The NSSE National Data Project: Phase Two Report

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for the Higher Education Quality Council of Ontario

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Executive Summary

The first phase of the NSSE National Data Project indicated the importance of student characteristics and academic discipline mix in explaining institution-level benchmark engagement variation. The institution-level benchmark regression results demonstrated, but did not formally measure, the existence of distinct “engagement dynamics” at the general discipline level. The question raised was whether sub-institutional engagement dynamics (i.e. engagement variation by student subgroup across specific programs, and engagement variation by specific program across student subgroups) were sufficiently different to warrant program- and student subgroup-specific engagement strategies.

The approach in this second phase was to move from institution-level benchmark models to a series of program-level engagement item models. Nine academic programs met specified criteria and their senior-year students were selected for the analysis. Explanatory models were constructed for each of the nine programs and within each program, for the 42 individual engagement items comprising the five benchmarks. In addition, the engagement profiles for selected student subgroups were examined across programs.

The analysis revealed substantial differences in item-based senior-year student engagement patterns across specific academic programs. In one academic program, for example, first generation students showed consistently lower SFI (student-faculty interaction) item scores relative to non-first generation students while in another program, it was their ACL (active and collaborative learning) item scores that are lower. In one program, student composition explained a very high proportion of the variation in numerous engagement items while in another, student composition explained very little. Several dimensions of these contrasting engagement profiles are discussed in detail in the report.

Since the focus for many engagement improvement strategies lies within academic programs, the findings indicate the appropriateness of a program- and student subgroup-tailored approach to engagement improvement. The figures containing the detailed model results are summarized and reorganized to provide a template for a program- and student subgroup-specific implementation focus.

Introduction: Phase Two Project Background and Objectives

The NSSE National Data Project (or what is now Phase One of the project) involved the assembly and analysis of National Survey of Student Engagement response data supplemented with additional data fields from student records systems for 69,000 records. These records were supplied by 44 Canadian universities participating in the 2008 or 2009 rounds of the survey.

The project accomplished its two primary objectives:

- The construction of NSSE item means, item frequencies, benchmarks and learning scales reports at the academic program- and student subgroup-level on an institution-by-institution (rather than peer set) basis. These detailed drilldown reports provide greater clarity and focus for engagement comparisons, support the identification of best results and assist in the identification of potential engagement improvement practice.

- Of particular relevance to this Phase Two analysis, the development of statistical explanations of institution-level benchmark engagement level and variation. The statistical models quantify the role (i.e. the strength and direction) of various student characteristics, program mix and institutional attributes in explaining institutional benchmark engagement level and variation, and provide an essential foundation for inter-institutional engagement comparisons.

This report makes use of abbreviated labels for NSSE items and benchmarks. Those unfamiliar with these abbreviations and the corresponding survey instrument questions should refer to Appendix 1.

The key finding of the Phase One analysis was that student characteristics, program mix (measured at the broad discipline level) and institutional size explain the majority (generally 80 per cent or more) of the variation in institution-level benchmark variation. The implications are that raw benchmark scores provide a poor basis for assessing institutional quality differences and that any benchmark score comparisons should take into account underlying student, program and institutional factors. Table 1 (adapted from Figures 21 and 22 of the NSSE National Data Project Report, available on the HEQCO website1) presents a summary of these findings – the "best" regression models for each of the five NSSE benchmarks – and permits several observations and conclusions that highlight Phase One findings including:

- The relative size of the first generation student population suppresses institutional engagement scores for all five of the first-year, and four of the five senior-year benchmarks. (This and many other examples of student subgroup engagement variation indicate not just a statistically significant, but also a "meaningful" impact on benchmark scores. A 20 per cent difference in the percentage of senior-year first generation students between two universities translates into a predicted 6 point

[1] http://www. heqco.ca/en-CA/Research/Research%20Publications/Pages/Summary.aspx?link=01&title=The%20NSSE%20National%20Data%20Project%20Report

difference in the senior-year EEE benchmark (or about 17 per cent of the mean benchmark score) all else held constant).

- The percentage of students in the traditional age groups (21 or less in first-year and 25 or less in fourth-year) is not statistically associated with benchmark engagement, except for the level of first-year Student-Faculty Interaction (SFI).

Table 1: Institution-Level Benchmark Engagement Regression Model Results

	First-Year (n=44 institutions)					Senior-Year (n=39 institutions)				
Predictors	**Level of Academic Challenge**	**Active & Collaborative Learning**	**Student-Faculty Interaction**	**Enriching Educational Experiences**	**Supportive Campus Enironment**	**Level of Academic Challenge**	**Active & Collaborative Learning**	**Student-Faculty Interaction**	**Enriching Educational Experiences**	**Supportive Campus Enironment**
Student Characteristics										
% in traditional age category			-0.130							
% male		-0.251		-0.136		-0.127	-0.419			
% French speaking			-0.108	-0.033		-0.033	-0.054	-0.153	-0.050	-0.067
% first generation	-0.224	-0.186	-0.193	-0.148	-0.241	-0.101		-0.137	-0.321	-0.201
% First Nation	-0.378	-0.561						-1.116	-0.633	-1.214
% visible minority								-0.151	-0.120	-0.264
% international origin	-0.328	-0.281								
% with short/walk commute							-0.108			
% with long/drive commute						0.088		0.051		
% out of province origin	-0.095	-0.143		-0.106		-0.073			-0.125	
% in lowest HS grade quartile	-0.132		-0.114	-0.071	-0.214		-0.072			-0.093
% in highest HS grade quartile	-0.079					0.112	0.234			
% studying full-time		-0.138								
% with previous university					-0.331			-0.168		-0.451
Program Mix										
% in business program		0.154					0.240	0.158	0.151	
% in education program			0.134		0.176				0.146	
% in engineering program		0.283		0.120	0.240	0.117	0.336		0.147	-0.113
% in general arts etc. program									0.158	
% in humanities program						0.084				-0.207
% in fine arts program		0.088		-0.037			0.663			-0.086
% in first professional program	0.183	0.250	0.154	0.112	0.157	0.119	0.178	0.128	0.190	
% in sciences program	0.062	0.107								
% in health sciences program					0.130	0.108	0.119	0.180	0.265	
University Size										
university in "small" category	3.029	5.810	4.734	2.029	3.476	2.372	3.246	5.203		5.719
university in "large" category					-4.304	-2.35	-2.584	-2.681		-3.485
Constant	69.19	63.76	48.29	38.20	82.44	51.96	59.35	49.05	44.08	91.32
R-Squared	0.776	0.918	0.876	0.785	0.781	0.822	0.889	0.936	0.870	0.865

Note: all coefficients shown are significant at < .05

- First-year First Nations students show lower average engagement on the Level of Academic Challenge (LAC) and Active and Collaborative Learning (ACL) benchmarks; by their senior year, these engagement differences disappear and are replaced by lower average engagement on the Student-Faculty Interaction (SFI), Supportive Campus Environment (SCE) and Enriching Educational Experiences (EEE) benchmarks.

- First professional programs (excluding Business) are associated with higher engagement across most benchmarks in both first-year and fourth-year; Health Sciences programs achieve significantly higher engagement levels particularly in fourth-year.

- Most programs show higher engagement levels on the fourth-year Enriching Educational Experiences benchmark than the Social Sciences programs reference point.

The regression results indicate that "program of study" (the percentage of students in a given broad program) and "student characteristics" (the percentage of students in a given subgroup) show effects that differ from other programs and student subgroups and across benchmarks. This suggests the existence of specific program-level and student subgroup-level engagement "dynamics". More detailed analysis can likely indicate whether these apparent differences warrant differential engagement implementation practice (i.e. whether and when standardized practice is appropriate and when program- and student subgroup-specific practice is warranted). This is a critical distinction, since it is generally accepted that the primary vehicle for engagement implementation practice is within the program/department (particularly with respect to the LAC, ACL, EEE and SFI benchmarks) with student services providing a secondary vehicle (with primary respect to the SCE benchmark and addressing the differing engagement profiles of particular student subgroups).

Benchmarks are composite measures of their component items. They are powerful measures from a statistical perspective and provide a reliable indicator of the general focus of engagement improvement efforts. For the most part, however, they are not the direct focus of those efforts: it is the individual engagement items that serve as "actionables" in the curriculum, the classroom and at the service desk. For example (see Table 1):

- First-year students in the lowest high school grade quartile achieve, on average, lower engagement on four of the five benchmarks, including Student-Faculty Interaction. But is lower SFI engagement a function of, for example, extremely low student-faculty interaction on grades discussions along with average or better-than-average interaction on other items? or does low interaction permeate all of the items within the SFI benchmark?

- Fourth year students in some programs show significantly higher engagement (relative to Social Sciences programs) on the ACL, SFI and EEE benchmarks (Business) and on the LAC, ACL and EEE benchmarks (Engineering). Does the foundation for these scores originate in the curriculum, classroom techniques or methods of course delivery? How do such individual items as class questions or discussions (within the ACL

benchmark), participation in practica or community service learning (within the EEE benchmark) or the focus on synthesis/analysis/judgement (within the LAC benchmark) contribute to higher benchmark scores? And can these practices be adapted for application in lower engagement programs?

