, positive effects on other learning outcomes. The lack of significant findings for first-year seminar, academic learning community, and writing-intensive courses should not be interpreted as necessarily suggesting that these educational practices are of no benefit to students. Again, future research should examine these practices more closely to explore how the effects of participation on students may vary according to facilitation and individual student characteristics. This research may also reveal ways in which the facilitation and administration of the practices can affect moral development.

Finally, two high-impact practices were significant, negative predictors within the current study. Service learning was a weak, significant, negative predictor for inclination to inquire and lifelong learning as measured by NCS. Capstone course/experience was a significant, negative predictor for critical thinking. Again, it must be noted that these results do not necessarily indicate that service learning and capstone courses/experiences have inverse relationships to inclination to inquire and lifelong learning and critical thinking, respectively. These surprising, negative findings suggest that future studies should examine differences in administration and facilitation in order to determine how effective these practices truly are in educating students.

As noted in the analyses section, a second set of analyses were conducted—by entering the high-impact practices into the analytic models separately—to further account for potential multicollinearity issues. Within the second set of analyses, active and collaborative learning and undergraduate research were significant, positive predictors for a variety of liberal arts learning outcomes. Similarly, several of the findings in the second analyses regarding the other high-impact practices were consistent with those of the first. While in the first set of analyses, academic learning community and writing-intensive courses were not significant predictors for any liberal arts learning outcomes, they both became significant predictors for intercultural effectiveness as measured by M-GUDS, and academic learning community also became a significant predictor for inclination to inquire and lifelong learning as measured by PATL. Further, several of the high-impact practices found to have a more concentrated effect on specific liberal arts learning outcomes within the first set of analyses had a more broad-reaching effect within the second set of analyses. This may suggest that the effects of high-impact practices seen in the first model were masked by the power of active and collaborative learning and undergraduate research, and that high-impact practices have an even more widespread positive effect on student learning and development.

## Concluding thoughts

The implications for high-impact practices on student development and learning are far-reaching, as depicted within the literature and the current study. The current study suggests that active and collaborative learning and undergraduate research are of immense benefit to students, while several other high-impact practices were also of notable impact. This finding holds within both sets of analyses in the current study. Further, when the less conservative model was used, the positive effects were even more far-reaching than when the high-impact practices were entered into the model together. This finding – that high-impact practices have an overall positive effect on student learning and development—has significant practical implications for institutions of higher education. Institutions should strive to provide students with opportunities to engage in high-impact practices, particularly practices such as undergraduate research and active and collaborative learning, which are shown to have vast positive impact for student learning and development. While the current study did not explore specifics associated with the facilitation of high-impact practices on campuses, it is likely that components inherent within these high-impact practices, such as interactions with faculty outside of class, academic challenge, and diversity experiences may ultimately be responsible for enhanced student learning (see Padgett et al. 2013). Institutions should therefore be intentional about incorporating good practices into the facilitation of high-impact practices to promote maximal student learning. In spite of these findings, additional research is needed to continue parceling out the effects of these educational practices on student learning. In particular, future research should examine whether conditional effects play an influential role in magnifying or mitigating the effectiveness of high-impact practices among varying student subpopulations. Overall, the findings of the current study largely support AAC&U’s advocacy of high-impact practices due to their educational benefits for undergraduate students. It appears that high-impact practices have an impact on undergraduate student learning, although this impact is complicated. Future studies must continue to research these practices to uncover additional empirical evidence to compare to the plethora of anecdotal assertions that these practices have vast benefits for student learning.

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