Predictive Validity
First-Year Retention

Shimon A. Sarraf (ssarraf@indiana.edu)

What is the relationship between NSSE Engagement Indicators and High-Impact Practices and first-year student retention?

Purpose

Student engagement is defined by educational practices that are associated with learning and development during college. Consequently, providing evidence of NSSE's ability to predict related measures is one of many important psychometric components to warrant the instrument's use for institutional assessment and improvement. To provide predictive validity evidence, the current study addressed the following research questions:

1. What is the relationship between NSSE measures (engagement indicators and high impact practices) and retention of first-year students?
2. Do these relationships exist for different standardized test score groups, and if so, which groups demonstrate a stronger relationship than others?

Sample & Data

The data used for this study included 12,976[1] first-year respondents to the 2012 NSSE 2.0 pilot survey, an instrument that closely resembles the updated NSSE survey launched in 2013[2]. Of this sample, approximately 68% were female, 97% were enrolled full-time, 63% were White, 12% were Hispanic, 9% were African-American/Black, 6% were Asian (with the rest classifying themselves as another race/ethnicity, multiracial, or unknown). About 98% were traditional age students (younger than 24). These students came from 45 institutions of various types, including 15 doctoral /research universities, 18 master's institutions, and 12 baccalaureate colleges. They had an average institution-level retention rate of 87%, ranging from 69% to 100%. Eight additional institutions participated in the pilot but did not provide retention or standardized test scores, and thus were excluded from this study.

We supplemented NSSE data with institution reported standardized test scores and retention information (based on spring 2012 to fall 2012 persistence behavior). Using this combined data set, we focused on the relationship between retention and nine NSSE scales (what are now called Engagement Indicators or EIs) as well as three high-impact practices (HIPs) that had particular relevance to the first-year population. The scales included Higher Order Learning (HO), Reflective & Integrative Learning (RI), Learning Strategies (LS), Quantitative Reasoning (QR), Collaborative Learning (CL), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interactions (QI), and Supportive Environment (SE); the three HIPs included learning community (LS), research with faculty (RF), and service learning (SL) participation. The Discussions with Diverse Others scale on the pilot instrument varied considerably from the current version we began using in 2013, thus it was excluded from these analyses; Effective Teaching Practices was also measured somewhat differently but not enough to exclude it from further analysis. All NSSE measures used in this study had a four point scale, with the exception of QI that had a seven point range and the three HIPs that were coded 1 or 0 for having completed or not completed an HIP, respectively. See descriptive statistics of all study variables in Table 1.

[1] The original sample had 15,664 but missing data for standardized test scores reduced the available sample for analysis.
[2] See appendix for a copy of the survey instrument as well as an indication of the items used for EI and HIP measures.

Methodology

We addressed our research questions using a combination of descriptive analysis and statistical modeling. As an initial step, we categorized students by engagement scale quartiles and three SAT groups using 2011 national norm percentiles [lowest quartile (SAT ≤ 860), interquartile (861 ≤ SAT ≤ 1,179), and upper quartile (SAT ≥ 1,180)]. We then analyzed retention rate tables that show results by engagement level with and without the potential moderating influence of standardized test scores, the most powerful predictor of retention available to us. More specifically, we compare the overall difference in retention rate between the top and bottom engagement indicator quartile group, and do the same comparison within each SAT group. Following this step, we developed logistic regression models using STATA that predicted retention status using each NSSE measure individually plus SAT score, a NSSE measure - SAT score interaction term, student sex, and student enrollment status (full- or part-time status). We weighted all results by student sex and enrollment status and adjusted standard errors to reflect the clustering of students within schools.

As shown in Table 2, we relied on average marginal effects (AMEs)[3] for each NSSE measure to estimate the average percentage point change in retention rate for all students given either a one point increase in engagement scale or HIP participation, controlling for other model variables. Referred to as the "range" in tables 2 and 3, we also estimated the impact of moving from the lowest to the highest level of each scale to estimate the ceiling effect of each NSSE measure. To investigate how this relationship varies or not by SAT score, we also present AMEs based on a one-point or maximum change assuming either a 10th, 50th, or 90th national percentile SAT score (equivalent to a raw score of 730, 1,020, and 1,330). Graphs showing how predicted probabilities change across the range of NSSE scores by these three SAT percentile levels are included to illustrate the presence and degree of an interaction or moderating effect (i.e., whether NSSE measures impact retention differently by SAT score). Because of missing data associated with NSSE measures, models used between approximately 12,600 and 9,400 students (an average of about 11,460 per model).

[3] For more information about AMEs or STATA's *SPost13* package that was used to estimate them, see J. Scott Long and Jeremy Freese. 2014. Regression Models for Categorical Dependent Variables Using Stata, Third Edition. College Station, TX: Stata Press.

Table 1. Descriptive statistics

	Mean	SD	Min	Max
Student Level *(n=12,976)*				
Retention Rate	0.88	-	0	1
SAT Score*	1106	180	470	1600
Higher Order Learning	3.0	.7	1	4
Reflective and Integrative Learning	2.8	.6	1	4
Learning Strategies	2.8	.7	1	4
Quantitative Reasoning	2.4	.8	1	4
Collaborative Learning	2.6	.7	1	4
Student-Faculty Interaction	2.0	.7	1	4
Effective Teaching Practices	2.8	.5	1	4
Quality of Interactions	5.0	1.2	1	7
Supportive Environment	2.9	.66	1	4
Learning Community	.16	-	0	1
Research with Faculty	.05	-	0	1
Service Learning	.44	-	0	1
Institution Level *(n=45)*				
Retention Rate	0.87	0.07	0.69	1.00
SAT Score*	1096	112	856	1362
Higher Order Learning	3.0	.1	2.8	3.3
Reflective and Integrative Learning	2.8	.1	2.6	3.1
Learning Strategies	2.8	.1	2.6	3.2
Quantitative Reasoning	2.4	.1	2.1	2.6
Collaborative Learning	2.6	.2	2.2	3.1
Student-Faculty Interaction	2.0	.2	1.6	2.7
Effective Teaching Practices	2.8	.1	2.6	3.1
Quality of Interactions	5.1	.3	4.5	5.7
Supportive Environment	2.9	.2	2.6	3.3
Learning Community	.15	.09	.03	.42
Research with Faculty	.06	.03	.01	.18
Service Learning	.49	.15	.23	.90

* SAT and converted ACT scores used.