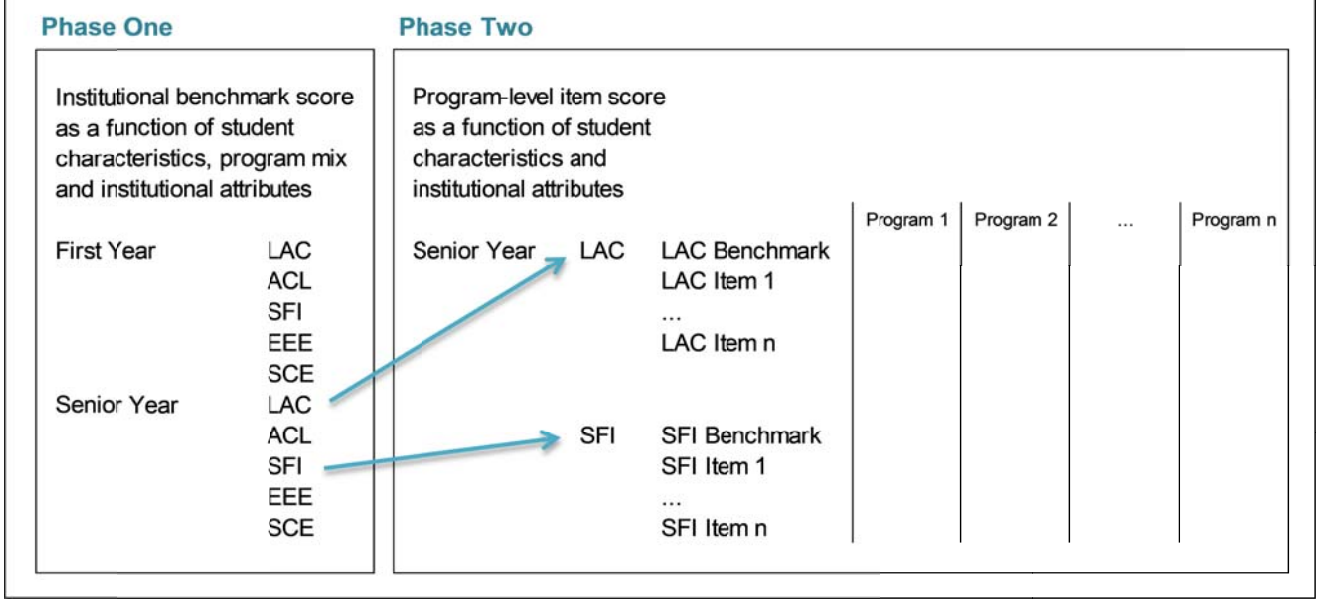
The answers to these questions require an analysis of item-level rather than benchmark-level engagement.

The primary objective of Phase Two, then, is to shift the previous analysis from the benchmark to the item level, and from the institutional to the specific academic program and student subgroup levels in order to determine whether distinct engagement dynamics exist across academic programs and student subgroups and to identify critical engagement actionables (i.e. items rather than benchmarks) within each academic program and student subgroup. Variations in engagement dynamics and the identification of key actionables are critical to the tools universities – and academic and service units – will want to select in addressing engagement concerns.

Methodology

The regression models presented in Table 1 were developed using the stepwise regression method, which generally produces relatively high R^2 values and, with sufficiently stringent variable entry and rejection criteria, guards against multicollinearity (i.e. it produces models in which most independent variables in the model are statistically significant). The approach in Phase Two was to "burst" these models as indicated in Figure 1: each single institutional benchmark model from Phase One translated into multiple program-level item models in Phase Two (i.e. the product of the number of items in the benchmark and the number of academic programs).

Figure 1: Moving to Program- and Student Subgroup-Level Engagement Item Analysis



Converting from institution-level benchmark models to program-level item models began with determining the number of institutions at which each of the various academic programs was offered, and the number of NSSE responses each program generated. Not all institutions offer all programs of study and even in institutions where particular programs are offered, the number of within-program responses was not always sufficient to ensure reliable item scores. An academic program was included in this analysis only if it was offered at a minimum of 20 institutions and only if each occurrence generated a minimum of 15 NSSE responses. (A slightly less stringent requirement was initially attempted but not pursued). The first criterion protects against artificial inflation in model coefficients and R^2 values resulting from very few residual degrees of freedom (after inclusion of half a dozen or more independent variables in the model). The second protects against small sample "noise" and volatile item scores that can distort model coefficients given the relatively low number of observations. Programs were classified using a coding system (1-digit general discipline and 3-digit specific program codes) based on rollups and clusters of CIP numeric program codes (documented in the Phase One report).

Nine academic programs satisfied both criteria: Nursing, English, History, Political Science, Psychology and Biology (at the detailed level), and Business, Engineering and Fine Arts (at the general level). Most Nursing programs in Ontario, and some in other provinces, are delivered through collaborative college-university arrangements that result in varying contributions from each provider in each year of study. Several other programs (Economics, Mechanical/Industrial Engineering, Media and Communications, Computer Science, Biochemistry and Education) fell just short of satisfying the inclusion criteria above and were excluded following initial analysis for the reasons indicated.

Variation in student subgroup-level engagement was examined within the program-level regressions. Within each program column indicated in Figure 1, the roles of student characteristics in predicting program-level engagement are identified and their consistency or variability is assessed across programs.

All analysis was limited to senior-year NSSE responses. At many universities, students complete their first year of study without declaring a concentration, doing so prior to second year. At other universities, students indicate a program interest or intention, but are not officially enrolled in a concentration. And even when first year program status can be clearly assigned, fairly general first-year programs (in, say Arts and Science) often fail to generate meaningful program-level differentiation because of the preponderance of common foundation courses.

The exclusion of small programs (less than 15 NSSE responses) from the program-level analysis resulted in fewer observations (21 to 38 for the nine selected programs) than that in the Phase One analysis (39 institutions overall). Generally speaking, no major changes in the size distribution of institutions included in each regression model occurred. For the 27 Nursing programs examined below, for example, the size distribution of institutions is virtually identical to that of the original 39. However, in order to protect against the effects of shifts in the institutional size distribution associated with the exclusion of small programs, institutional size was retained in all program-level models.

The approach employed in assessing different student subgroup dynamics (across academic programs) and academic program dynamics (across student subgroups) was to compare changes in coefficient behaviour and model explanatory power when moving from a single institution-level benchmark model (from Phase One) to numerous program-level item models (in this second phase). Naturally, *some* differences in coefficient values and model explanatory power will be observed when converting to program-level and item models; what is of particular interest is any consistent pattern of change in coefficient behavior (e.g. from significance to non-significance or from positive to negative sign) and model explanatory power (e.g. low vs. high R^2) when examining the role of benchmarks and items across academic programs. Where such patterns were identified, an assessment of their value to customized engagement improvement practice was undertaken. The detailed program-level item regression model results are contained in Appendix 2. The approach to interpreting the results documented in Appendix 2 was to move quickly through two “interim” sets of models – university-level item regressions and program-level benchmark regressions – and then to concentrate on the program-level item regressions, as indicated in Table 2.

Table 2: Assessing Academic Program and Student Subgroup Dynamics		
	Unit of Analysis	
Model Type	Institution	Academic Program
Benchmark	Table 1 (with student and program controls) and Column 2 in Appendix Tables 1(a), 2(a), etc. (with only student controls)	Appendix tables 1(a), 2(a), 3(a), 4(a) and 5(a) and re-presented in Figure 5(a) - 5(e)
Item	Table 3 (example for LAC items with student and program controls) and Column 2 in each Appendix table except 1(a), 2(a), etc. (all benchmark items with only student controls)	Column 3 or greater in each Appendix table except 1(a), 2(a), etc., and Figure 6(a) and 6(b) (selected examples)

Findings

Item Analysis at the University Level

Table 3 presents (as an example) the institution-level LAC benchmark regression and regressions for each of the LAC component items, all with controls for both student characteristics and general discipline mix. Table 3 demonstrates the extent to which the benchmark model mirrors each of the item models across the different student subgroups and general disciplines. In Table 3 and several other tables following, coefficient significance is denoted as *** (.01), ** (.05) and * (.10). Coefficients in the tables with no asterisk are significant at between .10 and .20; missing coefficients were excluded from the model according to the stepwise inclusion criteria used (p-in = .10, p-out = .20).

NSSE benchmarks are constructed as the average of the (normalized to base-100) item scores. Within this context, several patterns emerge. First, a number of predictors (e.g. percentage of students in the traditional age group, percentage of students with international origins) are insignificant in the benchmark model, but significant in a minority of the item models. This suggests that significant effects of student composition at the individual item level are not strong enough, in combination with other items, to affect the benchmark. Second, some predictors (e.g. percentage of students in Science programs) are insignificant in the benchmark model, but are both significantly positive and significantly negative in the item models (in roughly equal numbers). This indicates that offsetting effects of program mix across each of the items "cancel out" to generate insignificance at the benchmark level. Third, several predictors (e.g. percentage of students with long commutes, percentage of students in Humanities programs) are significant in the benchmark model and significant (in the same direction) in several, and sometimes the majority, of the item models. In these instances, the combined effect of the predictors at the item level carries through to the benchmark model.

In the latter case, the benchmark results provide a reasonably reliable basis for institutional response across multiple disciplines and student subgroups (as in the percentage of students in First Professional programs, which is significant at the .05 level in both the benchmark model and 7 of the 11 item models). In the first two cases, however, the benchmark model masks item variation in discipline and student mix – where variation can occur as both isolated predictor significance in one or two item models and more widespread but offsetting positive and negative predictor significance in several item models.

