Exploring the Effect of Parental Education on College Students' Deep Approaches to Learning

Amy K. Ribera

Indiana University Bloomington

Center for Postsecondary Research

Author's Note

This is a work in progress. Please do not cite without the author's permission.

Paper presented at the annual meeting of the American Educational Research Association in San Francisco, CA, April 27, 2013. Please direct correspondence concerning this paper to Amy Ribera at 1900 East Tenth Street, Suite 419, Bloomington, IN 47406-7512. Email: akribera@indiana.edu

Exploring the Effect of Parental Education on College Students' Deep Approaches to Learning

This study provides insights into how students' deep approaches to learning may be directly and indirectly affected by parental education, a component of SES. Goyette and Mullen (2006) found that students from lower SES families tended to hold lower degree aspirations and favor vocationally-focused majors. Hansen (1997) reported that students from socially disadvantaged backgrounds were less likely to select into degree tracks that are common gateways into graduate school such as fields in the arts and sciences. While it appears students' educational aspirations and choice of major is partly influenced by their social upbringing, it is unclear if these decisions also affect how they approach learning. We also do not know if parental education has a direct impact on students' engagement in deep approaches to learning (DAL). The following study explores these issues in tandem.

Literature Review

Students from socially and economically challenged backgrounds participate in higher education at lower rates than their advantaged peers (Blau & Duncan, 1967; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Fergusson, Horwood, & Borden, 2008). Furthermore, those who attend and successfully navigate the complexities of the college-going process are less likely to enjoy the same economic and social rewards as their privileged counterparts (Pascarella, 2006; Walpole, 2007; Wolniak et al, 2008). Many college impact studies about socioeconomic status (SES) tend to focus on the disparity in outcomes after college such as career earnings (Wolniak et al, 2008) or plans for graduate school (Hansen, 1997). Very few studies bring attention to the differences in students' educational experiences and decisions made while in college (Walpole, 2003). This study looks to see if aspirations for a graduate degree and the decision to major in a non-vocationally focused discipline (arts and sciences) are related to the quality and depth that students' approach learning.

Marton and Säljö (1976) were the first to identify qualitative differences in how Swedish college students processed information. They found students who extracted personal meaning and integrated or related material to what they already knew engaged in *deep-level processing*, and those who attempted to memorize disconnected pieces of information without imposing any coherent structure on the materials engaged in *surface-level processing*. Biggs (1979) further this line of research by stating students approached learning with qualitatively different motives and strategies. For example, a student who had a fear of failure and a narrow focus for learning was likely to take on a surface approach leading to a surface-achieving outcome. A student who took a deep approach to learning was likely to be intrinsically interested in the subject matter and take on a strategy that maximizes its meaning. Biggs (1987) attributed situational environment (e.g., faculty practices and assessment) and individual qualities (e.g., academic ability, locus of control, and meta-cognition) as predictors of students' chosen learning strategy. Yet, the influence of students' social background was left unexplored.

Other studies in US higher education have found educational strategies of college students vary greatly by their social upbringing (e.g., Collins, 2002; Lucas, 2001; Karabel & Astin, 1975; Smart & Pascarella, 1986). Students from privileged backgrounds are more likely to attend prestigious institutions (Davis & Guppy, 1997; Smart & Pascarella, 1986), major in arts and science disciplines (Goyette & Mullen, 2006), and earn a bachelor's degree (Nunez & Curraro-Alamin, 1998). Even after controlling for academic ability, students from lower SES background were less likely to attend highly selective institutions (Davis & Guppy, 1997) and hold lower degree aspirations (Goyette & Mullen, 2006; Walpole, 2003).

This social phenomenon may be partly due to *habitus* in which students develop unconscious values and attitudes about education inherited from close family and friends (Bourdieu, 1977). Habitus leads students from similar social upbringings to arrive at similar

decisions about the type of institutions to attend, fields of study to major in, and level of education to attain (Hovart, 2001; Lamont & Lareu; 1988). Walpole (2003) suggested academic decisions, also known as individual agency, are an important component to understanding why college experiences and outcomes may vary.