Table 2. Predicted Percentage Point Change in Retention Probability for Engagement Indicators and High Impact Practices [a b]

	Probability Change (+1) [d]	95% Confidence Interval		Probability Change (Range) [d]
		Lower Limit	Upper Limit	
Engagement Indicator				
Higher Order Learning	3%***	2%	3%	10%***
Reflective & Integrative Learning	2%***	1%	3%	7%***
Learning Strategies	2%***	1%	3%	7%***
Quantitative Reasoning	1%***	1%	2%	4%***
Collaborative Learning	3%***	2%	4%	10%***
Student-Faculty Interaction	3%***	1%	4%	8%***
Effective Teaching Practices	3%***	2%	4%	12%***
Quality of Interactions	2%***	1%	2%	14%***
Supportive Environment	3%***	2%	4%	12%***
High Impact Practice [c]				
Learning Community	4%**	1%	6%	-
Research with Faculty	3%*	1%	5%	-
Service Learning	2%*	0.3%	3%	-

Table 3. Predicted Percentage Point Change in Retention Probability for Engagement Indicators and High Impact Practices by SAT Percentile Group [a b]

	Probability Change (+1) [d]			Probability Change (Range) [d]		
SAT Percentile Group [e]	10th	50th	90th	10th	50th	90th
Engagement Indicator						
Higher Order Learning	3%*	3%***	2%***	11%*	11%***	9%**
Reflective & Integrative Learning	3%+	2%***	2%**	9%+	8%***	6%**
Learning Strategies	n.s.	2%***	2%***	n.s.	7%***	8%**
Quantitative Reasoning	2%*	1%***	1%+	7%*	5%***	3%+
Collaborative Learning	n.s.	3%***	3%***	n.s.	10%***	11%***
Student-Faculty Interaction	n.s.	3%***	3%**	n.s.	9%***	9%**
Effective Teaching Practices	4%***	3%***	3%***	15%**	13%***	10%**
Quality of Interactions	n.s.	2%***	2%***	n.s.	13%***	15%***
Supportive Environment	5%***	4%***	2%**	20%***	14%***	9%**
High Impact Practice [c]						
Learning Community	6%*	4%**	n.s.	-	-	-
Research with Faculty	8%*	4%*	n.s.	-	-	-
Service Learning	3%+	2%*	n.s.	-	-	-

Notes for Tables 2 and 3:

[a] Results are based on logistic regression models that included one NSSE measure, SAT score, NSSE measure-SAT score interaction term, student sex, and enrollment status. The interaction term was significant for all models.

[b] Unless otherwise noted with "n.s.", all results are statistically significant at the .1(+), .05(*), .01(**), or .001(***) levels.

[c] Students that participated in a learning community or did research with faculty were coded 1 in the data; all other students were coded 0. Students that reported that none of their courses during the current academic year included a community-based project were coded 0; all other student responses (All/Most/Some) were coded 1.

[d] Reflects the percentage point change in probability associated with a one point change (+1) in EI score or having done a HIP. A percentage point change in probability associated with a shift from the lowest to highest possible EI score (referred to as "range") is also included. The standard NSSE engagement indicator report for participating institutions uses a different scale (0 to 60), not the 1 to 4 or 1 to 7 point scale used for this psychometric analysis.

[e] The SAT 10th, 50th, and 90th percentile scores correspond to raw scores of 730, 1020, and 1330, respectively.

Results

Higher-Order Learning (HO)

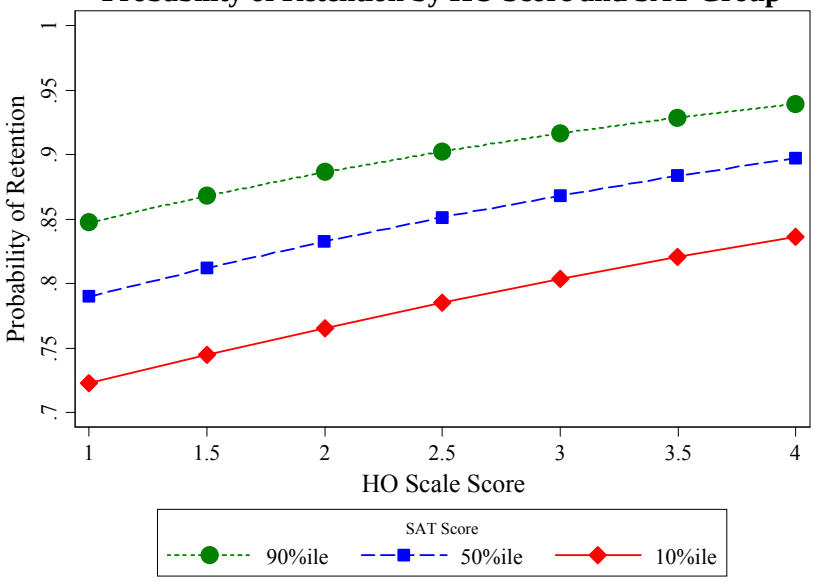
As with all the NSSE measures assessed in this study, a positive relationship exists between HO and retention from the 2nd to 3rd semester. The average retention rate difference between those in the bottom and top HO quartiles, whether that be in the aggregate or within SAT group, is approximately 5%. Our model estimates a student's retention probability increases about 3 percentage points given a 1 point increase in HO or about 10 percentage points given a maximum HO change of 3 points. Reviewing results by the three SAT percentile groups, a 1 point change in HO appears to impact students with different SAT scores similarly (about 2 or 3 percentage points). No evidence of a meaningful interaction between SAT and HO scores is suggested by the data. Each SAT percentile group shows a change of 9 to 11 percentage points given a change of 3 points.

Retention Rates by HO and SAT Group

SAT Group	HO Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	77.6	223
	2nd	82.7	278
	3rd	77.4	133
	4th	83.9	286
	Total	81.1	920
Middle 50%	1st	84.5	1,636
	2nd	87.8	2,369
	3rd	87.6	1,074
	4th	90.0	1,587
	Total	87.5	6,666
Top 25%	1st	88.2	1,250
	2nd	91.2	1,447
	3rd	91.8	790
	4th	93.6	822
	Total	90.9	4,309
Total	1st	85.5	3,109
	2nd	88.6	4,094
	3rd	88.6	1,997
	4th	90.4	2,695
	Total	88.2	11,895

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by HO Score and SAT Group



Reflective and Integrative Learning (RI)

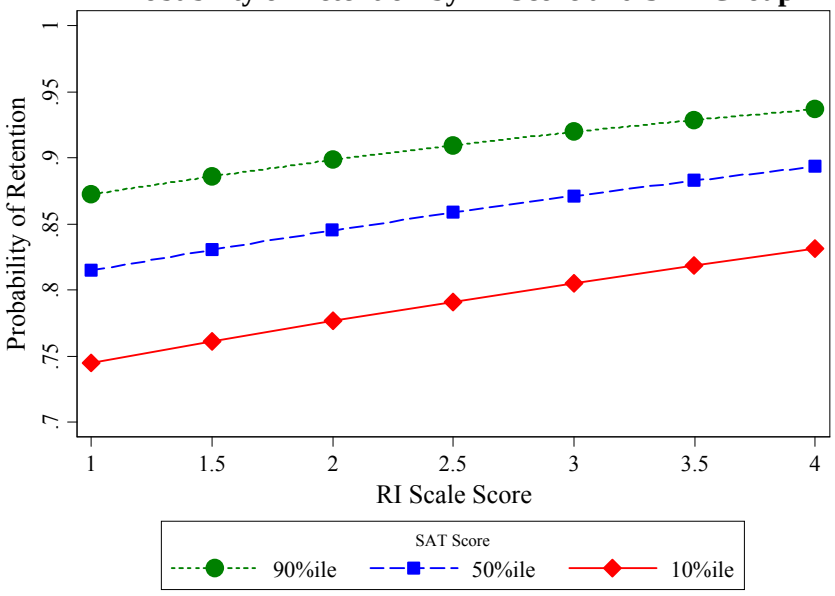
Students in the top RI quartile have approximately a 4 percentage point greater retention rate than those in the bottom quartile. However, some variation by SAT groups exists though. A 7 percentage point difference can be seen between the RI bottom and top quartiles within the lowest SAT quartile group, whereas only a 3 percentage point difference is found within the middle and top SAT groups. Furthermore, our model estimates a student's retention probability increases about 2 percentage points given a 1 point increase in RI or about 7 percentage points given a maximum RI change of three points. A 1 point change in RI appears to impact students with different SAT scores about the same, however with a shift of 3 points in RI a student with a 10th or 50th percentile SAT score appears to gain the most from increases in RI (8 or 9 percentage point change in retention probability versus 6 percentage point change for the 90th percentile).