These findings (which also apply in general terms to the other benchmarks) support the use of item- rather than benchmark-based analysis in the design of institutional engagement responses that accommodate variation in engagement patterns across student subgroups and academic programs.

Table 3: LAC (Level of Academic Challenge) Component Item Analysis at the University Level												
		Component Items										
Predictor	Benchmark	ACADPR01 Time spent preparing for class	WORKHAND Worked harder to meet expectations	READASGN Number of assigned texts read	WRITEMOR Number of written reports 20+ pages	WRITEMID Number of written reports 5-19 pages	WRITESML Number of written reports < 5 pages	ANALYZE Coursework emphasis on analysis	SYNTHESZ Coursework emphasis on synthesis	EVALUATE Coursework emphasis on making judgments	APPLYING Coursework emphasis on applying theories & concepts	ENVSCHOL Campus environment emphasis on academic work
Percentage of Students:												
Traditional age group			-0.00567**		-0.00791**		0.00496					-0.00524
Male	-0.127**	-0.0272**			-0.0125**	-0.00719*						
French-speaking	-0.0322***	-0.00591***	-0.00243***	-0.00226***	0.00161	-0.00153**		-0.00154***	0.00116***	-0.00347***	-0.00161***	
First generation	-0.101***	-0.0142***	0.00386*	-0.00498**	-0.00430		-0.00642*	-0.00251**	-0.00531***		0.00435***	0.00456
First Nation		0.0832***		-0.0122	0.0246		0.0228	-0.0119**	-0.0191***	-0.0151**	-0.0134**	
Visible Minority					0.00423				0.00169			0.00777***
International	0.132	0.032	0.00872		0.0218**		0.0177*		-0.00792*			
Short distance commute	0.0631		0.00517				0.0128**			-0.00202***		0.00236*
Long distance commute	0.0884**		0.00566*	0.00111			0.0108**	0.00137***	0.00256***			
Out-of-province	-0.0727**	-0.00693		-0.00745***	-0.00537	-0.00378		-0.00163				
Lowest HS grade quartile												
Highest HS grade quartile	0.112***	0.0220***	0.00854***		0.0118***	0.00421	0.00710*					0.00445*
Full-time			0.00199	0.00223*	0.00626**	0.00348**				0.00190**		0.00478**
Previous univ. enrolment												
Program Mix:												
% in business program		0.0163*	0.00347*				0.00613*		-0.00493***	-0.00402***		-0.00445**
% in education program		0.0111	0.00458**				0.0105***			-0.00316**		
% in engineering program	0.117***	0.0316***	0.00231	-0.00590***	0.0171***	0.00859***	0.00466***	0.000647	-0.00269***	-0.00171**	0.00258***	0.00197*
% in general arts etc. program		0.0169**			-0.00554***							0.00242*
% in humanities program	0.0840**	0.0270*	0.00692**	0.0148***		0.00764***		0.00444***		0.00221		0.00577*
% in fine arts program		0.0230***	0.00439***	-0.00796***	-0.00448***	-0.00315**	0.00255					
% in first professional program	0.119***	0.0306***	0.00976***	-0.00375	0.00737**			0.00367***	0.00259*	0.00455**	0.00541***	0.00699***
% in sciences program		0.0304***		-0.00984***		-0.00463*	0.00473*			-0.00221		0.0109***
% in health sciences program	0.108***	0.0211**	0.00649***	0.00281	0.00351			0.00227**		0.00261*	0.00317**	0.00581**
Dummy Coefficients:												
Small size university	2.372***		0.0960***	0.105**	0.161**		0.166***	0.0577***	0.0878***	0.0477**	0.0601***	
Large size university	-2.350***	-0.137			-0.191***	-0.115**		-0.0598**	-0.124***	-0.114***		-0.0786
Constant	51.96***	3.493***	1.713***	3.293***	1.969***	2.723***	0.997**	3.188***	3.190***	2.926***	2.848***	2.279***
Observations	39	39	39	39	39	39	39	39	39	39	39	39
R-squared	.822	0.899	0.826	0.941	0.918	0.686	0.644	0.857	0.800	0.941	0.689	0.714

Benchmark Analysis at the Program Level

Tables 4(a) to 4(e) present the second interim step in the analysis: the construction of benchmark regression models for individual academic programs. (Six of the nine selected programs are presented in the tables. The remaining three – Engineering, Business and Fine Arts – represent aggregations of programs rather than distinct programs, and were treated as general disciplines in the Phase One report, where their importance in explaining benchmark variation was discussed. Appendix 2, however, contains program-level benchmark models for all nine programs.) The purpose of Tables 4(a) to 4(e) is to determine the consistency of benchmark-level models across academic programs. If the behaviour of the student mix predictors in the benchmark models is reasonably consistent across all programs, then the case for program-based engagement practice would be weakened and for university- or Faculty-wide practice strengthened (notwithstanding the analysis below of program-based item engagement).

The "University-Wide" column in each of the tables is for general context only. It presents a revised university-level benchmark model (for the entire population of universities and programs) without academic program controls, in order to provide a reference point for each of the program-level models (which by definition exclude program controls). As noted above, comparison of the program-level models and the significance of the predictors in each should acknowledge that the institutions represented in each model differ somewhat.

The models – which explain benchmark engagement as a function of student characteristics (within program) and university size – account for as little as 10 per cent and as much as 95 per cent of benchmark variation. A first conclusion is that student characteristics are associated with engagement in some programs much more than in others. The LAC model in Biology, for example, contains no significant student characteristics: only institution size (p-value > .10) qualified for model entry and the model explains less than 10 per cent of LAC benchmark engagement variation across Biology programs. The LAC model for Nursing indicates significance for seven of the student mix predictors and institutional size, all at p-value < .05, and achieves total explained variation of nearly 90 per cent.

An examination of each of the benchmark models reveals significantly different engagement dynamics across the academic programs. In Psychology and Biology programs, for example, student characteristics explain a substantially lower proportion of SFI variation, while in Political Science and Nursing programs they explain a higher proportion of SFI variation (Table 4(a)). The student characteristics predictors themselves are often significant across two or more programs, but only one or two (e.g. First Nations) have consistent signs across the programs in which they appear. To the extent that several student characteristics are significantly positive in some programs and significantly negative in others, provides at least preliminary support for the existence of very different engagement dynamics across programs (including, of course, the possibility that other student and non-student characteristics not included in the models might contribute to explained variation). But even with available student predictors, it seems reasonable to suggest that differing pedagogy and/or program delivery generate differing SFI profiles across the programs and therefore that SFI will be explained by different student characteristics depending on academic program.

Similarly, the LAC benchmark score (see Table 4(b)) is less well explained by student characteristics in Political Science and Biology relative to the other programs; and most of the

student characteristic predictors show widely varying behavior (insignificance vs. significance, positive and negative coefficients) across programs.

Across all five benchmark models, it can be seen that very few student characteristics are significant and carry the same sign across more than a few of the academic programs.

Table 4(a): Program-Level Benchmark Model Regression (SFI - Student-Faculty Interaction)

Predictor	University-Wide	Nursing	English	History	Political Science	Psychology	Biology
Percentage of students:							
Traditional age group	-0.0884*			-0.251***		-0.175	
Male	-0.0722***			0.526***			0.423
French-speaking	-0.104***	-0.142***	0.0331**		-0.229***	-0.0555*	
First generation			-0.305***		-0.361***	-0.169*	0.268***
First Nation	-0.799***	-0.350**	-1.110***		-1.246***		-0.767*
Visible minority		0.129*	-0.315***	-0.166	-0.569***		
International	-0.333**	-0.557*	-0.501**	-0.335**			
Short distance commute					-0.243***		0.128**
Long distance commute			0.159***				
Out-of-province		0.187	0.239***	0.176*	-0.950***		
Lowest HS grade quartile			-0.0973*	-0.229***	0.475***		-0.296**
Highest HS grade quartile					0.644***		
Full-time	0.114***		0.314***		-0.0984	0.148**	
Previous univ. enrolment		-0.127	0.373***		-0.360***	-0.475***	0.254
Dummy coefficients:							
Small size university	3.526***	4.435**		9.664***	4.323*	5.418**	
Large size university	-2.896***	-4.123				-4.299*	
Constant	38.09***	38.38***	19.26*	38.46***	66.48***	49.42***	11.33
Observations	39	27	27	26	21	31	28
R-squared	0.875	0.824	0.814	0.723	0.945	0.591	0.515

Table 4(b): Program-Level Benchmark Model Regression (LAC -Level of Academic Challenge)

Predictor	University-Wide	Nursing	English	History	Political Science	Psychology	Biology
Percentage of students:							
Traditional age group	0.0843**	-0.0784*	-0.143**	-0.111	0.233**	0.295***	
Male	-0.0272	-0.162*	0.0933	0.257		-0.341***	
French-speaking	-0.0151*	0.0673***		0.055			
First generation	-0.0948**		-0.144***			0.0753	
First Nation			-0.827***		-0.548*	0.972**	
Visible Minority		0.0712**		0.203**			
International				-0.255*	0.268**		
Short distance commute		0.0975	0.201**	0.0777**			
Long distance commute	0.0468**	0.0958**	0.168**				
Out-of-province		0.235***					
Lowest HS grade quartile		-0.0976***	-0.0887**	-0.162**		0.0535	
Highest HS grade quartile	0.0956**	-0.157**		-0.134		-0.133**	
Full-time		0.178***	0.189***		-0.158*	-0.0513	
Previous univ. enrolment				-0.290***		0.149	
Dummy coefficients:							
Small size university	2.029***		3.065**	4.425**			
Large size university	-2.705***	-2.743**			-5.144**	-2.590**	-2.349
Constant	50.49***	41.83***	47.62***	61.15***	53.19***	35.17***	55.82***
Observations	39	27	27	26	21	31	28
R-squared	0.625	0.891	0.755	0.529	0.497	0.722	0.095