Purpose and Research Questions

Previous studies have shown students who are first in their families to attend college tend to select in to vocationally-focused majors (as opposed to arts and science fields) and hold lower degree aspirations (Hansen, 1997; Goyette & Mullen, 2006). This study explores the impact of these decisions on students' deep approaches to learning. The second aim is to examine if students' social background, in particular parental education, has a direct effect on their engagement in deep approaches to learning. The specific research questions for this study are as followed:

1) What is the effect of individual agency on DAL?
    a. What is the impact of majoring in a vocational field (versus arts and science major) on DAL?
    b. What is the effect of degree aspirations on DAL?
2) What is the effect of parental education on students' DAL?

Methods

Sample

This study analyzed first-year student data collected by the Beginning College Student Survey of Student Engagement (BCSSE) in the fall of 2008 and the National Survey of Student Engagement (NSSE) in the spring of 2009. The sample was inclusive of a wide variety of institutions (n=80) and students (n=9,349). Of the 80 four-year US colleges and universities, a

wide range of institutional types by Carnegie Classification, control, selectivity, and enrollment size were represented in the sample (Table 1). Many characteristics resembled national figures. For example, two-fifth of institutions were Master's level institutions. Doctoral research universities and baccalaureate institutions, specializing in arts and science fields, represented about one-fifth of the sample, respectively. Baccalaureate-level schools in the diverse category were under-represented by 10%. Public (43%) and private (57%) institutions were also well-represented. In terms of enrollment size about 50 institutions had enrollments less than 5,000 students, 20% had enrollments between 5 to 10 thousand undergraduates, and the remaining 18% enrolled more than 10,000 students. Again, percentages roughly matched US proportions overall.

Table 2 shows the diversity among the 9,300 first-year students included in the study, and again, the sample compared to national enrollment trend found at 4-year colleges and universities. For example, compared to US percentages, the majority of students in the sample were female (67%) and identified as White (76%). Students of color were also largely underrepresented. Only 16% of the sample included response from minority populations—7% identified as Black/African American, 5% as Asian/Asian American, and 4% Latino/Hispanic—which was lower than national averages. A wide range of socioeconomic backgrounds were also represented in the sample. According to the 2007-08 National Postsecondary Student Aid Study (NPSAS) data collected by NCES, one-quarter of students enrolled in 4-year colleges and universities had at least one parent that experienced "some" college which was similar to the proportion of students in the sample. Yet, a higher percentage of the sample (45% versus 25%) reported having at least one parent with a baccalaureate degree. Only 14% claimed they were the first in their families to attend college which was lower than the national average (25%). Also, in

Table 1

Institutional-level Sample Statistics (n=80)

	BCSSE 2008-NSSE 2009		US[a]
	N	%	%
Carnegie Classification			
Doctoral Research University	16	20%	18%
Master's Level	34	43%	42%
Baccalaureate - Diverse	10	13%	23%
Baccalaureate - Arts and Sciences	16	20%	18%
Other	4	5%	
Control			
Public sector	36	43%	35%
Private sector	46	57%	65%
Barron's Selectivity Index[b]			
Not available/special	5	6.3%	-
Noncompetitive	3	3.8%	-
Noncompetitive Plus	0	0%	-
Less Noncompetitive	10	12.5%	-
Less Noncompetitive Plus	0	0%	-
Competitive	30	37.5%	-
Competitive Plus	1	1.3%	-
Very Competitive	15	18.8%	-
Very Competitive Plus	6	7.5%	-
Highly Competitive	6	17.5%	-
Highly Competitive Plus	1	1.3%	-
Most Competitive	3	3.8%	-
Total Undergraduate Enrollment			
Less than 1,000	7	8.8%	19%
1,000 – 5,000	43	53.8%	51%
5,001 – 10,000	16	20%	15%
10,001 – 20,000	10	12.5%	10%
More than 20,000	4	5%	5%

[a]US percentages are based on data from the 2008 IPEDS Institutional Characteristics File