Retention Rates by RI and SAT Group

SAT Group	RI Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	75.2	286
	2nd	82.5	263
	3rd	80.1	231
	4th	81.9	221
	Total	79.7	1,001
Middle 50%	1st	85.6	1,708
	2nd	87.8	1,851
	3rd	87.6	1,813
	4th	88.7	1,652
	Total	87.4	7,024
Top 25%	1st	89.5	961
	2nd	90.4	1,174
	3rd	90.5	1,183
	4th	92.8	1,160
	Total	90.9	4,478
Total	1st	85.9	2,955
	2nd	88.3	3,288
	3rd	88.1	3,227
	4th	89.8	3,033
	Total	88.0	12,503

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by RI Score and SAT Group



Learning Strategies (LS)

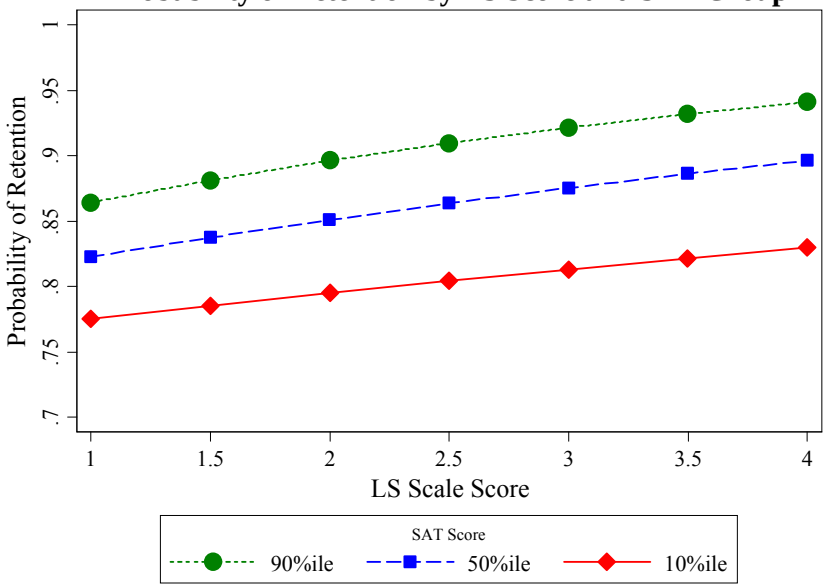
Students in the top LS quartile have a 5 percentage point greater retention rate than those in the bottom quartile. The bottom SAT group shows a negligible difference with more pronounced differences of about 5 percentage points for the two higher SAT groups. Our LS model estimates a student's retention probability increases about 2 percentage points given a 1 point increase in LS or about 7 percentage points given a maximum LS change of 3 points. A 1 point change in LS appears to impact students with different SAT scores similarly (about 2% for the middle and top groups), however with a shift of 3 points in LS a student with a 50th or 90th SAT percentile score appears to gain the most from increases in LS compared to students with a 10th percentile score (a 7 or 8 percentage point change compared to a 5 percentage point change).

Retention Rates by LS and SAT Group

SAT Group	LS Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	80.4	209
	2nd	81.2	202
	3rd	80.4	189
	4th	81.7	241
	Total	81.0	841
Middle 50%	1st	83.4	1,413
	2nd	88.6	1,714
	3rd	89.3	1,364
	4th	88.8	1,674
	Total	87.6	6,165
Top 25%	1st	87.9	881
	2nd	90.8	1,235
	3rd	92.0	824
	4th	92.8	1,173
	Total	91.0	4,113
Total	1st	84.7	2,503
	2nd	89.0	3,151
	3rd	89.5	2,377
	4th	89.7	3,088
	Total	88.4	11,119

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by LS Score and SAT Group



Quantitative Reasoning (QR)

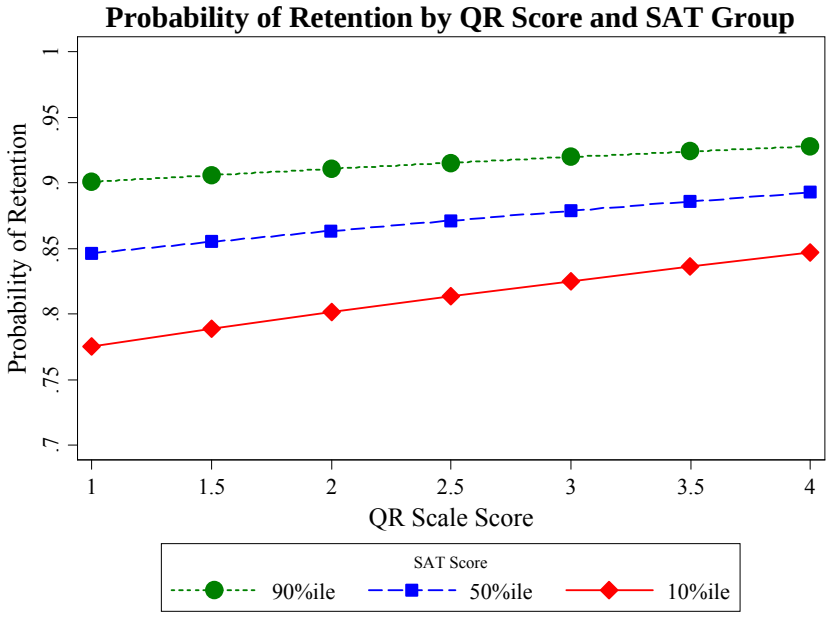
Students in the top QR quartile have about a 3 percentage point greater retention rate than those in the bottom quartile. Looking within SAT groups, nearly the same difference is found for both the middle and top groups, however the bottom group has a more noticeable difference of about 7 percentage points. Our QR model estimates a student's retention probability increases about 1 percentage point given a 1 point increase in QR or about 4 percentage points given a maximum QR change of 3 points. A 1 point change in QR appears to impact students with different SAT scores about the same (about 1 or 2 percentage points), however with a 3 point QR change the model predicts that a student with a 10th percentile SAT score gains more than a student with a 50th or 90th percentile score (a 7 percentage point change in retention probability versus 5 or 3 percentage points).