Table 4(c): Program-Level Benchmark Model Regression (ACL - Active and Collaborative Learning)

Predictor	University-Wide	Nursing	English	History	Political Science	Psychology	Biology
Percentage of students:							
Traditional age group							
Male	-0.0827**		-0.111	0.342**		-0.462***	
French-speaking				-0.0655*			0.0807
First generation			-0.144			0.180**	
First Nation	-0.503*		-0.770**		-0.906**	0.918	
Visible Minority	0.0977**	0.143	-0.253**		-0.136*		0.101
International	-0.384**		-0.430*	-0.505***			
Short distance commute	-0.203**		0.171		-0.0725*	-0.112	0.0771*
Long distance commute	-0.118	0.151**	0.278***			-0.119	
Out-of-province					-0.436***	0.300***	
Lowest HS grade quartile	-0.0732			-0.236***	0.0638		
Highest HS grade quartile	0.144*		0.101		0.528***		0.0962
Full-time	0.125**			-0.118*		0.169***	
Previous univ. enrolment				-0.169*			
Dummy coefficients:							
Small size university	3.321***			5.429**	8.243***		7.632***
Large size university	-5.457***	-4.54					-5.862**
Constant	**51.39*** **	42.64***	36.94***	43.94***	41.83***	34.05***	34.78***
Observations	**39**	27	27	26	21	31	28
R-squared	**0.767**	0.274	0.696	0.687	0.749	0.592	0.565

Table 4(d): Program-Level Benchmark Model Regression (SCE - Supportive Campus Environment)

Predictor	University-Wide	Nursing	English	History	Political Science	Psychology	Biology
Percentage of students:							
Traditional age group							
Male			-0.122*				0.337*
French-speaking	-0.0671***		0.718*	-0.0830*			
First generation	-0.201**				-0.579***		0.233***
First Nation	-1.214***		-0.925***	-0.497**	-1.297**		-1.108***
Visible Minority	-0.264***		-0.255***	-0.562**	-0.197		
International				-0.522**	-0.211	0.521**	
Short distance commute	-0.0599		-0.101**			-0.222**	
Long distance commute		-0.136***			0.219***	-0.227***	
Out-of-province			0.195**	0.351**	-0.886***		0.313***
Lowest HS grade quartile	-0.0925**				0.240**	0.123*	-0.217***
Highest HS grade quartile					0.472**		-0.197***
Full-time	-0.0814*			-0.278*	-0.157	0.106	0.131**
Previous univ. enrolment	-0.451***			-0.232	-0.547***	-0.349***	0.177
Dummy coefficients:							
Small size university	5.719***	6.880***		6.115**		6.497***	
Large size university	-3.485***		-7.392***		-5.774**	-9.106***	-4.513**
Constant	91.32***	59.18***	65.36***	84.98***	80.83***	62.23***	29.72***
Observations	39	27	27	26	21	31	28
R-squared	0.865	0.432	0.759	0.799	0.874	0.746	0.836

Figure 4(e): Program-Level Benchmark Model Regression (EEE - Enriching Educational Experiences)

Predictor	University-Wide	Nursing	English	History	Political Science	Psychology	Biology
Percentage of students:							
Traditional age group		0.121***			0.105		
Male				0.739***	-0.161**		
French-speaking	-0.0498***	-0.0391*			0.0549*		
First generation	-0.321***	0.261***					
First Nation	-0.633***		-0.432***	-0.383**			
Visible Minority	-0.120**	0.101**		-0.388**			0.112**
International					0.158*	0.599***	
Short distance commute	-0.0498*		0.106		-0.200*	-0.147**	0.105***
Long distance commute		-0.0662*	0.0818	-0.0798**	-0.190*	-0.165***	
Out-of-province	-0.125**	0.371***					
Lowest HS grade quartile				-0.133**		0.0648	
Highest HS grade quartile		-0.182*	0.0635	0.258**	0.280**		
Full-time		0.0766**		-0.400***	0.135**	0.122**	0.0784
Previous univ. enrolment	-0.152*	-0.181**		-0.234**		-0.329***	0.209**
Dummy coefficients:							
Small size university	1.892*			7.459***	7.787***		
Large size university	-1.928*		1.926	2.261		-2.18	
Constant	44.08***	10.89*	24.81***	45.34***	33.42***	36.81***	19.98***
Observations	39	27	27	26	21	31	28
R-squared	0.870	0.746	0.422	0.691	0.856	0.657	0.506

Tables 4(a) to 4(e) can also be used to examine each of the academic programs across all five benchmarks. Within History programs, for example, benchmark variation is generally well explained with numerous student characteristics and institutional size (from an R^2 of .529 for the LAC benchmark to an R^2 of .799 for the SCE benchmark, with models incorporating 5 to 8 predictor variables). Conversely, within Biology programs, explained variation (R^2) in benchmark scores ranges from a low of only .095 (LAC) to a high of .836 (SCE).

As was the case with item analysis at the university-level, analysis of benchmark variation at the program-level identifies numerous differences in the relationship between student characteristics and particular aspects of engagement within individual academic programs. The following section explores whether an analysis of student characteristics in explaining engagement *item* variation *within* academic programs provides further evidence of distinct program-level engagement dynamics.

Item Analysis at the Program Level

Two approaches are used to assess the additional value of program-level engagement item analysis:

- Within a given program, what is the degree of similarity between the benchmark model and each of the component item models, and among the various component item models? If each item essentially "tells the same story" as its parent benchmark (i.e. similar R^2 and similar student characteristic predictors with similar coefficient signs) and if each item tells essentially the same story as each other item, then item-focused analysis adds little to benchmark-focused analysis at the program level.

- Across programs, what is the degree of similarity among item models? If a given item model (e.g. participation in community service or volunteer work) is highly similar when applied to History and Psychology and Nursing programs, then program-focused analysis adds little to university-focused analysis at the item level.

Table 5(a) presents one set of within-program models – the EEE benchmark and component item models for English programs – as an example of the first approach.

Table 5(a): English Program Item Models (Enriching Educational Experiences Benchmark)

Predictor	EEE Benchmark	DIFFSTU2 Contact with students of differing beliefs	DIVRSTUD Contact with students of different race	ENVDIVRS Contact with diverse students encouraged	ITACADEM Used electronic tech to discuss assignments	INTERNO4 Participated in internship	VOLNTR04 Participated in community service	FORLNG04 Participated in foreign language coursework	STDABR04 Participated in study abroad	INDSTD04 Participated in independent study	SNRX04 Participated in culminating experience	COCURR01 Participated in co-curricular activities	LRNCOM04 Participated in learning community
Percentage of students:													
Traditional age group		0.00545**					0.00357*	-0.00932*			0.0108***	-0.00999	
Male				-0.0103***			-0.0128***		0.00435	0.00334		-0.00646	
French-speaking		0.0413***	0.0401**			-0.0305				-0.0333***	0.0267**	-0.0579***	
First generation		-0.00431*		0.00869***							-0.00471*	-0.00884**	
First Nation	-0.432***	-0.0475***	-0.0334***			0.0335*					-0.0387***		-0.0171*
Visible Minority		-0.0114***	0.0149***			0.0127**		-0.00889	0.00451	-0.00483**	-0.0158***		
International							-0.00634	0.0286**	0.0220***	-0.0141**			
Short distance commute	0.106	-0.0122***		-0.00377*		0.0164**					-0.0219***	0.0156*	
Long distance commute	0.0818	-0.00569*				0.0157***		0.00606**			-0.0138***	0.0109	
Out-of-province			-0.00625**	0.00827**				0.0147**	0.00642*		0.00601**	0.0171***	0.00835***
Lowest HS grade quartile		-0.00458**								-0.00424**			
Highest HS grade quartile	0.0635	0.00622**									0.00318		0.00631**
Full-time			0.00633**					0.00935*				0.0103*	
Previous univ. enrolment										0.0112***	0.0149***	-0.00946	
Dummy coefficients:													
Small size university		-0.218***				0.391***		-0.272**			-0.113	-0.191*	
Large size university	1.926		0.102	-0.146*						0.176**			
Constant	24.81***	3.657***	2.167***	2.173***	2.613***	0.736	3.265***	2.318***	1.839***	2.124***	3.048***	1.386**	2.147***
Observations	27	27	27	27	27	27	27	27	27	27	27	27	27
R-squared	0.422	0.803	0.765	0.588	n/a	0.463	0.757	0.473	0.494	0.713	0.777	0.799	0.478

no predictors satisfied the inclusion criteria

The heads of English programs meeting to explore approaches to EEE improvement and relying only on the benchmark model in Table 5(a) would possibly agree to focus their attention on lower First Nation student engagement and seek an explanation for higher engagement among high-performing high school students and the (perhaps unexpected) higher engagement level for commuter students. (Each would weigh these potential approaches against the relative

percentage of the First Nation, commuter and high-performing secondary school students in their own programs and the value of the coefficient itself to determine the potential impact of the approach.) The program heads in smaller institutions would also likely seek advice from their colleagues in larger institutions on how they achieve the higher level of enriching experiences that small institution programs appear to lack. They might also agree that since only 42 per cent of benchmark variation is explained by the model, their efforts might have limited effectiveness until such time as additional student characteristics associated with engagement could be uncovered.

