

Assessing the Validity of CCSSE in an Ontario College

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Abstract

This study investigates the validity, within an Ontario college, of the U.S.-based Community College Survey of Student Engagement (CCSSE) benchmarks of effective educational practices, formally referred to as the Model of Effective Educational Practices (MEEP). MEEP factors include active and collaborative learning; student effort, academic challenge, student-faculty interaction, and support for learners. The validity of CCSSE was explored for this study through analysis of the model fit of MEEP and analysis of its correlations and capacity to predict five academic outcomes based on a sample of Ontario students that completed CCSSE during the Winter 2009 semester. Results of the analyses reveal that MEEP exhibits good model fit and that three of the five benchmarks were consistently correlated with the five selected academic outcomes (self-reported GPA, semester GPA, cumulative GPA, cumulative credit completion ratio, and percentage of courses completed with a grade of 70 per cent or higher). After controlling for subject characteristics, two of the five benchmarks, active and collaborative learning and academic challenge were identified as predictors of most of the academic outcomes.

Introduction

Humber Institute of Technology and Advanced Learning participated in the U.S.-developed and -based Community College Survey of Student Engagement (CCSSE) during the Winter 2009 semester. This was the first time an Ontario college has participated in CCSSE and only the third Canadian college to do so since CCSSE was launched in 2001; Douglas College in British Columbia participated in 2003 and 2007 and Nova Scotia Community College participated in 2008. Over 700 colleges have participated in CCSSE since 2001 but only four have been from outside the U.S.: the three Canadian colleges noted above and a community college in the Marshall Islands.

Participation in CCSSE was prompted by the formation of a Student Success and Engagement Committee at Humber and a desire to identify areas where the college could help increase student engagement in academic and college life. Despite the strong track record of participation in CCSSE by American two-year colleges and evidence of CCSSE's validity based on samples of American students, no studies have been published to date about the validity of CCSSE based on samples of Canadian students. In order to confidently interpret and consider actions based on CCSSE survey results within the college, it is necessary to identify whether CCSSE exhibits similar psychometric properties based on Humber students as it exhibits based on U.S. college students. The analyses of the psychometric properties of CCSSE based on data from an Ontario college is an important first step in filling a gap in knowledge about the validity of CCSSE for the Ontario and Canadian college contexts.

CCSSE was developed in the U.S. to explore and understand the nature of student engagement at American two-year community and technical colleges. Its development was based on research and theoretical perspectives that have primarily focused on student engagement in American four-year colleges, or universities, and includes foundational perspectives about the nature of student involvement (Astin, 1985), student effort (Pace, 1984) and student integration in the academic and social dimensions of university life (Tinto, 1987). Numerous research studies conducted over the last four decades into these and other theoretical perspectives have provided substantial evidence of the association between student engagement with positive educational outcomes in the American four-year college sector, including academic performance, persistence, retention, and intellectual development and personal growth (Pascarella and Terenzini, 2005). Based on data collected through CCSSE from American two-year college students, studies conducted by McClenney and Marti (2006) and Marti (2009) have provided evidence of these associations in the two-year college sector as well, highlighted by the following statements found on CCSSE's website¹ :

CCSSE's survey instrument, *The Community College Student Report*, provides information on student engagement, a key indicator of learning and, therefore, of the quality of community colleges. The survey, administered to community college students,

¹ <http://www.ccsse.org/aboutccsse/aboutccsse.cfm>

asks questions that assess institutional practices and student behaviors that are correlated highly with student learning and student retention.

Despite the relationships identified in the CCSSE studies, there are stark differences between U.S. and Canadian community colleges, which raise the important question about the validity of CCSSE in the Canadian context. Primary among these are substantial differences in enrolment status, program offerings, and program structure found in the two jurisdictions.