Retention Rates by QR and SAT Group

SAT Group	QR Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	76.3	211
	2nd	82.1	195
	3rd	82.6	184
	4th	83.3	282
	Total	81.2	872
Middle 50%	1st	85.7	1,477
	2nd	87.7	1,512
	3rd	88.7	1,463
	4th	88.3	1,981
	Total	87.7	6,433
Top 25%	1st	88.9	1,003
	2nd	90.8	920
	3rd	91.9	1,086
	4th	91.6	1,196
	Total	90.8	4,205
Total	1st	86.2	2,691
	2nd	88.4	2,627
	3rd	89.5	2,733
	4th	89.0	3,459
	Total	88.3	11,510

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by QR Score and SAT Group



Collaborative Learning (CL)

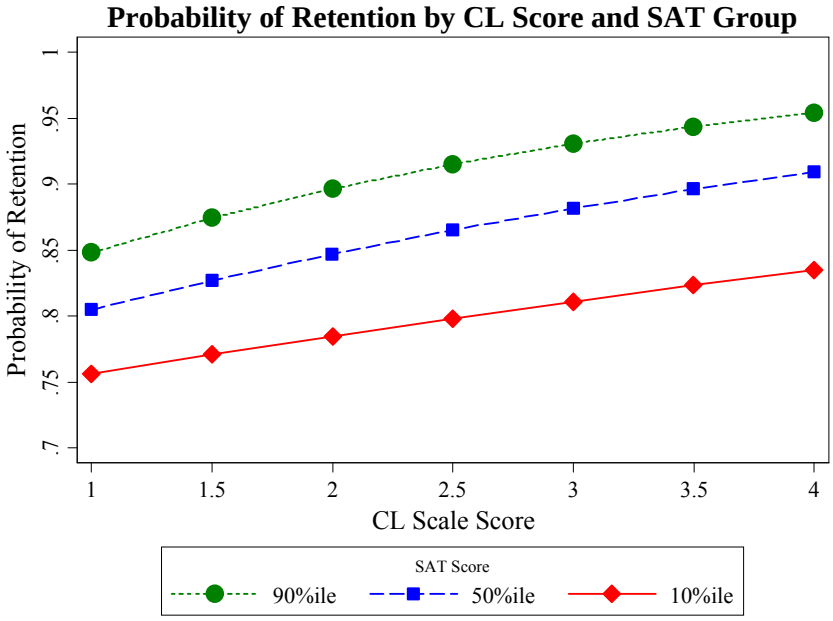
Students in the top CL quartile have about a 5 percentage point greater retention rate than those in the bottom quartile. Looking within each SAT group, nearly the same difference is found. Our CL model estimates a student's retention probability increases about 3 percentage points given a 1 point increase in CL or about 10 percentage points given a maximum CL change of three points. A 1 point change in CL appears to impact students with different SAT scores about the same for a student in the 50th or 90th percentile (3 percentage points). Our model also predicts that with a 3 point CL change a student with a 50th or 90th percentile SAT score would increase their retention probability by 10 or 11 percentage points. With either a 1 point or maximum CL change, the effects for students at the 10th percentile were *not* statistically significant.

Retention Rates by CL and SAT Group

SAT Group	CL Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	79.9	269
	2nd	74.2	252
	3rd	82.3	232
	4th	84.6	259
	Total	80.2	1,012
Middle 50%	1st	84.5	2,002
	2nd	87.8	1,944
	3rd	88.6	1,738
	4th	90.2	1,433
	Total	87.5	7,117
Top 25%	1st	87.1	1,275
	2nd	91.9	1,265
	3rd	92.0	1,111
	4th	92.6	842
	Total	90.7	4,493
Total	1st	85.1	3,546
	2nd	88.3	3,461
	3rd	89.4	3,081
	4th	90.4	2,534
	Total	88.1	12,622

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by CL Score and SAT Group



Student-Faculty Interactions (SF)

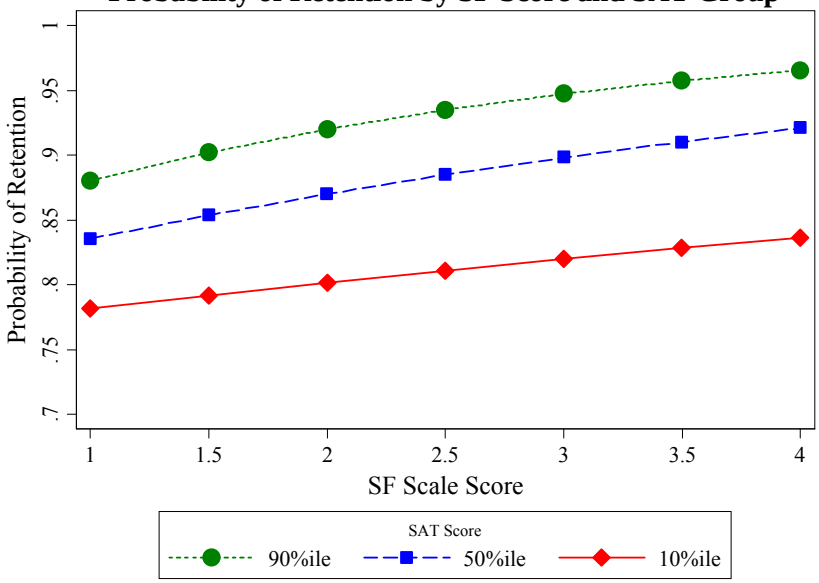
Students in the top SF quartile have about a 6 percentage point greater retention rate than those in the bottom quartile. Looking within each SAT group, nearly the same difference is found. Our SF model estimates a student's retention probability increases about 3 percentage points given a 1 point increase in SF or about 8 percentage points given a maximum SF change of three points. A 1 point change in SF appears to impact students with different SAT scores about the same for a student in the 50th or 90th percentile (3 percentage points). Our model also predicts that with a 3 point SF change a student with a 50th or 90th percentile SAT score would increase their retention probability by 9 percentage points. With either a 1 point or maximum SF change, the effects for students at the 10th percentile were *not* statistically significant.

Retention Rates by SF and SAT Group

SAT Group	SF Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	77.3	176
	2nd	84.0	225
	3rd	76.3	215
	4th	83.4	296
	Total	80.7	912
Middle 50%	1st	84.6	1,446
	2nd	86.5	1,976
	3rd	88.5	1,653
	4th	90.3	1,624
	Total	87.5	6,699
Top 25%	1st	87.1	860
	2nd	90.3	1,413
	3rd	92.1	1,149
	4th	93.7	932
	Total	90.9	4,354
Total	1st	85.0	2,482
	2nd	87.8	3,614
	3rd	89.0	3,017
	4th	90.7	2,852
	Total	88.2	11,965

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by SF Score and SAT Group



Effective Teaching Practices (ET)

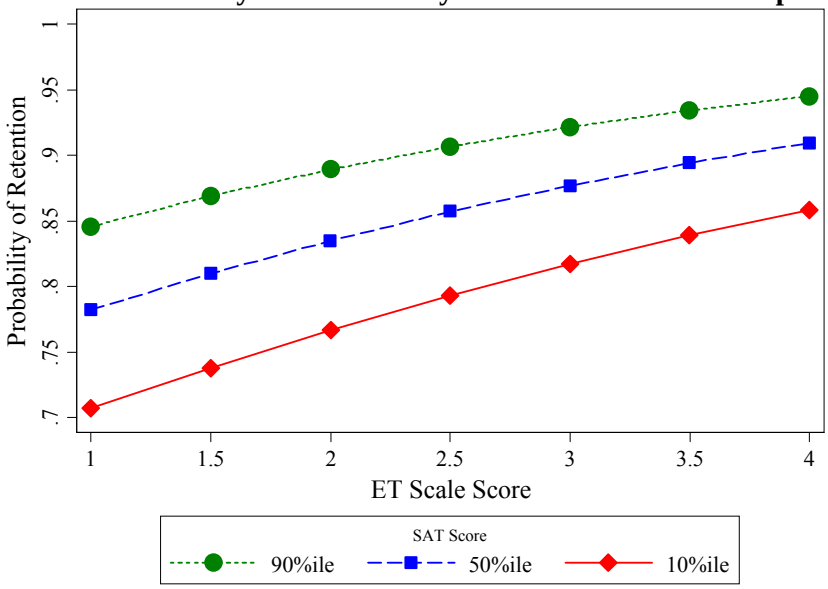
Students in the top ET quartile have approximately a 5 percentage point greater retention rate than those in the bottom quartile. Some variation by SAT groups exists though. A nearly 8 point difference can be seen between the ET bottom and top quartiles within the lowest SAT quartile group, whereas we only see a 4 or 6 point difference with the middle and top SAT groups, respectively. Furthermore, our model estimates a student's retention probability increases about 3 percentage points given a 1 point increase in ET or about 12 percentage points given a maximum ET change of 3 points. A 1 point change in ET appears to impact students with different SAT scores about the same (3 or 4 percentage points), however with a shift of 3 points in ET a student with a 10th percentile SAT score appears to gain the most from increases in ET (15 percentage points compared to 13 and 10 point changes for those with 50th and 90th percentile scores, respectively).