An analysis of the nine EEE component item models would provide the program heads with a range of additional insights:

- The issue of lower First Nation student engagement observed at the benchmark level is associated entirely with the two items that measure degree of interaction with students of different beliefs, opinions, race or ethnicity (DIFFSTU2 and DIVRSTUD). First Nation students do not report significantly different involvement with such other enriching experiences as study abroad, independent study, internships or foreign language study.

- While the percentage of students in the lowest high school grade quartile did not contribute to the explanation of EEE benchmark variation, this item is a significant negative predictor of both DIFFSTU2 (degree of interaction with students having different beliefs or opinions) and INDSTD04 (participation in independent study). Similarly, while the percentage of students in the highest high school grade quartile did contribute significantly to EEE variation, it does so entirely on the basis of the DIFFSTU2 item.

- Contrary to what the benchmark model suggests, small and large institutions may have something to learn from each other. Smaller universities generate higher average scores on internships/practica and lower average scores on student interactions and foreign language study (none of which were visible at the benchmark level). Larger universities generate higher average scores on student interaction and independent study but lower average scores on ENVDIVRS (an institutional “climate of diversity” measure).

- International students are more heavily involved in both foreign language study and study abroad (as might be expected) but have a lower level of involvement in independent study.

- Participation in independent study (INDSTD04) is negatively associated with the percentage of French-speaking students (essentially a francophone-anglophone university distinction), visible minority and international students, and students in the lowest quartile of high school grades. It is positively associated with the percentage of transfer students and is higher in larger universities. This pattern is quite different from that observed for participation in internships/practica, where different student characteristics having different coefficient signs are the key predictors.

Table 5(b) contains one set of across-program models (for the EEE component item “participation in community service or volunteer work” across the nine programs/disciplines and for all programs/all universities) to highlight the second approach proposed at the beginning of

this section. In most programs, community service is not an academic requirement, though in several, it may be encouraged either as part of practicum or project activity or as an important component of disciplinary study. As such, variation within and across academic programs measures more than just a curriculum effect. As noted above, some caution should be applied in interpreting model differences because the institutional membership in each program model varies slightly.

The all-programs/all-universities model explains 84 per cent of item variation. The percentage of students in the traditional age group has a positive coefficient while the percentages of male, visible minority, commuting and out-of-province students show negative coefficients. A university-wide or all-programs approach would initially suggest these items as the targets for engagement improvement efforts.

Each of the program-level models explains the majority (58 to 88 per cent) of the variation in the community service item. The seven significant variables (at the .10 level or better) in the all-programs model are replicated in sign and significance in between one to five of the nine academic programs. Each academic program model varies substantially from the all-programs model: Nursing, for example, matches sign and significance for only one predictor (percentage of French-speaking students), matches insignificance on six predictors, and shows conflicting significance (significance on one/insignificance on the other, or opposite signs) on nine predictors. Similar findings apply when the all-programs model is compared to each of the other academic program models.

Table 5(b): EEE Item VOLNTR04 (Participation in Community Service or Volunteer Work) by Academic Program

Predictor	All Programs	Nursing	English	History	Political Science	Psychology	Biology	Business	Engineering	Fine Arts
Percentage of students:										
Traditional age group	0.00908***	0.00325	0.00357*			0.00901***		0.00745	-0.00515*	
Male	-0.00622***		-0.0128***		-0.00926***				-0.0148***	-0.00929*
French-speaking	-0.00530***	-0.00322**			0.00364**	-0.0014	-0.00855***	-0.00429**	-0.00579***	-0.00501***
First generation				0.0115**						
First Nation					0.0380**	-0.0415**	-0.0240**	0.0412*	-0.0467***	
Visible Minority	-0.00307*			0.0125				0.00449		
International			-0.00634	-0.0179	0.0114**		-0.00894*		0.0102**	
Short distance commute	-0.0104**						0.00474***	0.00684***		
Long distance commute	-0.0108**			-0.00706**	-0.00291*	-0.00233*			0.00484**	-0.00633**
Out-of-province	-0.00469*	0.0239***			0.0102*			-0.00798	0.00683*	
Lowest HS grade quartile		0.00630*		-0.00603		0.00422*	-0.00610**			
Highest HS grade quartile									0.00442	0.0136**
Full-time		0.00652***			0.0122***		-0.00531**	-0.00338		
Previous univ. enrolment				-0.0101	0.0152***			0.0108	-0.0198***	-0.00962
Dummy coefficients:										
Small size university						-0.128*	-0.144**		0.207*	
Large size university		-0.385**		0.195		-0.163*	0.143*	0.202*		0.206*
Constant	3.715***	2.212***	3.265***	3.166***	1.748***	2.810***	3.878***	2.234***	4.257***	3.616***
Observations	39	27	27	26	21	31	28	38	23	23
R-squared	0.840	0.595	0.757	0.583	0.835	0.673	0.771	0.764	0.883	0.739

The limitations inherent in comparing slightly dissimilar populations across the models, suggests that a more general approach might be warranted. Would the heads of each program adopt a distinct focus for their engagement practices, given the differences in each program's model? The answer is almost certainly "yes" – at least with respect to first priorities – though several programs might share approaches with respect to, for example, the engagement of commuter students. Detailed examination of Appendix 2 (which contains the item models for each of the academic programs) reveals that across virtually all items, the critical engagement drivers vary widely, and that the all-programs item models match reasonably well with only a minority of the program-level item models.

Applications of Program- and Student Subgroup-Level Engagement Models

Overview

The discussion above has indicated in statistical terms that differences between benchmark and component item models, and between all-program and specific program models, are sufficiently great to warrant a program-specific and item-based approach to engagement improvement efforts. Such an approach is likely to be more efficient and more effective than a Faculty-wide or university-wide approach based on aggregate benchmark measures.

The relevance of these statistical results to real-world engagement practice will not necessarily be clear, nor will the results necessarily even be accessible, to the faculty members or service providers with whom responsibility for engagement improvement often lies. A discussion of the applications of these results must therefore be preceded by several introductory comments.

First, the program-level regression models discussed above identify the significance of certain predictors, as measured at the program (not individual student) level. As such, they present patterns of engagement that apply in the aggregate to students within the program. Furthermore, they utilize available demographic and academic predictors which, while statistically reliable, are most likely surrogates for much more complex student attributes. The aggregate (rather than individual student) effects of institutional efforts can be expected to conform, in general, to the effects estimated by the models.

Second, the engagement items whose values the models aim to predict using student and institutional attributes bear varying relationships to the practices intended to improve them. Participation in an independent study or internship has a very direct effect on the resulting item measure. However, other items – coursework emphasis on synthesis, the degree to which the campus environment supports academic effort – are less directly linked to engagement responses because they may reflect varying levels of awareness of academic support services, student expectations and intensity of student involvement. In these cases, it is less clear which particular response is appropriate.

Third, even once an engagement improvement response is identified, its effect will be proportional to the values of the item coefficient and the predictor variable (e.g. the percentage of students in a given category). For example, in Table 5(b), the model for community service involvement in History programs assigns a coefficient of 0.0115 to the “first generation” predictor. If 30 per cent of students in a given program had first generation status, this combination would contribute .345 to the predicted item score (which the model defines as the model constant plus all the coefficient-predictor products). Another program with only 5 per cent of its students in the first generation group would be predicted to contribute .058 to the predicted item score. (On the four-point scale for this item, this range of predicted effects implies an item score difference of about 7 per cent.) First generation students do in fact typically constitute between 5 per cent and 30 per cent of the student population. If a set of initiatives was successful in elevating non-first generation students to the engagement level of first generation students, the second program would experience a higher engagement gain because a larger percentage of its students were affected (all else equal). Similarly, two predictors with coefficients of .01 and .10 would suggest, all else equal, that the potential impact of

engagement initiatives would be much greater for the second. Because student composition in every program at every institution varies, each program needs to examine the potential scale of impact consistent with each improvement approach.

Finally, while the models indicate the direction and potential scale of engagement changes resulting from institutional effort, they do not necessarily prescribe a precise "formula" for action tied to the model coefficients. Because institutional capacity is limited, and because some efforts will be more difficult than others, the models indicate at least the first priority (and sometimes the second and subsequent priorities) for action. The focus of engagement improvement efforts need not focus solely on under-engagement (i.e. negative coefficients). Institutional priorities, student composition, and the possibility of "bundling" strategies to achieve engagement improvement on multiple fronts should also influence strategy. Similarly, if a particular engagement issue occurs across several (but not all) programs, there is no suggestion here that efforts should be limited to only selected programs, particularly if "mass" delivery of those efforts is more efficient than tailoring.