As highlighted in the McClenney and Marti (2006) validation study, a majority of community college students in the U.S. participate in college programs on a part-time basis and take 10 or more terms (or semesters) to complete. By contrast, the vast majority of Ontario and Canadian community college students participate in certificate and diploma programs on a full-time basis, with a majority graduating within one or two semesters of the normal program duration. For example, Nova Scotia Community College, which participated in CCSSE in 2008, has a part-time enrolment of 9 per cent, while part-time enrolment at Humber constitutes 6 per cent.

As it concerns program offerings and program structure, the majority of U.S. colleges offer only 1- and 2-year programs, whereas in Ontario and Canada, 3-year diploma programs are common. Furthermore, curricula in certificate and diploma programs in Ontario colleges, in particular, are much more prescriptive with regards to requirements than in the U.S. Finally, the cohort structure, where a group of students enters and progresses through each semester together in the same classes, is another characteristic common in Ontario and Canadian colleges that is not normally found in U.S. colleges. Although the implication of these major differences between jurisdictions is unknown, they suggest the potential for differences in engagement and outcome relationships, which underscores the need to validate CCSSE in the Ontario and Canadian college context.

Part I: Validating the Model of Effective Educational Practices

The purpose of this study is to identify if the Model of Effective Educational Practices (MEEP) exhibits good model fit based on a sample of Humber students who completed CCSSE during the Winter 2009 semester. Identifying whether MEEP exhibits good model fit will determine the comparative value of the Model for this institutional context. It will also help fill a gap in knowledge about the comparative value of the Model in the Ontario and Canadian college contexts.

Background: The Model of Effective Educational Practices

Marti's (2009) study helped to establish the Model of Effective Educational Practices (MEEP). The purpose of MEEP was to provide practitioners with benchmarks that could be used to identify areas of institutional strength and weakness with regard to student engagement. MEEP consists of five latent factors or constructs:

1. Active and Collaborative Learning;
2. Student Effort;
3. Academic Challenge;
4. Student-Faculty Interaction; and
5. Support for Learners.

These factors were derived from 38 Community College Student Report (CCSR) survey items and analyzed for model fit through Confirmatory Factor Analysis (CFA) based on a large sample of over 274,000 American two-year college students who completed the CCSR in 2003, 2004, and 2005. Results from the CFA revealed that the “five-factor solution exhibited reasonable model fit” based on the total sample (Marti, 2009, p. 9). Measurement invariance was also conducted to identify if the model exhibited good fit for sub-groups within the sample based on full-time and part-time enrolment status, males and females, and across years of survey completion – 2003, 2004, and 2005. Results of the analyses indicated that MEEP demonstrated strong measurement invariance and, therefore, was applicable to each of the sub-groups. Appendix A lists the CCSR items according to the benchmarks established by CCSSE, along with standardized coefficients from the total sample analysis identified by Marti (2009).

Amongst the various post-survey reports provided by CCSSE to participating colleges is a report that highlights the college's results on the five benchmarks that constitute MEEP. This benchmark report is comparative and includes the scores of other colleges with similar institutional characteristics (classified according to categories including public or private college, size/student population, and region – rural, suburban or urban). The comparative report is a prominent and important feature that provides colleges with a valuable perspective from which to assess results and identify what areas of student engagement may be high or low and where action may be taken. Although MEEP has demonstrated model fit based on the American

college students, it is unknown whether comparison based on the Model's benchmarks is appropriate in the Ontario or Canadian college context. Analysis of model fit based on a sample of Ontario college students would help determine whether comparisons with U.S. colleges based on the Model's benchmarks would provide an appropriate perspective for assessing results and taking action.

Methods

Confirmatory factor analysis² (CFA) was conducted on the Model of Effective Educational Practice using SPSS Amos 18 and was evaluated according to conventional measures of model fit outlined by Hu and Bentler (1999). Measurement invariance was also examined through a multi-group CFA, which analyzed consistency of MEEP with male and female survey respondents. Consistent with the analysis conducted by Marti (2009), the models were evaluated using the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Residual (SRMR) following the two-index presentation strategy recommended by Hu and Bentler (1999). As noted by Marti, the two-index presentation strategy implements two indexes that are not highly correlated to avoid the use of redundant fit index information. Cut-off scores of RMSEA < 0.06 and SRMR < 0.08 were used to evaluate the models, which minimize Type I and Type II error rates (as per Hu and Bentler, 1999).