Retention Rates by ET and SAT Group

SAT Group	SE Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	75.5	277
	2nd	84.0	162
	3rd	82.8	192
	4th	83.3	311
	Total	81.0	942
Middle 50%	1st	85.2	2,029
	2nd	89.1	1,484
	3rd	87.5	1,483
	4th	89.2	1,827
	Total	87.6	6,823
Top 25%	1st	87.8	1,089
	2nd	90.5	1,104
	3rd	91.3	1,052
	4th	93.9	1,157
	Total	90.9	4,402
Total	1st	85.2	3,395
	2nd	89.3	2,750
	3rd	88.6	2,727
	4th	90.3	3,295
	Total	88.3	12,167

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by ET Score and SAT Group



Quality of Interactions (QI)

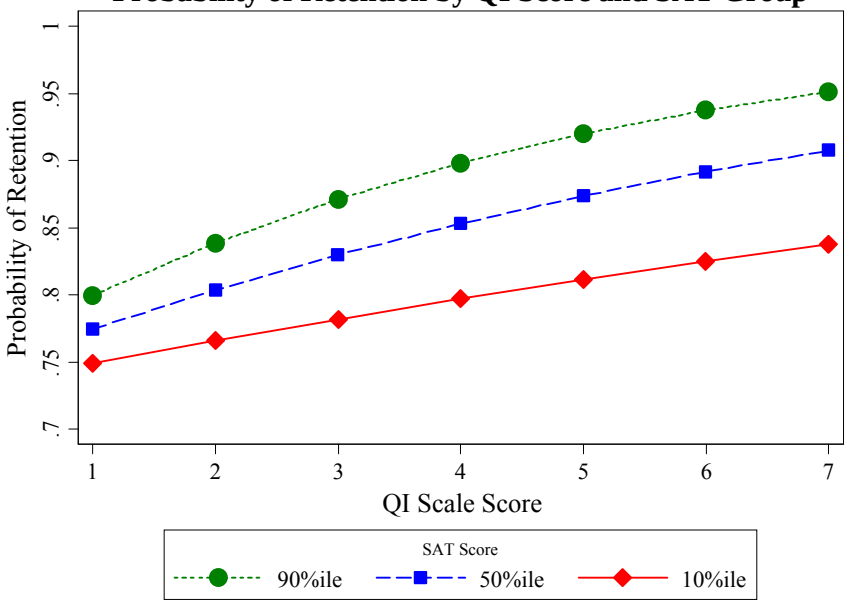
Students in the top QI quartile have more than a 6 percentage point greater retention rate than those in the bottom quartile. Looking within each SAT group, we see a difference among students within the top SAT quartile of almost 9 percentage points, whereas the middle and bottom SAT groups show about a 5 percentage point gap between their top and bottom QI quartile students. Our QI model estimates a student's retention probability increases about 2 percentage points given a 1 point increase in QI or about 14 percentage points given a maximum QI change of six points. A 1 point change in QI appears to impact students with different SAT scores about the same for a student in the 50th or 90th percentile (2 percentage points). Our model also predicts that with a 6-point QI change a student with a 50th or 90th percentile SAT score would increase their retention probability by 13 or 15 percentage points, respectively. The effects for students at the 10th percentile were not statistically significant.

Retention Rates by QI and SAT Group

SAT Group	QI Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	80.0	265
	2nd	79.2	144
	3rd	76.7	120
	4th	85.5	193
	Total	80.7	722
Middle 50%	1st	84.5	1,517
	2nd	88.2	1,189
	3rd	90.7	1,224
	4th	89.0	1,345
	Total	87.9	5,275
Top 25%	1st	85.2	677
	2nd	92.4	798
	3rd	92.2	984
	4th	93.9	981
	Total	91.3	3,440
Total	1st	84.2	2,459
	2nd	89.2	2,131
	3rd	90.6	2,328
	4th	90.6	2,519
	Total	88.6	9,437

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by QI Score and SAT Group



Supportive Environment (SE)

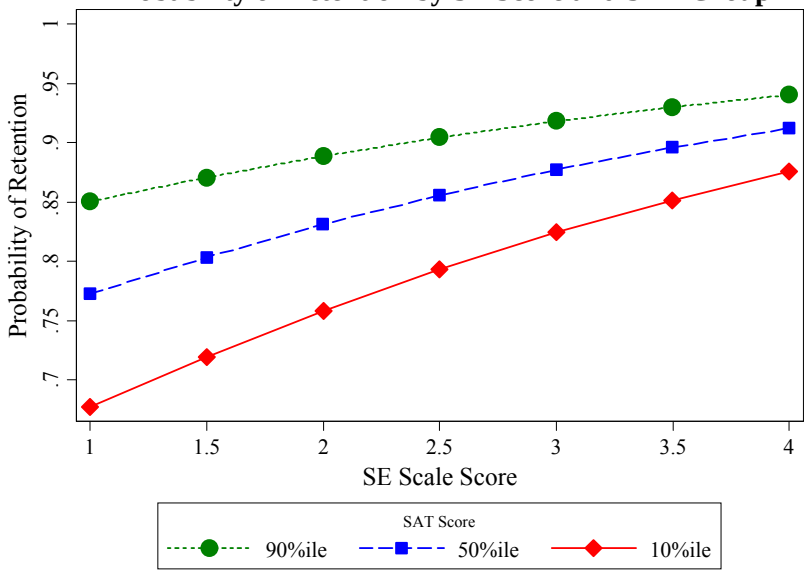
Students in the top SE quartile have about a 7 percentage point greater retention rate than those in the bottom quartile. Looking within each SAT group, we see a difference within the bottom SAT quartile of almost 13 percentage points, whereas the middle and top SAT groups show about a 6 to7 percentage point gap between their top and bottom SE quartile students. Model estimates indicate a student's retention probability increases about 3 percentage points given a 1 point increase in SE or about 12 percentage points given a maximum SE change of three points. A 1 point change in SE appears to impact students with varied SAT scores differently. A one point increase in SE is associated with a 4 to 5 percentage point change for 10th and 50th SAT percentile scores, but only 2 percentage points for the 90th percentile. With a 3 point SE change the model estimates a 20, 14, and 9 percentage point change for a student with either a 10th, 50th or 90th SAT percentile score, respectively.