[b]US percentages reported by NCES are restricted to the public

Table 2

Student-level Sample Statistics

	BCSSE 2008-NSSE 2009 (N=9,349)		US
	N	%	%
Parental Education[a]			
First-generation (neither parent attended college)	1,309	14%	25%
At least one parent had some college experience	2,244	24%	24%
At least one parent earned a bachelor's degree	4,207	45%	25%
At least one parent earned a graduate degree	1,589	17%	24%
Gender[b]			
Women	6,264	67%	56%
Men	3,085	33%	44%
Race/Ethnicity[c]			
African American/Black	655	7%	12%
Asian American/Asian	467	5%	7%
White (non-Hispanic)	7,105	76%	67%
Latino/Hispanic	374	4%	10%
Other race	748	8%	-
Enrollment Status[b]			
Full-time	9,255	99%	82%
Part-time	94	1%	12%
Age[b]			
18-24 years old	9,322	99%	63%
Older than 24 years	27	<1%	37%
Plans for Degree Attainment[c]			
Bachelor's degree	3,646	39%	-
Master's or Doctoral degree	5,703	61%	-
Prior Academic Ability (SAT/ACT Scores)			
400 – 700	73	<1%	-
701 – 1,000	2,038	22%	-
1,001 – 1,300	5,665	61%	-
1,301 – 1,600	1,573	17%	-

[a]US percentages are based on data from the 2007-08 NPSAS

[b]US percentages are based on data from 2007-08 IPEDS

comparison to NPSAS data, a smaller percentage of first-year students had a parent who held a graduate degree (17% versus 24%).

As for degree aspirations, most of the sample aspired to earn a graduate degree. That is, nearly two-thirds of first-years said they had plans to pursue either a master's or a doctoral degree. About 2 in 5 students had plans to earn a 4-year degree. And lastly, the majority of respondents (61%) scored between 1,000 and 1,300 on their college entrance.

Variables

The dependent measure was the deep approaches to learning (DAL) scale which is composed of 12 items that ask students about their learning behaviors. The DAL scale is equaled to the total mean score of three subscales that measure students' engagement in integrative learning and reflective learning as well as perceptions of courses emphasis on higher-order learning. The higher-order learning subscale is composed of four items that measured the extent students believe their courses require them to use advance cognitive skills such as analyzing and synthesizing new information as well as forming judgments and applying knowledge to solve practical problems. The 5-item integrative learning subscale measures the amount students engage in activities that require them to integrate information from various resources, typically outside of class, or consider the perspective of others when completing an assignment or participating in a class discussion. And lastly, the reflective learning subscale is comprised of three items that ask students how often they reflect on their own learning process such as examining the strength and weakness of their personal views; trying to better understand someone else's perspective; and learning something that changed their current conception of an idea or issue. Collectively, these scales resulted in a moderately high consistent measure of DAL for first-year students (Appendix A).

Table 3 represents the list of institution and student level variables included in the study as independent measures. Institutional control (private or public), a 6-point selectivity score based on Barron's rating of institutional selectivity, and enrollment size were selected as institutional-level control variables.

Table 3

Descriptive Statistics of Independent Variables

	FY Mean	Std. Deviation	Minimum	Maximum
Institutional-level Variables (n=80)				
Private	0.57	0.50	0.00	1.00
Selectivity (Barron's)	3.21	1.38	0.00	6.00
Size (undergraduate total enrollment)	5,800.14	6,384.73	321	31,626.00
Student-level Variables (n=9,349)				
First-generation status	0.14	0.35	0.00	1.00
At least one parent attended some college	0.24	0.42	0.00	1.00
At least one parent earned a 4-year degree	0.45	0.50	0.00	1.00
Female	0.67	0.47	0.00	1.00
African American/Black	0.07	0.25	0.00	1.00
Asian American/Asian	0.05	0.21	0.00	1.00
Latino/Hispanic	0.04	0.19	0.00	1.00
Other race	0.08	0.28	0.00	1.00
Age	18.41	1.94	16.00	1.00
Full-time status	0.99	0.10	0.00	1.00
College readiness (SAT-ACT score)	1,144.22	173.07	420.00	1,600.00
Earned mostly Bs in college	0.45	0.50	0.00	1.00
Earned mostly Cs in college	0.09	0.29	0.00	1.00
Aspired to earn a graduate degree	0.61	0.49	0.00	1.00
Potential annual income of major	52,659.06	8,415.19	37,836.00	75,579.00
Vocational degree track	0.56	0.50	0.00	1.00

The student-level variables included a host of socio-demographics and academic characteristics. For parental education, a single measure was derived by combining the education level of both the father and mother. Students were coded into four groups based on the highest level of education that either their mother or father had achieved. For instance, the first group

had either a mother and/or father who held a graduate degree. Students who had at least one parent with a bachelor's degree were coded into the second group. If at least one of their parents participated in college but did not earn a 4-year degree, they were assigned to the third group. Lastly, if they were the first in their families to attend college, students were coded into the fourth group. It is important to note that there is not a universal definition for first-generation status (Nunez & Cuccaro-Alamin, 1998; Pike & Kuh, 2005; Walpole, 2007) but for this study the fourth group was defined as first-generation students. The act of going to college, whether the parent received a degree or not, may be an indication they have some level of "insider knowledge" that the student could benefit from (St. John, Shouping, & Fisher, 2011).