Samples

A Course Master Data File was created, which identified all of the course sections being offered during the Winter 2009 semester with the CCSSE-designated and Humber-identified exclusions (Table 1.1). The master file included course number, section number, course name, campus (for multi-campus colleges), teacher name, days and times of course delivery, and enrolment. From this file, a random stratified sample was created that included a combination of morning, afternoon, and late afternoon/evening classes. Given Humber's overall enrolment of 18,000 diploma, degree, and post-graduate students, of which 13,049 were identified as diploma students, the target sample was 1,200 student responses (as outlined by CCSSE). To capture a target sample of 1,200 students, 160 per cent of this target, or 1,920 students, was selected. This translated into 62 sections of 56 Humber courses selected for the survey.

A total of 1,087 from the selected 1,920 students at Humber Institute completed the CCSR during the Winter 2009 semester. Of this total, 1,030 were full-time students in 1-year certificate, 2- and 3-year diploma programs and 47 self-identified their enrolment status as part-time. A strong ratio of 27:1 student records to variables was achieved for the CFA based on 1,030 student records and 38 variables included in the CFA. To assess the potential impact of the small sample size, the record to variable ratio was calculated. Ratios above 20:1 are considered "strong," indicating that the results are generalizable and replicable (Costello and Osborne,

² Confirmatory factor analysis (CFA) is a multivariate statistical procedure that is used to test how well the measured variables represent the number of constructs and is used to confirm or reject the measurement theory. In CFA, researchers can specify the number of factors required in the data and which measured variable is related to which latent variable.

2005). Measurement invariance for male and female full-time student sub-groups involved a ratio of 11:1 for males (n=434) and 15:1 for females (n=586), which are considered adequate ratios for path analysis (Stevens, 1996). Given the small sample size and ratio requirements, part-time students were excluded from the CFA. A Markov Chain Monte Carlo multiple imputation (MI) procedure in SPSS was used to replace missing data and create five complete datasets for each analysis: CFA based on full-time enrolment and measurement invariance for male and female full-time students. This was done in order to avoid biasing the model by dropping cases, although low levels of missing data (less than 5 per cent) constituted the original data sets.

Demographic characteristics of the analysis sample (n=1,030), the 160 per cent target sample (N=1,769), and Humber total diploma student population (n=13,049) data are compared in Table 1.2, which highlights a greater survey completion rate for females and those classified as 21 years of age and under. The gender ratio difference in the diploma student population (48.2 per cent female, 52.8 per cent male) differs significantly from the overall 2009 CCSSE Cohort (58 per cent female, 42 per cent male). However, the target sample gender ratio (55.2 per cent female, 44.8 per cent male) and the analysed sample population (57.5 per cent female, 42.5 per cent male) were similar to the CCSSE survey respondent ratio (59 per cent female, 41 per cent male). The overall gender differences between Humber and other CCSSE-participating colleges may reflect the types of programs offered, an international student population that has a strong male enrolment bias, and a lower percentage of part-time students at Humber. The significant gender-ratio differences between the Humber diploma student and target sample populations are due to the sampling of courses with themes and delivery times that tend to have female-skewed enrolments.

The National Survey of Student Engagement (NSSE), a similar survey directed at four-year colleges and universities, experiences significantly higher response ratio of females to males, necessitating the use of weighting to better represent the overall cohort (NSSE, 2009). No weighting schemes were applied to the Humber data or the CCSSE data. As Humber has longer programs (two- and three-year diplomas) and fewer part-time students than U.S. community colleges, the demographics of the student population are intermediate between the overall CCSSE and NSSE cohorts.