Program-Level Engagement Applications

Appendix 2 is organized by item and benchmark rather than by academic program. However, the tables in Appendix 2 can be reorganized by academic program to present all the benchmark and item models relevant to each program. Table 6 below presents one example – Nursing program SFI benchmark and item models – of the 45 tables that could be constructed (5 benchmarks and their component items for 9 academic programs).

Table 6: Nursing Program Item Engagement Models (SFI - Student-Faculty Interaction							
		Component Items					
Predictor	Benchmark	FACGRADE Discussed grades with instructor	FACPLANS Discussed career plans with instructor	FACIDEAS Discussed ideas with faculty outside class	FACFEED Received prompt feedback on performance	FACOTHER Worked with faculty on non-course activities	RESRCH04 Worked with faculty on research project
Student Characteristics							
% in traditional age category		0.00294	0.00754***	0.00468*			
% male		0.0106	0.0104	0.0154*	-0.0161**		
% French speaking	-0.142***	-0.00416***	-0.00635***	-0.00526***		-0.00415***	-0.00351**
% first generation					-0.0189***		
% First Nation	-0.350**	-0.00973	-0.0116*	-0.0107		-0.0122	-0.0135*
% visible minority	0.129*					0.00418	
% international origin	-0.557*	-0.0149			-0.0143		-0.0144
% with short/walk commute				-0.00663***	0.0119**	0.00518	
% with long/drive commute					0.00997***	0.00881***	
% out of province origin	0.187	-0.00687			0.0198***	0.0204***	0.0165***
% in lowest HS grade quartile					-0.00368**		0.00418*
% in highest HS grade quartile		0.00648					
% studying full-time		-0.00552**	-0.00407**	-0.00449**	0.00230*		
% with previous university	-0.127			-0.00840**		-0.0116**	-0.00638*
University Size							
university in "small" category	4.435**		0.117	0.162**	0.108		-0.125
university in "large" category	-4.123	-0.182**	-0.236**		-0.609***		
Constant	38.38***	2.976***	2.119***	2.115***	3.852***	0.910***	1.680***
Observations	27	27	27	27	27	27	27
R-Squared	0.824	0.747	0.828	0.639	0.916	0.714	0.652

Each of the benchmark and item models can be simplified to present only the sign (+ or -) of only the statistically significant predictors, allowing the entire academic program to be presented in one table. These summaries are presented in Tables 7(a) to 7(c) for three of the nine academic programs and in Appendix 3 for all nine programs. The tables do not differentiate between programs with high or low engagement improvement potential as determined by student composition or coefficient value. They do, however, identify an appropriate initial focus for engagement improvement efforts from which individual programs can select particular options based on their particular student and institutional profile. The tables also contain comments related to the items within each benchmark and the role of student and institutional characteristics in explaining the engagement variation of that program. These comments reflect the model results – that is, they identify issues associated with the significant predictors for each item and across items.

Table 7(a) indicates an engagement profile and corresponding potential course(s) of action for Nursing programs (which, as indicated above, need to be tailored to the student composition of each program):

- Non-traditional age students report lower levels of contact with students having different opinions, beliefs and origins, with a perceived lower quality of relationships with other

students and a less socially supportive campus environment. In combination, these suggest the need to enhance student and social interactions among mature students.

- Francophone programs show a consistently lower engagement level across SFI items, and anglophone programs show numerous examples of lower engagement across LAC items. The Phase One report suggested that cultural differences may underlie such response differences, but a comparison of instructional and curricular practices may nonetheless provide insight.

- Very little benchmark or item differentiation is observed between first generation and non-first generation students or between First Nations and non-First Nations students.

- An “encouraging” international student engagement profile exists (quite unlike that for several other academic programs), which may provide clues to improved engagement for domestic students and opportunities for improved interaction among domestic and international students.

- Both short- and long-distance commuter students display a generally positive engagement profile (relative to those living on campus) that is different from the mixed profile found in other academic programs. This result is perhaps counter-intuitive and may serve as an example of residential location serving as a surrogate for student characteristics not contained in the model.

- There is a substantial difference between the engagement pattern of full-time students and that of part-time students. Programs with a higher proportion of full-time students display higher engagement across virtually every LAC benchmark item, lower engagement in several SFI benchmark items related to out-of-class discussions with faculty members, and higher involvement in selected enrichment activities. On balance, the part-time student experience appears to be strongly associated with a lower level of academic effort and a lower perceived coursework emphasis on analysis, synthesis, judgment-making and application of theory to practice.

- The effects of university size/enrolment translate into Nursing program engagement behaviour particularly with respect to SCE and SFI items. Smaller university size is associated with generally higher SCE item scores and to a lesser extent, larger university size is consistent with selected lower SFI item scores. That SCE items tend to reflect university-wide rather than program-specific factors is borne out in Tables 7(a) to (c), where small universities show predominantly positive signs and large universities show negative signs. And while SFI items are more closely associated with within-program practices, they too may show systematic patterns across universities based on specific policies and procedures.

Table 7(a): Nursing Program Item Engagement Models Summary

Predictor	SFI							LAC												ACL								SCE							EEE												
	Benchmark	Discuss Grades with Faculty	Discuss Career Plans with Faculty	Discuss Course Ideas with Faculty	Received Prompt Feedback from Faculty	Worked with Faculty on Other than Coursework	Worked with Faculty on Research	Benchmark	Time Spent in Class Preparation	Worked to Meet Instructor Expectations	Number of Assigned Texts Read	Number of Long Papers Written	Number of Medium-Sized Papers Written	Number of Short Papers Written	Course Emphasis on Analysis	Course Emphasis on Synthesis	Course Emphasis on Making Judgments	Course Emphasis on Application of Theory	Institutional Support to Academic Work	Benchmark	Asked Questions in Class	Made a Class Presenetation	Worked with Other Students in Class	Worked with Classmates Out of Class	Tutored or Taught Other Students	Participated in Community-Based Project	Discussed Issues with Others Outside Class	Benchmark	Environment Supportive of Academic Success	Environment Supportive of Non-Academics	Campus Environment Socially Supportive	Quality of Student Relationships	Quality of Faculty Relationships	Quality of Staff/Admin Relationships	Benchmark	Contact with Students (Beliefs and Opinions)	Contact with Students (Race and Ethnicity)	Environment Supports Student Contacts	Used Electronic Tech to Do Assignments	Internship Participation	Community Service Work Participation	Participated in Foreign Language Study	Participated in Study Abroad	Participated in Independent Study	Participated in Culminating Senior Experience	Participated in CoCurricular Activity	Participated in Learning Community
Percent of students:																																															
Traditional age			+										-									+									+	+	-		+	+	+			-							
Male					-														-													+						+									
French-speaking	-	-	-	-		-	-	+	+	+	+		+					-					+		-	-	-				-	-				-		-	+		-	+	+	-		-	
First generation					-							+	+						-				-				+								+					+						+	
First Nation	-																													-		-															
Visible minority								+					+														+					-		-	+					+				-		+	
International									+		+																-				+	+								-		+		+			
Short commute				-	+				+				+	+				+			-	-		+		+							+	+		-	-	-		+		+				+	+
Long commute					+	+		+							+	+		+	+	+			+	+		+		-	-		-					-		-									+
Out-of-province					+	+	+	+							+	+			+				+							+				+	+						+	+	+			-	+
Lowest HS grade Q					-			-	-	-		+	-	-										+						-		+								-						+	
Highest HS grade Q								-							-	-		-					-																						-		
Full-time		-	-	-				+	+	+	+	+	+		+	+	+	+	+				+												+				+	+	+						
Prior U enrol				-		-							+			-														-		+			-									-			-
Dummy coefficients:																																															
Small university	+			+					-																			+	+		+		+	+								-					
Large university	-	-	-		-			-						+	-	-		-	-				-									-									-					+	-

Item Issues Summary	SFI	LAC	ACL	SCE	EEE
	few systemic item concerns main weaknesses are grades, career plans, ideas interactions main strengths are prompt feedback and non-course, non-research interactions	benchmark model is highly consistent with several item models action warranted and likely effective on several fronts	item models much more revealing than benchmark model because of the selective significance of student subgroup predictors and their signs in-class and out-of-class student interaction improvement likely to affect largest proportion of students overall	item models more revealing than benchmark model social supportiveness of campus and student-student interaction should be primary focus of initial efforts	significant benchmark score very much a function of "climate" items internship, independent study, foreign language study and culminating senior experience item scores most subject to variation in student subgroup participation

Student Subgroup and Institutional Issues Summary

campus support and student interaction lower for non-traditional age students

consistently lower engagement for francophone students

international students show selectively higher LAC, SCE and EEE engagement

off-campus and commuter students are generally more engaged than on-campus across all five benchmarks

out-of-province students more engaged across numerous items in all benchmarks

LAC engagement concerns for both low- and high-grade quartiles

pronounced LAC and EEE engagement risk for part-time students

small university SCE benefits and large university SFI & LAC concerns

First Nation engagement concerns limited to SCE

The engagement profile and potential responses in English programs (Table 7(b)) present an entirely different picture:

- The percentages of non-traditional age, male and francophone students show only sporadic significance across the various items. While the general effects of the percentages of male and francophone students appear reasonably consistent with those in Nursing, non-traditional age students show a mix of positive and negative coefficients across the models (whereas in Nursing, the coefficients are generally positive).