Academic major was also included in the analysis as independent measure as well. Guided by previous studies major choice was recoded into two variables – potential annual earnings (Fogg, Harrington, & Harrington, 2004) and vocational versus arts and sciences degree track (Brint, et al, 2005; Goyette & Mullen, 2006) (see Appendix C). In addition, the BCSSE survey provided information about future plans to attend graduate school which was also included in the study as an independent variable. Other socio-demographic variables included age, gender (female served as the reference group), and race/ethnicity (with White as the reference group). Other academic variables included SAT/ACT scores as a measure of college readiness, enrollment status, and self-reported college grades. Students were asked to report what most of their grades had been at their current institution. Grade categories were collapsed into mostly A's (reference group), mostly B's and C's or below.

To explore if the data aligns with previous studies that assert first-generation students are less likely to aspire to earn a graduate degree and select an arts and science field of study, simple frequency table was calculated. Table 4 roughly shows a positive correlation with level of parental education and degree aspirations. Nearly 7 out of 10 students whose parents earned a

graduate degree also aspired to the same educational level. Among first-generation students, the percentage was considerable lower (56%). First-generation students were also less likely to select into an arts and science major compared to students whose parents more college education. These trends align with findings from studies by Goyette and Mullen (2006) and Walpole (2003).

Table 4

Level of Parental Education by Degree Aspirations and Field of Study

Parental Education	Graduate Degree Aspirations	Arts & Sciences Track
First-generation status	56%	39%
At least one parent with some college experience	59%	40%
At least one parent earned a baccalaureate degree	60%	44%
At least one parent earned a graduate degree	69%	50%

Analyses

To account for students being nested within institutions, hierarchical liner modeling (HLM) was the chosen analytical method for this study (Ethington, 1997; Raudenbush & Bryk, 2002). The multilevel analysis was run in three steps. The first step ran a one-way ANOVA model with no predictors. The variance components are derived from the null model. The null model is a one-way ANOVA where Y_{ij} is the dependent variable, in this case DAL, β_{oj} is the institutional mean, and r_{ij} is the deviation from the institutional mean for student ij:

$$Y_{ij} = \beta_{oj} + r_{ij}$$

The null model allows the intercept, β_{oj}, to vary and, therefore, partitions the variances within and between institutions. The intraclass correlation coefficients (ICC) are calculated based on information provided by the variance components. The ICC identifies the proportion of variance in DAL scales that is attributed to within and between institutions.

The second step ran a model which included only student-level variables. For this step of the modeling process, two blocks of variables were entered one at a time. The first block included variables that described the student before they entered college such as demographic (parental education, gender, race/ethnicity, age) and precollege academic (SAT/ACT score) characteristics. The second block contained variables that described academic decisions and performance after they entered college. For instance, academic decisions for major choice were characterized by type of degree track they selected (vocational or arts and sciences) and the students' potential earning based on the disciplinary field of their major choice. Decisions to enroll as a full-time student and future plans for graduate school were also entered in the second block. Self-reported grades were entered in the second block as a measure of academic performance. The third and final step ran a full model which included both student-level and institutional-level variables. Prior to entry into the model, the dependent measure, DAL scale, was standardized with a mean of zero and a standard deviation of one. Also all student-level variables were grand-mean centered (Enders & Tofighi, 2007). The final model was as follows:

Level-1 Model:

$$\begin{aligned}\text{DAL}_{ij} = {} & \beta_{oj} + \beta_{1j}(\text{ParEd-First Gen}_{ij}) + \beta_{2j}(\text{ParEd-SomeColl}_{ij}) + \beta_{3j}(\text{ParEd-Bac}_{ij}) + \\ & \beta_{4j}(\text{Female}_{ij}) + \beta_{5j}(\text{AfrAm}_{ij}) + \beta_{6j}(\text{AsianAm}_{ij}) + B_{7j}(\text{Latino}_{ij}) + \beta_{8j}(\text{OthRace}_{ij}) + \\ & \beta_{9j}(\text{Age}_{ij}) + \beta_{10j}(\text{SAT/ACT}_{ij}) + \beta_{11j}(\text{Grades-Bs}_{ij}) + \beta_{12j}(\text{Grades-Cs}_{ij}) + \beta_{13j}(\text{Aspire-Grad}_{ij}) + \\ & \beta_{14j}(\text{Major-Income}_{ij}) + \beta_{15j}(\text{Major-Voc}_{ij}) + r_{ij}\end{aligned}$$

Level-2 Model:

$$\beta_{oj} = \gamma_{oo} + \gamma_{o1}(\textit{Selectivity}) + \gamma_{o2}(\textit{Private}) + \gamma_{o3}(\textit{UGSize}) + u_{oj}$$

Results

Estimations from the null model provided information to compute the intra-class correlation. Table 5 reveals variance components used to calculate the ICCs. It appears only a

trivial portion of the total variance in the dependent measures is attributable to between-institution differences (2.3%); however, Porter and Swing (2006) argued that even a small amount of variance explained is valuable in higher education research.

Table 5

Null Model Results: Partitioning Variance Components

	DAL
Null models	
Variance components	
Between-institutions	0.023
Within-institutions	0.980
Reliabilities	0.622
ICC (%)	2.29%

Table 6 shows the final DAL results for two models. Model 1 includes the block of "before college" variables and Model 2 adds the block of "in college" variables which includes degree aspirations and major choice. The institutional-level variables were entered primarily as controls. In general, parental education had a weak but significant effect on first-year students' DAL even after controlling for a host of institutional and student characteristics. First-generation students engaged in DAL slightly less than students whose parents held advanced degrees (B_{fgen}=-.069; p<.01). However, by disaggregating parental education into four categories (no college experience; some college experience; earned a baccalaureate degree; and earned an advance degree), interesting nuances in the findings were uncovered. The widest gap in deep learning were actually between students whose parents earned baccalaureate degrees and those with parents held advanced degrees (B_{bac}=-.074; p<.01). Further, when controlling for student and institutional factors, students who had parents with *some* college experience engaged in DAL to a similar extent as their peers whose parents held a graduate degree.

Table 6

Random Intercept Model: Estimations for DAL

	DAL	
	Model 1	Model 2
	B	B
Intercept	0.054	0.042
Institutional-level Variables		
Private	0.064	0.057
Selectivity (Barron's)	-0.005	-0.006
Size (UG enrollment in thousands)	-0.007	-0.005
Student-level Variables		
First-generation	-0.069*	-0.036
Parent(s) with some college	-0.059	-0.033
Parent(s) with bachelor's degree	-0.074**	-0.053*
Parent(s) with grad degree (ref group)		
Female	0.024	-0.024
White/non-Hispanic (ref group)		
African American/Black	0.193***	0.186***
Asian American/Asian	0.005	0.062
Latino/Hispanic	0.123**	0.120*
Other race	0.134***	0.124**
Age	0.000	0.001
Prior academic ability (SAT-ACT in 100s)	0.040***	0.011
Full-time status		0.196*
Earned mostly As in college (ref group)		
Earned mostly Bs in college		-0.116***
Earned mostly Cs in college		-0.315***
Aspired to earn a graduate degree		0.150***
Potential annual income of major (in $10Ks)		-0.030*
Vocational degree track		-0.155***
Variance Components		
Variance between institutions	0.013	0.011
Variance between institutions - % explained	43.48%	52.17%
Variance within institutions	0.976	0.956
Variance within institutions - % explained	0.41%	2.45%
Reliabilities		
Intercept	0.499	0.483

Note. Model 1 represents coefficient estimates of grand mean centered level-1 variables (parental education, gender, race/ethnicity, age, & prior academic ability) and uncentered level-2 variables (control, selectivity, & total undergraduate enrollment). Model 2 adds a block of "in college" level-2 variables (full-time status, college grades, degree aspirations, potential annual income of major, & degree track) which were also centered on the grand mean. *p < 0.05; **p < 0.01; ***p < 0.001

Degree aspirations and major choice also had a significant impact on the outcome measure. Model 2 shows the effect of having higher degree aspirations on DAL as significant and positive (B_{grad}=0.150; p<.001) even after controlling for the type of institution that students attended as well as their precollege, demographic, and academic characteristics. In general, first-year students who had plans to earn a graduate degree tended to approaches learning more deeply than their peers who held lower degree aspirations. The same result was found regarding degree track. On average, students who majored in arts and science fields tended to engage in DAL more than those who selected into vocationally-oriented fields (B_{voc}=-0.155; p<.001). Furthermore, a weak negative relationship was found between lucrative majors and deep learning measure (B_{inc}=-0.030; p<.05).