Results

The five benchmarks specified in the CFA for full-time enrolment status exhibited good model fit, with the averaged RMSEA over the five imputed data sets equal to 0.058 and the SRMR equal to 0.064. The RMSEA was slightly lower than that found by Marti (RMSEA = 0.060) and the SRMR was slightly higher (SRMR = 0.062), but well below the < 0.08 cut off level for SRMR. Standardized coefficients for the Model items are reported in Appendix A, which were derived from one of the five imputed data sets with RMSEA and SRMR values identical to those averaged in the multiple imputation results.

Multiple-group analysis was undertaken to examine measurement invariance of MEEP across male and female full-time students. For the models, factor loadings were constrained to be equal across the groups and structural parameters were freely estimated. Invariance was

measured based on a cut-off of 0.0126 for $\Delta RMSEA$, which was applied in Marti (2009) and recommended by Cheung and Rensvold (2002). Measurement invariance was examined based on a change in goodness-of-fit index (GFI) according to the formula $\Delta GFI_c = GFI_c - GFI_{uc}$, where GFI_c is the GFI value in the constrained model and GFI_{uc} is the GFI value in the unconstrained model. Tests of measurement invariance demonstrate no difference in the model across males and females. The MEEP multiple-group CFA exhibited equivalent fit in the unconstrained model and the constrained models across males and females-- $\Delta RMSEA = 0.002$.

Evaluation of Cronbach's alpha values showed that there was generally strong consistency in the underlying construct being measured within a factor. Three of the five CCSSE benchmarks (Academic Challenge, Student-Faculty Interaction, and Support for Learners) were all above the gold standard of $\alpha=0.70$, while active and collaborative learning was just under the standard (Table 1.3). These results are consistent with Marti's (2009) findings as was the lower consistency in the student effort data in both the Humber data ($\alpha=0.38$) and the CCSSE comparison data ($\alpha=0.56$).

Table 1.1
Courses Exclusion from the Course Master Data File

CCSSE required course exclusions:
<ul style="list-style-type: none"> Non-credit courses Dual credit courses comprised of high school students Distance learning classes as well as clinicals, internships, co-ops Lower-level ESL courses in which students do not have sufficient English proficiency to complete the survey Lab sections associated with a lecture Individual instruction courses (e.g., music lesson) Independent study or self-paced classes
To increase comparability with U.S. community colleges
<ul style="list-style-type: none"> Degree courses Post-graduate certificate courses

Table 1.2
Comparison of Factor Analysis Sample with Humber Diploma Student, Target Sample Populations and overall 2009 CCSSE population

Variable	Winter 2009 Analyzed Student Sample	Winter 2009 160% Target Student Sample	Winter 2009 Humber Diploma Student Population	2009 CCSSE Analyzed Sample
Population (N)	1,030	1,769	13,049	400,886
Sex (%)				
Female	57.5	55.2	47.2	58
Male	42.5	44.8	52.8	42
Age (%)				
21 and under	61.1	49.8	49.5	44
22-24	19.7	26.1	28.2	15
25 and older	19.2	24.1	22.1	42
Enrolment Status (%)				
Full-time	95.6	98.0	94.5	40
Part-time	4.4	2.0	5.5	60

Table 1.3
Comparison of Construct Reliability between Humber and CCSSE

Latent construct	Humber Alpha	CCSSE Alpha ³
Active and Collaborative Learning	0.64	0.66
Student Effort	0.38	0.56
Academic Challenge	0.75	0.80
Student-Faculty Interaction	0.74	0.67
Support for Learners	0.74	0.76

³ Marti (2009)

Part II: Analysis of Relationships between CCSSE Benchmarks and Academic Outcomes

The purpose of this study is to identify if there are any significant relationships between CCSSE benchmarks and selected academic outcomes based on a sample of Humber students who completed CCSSE during the winter 2009 semester. Identifying significant or non-significant relationships based on this sample will help determine if any of the CCSSE benchmarks are good predictors of some important academic outcomes in this institutional context. Results of this study will also help fill a gap in knowledge about predictors of student engagement in the Ontario and Canadian college contexts.