- The models indicate systematic under-engagement of first generation, First Nations, visible minority and international students across the majority of SFI, LAC, ACL and SCE items and for First Nations and visible minority students across several EEE items as well. The results indicate the existence of a large number of real or perceived engagement barriers that are clearly different from and more serious than those in play in other academic programs.

- As was the case with Nursing, English program engagement is positively associated with the percentage of commuter and out-of-province students.

- The percentage of students in the lowest high school grade quartile is generally associated with lower engagement, most prominently within the LAC benchmark. Conversely, the percentage in the highest high school grade quartile predicts higher program engagement, though the effects are scattered across the five benchmarks.

- Full-time status and prior university enrolment are stronger and more consistent (positive) predictors of program engagement in English programs than in Nursing programs, suggesting a need for action to explore and address engagement problems among part-time students.

- The predictive role of university size is limited primarily to SCE and LAC items, in roughly the same fashion as in Nursing. (In Nursing, small university size shows a positive effect in SCE and a negative effect in LAC; in English, large university size shows a negative effect in SCE and a positive effect in LAC.)

Like English, History is also located within the Humanities. Phase One analysis indicated that the proportion of students in the Humanities was positively associated with the LAC benchmark, and negatively associated with the SCE benchmark. But do English and History programs share a similar engagement profile? Table 7(c) contains the History program engagement item models and indicates that numerous differences exist between the two programs. The percentage of male students is a stronger and more consistent positive predictor of engagement in English than in History. And while English program results indicated systematic under-engagement of first generation, First Nations, visible minority and international students, only international students and not the other subgroups are consistently under-engaged in History programs. Commuter and out-of-province student proportions are not generally significant predictors of History program engagement and neither is the proportion of full-time students (though it played a significant role in English). Finally, small university size constitutes a systemic positive predictor of engagement in History programs rather than a reasonably strong and consistent predictor as is the case in English programs.

The first priority for engagement response clearly differs across the three programs discussed above. In Nursing, part-time student under-engagement, lower engagement across numerous SFI and LAC items within larger universities and the possible existence of cultural issues between francophone and anglophone programs are key concerns. The consistent under-engagement of under-represented and minority groups and the engagement differences between students in the lowest quartile and highest quartile high school grades are critical issues in English programs. History programs are characterized by relatively lower female student engagement, SFI and SCE under-engagement associated with international students, and presumably, a common desire to explore the advantages of small university size across many of the benchmarks and items.

Table 7(b): English Program Item Engagement Models Summary

Predictor	SFI							LAC												ACL								SCE							EEE										Student Subgroup and Institutional Issues Summary
	Benchmark	Discuss Grades with Faculty	Discuss Career Plans with Faculty	Discuss Course Ideas with Faculty	Received Prompt Feedback from Faculty	Worked with Faculty on Other than Coursework	Worked with Faculty on Research	Benchmark	Time Spent in Class Preparation	Worked to Meet Instructor Expectations	Number of Assigned Texts Read	Number of Long Papers Written	Number of Medium-Sized Papers Written	Number of Short Papers Written	Course Emphasis on Analysis	Course Emphasis on Synthesis	Course Emphasis on Making Judgments	Course Emphasis on Application of Theory	Institutional Support to Academic Work	Benchmark	Asked Questions in Class	Made a Class Presentation	Worked with Other Students in Class	Worked with Classmates Out of Class	Tutored or Taught Other Students	Participated in Community-Based Project	Discussed Issues with Others Outside Class	Benchmark	Environment Supportive of Academic Success	Environment Supportive of Non-Academic	Campus Environment Socially Supportive	Quality of Student Relationships	Quality of Faculty Relationships	Quality of Staff/Admin Relationships	Benchmark	Contact with Students (Beliefs and Opinions)	Contact with Students (Race and Ethnicity)	Environment Supports Student Contacts	Used Electronic Tech to Do Assignments	Internship Participation	Community Service Work Participation	Participated in Foreign Language Study	Participated in Study Abroad	Participated in Independent Study	Participated in Culminating Senior Experience	Participated in CoCurricular Activity	Participated in Learning Community	
Percentage of students:																																												
Traditional age				+				-			-					-			-								+				+										+		traditional age students score lower, and male students higher, on selected LAC items
Male										+		+	-				+	+			-	-	-	-			+	-								-								
French-speaking	+																		+															+								-	+	-	
First generation	-	-		-	-	-		-	-		-			-	-	-	-		-								-				-		+									-		
First Nation	-	-		-	-		-	-		-	-			-	-	-	-	-	-	-		-					-	-	-	-	-		-	-	-							-		
Visible minority	-	-		-	-	-									-		-	-		-	-						-	-	-	-	-	-	-	-	+			+			-	-		
International	-		-	-	-		-							-			-		+			-	-				-												+	+	-				
Short commute				-	-		-	+	+							+								+		+		-	-			-			-		+				-			
Long commute	+	+				+	-	+	+		+					+				+	-	+		+	+	+	+			+							+				-			
Out-of-province	+			+	+	+	-								-											+		+								-	+			+		+	+	+	
Lowest HS grade Q					-			-			-	+	-		-	-	-							+		-									-					-				
Highest HS grade Q																+					+			+			-		+				+										+	
Full-time	+	+	+	+	+		+	+		+	+			+		+			+						+										+									
Prior U enrol	+		+	+	+		+							+			+								+														+	+			
Dummy coefficients:																																												lower engagement for lowest-quartile high school students largely limited to LAC items
Small university			+		+			+	+	+	+	+												+	+				-						-					+		-			
Large university		-			-														-								-	-			-	-	-							+				
Item Summary	consistently lower SFI item scores for first-gen and cultural minorities generally higher SFI item scores for FT and transfer students few significant university size effects							most item scores lower for first-gen and cultural minorities somewhat lower engagement for lowest quartile of high school students small university size associated with selected higher item scores selectively higher engagement among male students; selectively lower engagement among traditional age students												selectively lower engagement for male students and cultural minorities higher item scores for commuter students (over campus-based) for some items few significant university size effects								consistently lower SCE scores among First Nation and visible minority students large university size associated with selected lower item scores few item scores associated with high school grade performance								lower First Nation items scores for "climate" oriented EEE items no discernible variation in participation for "educational enrichment" oriented items, except for independent study and culminating senior experience										higher engagement for full-time and transfer students generally limited to SFI and LAC items higher engagement for small universities largely limited to LAC items; lower engagement for large universities largely limited to SCE items

Table 7(c): Nursing Program Item Engagement Models Summary

SFI

Predictor	Benchmark	Discuss Grades with Faculty	Discuss Career Plans with Faculty	Discuss Course Ideas with Faculty	Received Prompt Feedback from Faculty	Worked with Faculty on Other than Coursework	Worked with Faculty on Research
Percentage of students:							
Traditional age	-		-	-		-	-
Male	+	+	+	+		+	
French-speaking					-		+
First generation		-				+	
First Nation			-				
Visible minority			-		-		
International	-	-	-	-			+
Short commute							
Long commute						-	
Out-of-province					+		
Lowest HS grade Q	-	-	-	-		-	
Highest HS grade Q		+	+				
Full-time					-		
Prior U enrol							
Dummy coefficients:							
Small university	+	+	+	+		+	
Large university							

LAC

Predictor	Benchmark	Time Spent in Class Preparation	Worked to Meet Instructor Expectations	Number of Assigned Texts Read	Number of Long Papers Written	Number of Medium-Sized Papers Written	Number of Short Papers Written	Course Emphasis on Analysis	Course Emphasis on Synthesis	Course Emphasis on Making Judgments	Course Emphasis on Application of Theory	Institutional Support to Academic Work
Percentage of students:												
Traditional age							+					-
Male			+							+		+
French-speaking											-	
First generation					-							
First Nation												-
Visible minority	+						+					
International		-	-									
Short commute	+										-	
Long commute		-										-
Out-of-province				+								+
Lowest HS grade Q	-	-	-	-								-
Highest HS grade Q												
Full-time												-
Prior U enrol	-	-	-	-	-	-	+			-		-
Dummy coefficients:												
Small university	+		+								+	+
Large university		+					-					+

ACL

Predictor	Benchmark	Asked Questions in Class	Made a Class Presenetation	Worked with Other Students in Class	Worked with Classmates Out of Class	Tutored or Taught Other Students	Participated in Community-Based Project	Discussed Issues with Others Outside Class
Percentage of students:								
Traditional age								
Male	+	+						
French-speaking			-		-			
First generation				+				
First Nation								
Visible minority				+				
International	-	-				-	-	-
Short commute								
Long commute								
Out-of-province							+	
Lowest HS grade Q	-	-	-				-	-
Highest HS grade Q								
Full-time		-						
Prior U enrol		-						-
Dummy coefficients:								
Small university	+	+			+			
Large university								

SCE

Predictor	Benchmark	Environment Supportive of Academic Success	Environment Supportive of Non-Academic	Campus Environment Socially Supportive	Quality of Student Relationships	Quality of Faculty Relationships	Quality of Staff/Admin Relationships
Percentage of students:							
Traditional age							
Male						+	
French-speaking					-		
First generation			+				
First Nation	-						-
Visible minority	-				-	-	-
International	-	-		-	-		-
Short commute				+	+	+	
Long commute						+	
Out-of-province	+		+				
Lowest HS grade Q		-					
Highest HS grade Q							
Full-time					-	-	-
Prior U enrol					-	-	
Dummy coefficients:							
Small university	+	+		+	+	+	
Large university							