Model 2 also revealed that when the "college experience" block of variables were entered, the effect of parental education on DAL was diminished. The gap between first-generation students and students whose parents earned a graduate degree was no longer statistically different from zero. Yet, students whose parents had bachelor's degree still reported slightly lower DAL scores than students whose parents held graduate degrees (B_{bac}=-.053; p<.05).

Discussion

The rising cost of higher education has forced students from less affluent families to make difficult choices about whether or not to invest in college, and if so, which institution and program will provide them with the best return on their investment (Thomas & Perna, 2004). St. John, Hu, and Fisher (2010) recognized financial concerns and job security may cloud judgment and lead to uninformed academic decisions. Unlike students from upper SES backgrounds, many first-generation students do not have a reservoir of friends and family who can help guide these important decisions as well as offer first-hand knowledge of higher-learning gains. They may

need additional help in shape their expectations about college so they become more intentional about learning. Academic counselors and faculty may serve as a viable resource for lower SES students to gain the "academic capital" they need to be successful in college.

Findings here provide an example of how major choice and degree aspiration may negatively impact students' decision to approach learning in a deep way. Unfortunately, it also appears that students whose parents have lower levels of education tended to gravitate toward academic decisions and preferences associated with lower engagement in deep learning. The models revealed that students with lower degree aspirations reported lower deep approaches to learning scores. Also, when controlling for student and institution factors, vocationally-focused fields and majors with higher earning potential were both negatively associated with deep approaches to learning.

Interestingly, the findings also indicated a weak relationship with parental educational and deep approaches to learning. Pike and Kuh (2005) reported low levels of engagement among first-generation students are "indirect result of being the first in one's family to go to college and are more directly a function of lower educational aspirations" (p. 290). Perhaps it is less about the label and more about decisions and practices that students make while in college.

One important area left unaddressed by this study is the relationship between student-faculty interactions and deep approaches to learning. A future study may examine if a positive relationship exists between these two concepts, and if so, does it help explain why first-generation students tend to engage in DAL slightly less than their affluent peers. We know from Young and Sax (2009) that first-generation students at research institutions tended to be less satisfied with their interaction with faculty and less likely to communicate with them in and outside of the classroom. A future study may explore if this phenomenon also affects students' level of engagement in deep learning.

Conclusion

Although the goal was to provide a clearer picture of social stratification within in colleges and universities, nuance in the results suggests the picture is murky at best. Students whose parents had less college education did not always engage in DAL less. By disaggregating the non-first-generation students, the study revealed some counter-intuitive findings. For example, it is unclear why students whose parents had some college experience engaged in DAL to the same extent as those whose parents earned an advanced degree. Secondly, why did the parental education gap persist in the presence of the "college experiences" variable among students whose parents earned a bachelor's degree? While students may be socially stratified in their deep approaches to learning, how they are stratified is not straightforward.

References

Biggs, J.B. (1979). Individual differences in study processes and the quality of learning outcomes. *Higher Education, 8,* 381-394.

Biggs, J.B. (1987). *Student approaches to learning and studying.* Hawthorn: Australian Council for Educational Research.

Blau, P.M., & Duncan, O.D. (1967). *The American Occupational Structure.* New York: Wiley.

Bourdieu, P. (1977). *Outline of a theory of practice.* London: Cambridge University Press.

Brint, S., Riddle, M., Turk-Bicakci, L., & Levy, C.S. (2005). From the liberal to the practical arts in American colleges and universities: Organizational analysis and curricular change. *The Journal of Higher Education, 76*(2), 151-180.

Collins, R. (2002). Credential inflation and the future of universities. In S. Brint (Ed.). *The Future of the City of Intellect: The Changing American University* (pp. 23 46). Stanford, CA: Stanford University Press.