Background: Relationships between CCSSE Benchmarks and Academic Outcomes

The evaluative studies conducted by McClenney and Marti (2006) and Marti (2009) involve analysis of the relationship between CCSSE benchmarks or factors and educational outcomes. The results from these studies provide evidence of a positive relationship between student engagement and educational outcomes, thereby supporting the student engagement construct. The study conducted by Marti (2009) focused on identifying relationships between CCSSE benchmarks and self-reported grade point average (GPA) based on a large nationally representative sample of 274,694 American students who completed CCSSE in 2003, 2004 and 2005. In this study, four of the five CCSSE benchmarks were identified as having a positive relationship with self-reported GPA: Active and Collaborative Learning, Academic Challenge, Student Effort, and Student-Faculty Interaction. Details of the three studies included in the McClenney and Marti (2006) analysis are summarized in Appendix B.

The study conducted by McClenney and Marti (2006) included data from three independent, parallel studies involving a total of 9,725 American community college students who completed CCSSE in 2002, 2003 and 2004 and provided their unique student number: The *Study 1* sample consisted of 4,823 student records (data from the Florida Community College System), *Study 2* consisted of 1,623 (data from 24 community colleges in the Achieving the Dream initiative), and *Study 3* consisted of 3,279 student records (data from 16 colleges in the Hispanic Student Success Consortium). Each of these parallel studies looked at the relationship between CCSSE benchmarks and students' cumulative GPA. Two of the studies also looked at the relationship between CCSSE benchmarks and credit completion ratios, as well as the completion of courses in which a letter grade of "B" and higher, in some analyses, or "C" and higher, in other analyses, was achieved. Academic records for all of these analyses were extracted from college databases. Overall, results from the analyses provide evidence of a positive relationship between CCSSE benchmarks and these academic outcomes, as outlined below.

Cumulative GPA

Analysis using cumulative GPA as the dependant variable provided a measure of the relationship between CCSSE benchmarks over the duration of students' academic careers. In

Study 1, correlation and regression analyses were conducted based on three separate datasets representing: (1) several years of academic study dating back to 1996 for students who completed CCSSE in 2002, 2003, or 2004; (2) the first three terms of study dating back to 2002 for students that completed CCSSE in 2002, 2003, and 2004; and (3) a cross-section representing one year of study from the Winter 2004 survey administration which corresponded with the actual period of time in which students were referred to report their experiences and behaviours in CCSSE when it was administered in the Winter 2004 semester. Control variables in the regression analyses included sex, race/ethnicity (black, Hispanic, Native American), age at entry, number of years since high school completion, computerized placement (CPT) test scores in reading, writing and math, and credit-hour load. In each of the analyses, significant bivariate correlation and net effects were identified for Active and Collaborative Learning and Student Effort benchmarks. A positive correlation and net effects were identified also for Academic Challenge and Student-Faculty Interaction benchmarks in the cross-sectional analysis.

In *Study 2*, three separate analyses were conducted with cumulative GPA based on students with more than two years (four semesters) of study, two years of study, and one year of college study. Control variables in these analyses included sex, race/ethnicity, age, developmental math placement levels, and part-time status. Across the three analyses, significant bivariate correlations and positive net effects were identified for Active and Collaborative Learning and Academic Challenge. The Student Effort benchmark was a significant bivariate and net predictor of cumulative GPA for students with one and two years of study. The Student-Faculty Interaction benchmark was as a significant correlate and net predictor of cumulative GPA for students with more than two years of study. Finally, in *Study 3*, a single analysis based on cumulative GPA was conducted for students who completed CCSSE in 2002, 2003, and 2004 and included controls for race/ethnicity and domestic/international status. Results of this analysis identify four CCSSE benchmarks that are positively correlated and have net effects: Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction.