Retention Rates by SE and SAT Group

SAT Group	SE Quartile [a]	Retention Rate (%)	N
Bottom 25%	1st	74.4	238
	2nd	78.9	142
	3rd	82.5	171
	4th	87.0	192
	Total	80.4	743
Middle 50%	1st	83.5	1,379
	2nd	87.9	1,392
	3rd	90.1	1,463
	4th	90.4	1,360
	Total	88.0	5,594
Top 25%	1st	86.9	786
	2nd	90.7	1,067
	3rd	91.8	1,110
	4th	93.0	896
	Total	90.8	3,859
Total	1st	83.7	2,403
	2nd	88.5	2,601
	3rd	90.3	2,744
	4th	91.1	2,448
	Total	88.5	10,196

[a] 1st quartile of Engagement Indicator reflects bottom 25% of scores; 4th quartile reflects top 25% of scores.

Probability of Retention by SE Score and SAT Group

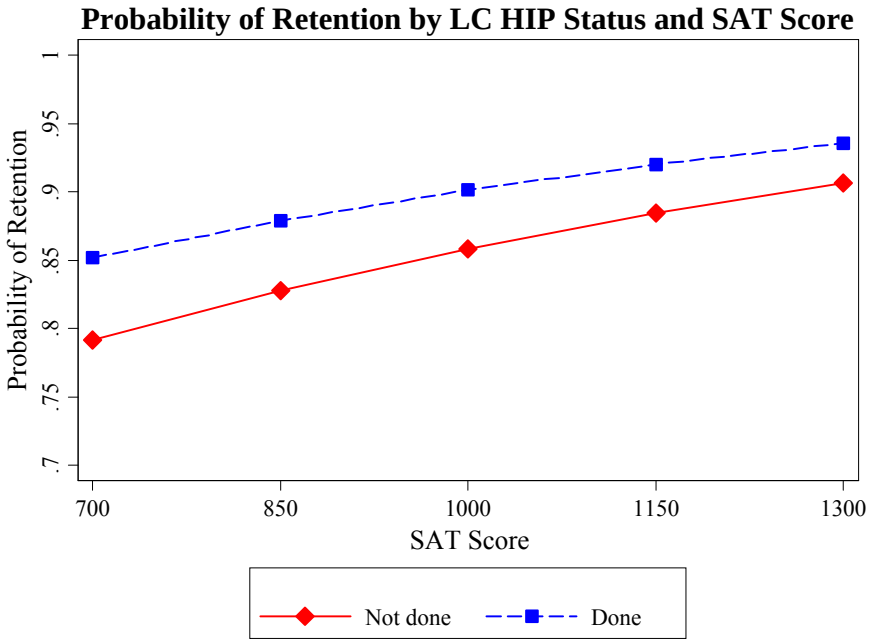


Learning Community (LC)

Students that participate in learning communities have about a 3 percentage point greater retention rate than those who did not participate. Looking within each SAT group, we see a difference within the bottom SAT quartile of 7 percentage points compared to 4 and 2 percentage points for the middle and top SAT groups, respectively. Model estimates show a student's retention probability increases about 4 percentage points on average given LC participation. A student with a 10th percentile SAT score (730) has an even greater estimated change of 6 percentage points compared with 4 percentage points for a student with a 50th percentile score (1,020). The effect for a student at the 90th SAT percentile (1,330) is not statistically significant.

Retention Rate by LC Status and SAT Group

SAT Group	Participation Status	Retention Rate	N
Bottom 25%	Non-Participant	79.5	704
	Participant	86.7	150
	Total	80.8	854
Middle 50%	Non-Participant	87.0	5,230
	Participant	90.8	1,043
	Total	87.7	6,273
Top 25%	Non-Participant	90.6	3,580
	Participant	92.5	589
	Total	90.9	4,169
Total	Non-Participant	87.8	9,514
	Participant	91.0	1,782
	Total	88.3	11,296

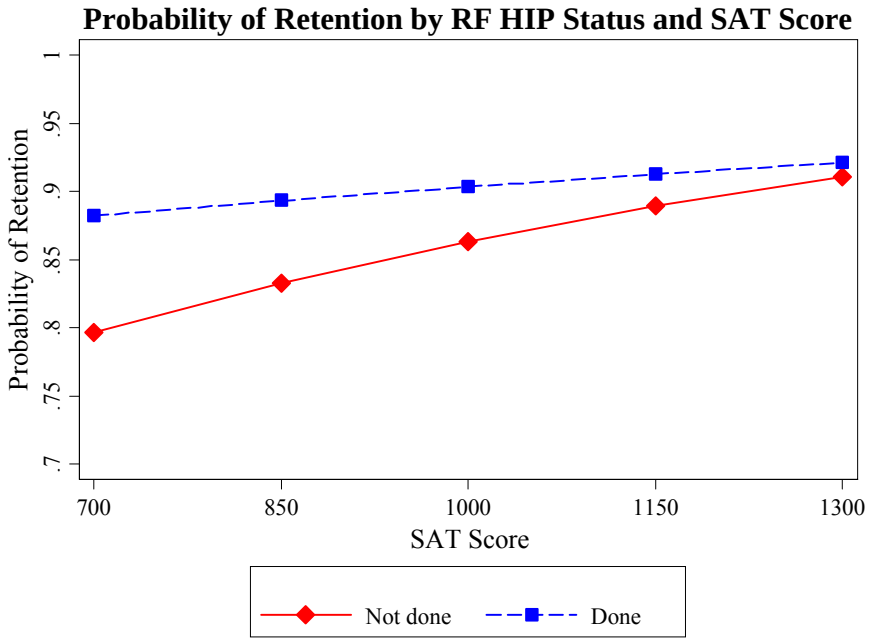


Research with Faculty (RF)

Students that participate in research with faculty have a 3 percentage point greater retention rate than those who do not. Looking within SAT groups, we see a difference of 6 percentage points for the bottom SAT group compared to 4 and 2 percentage points for the middle and top SAT groups, respectively. Model estimates show a student's retention probability increases about 3 percentage points on average given RF participation. A student with a 10th percentile SAT score (730) has an even greater estimated change of 8 percentage points compared with 4 percentage points for a student with a 50th percentile score (1,020). The effect for a student at the 90th percentile (1,330) is *not* statistically significant.

Retention Rate by RF Status and SAT Group

SAT Group	Participation Status	Retention Rate	N
Bottom 25%	Non-Participant	80.2	781
	Participant	85.9	64
	Total	80.6	845
Middle 50%	Non-Participant	87.5	5,970
	Participant	91.9	283
	Total	87.7	6,253
Top 25%	Non-Participant	90.8	3,905
	Participant	92.1	242
	Total	90.9	4,147
Total	Non-Participant	88.2	10,656
	Participant	91.3	589
	Total	88.4	11,245

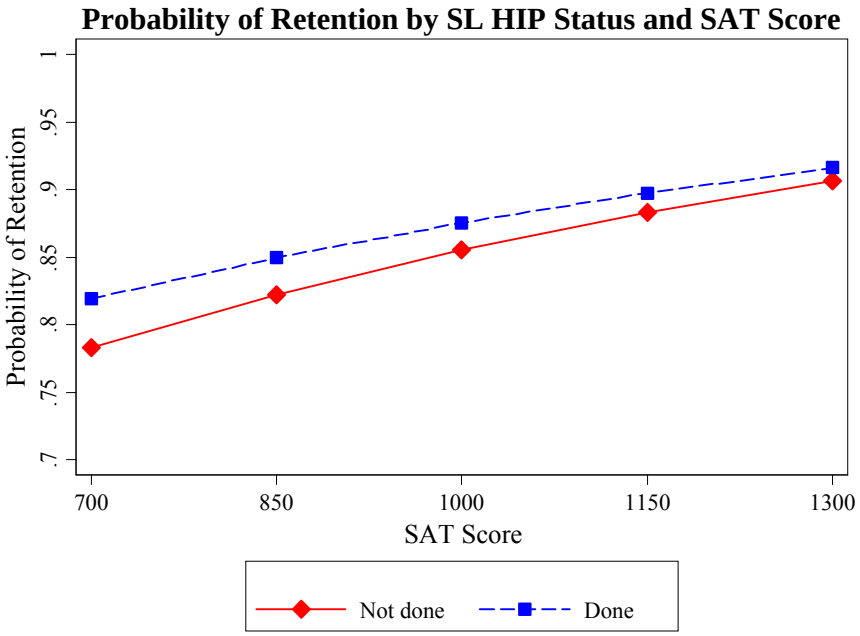


Servicing Learning (SL)