Davies, S. & Guppy, N. (1997). Fields of study, college selectivity, and student inequalities in higher education. *Social Forces, 75,* 1417-1438.

Duncan, G.J., Yeung, W.J., Brooks-Gunn, J., & Smith, J. (1998). How much does childhood poverty affect the life chances of children? *American Sociological Review, 63,* 406-423.

Enders, C.K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12,* 121-138.

Ethington, C.A. (1997). A hierarchical linear modeling approach to studying college effects. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research, Volume XII* (pp. 165-194). New York: Agathon Press.

Fergusson, D.M., Horwood, L.J, & Boden, J.M. (2008). The transmission of social inequality: Examination of the linkages between family socioeconomic status in childhood and educational achievement in young adulthood. *Research in Social Stratification and Mobility, 26,* 277-295.

Fogg, N. P., Harrington, P. & Harrington, T. (2004). *College major handbook with real career paths and payoffs: The actual jobs, earnings, and trends for graduates of 60 college majors*. Indianapolis, IN: JIST Publishing Inc.

Gibbs, G., Morgan, A., & Taylor, E. (1984). The world of learner. In F. Marton, D.J. Hounsell, & N.J. Entwistle (Eds.), *The Experience of Learning* (pp. 165-188). Edinburgh, UK: Scottish Academic.

Goyette, K.A., & Mullen, A.L. (2006). Who studies the arts and sciences? Social background and the choice and consequences of undergraduate field of study. *The Journal of Higher Education, 77*(3), 497-538.

Hansen, M.N. (1997). Social and economic inequality in the educational career: Do the effects of the social background characteristics decline? *European Sociological Review, 13*(3), 305 321.

Horvat, E.M. (2001). Understanding equity and access in higher education: The potential contribution of Pierre Bourdieu. In J. Smart (Ed). *Higher education: Handbook of theory and research, Vol. 16*. Edison, NJ: Agathon Press.

Karabel, J., & Astin, A.W. (1975). Social class, academic ability, and college "quality." *Social Forces, 53*(3), 381-398.

Lamont, M. & Lareau, A. (1988). Cultural capital: Allusions, gaps, and glissandos in recent theoretical developments. *Sociological Theory, 6,* 153-168.

Lucas, S.R. (2001). Effectively maintained inequality: Education transitions, track mobility, and social mobility, and social background effects. *American Journal of Sociology,106,* 1642 1690.

Marton, F., & Säljö, R. (1976). On qualitative differences in learning. I: Outcome and process. *British Journal of Educational Psychology*, 46, 4-11.

Nunez, A., & Cuccaro-Alamin, S. (1998). *First-generation students: Undergraduates whose parents never enrolled in postsecondary education* (NCES 98-082). Washington, DC: NCES.

Pascarella, E.T. (2006). How college affects students: Ten directions for future research. *Journal of College Student Development, 4*7(5), 508-520.

Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical liner models: Applications and data analysis methods.* Thousand Oaks, CA: Sage Publications.

Smart, J.C., & Pascarella, E.T. (1986). Socioeconomic achievements of former college students. *The Journal of Higher Education*, 57(5), 529-549.

St. John, E. P., Shouping, H., & Fisher, A. (2011). *Breaking through the access barrier: How academic capital formation can improve policy in higher education.* New York: Taylor and Francis Routledge.

Thomas, S.L., & Perna, L.W. (2004). The opportunity agenda: A reexamination of postsecondary reward and opportunity. In J.C. Smart (Ed.), *Higher Education: Handbook of Theory and Research, Vol. XIX*, (pp-43-84). Netherlands: Kluwer Academic Publishers.

Walpole, M. (2003). Socioeconomic status and college: How SES affects college experiences and outcomes. *The Review of Higher Education, 27*(1), 45-73.

Walpole, M. (2007). Economically and educationally challenged students in higher education: Access to outcomes. In K. Ward & L.E. Wolf-Wendel (Eds.), *In ASHE Higher Education Report, Vol. 3.* Hoboken, NJ: Wiley Periodicals, Inc.

Wolniak, G.C., Seifert, T.A., Reed, E.J., & Pascarella, E.T. (2008). College majors and social mobility. *Research in Social Stratification and Mobility*, 26, 123-139.

Zhang, L. (2005). University students' learning approaches in three cultures: An investigation of Biggs's 3P model. *The Journal of Psychology*, 134(1), 37-55.