Credit Completion Ratio

The credit completion ratio variable is noted in McClenney and Marti (2006) as accounting for course withdrawals, incompletes, and academic performance. Credit completion ratios in *Study 1* and *Study 2* were based on the number of credits completed divided by the number of credits attempted. As with cumulative GPA, *Study 1* involved separate analyses of credit completion ratios based on three analytical files. Results from the cross-sectional analysis identified four benchmarks as predictors of credit completion ratio—Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction. Only one benchmark was identified as a predictor in each of the other two analyses: Active and Collaborative Learning was a predictor of credit completion ratios for students with several years of study and Support for Learners was a predictor for students with three terms of study (the only time Support for Learners acted as a predictor in any study). *Study 2* included analyses of credit completion ratios based on the first two years of study and first three years of study in separate analytical files. *Study 2* included three analyses of credit completion ratios based on more than two years of study, two years, and one year of study. A total of four benchmarks were identified as

correlates and net predictors of credit completion ratio for students with more than two years of study and two years of college study—Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction. No direct relationships or net effects were identified in analysis of students with one year of study.

Completion of Courses with a “C” and Higher

This variable was developed based on the total number of courses in which specific course grades were earned, divided by the total number of courses attempted. In *Study 1*, analyses focused on all student courses, irrespective of subject/topic or level (college or pre-college/developmental). In this study, Active and Collaborative Learning, Student Effort, and Academic Challenge benchmarks were identified as bivariate and net predictors of the percentage of courses with a letter grade of “C” and higher in analysis based on students with several years of study. Similarly, these three benchmarks were identified as net predictors in the cross-sectional analysis but only Active and Collaborative Learning and Academic Challenge had a bivariate correlation. In *Study 2*, a number of specific college level and developmental (or pre-college level) English and math courses were analyzed separately to identify relationships between CCSSE benchmarks and academic performance in these courses based on a letter grade of “B” and higher or “C” and higher. Active and Collaborative Learning was identified as having a significant correlation with College Algebra with a “C” or higher. Student Effort and Academic Challenge benchmarks were correlated with the completion of developmental mathematics courses with a “B” or better. The Student Effort benchmark was correlated with the completion of developmental reading courses one and two levels below college with a “B” or higher.

Across these analyses and studies, cumulative GPA had the most consistent relationships with CCSSE benchmarks, with at least two benchmarks identified as predictors in each analysis. Overall, Active and Collaborative Learning and Academic Challenge benchmarks were the most consistent across these analyses and studies, followed by Student Effort and Student-Faculty Interaction benchmarks. Analyses of credit completion ratios based on analyses in two studies reveals less consistent results, but which do highlight CCSSE benchmarks as significant bivariate and net predictors. Among these, Active and Collaborative Learning is the most consistent benchmark identified across studies. Student Effort, Academic Challenge, and Student-Faculty Interaction benchmarks were identified as bivariate and net predictors in different analyses across the two studies as well. Regarding completion of courses with a “B” and higher or “C” and higher, analysis from two studies suggest that CCSSE benchmarks are also good predictors of college level and developmental or pre-college level academic performance.

Methods

Bivariate correlations and regression analysis were used to examine relationships between CCSSE benchmarks and selected academic outcomes as dependent variables. First, bivariate correlations were calculated for each possible pair of CCSSE benchmarks and dependent variables. These analyses were not limited by missing data except any missing data that might be present in either of the two paired variables. Second, regression analyses were performed to

determine the net effect of each CCSSE benchmark on each dependent variable. Control variables in the regression included age at time of surveying (according to the categories listed in CCSSE), sex, English as first language, international student status, high school GPA in the last year of study, and dichotomous variables were created for race (Hispanic and non-Hispanic, etc.) and first generation student status. The cumulative effects of missing data (principally first generation student status and high school GPA, both derived from administrative records) meant these analyses were based on about one third fewer students than the correlation analyses.

Sample and Data File Construction

Of the 1,087 students who completed CCSSE during the Winter 2009 semester, 509 students voluntarily provided their student number, which allowed their CCSSE survey responses to be matched with academic records for this analysis. Demographic characteristics of the analysis sample and Humber population data are compared in Table 1.2, which highlights that there is a close match between the sample and population demographics. CCSSE responses from the sample were merged based on student number with student academic outcomes as dependent measures, which were obtained from college records. The dependent measures based on student records were end of semester GPA achieved in the Winter 2009 semester, cumulative GPA, credit completion ratios, and percentage of courses in which a grade of 70 per cent or higher was achieved. Also merged in the dataset was high school GPA earned in the last year of high school, which was used as a control variable for entering ability.