Students that reported taking classes with a service learning component have a 2 percentage point greater retention rate than those who did not. Looking within SAT groups, we see a larger difference of about 7 percentage points for those in the bottom SAT quartile, which is in contrast to the 1 to 2 percentage point difference for the other two groups with higher SAT scores. Model estimates show a student's retention probability increases about 2 percentage points on average given SL participation, and a student with a SAT 10th percentile (730) or 50th percentile (1,020) score has about a 2 to 3 percentage point estimated change. The effect for a student at the 90th percentile (1,330) is not statistically significant.

Retention Rate by SL Status and SAT Group

SAT Group	Participation Status	Retention Rate	N
Bottom 25%	Non-Participant	77.6	411
	Participant	84.2	480
	Total	81.1	891
Middle 50%	Non-Participant	86.9	3,459
	Participant	88.4	3,034
	Total	87.6	6,493
Top 25%	Non-Participant	90.3	2,604
	Participant	91.6	1,646
	Total	90.8	4,250
Total	Non-Participant	87.7	6,474
	Participant	89.0	5,160
	Total	88.3	11,634



Summary

These results suggest a meaningful, positive relationship exists between various NSSE measures and first-year student retention. A 1 point change in each NSSE measure studied here corresponds to a 2 to 4 percentage point increase in retention rates; overall effects associated with larger changes for NSSE measures are more notable, ranging from 4 to 14 percentage points. The largest effects are seen with Effective Teaching Practices, Quality of Interactions, and Supportive Environment engagement indicators while Quantitative Reasoning shows the weakest effects. Our data also suggests engagement impacts students with SAT scores of various levels differently. Students with relatively lower SAT scores appear to be more positively affected by Reflective and Integrative Learning, Quantitative Reasoning, Effective Teaching Practices, Supportive Environment, learning community participation, and research with faculty than students at the opposite end of the spectrum. In contrast, our models suggest that retention for this population is not strongly influenced by higher levels of Learning Strategies, Collaborative Learning, Student-Faculty Interaction, and Quality of Interactions. Though our study suggests that high impact practices do not influence student retention for those with very high SAT scores, the results show that this population's behavior is strongly correlated with all engagement indicators except for Quantitative Reasoning and Reflective and Integrative Learning.

Suggested citation

Sarraf, S.A. (2018). *Predictive Validity: First-Year Retention* (NSSE Psychometric Portfolio Report). Bloomington, IN: Center for Postsecondary Research, Indiana University, School of Education. Available online: http://nsse.indiana.edu/html/psychometric_portfolio.cfm

Appendix

List of Study Institutions (n=45)

Albany State University
Alma College
Averett University
Baldwin-Wallace College
California State University, Fullerton
California State University, Northridge
Cornell College
DePauw University
Henderson State University
Indiana University Bloomington
Indiana University-Purdue University Indianapolis
Johnson State College
Kenyon College
Marquette University
Oakland University
Philander Smith College
Roger Williams University
Saint Anselm College
San Diego State University
Savannah State University
Slippery Rock University of Pennsylvania
SUNY Potsdam
Sweet Briar College
Taylor University
Texas Christian University
Texas Lutheran University
Texas State University-San Marcos
Truman State University
University of Alabama
University of Miami
University of Nebraska at Kearney
University of Nebraska at Lincoln
University of North Carolina at Charlotte
University of North Carolina Wilmington
University of San Francisco
University of South Florida
University of Southern Mississippi
University of the Incarnate Word
University of Wisconsin-Eau Claire
University of Wisconsin-Green Bay
Utah State University
Virginia Commonwealth University
Weber State University
Winthrop University
Xavier University of Louisiana

NSSE 2.0 Pilot 2012

Study Measures

1. In your experience at your institution during the current school year, about how often have you done each of the following?

Never, Sometimes, Often, Very Often

a. Asked questions or contributed to course discussions in other ways
b. Carefully revised the content or organization of a paper before turning it in
c. Completed course readings and other assignments on time
d. Missed or skipped class for any reason
e. Attended an art exhibit, play or other arts performance (dance, music, etc.)
f. Asked another student to help you understand course material — CL
g. Explained course material to one or more students — CL
h. Prepared for exams by discussing or working through course material with other students — CL
i. Worked with other students on course projects or assignments — CL
j. Discussed ideas from your courses with others (friends, family, co-workers, etc.)

2. In your experience at your institution during the current school year, about how often have you done each of the following?

Never, Sometimes, Often, Very Often

a. Connected your learning to societal problems or issues — RI
b. Combined ideas from different courses when completing assignments — RI
c. Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments — RI
d. Examined the strengths and weaknesses of your own views on a topic or issue — RI
e. Tried to better understand someone else's views by imagining how an issue looks from his or her perspective — RI
f. Learned something that changed the way you understand an issue or concept — RI
g. Connected ideas from your courses to your prior experiences and knowledge — RI

3. In your experience at your institution during the current school year, about how often have you done each of the following?

Never, Sometimes, Often, Very Often

a. Talked about career plans with a faculty member — SF
b. Worked with a faculty member on activities other than coursework (committees, student groups, etc.) — SF
c. Discussed ideas for a course project or paper with a faculty member
d. Discussed course topics, ideas, or concepts with a faculty member outside of class — SF
e. Asked a faculty member for guidance on your academic program or plans
f. Discussed your academic performance with a faculty member — SF

4. During the current school year, in about how many of your courses have your instructors done the following?

None, Some, Most, All

a. Clearly explained course goals and requirements — ET
b. Taught course sessions in an organized way — ET
c. Used examples or illustrations to explain difficult points — ET
d. Taught in ways that encouraged your active participation
e. Created an atmosphere to promote your learning
f. Got to know you as an individual

g. Provided feedback on a draft or work in progress
h. Gave **prompt** feedback on tests or assignments ET
i. Gave **detailed** feedback on tests or assignments ET

5. During the current school year, indicate the extent to which your courses have challenged you to do your best work

Very little, Some, Quite a bit, Very much

6. During the current school year, how much has your coursework emphasized the following?

Very little, Some, Quite a bit, Very much

a. Memorizing course material
b. Applying facts, theories, or methods to practical problems or new situations HO
c. Analyzing an idea, experience, or line of reasoning in depth by examining its basic parts HO
d. Evaluating a point of view, decision, or information source HO
e. Forming a new idea or understanding from various pieces of information HO

7. In your experience at your institution during the current school year, about how often have you done each of the following?