EEE

Predictor	Benchmark	Contact with Students (Beliefs and Opinions)	Contact with Students (Race and Ethnicity)	Environment Supports Student Contacts	Used Electronic Tech to Do Assignments	Internship Participation	Community Service Work Participation	Participated in Foreign Language Study	Participated in Study Abroad	Participated in Independent Study	Participated in Culminating Senior Experience	Participated in CoCurricular Activity	Participated in Learning Community
Percentage of students:													
Traditional age		+	+			-							
Male	+		+		-	+		+					
French-speaking								+					
First generation		-	-		-		+						
First Nation	-										-		
Visible minority	-										-		
International										+			
Short commute										+	-	+	
Long commute	-		+				-	-	-		-		
Out-of-province													
Lowest HS grade Q	-				+	-		-		+		+	
Highest HS grade Q	+					+					+		
Full-time	-		-								-		
Prior U enrol	-		-	-									
Dummy coefficients:													
Small university	+			+		+				+			+
Large university													

Student Subgroup and Institutional Issues Summary

Traditional age and male student proportion strong predictors of SFI items

Selectively lower engagement for first gen, First Nation, visible minority, international, transfer and lowest HS grade quartile students over several benchmarks and items

Small university size positively associated with engagement in 20+ items across all benchmarks

Item Summary

	SFI	LAC	ACL	SCE	EEE
Item Summary	benchmark aligns fairly well with the three "discuss with faculty" items all items except "worked with faculty on research" vary across a half dozen + student subgroups small university size positively associated with most items	benchmark loosely aligned with the "out of class preparation" and "writing" items "time spent in class preparation", "working to meet expectations" and "institutional support to academic work" most subject to variation by student subgroup	only a few items (particularly "asking questions in class") mirror the ACL benchmark except for "asking questions in class", items show only selected subgroup effects	benchmark driven disproportionately by "quality of student" and "quality of staff" relationships "quality of relationships" items most sensitive to subgroup effects	Several of the items show limited subgroup effects; these effects vary by item Only "participation in foreign language study" mirror the benchmark to any degree

Student Subgroup Engagement Applications

The predictive power of student characteristics in program-level engagement variation is critical to the essentially program-based responses suggested in the majority of the SFI, LAC, ACL and EEE items. However, although student services staff can certainly work with specific programs to address within-program engagement strategies, they generally deal with students and with specific student groups to address common needs regardless of programs of enrolment. As such, a comprehensive understanding of student subgroups is beneficial to the design and delivery of services affecting these groups.

Table 8 presents, as an example of a student subgroup engagement application, a summary of first generation student engagement by benchmark and item for all nine academic programs examined in this report. The table contains program-level model coefficients for the percentage of students having first generation status as found in (and extracted from) each of the models in Appendix 2. Each column identifies within-program coefficients as discussed above. Each row identifies similarities and differences in coefficients across programs and hence, the amount of focusing and tailoring that may be required to address first generation issues across the entire university (or at least that portion of the university captured by the nine programs). As noted above, within-program analysis is more robust than across-program analysis because of slight differences in the population of programs across the program models.

Table 8 indicates that first generation status plays an important role in explaining engagement variation for numerous items within and across programs, though not necessarily in the same way or to the same extent. In Nursing programs, for example, first generation status predicts relatively few engagement items, and where it does, it shows an equal combination of positive and negative signs. In Psychology programs on the other hand, first generation status is a significant (and most often negative) predictor of the majority of items in the majority of the benchmarks. A case can be made, then, for a Psychology-specific approach to first generation student engagement. However, first generation status is associated with lower levels of DIFFSTU2 and DIVRSTUD (frequency of discussions with students having different values, opinions and racial/ethnic backgrounds) in seven of the nine programs, which suggests that a pan-program approach would be effective.

The primary value of a data summary like that in Table 8 is to highlight the program-level and cross-program patterns in student subgroup engagement in order to inform the design of improvement strategies.

Table 8: First Generation Student Benchmark and Item Coefficients									
Benchmarks and Items	**Nursing**	**English**	**History**	**Political Science**	**Psychology**	**Biology**	**Business**	**Engineering**	**Fine Arts**
SFI		-0.305***		-0.361***	-0.169*	0.268***			
FACGRADE		-0.00810**	-0.00647**	-0.0056				0.00519*	
FACPLANS		-0.00616*		-0.0204***	0.00409	0.00583**	-0.00642**		0.00416
FACIDEAS		-0.0125***		-0.00863**		0.00799**	0.00462*		
FACFEED	-0.0189***	-0.0127***		-0.00888***		0.00529			
FACOTHER		-0.0143**	0.00662**	-0.00877*	-0.00815***	0.0122***	0.00479		
RESRCH04				-0.0109**	-0.0159***			-0.00558	-0.00677*
LAC		-0.144***			0.0753			0.0917*	
ACADPR01		-0.0117**		-0.0117	-0.00888*	-0.0146**			
WORKHARD									0.00679**
READASGN		-0.0161***			0.0175***		-0.00773***		
WRITEMOR	0.0139**		-0.0110**	-0.00721		-0.00601		0.0215***	
WRITEMID	0.0194**		-0.00553*		0.00961***		-0.00545	0.00823*	-0.00658*
WRITESML		-0.0170***			0.0158***	-0.00729			
ANALYZE	-0.00641*	-0.00500***							
SYNTHESZ	-0.00929*	-0.00854***							-0.00680*
EVALUATE		-0.00781***						0.00953***	
APPLYING					0.00575***	0.00503*	-0.00850***		
ENVSCHOL	-0.00921**	-0.00467**			-0.00655**	-0.0107***			
ACL		-0.144			0.180**				0.206**
CLQUEST				-0.00921**	0.00829**	0.00546		-0.0104	
CLPRESEN	-0.0159*						-0.0105**		
CLASSGRP	-0.0281***		0.00574**	0.00993**	0.0146***			0.0160***	
OOCGRP		-0.00539			0.00660**				
TUTOR		-0.00543*			-0.00822**	0.00879***			0.00348*
COMMPROJ						-0.00275*	0.00583	0.00806**	0.00952**
OOCIDEAS	0.0134***	-0.00879***				-0.00946***	-0.00336		0.00601**
SCE				-0.579***		0.233***			
ENVSUPRT						0.00579**			0.0108**
ENVNACAD			0.00646**			0.00577**	0.00722***		
ENVSOCAL				-0.0102*		0.00975***			
ENVSTU		-0.0149***		-0.0267***	0.0120**	0.00657		-0.00927**	
ENVFAC				-0.0327***				0.0114**	0.00514
ENVADM		-0.0183**		-0.0310***	-0.00836	0.0197***			
EEE	0.261***						-0.265***		
DIFFSTU2	0.00897	-0.00431*	-0.00961***	-0.0120***	-0.00522*		-0.0107***	-0.00734*	-0.0124***
DIVRSTUD	0.0145		-0.00981***	-0.00777	-0.00744**		-0.0169***		-0.0209***
ENVDIVRS	0.0124*	0.00869***		-0.00752*		0.0104***			
ITACADEM			-0.00952**		0.00561*	0.00639			
INTERN04	0.0195**		0.00709		0.0209***			-0.0248***	-0.00988
VOLNTR04			0.0115**						
FORLNG04					-0.00529**		-0.0207***		0.00946**
STDABR04					-0.00866***	-0.00606***	-0.0161***		
INDSTD04				-0.0140***	0.00523*			-0.0043	
SNRX04	-0.00878	-0.00471*	-0.00975						
COCURR01	0.0180***	-0.00884**			-0.00871**				
LRNCOM04					0.00313*	-0.00409*	-0.00999***		0.00572

Conclusions

The objective of this research was to pursue the initial evidence from Phase One suggesting that distinct engagement dynamics across specific academic programs and student subgroups may warrant the effort required to conduct analyses at the drilldown, rather than university-wide level and for engagement items rather than benchmarks. Multiple regression analysis at the level of the academic program for individual engagement items indicates that such distinct engagement dynamics do indeed exist. The statistical explanations for item variation within an engagement benchmark differ from the benchmark itself and from each other within academic programs, and the explanations for variations in specific items differ across academic programs. In other words, the role of student characteristics in predicting engagement item variation differs across items within a benchmark and program, and for similar items across programs.

To the extent that a substantial amount of engagement improvement practice is most appropriately undertaken at the academic program level through specific (i.e., item-driven) interventions, the findings have the potential to provide institution-, program- and student composition-specific direction to engagement improvement practice. The findings appear particularly strong *within* academic programs having identical institution-program records (suggesting an item-based approach) but they are still fairly strong *across* academic programs having nearly similar institution-program records (suggesting a program-based approach).

Interpretation of the model results from the perspective of particular student subgroups (as student services professionals may find appropriate) indicates that generally speaking, most student subgroups are not universally engaged or disengaged, but rather show more or less engagement across items within and across benchmarks in a given program, and more or less engagement for particular items across programs.

With respect to applications, the findings provide direction for initial, and in several cases, subsequent engagement practices consistent with the student composition in each academic program and the engagement profiles of student subgroups across programs. Though not undertaken as part of this research, it appears that the calculation of predicted benchmark and item scores at the academic program level (as contained in the Phase One report for benchmark engagement at the institutional level) may provide a useful basis for program comparisons and assessments and for incorporating student composition in specific programs into the selection of engagement strategies.