Study Variables

Five academic outcomes or performance measures were selected as dependent variables for this study, which are as follows:

1. *Self-reported GPA*. The overall grade average achieved at the college, as reported in CCSSE. This measure is assumed to represent the current academic year, consistent with the period of time students were referred to report their behaviours and experiences in CCSSE.
2. *End of semester GPA*. The grade point average earned from all courses taken during the Winter 2009 semester. This measure corresponds with the semester in which students completed CCSSE.
3. *Cumulative GPA*. The grade point average earned from completed courses in all semesters of study.
4. *Cumulative credit completion ratio*. The total number of credits earned by students in an analysis divided by the total number of credits attempted.

5. *Percentage of courses completed with a grade of 70 per cent or higher.* The total number of courses in which a grade of 70 per cent or higher was earned by students in an analysis divided by the total number of courses completed.

Results

Overall, two CCSSE benchmarks, Active and Collaborative Learning and Academic Challenge, are significantly correlated with all five academic outcomes selected as dependent variables ($p \leq 0.05$). Student Effort is significantly correlated with GPA, end of semester GPA, cumulative GPA, and percent of courses completed with a grade of 70 per cent or higher ($p \leq 0.05$). Neither Student-Faculty Interaction nor Support for Learners was correlated with any of the five academic outcomes (Tables 2.1 – 2.5).

Active and Collaborative Learning is a net predictor of self-reported GPA, end of semester GPA, and cumulative GPA, while Academic Challenge is a net predictor of end of semester GPA, cumulative GPA, and credit completion ratio. Student Effort, Student-Faculty Interaction, and Support for Learners are not shown to be predictors of any academic outcomes. Of the control variables included in the regression models (age, sex, English as a first language, international student status, final year high school GPA, race, and first generation status), age group and final year high school GPA were consistent net predictors of all five outcomes. Further study on the effect of individual control variables on benchmarks and outcomes is recommended and requires a more detailed analysis than could be performed in this study.

Table 2.1
Outcome: Self-Reported GPA

CCSSE Predictor	Regression									
	Beta	Sig.	R ²	N	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.
Active and Collaborative Learning	0.155	.007**	.182	309	Age Group	0.144	.013*	Final Year HS GPA	0.314	.000**
Student Effort	0.084	.150	.168	309	Age Group	0.150	.010**	Final Year HS GPA	0.312	.000**
Academic Challenge	0.099	.089	.170	309	Age Group	0.151	.009**	Final Year HS GPA	0.313	.000**
Student-Faculty Interaction	0.000	.999	.162	309	Age Group	0.159	.006**	Final Year HS GPA	0.318	.000**
Support for Learners	0.055	.346	.165	309	Age Group	0.158	.006**	Final Year HS GPA	0.316	.000**

*p < .05, **p < .01

^No other control variables included in the regression models were significant.

CCSSE Predictor	Correlation		
	Coeff.	Sig.	N
Active and Collaborative Learning	.191	.000**	503
Student Effort	.137	.002**	503
Academic Challenge	.140	.002**	503
Student-Faculty Interaction	.024	.596	503
Support for Learners	.066	.138	503

*p < .05, **p < .01

Table 2.2
Outcome: End of Semester GPA (Winter 2009)

CCSSE Predictor	Regression									
	Beta	Sig.	R ²	N	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.
Active and Collaborative Learning	0.148	.011*	.236	309	Age Group	0.240	.000**	Final Year HS GPA	0.368	.000**
Student Effort	0.076	.191	.223	309	Age Group	0.245	.000**	Final Year HS GPA	0.366	.000**
Academic Challenge	0.162	.005**	.239	309	Age Group	0.242	.000**	Final Year HS GPA	0.366	.000**
Student-Faculty Interaction	0.061	.291	.221	309	Age Group	0.243	.000**	Final Year HS GPA	0.374	.000**
Support for Learners	0.036	.541	.219	309	Age Group	0.253	.000**	Final Year HS GPA	0.369	.000**

*p < .05, **p < .01

^No other control variables included in the regression models were significant.