Never, Sometimes, Often, Very Often

a. Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.) QR
b. Used numerical information to examine a real-world problem or issue (unemployment, climate change, disease prevention, etc.) QR
c. Evaluated what others have concluded from numerical information QR

8. During the current school year, in about how many of your courses did you do the following?

None, Some, Most, All

a. Gave a course presentation
b. Participated in a community-based project as part of a regular course (i.e., service-learning) HIP
c. Completed an experiment or project using scientific methods

9. During the current school year, about how many times have you written a paper, report, or other assignment that was of the following length?

None, 1-2, 3-5, 6-10, 11-15, 16-20, More than 20

a. Up to 5 pages
b. Between 6 and 10 pages
c. 11 pages or more

10. In a *typical week* this year, about how many total pages have you read for all of your courses?

0, 1-25, 26-50, 51-100, 101-200, 201-300, more than 300

11. Which of the following have you done or do you plan to do before you graduate from your institution?

Done or in progress, Plan to do, Do not plan to do, Have not decided

a. Participate in a formal program where groups of students take two or more classes together (sometimes called a learning community) HIP
b. Participate in an internship, co-op, field experience, student teaching, or clinical assignment
c. Participate in a study abroad program
d. Hold a formal leadership role in a student organization or group
e. Work with a faculty member on a research project HIP
f. Complete a culminating senior experience (capstone course, senior project or thesis, comprehensive exam, portfolio, etc.)

12. Indicate the quality of your interactions with the following people at your institution:

Poor to Excellent (1 to 7) or Not Applicable

a. Students QI
b. Academic advisors QI
c. Faculty QI
d. Student services staff (campus activities, housing, career services, etc.) QI
e. Other administrative staff and offices (registrar, financial aid, etc.) QI

13. During the current school year, about how many times have you met with an academic advisor to discuss your academic interests, course selection, or academic performance?

0, 1, 2, 3, 4, 5 , 6or more

14. In your experience at your institution during the current school year, about how often have you had serious conversations with people who differ from you in the following ways?

Never, Sometimes, Often, Very Often

a. Political views
b. Economic and social background
c. Religious beliefs or philosophy of life
d. Race, ethnic background, or country of origin
e. Sexual orientation

15. In your experience at your institution during the current school year, about how often have you done each of the following?

Never, Sometimes, Often, Very Often

a. Discussed study strategies with others
b. Identified key information from reading assignments LS
c. Reviewed your notes after class LS
d. Summarized what you learned in class or from course materials LS

16. How much does your institution emphasize each of the following?

Very little, Some, Quite a bit, Very much

a. Providing the support you need to help you succeed academically SE
b. Spending significant amounts of time studying and on academic work
c. Using learning support services (writing center, tutoring services, etc.) SE
d. Having contact among students from different backgrounds (social, racial/ethnic, religious, etc.) SE
e. Providing opportunities to be involved socially SE
f. Providing support for your overall well-being (recreation, health care, counseling, etc.) SE
g. Helping you manage your non-academic responsibilities (work, family, etc.) SE
h. Attending campus events and activities (special speakers, cultural performances, athletic events, etc.) SE
i. Attending events that address important social, economic, or political issues SE

17. About how many hours do you spend in a typical 7-day week doing each of the following?

0 hrs/wk, 1-5 hrs/wk, 6-10 hrs/wk, 11-15 hrs/wk, 16-20 hrs/wk, 21-25 hrs/wk, 26-30 hrs/wk, More than 30 hrs/wk

a. Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
b. Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)
c. Working at an internship, co-op, field experience, student teaching, or clinical assignment
d. Working for pay **on campus**
e. Working for pay **off campus**
f. Volunteering
g. Relaxing and socializing (time with friends, video games, TV or videos, keeping up with friends online, etc.)
h. Providing care for dependents (children, parents, etc.)
i. Commuting to campus

18. How much has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas?

Very little, Some, Quite a bit, Very much

a. Writing clearly and effectively
b. Speaking clearly and effectively
c. Thinking critically and analytically
d. Analyzing numerical and statistical information
e. Acquiring job- or work-related knowledge and skills
f. Working effectively with others
g. Developing or clarifying a personal code of values and ethics
h. Understanding people of other backgrounds (economic, racial/ethnic, political, religious, nationality, etc.)
i. Solving complex real-world problems

19. How would you evaluate your entire educational experience at this institution?

Poor, Fair, Good, Excellent

20. If you could start over again, would you enroll at this institution?

Definitely yes, Probably yes, Probably no, Definitely no

21. What is your class level?

Freshman/first-year, Sophomore, Junior, Senior, Unclassified

22. Thinking about this current academic term, are you a full-time student?

Yes, No

23. How many courses are you taking this current academic term?

0, 1, 2, 3, 4, 5, 6, 7 or more

a. Of these, how many are entirely online?

0, 1, 2, 3, 4, 5, 6, 7 or more

24. Will you complete one major or more than one? (do not count minors.)

One, More than one

a. [If answered "one"] Please enter your major or expected major:
b. [If answered "more than one"] Please enter up to two majors or expected majors (do not enter minors):

25. What is the highest level of education you expect to complete?

Some college but less than a bachelor's degree; Bachelor's degree (B.A., B.S., etc.); Master's degree (M.A., M.S., etc.); Doctoral or professional degree (Ph.D., J.D., M.D., etc.)

26. Your sex:

Male, Female

27. Enter your year of birth: 19[ ]

28. What is the **highest** level of education completed by **either** of your parents (or those who raised you)?

Did not finish high school
High school diploma/G.E.D.
Attended college but did not complete degree
Associate's degree (A.A., A.S., etc.)
Bachelor's degree (B.A., B.S., etc.)
Master's degree (M.A., M.S., etc.)
Doctoral or professional degree (Ph.D., J.D., M.D., etc.)

29. Did you begin college at this institution or elsewhere?

Started here, Started elsewhere

30. Since graduating from high school, which of the following types of schools have you attended other than the one you are attending now? (Select all that apply.)

Vocational or technical school, Community or junior college, 4-year college or university other than this one, None, Other

31. What have most of your grades been up to now at this institution?

A, A-, B+, B, B-, C+, C, C- or lower

32. Are you a U.S. citizen or permanent resident?

Yes, No

a. [If answered "no"] What is your country of citizenship?

33. What is your racial or ethnic identification? (select all that apply.)

American Indian or other Native American
Asian, Asian American, or Pacific Islander
Black or African American
White
Mexican American, Puerto Rican, Other Hispanic or Latino
Other
I prefer not to respond

34. Are you a member of a social fraternity or sorority?

Yes, No

35. Which of the following best describes where you are living while attending college?

Dormitory or other campus housing (not fraternity/sorority house)
Fraternity or sorority house
*Residence (house, apartment, etc.) within **walking distance** of the institution*
*Residence (house, apartment, etc.) within **driving distance** of the institution*
None of the above

36. Are you a student-athlete on a team sponsored by your institution's athletics department?

Yes, No

a. [If answered "yes"] On what team(s) are you an athlete? (Select all that apply.)

37. Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?

Yes, No

Your institution will not receive your identified response to the following questions. Only an overall summary of responses will be provided.

38. Have you been diagnosed with any disability or impairment?

Yes, No, I prefer not to respond

a. [If answered "yes"] Which of the following have you been diagnosed with? (Select all that apply.)
   A sensory impairment (vision or hearing)
   A mobility impairment
   A learning disability (e.g., ADHD, dyslexia)
   A mental health disorder
   A medical disability not listed above
   Another disability

39. Which of the following best describes your sexual orientation?

Heterosexual, Gay, Lesbian, Bisexual, Questioning/unsure, I prefer not to respond