Appendix A

NSSE Deep Approaches to Learning Scale, Subscales, Component Items, and Reliability

Deep Approaches to Learning (Cronbach's alpha=0.85)

Combination of the 3 subscales listed below

Higher-Order Learning[a] (Cronbach's alpha=0.82)

Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components

Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships

Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions

Applying theories or concepts to practical problems or in new situations

Integrative Learning[b] (Cronbach's alpha:=0.70)

Work on a paper or project that required integrating ideas or information from various sources

Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments

Put together ideas or concepts from different courses when completing assignments or during class discussions

Discussed ideas from your readings or classes with faculty members outside of class

Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)

Importance of Reflective Learning[b] (Cronbach's alpha=0.80)

Examine the strengths and weaknesses of your own views on a topic or issue

Tried to better understand someone else's views by imagining how an issue looks from his or her perspective

Learned something that changed the way your understand an issue or concept

[a] Students were asked how much (1=Very little, 2=Some, 3=Quite a bit, 4=Very much) has their coursework emphasized the following mental activities during the current school year.

[b] Students were asked how often (1=Never, 2=Sometimes, 3=Often, 4=Very often) have they done each of the following activities during the current school year.

Appendix B

BCSSE 2008-NSSE 2009 Sample: Independent Variables

Variable	Description
Student-level	
Level of parental education[a]	First-generation (neither parent attended college); At least one parent attended some college; At least one parent earned a bachelor's degree; At least one parent earned a graduate degree [b]
Gender	0 = Male; 1 = Female
Age	Number of years old
Enrollment status	0 = Part-time; 1 = Full-time
Academic ability	SAT/ACT equivalent score
Earned college grades [a]	Mostly As [b]; Mostly Bs; Mostly Cs
Potential annual income of major [c]	Average annual income of graduates with only a bachelor's degree by major
Degree track [d]	0 = Arts and Science; 1 = Vocational
Educational aspirations	0 = Aspire to earn less than a graduate degree; 1 = Aspire to earn a graduate degree
Institutional-level	
Carnegie classification	Doctoral-Research; Master's; Bac-Diverse; Bac-A&S [b]; Other Carnegie
Control	0 = Public; 1 = Private
Selectivity	Barron's selectivity index

Note: All variables are grand mean centered prior to entry into the HLM model. Interaction terms are the product of grand mean centered variables.

[a] Coded as a dichotomous variable (0 = not in group; 1 = in group)

[b] Reference group

[c] Based on averages reported in Fogg, Harington, & Harrington (2004)

[d] Categorization guided by Goyette & Mullen (2006) and Brint, Riddle, Turk-Bicakci, & Levy (2005)

Appendix C

NSSE Primary Major Choice Categorized by Degree Track Type [a]

Arts and Science	Vocational
Anthropology	Accounting
Art, fine and applied	Aero-/astronautical engineering
Astronomy	Agriculture
Atmospheric science	Allied health/other medical
Biochemistry or biophysics	Architecture
Biology (general)	Business administration (general)
Botany	Business education
Chemistry	Chemical engineering
Earth science (including geology)	Civil engineering
Economics	Communications
English (language and literature)	Computer science
Environmental science	Criminal justice
Ethnic studies	Dentistry
Gender studies	Electrical or electronic engineering
Geography	Elementary/middle school education
History	Family Studies
Language and literature (except English)	Finance
Marine (life) science	General/other engineering
Mathematics	Health technology
Microbiology or bacteriology	Industrial engineering
Music	International business
Other arts & humanities	Journalism
Other biological science	Kinesiology
Other physical science	Law
Other social science	Library/archival science
Philosophy	Management
Physics	Marketing
Political science	Materials engineering
Psychology	Mechanical engineering
Sociology	Medicine
Statistics	Military science
Theater or drama	Music or art education
Theology or religion	Natural resources and conservation
Zoolology	Nursing
	Other business, education, professional
	Parks, recreation, leisure studies, sports management
	Pharmacy
	Physical education or recreation
	Public administration
	Secondary education
	Social work
	Special education
	Speech
	Technical/vocational
	Therapy (occupational, physical, speech)
	Urban planning
	Veterinarian

[a] Categorization guided by Goyette & Mullen (2006) and Brint, Riddle, Turk-Bicakci, & Levy (2005)