CCSSE Predictor	Correlation		
	Coeff.	Sig.	N
Active and Collaborative Learning	.187	.000**	501
Student Effort	.139	.002**	501
Academic Challenge	.197	.000**	501
Student-Faculty Interaction	.086	.054	501
Support for Learners	.054	.231	501

*p < .05, **p < .01

Table 2.3
Outcome: Cumulative GPA

CCSSE Predictor	Regression				Control Variable	Beta	Sig.	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.
	Beta	Sig.	R ²	N									
Active and Collaborative Learning	0.133	.022*	.301	309	Age Group	0.277	.000**	Final Year HS GPA	0.431	.000**	African American	-0.081	.162
Student Effort	0.056	.338	.291	309	Age Group	0.283	.000**	Final Year HS GPA	0.430	.000**	African American	-0.152	.009**
Academic Challenge	0.132	.023*	.301	309	Age Group	0.280	.000**	Final Year HS GPA	0.430	.000**	African American	-0.152	.009**
Student-Faculty Interaction	0.019	.740	.289	309	Age Group	0.285	.000**	Final Year HS GPA	0.434	.000**	African American	-0.150	.010**
Support for Learners	0.043	.461	.290	309	Age Group	0.288	.000**	Final Year HS GPA	0.432	.000**	African American	-0.155	.007**

*p < .05, **p < .01

^No other control variables included in the regression models were significant.

CCSSE Predictor	Correlation		
	Coeff.	Sig.	N
Active and Collaborative Learning	.173	.000**	501
Student Effort	.124	.005**	501
Academic Challenge	.169	.000**	501
Student-Faculty Interaction	.051	.255	501
Support for Learners	.053	.235	501

*p < .05, **p < .01

Table 2.4
Outcome: Credit Completion Ratio

CCSSE Predictor	Regression															
	Beta	Sig.	R ²	N	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.
Active and Collaborative Learning	0.095	.101	.174	309	Age Group	0.111	.055	Final Year HS GPA	0.317	.000**	African American	-0.112	.055	Asian	-0.081	.165
Student Effort	0.041	.478	.168	309	Age Group	0.117	.044*	Final Year HS GPA	0.317	.000**	African American	-0.180	.002**	Asian	-0.144	.013*
Academic Challenge	0.141	.015*	.183	309	Age Group	0.109	.060	Final Year HS GPA	0.315	.000**	African American	-0.181	.002**	Asian	-0.144	.013*
Student-Faculty Interaction	0.033	.568	.167	309	Age Group	0.116	.046*	Final Year HS GPA	0.321	.000**	African American	-0.178	.002**	Asian	-0.146	.012*
Support for Learners	0.044	.453	.168	309	Age Group	0.120	.038*	Final Year HS GPA	0.318	.000**	African American	-0.184	.001**	Asian	-0.147	.011*

*p < .05, **p < .01

^No other control variables included in the regression models were significant.

CCSSE Predictor	Correlation		
	Coeff.	Sig.	N
Active and Collaborative Learning	.131	.003**	509
Student Effort	.083	.061	509
Academic Challenge	.164	.000**	509
Student-Faculty Interaction	.046	.303	509
Support for Learners	.035	.434	509

*p < .05, **p < .01

Table 2.5
Outcome: Percent of Courses Completed with a Grade of 70% and Higher

CCSSE Predictor	Regression															
	Beta	Sig.	R ²	N	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.	Control Variable	Beta	Sig.
Active and Collaborative Learning	0.058	.320	.243	309	Age Group	0.173	.003**	Final Year HS GPA	0.384	.000**	African American	-0.082	.160	Asian	-0.041	.482
Student Effort	0.035	.546	.241	309	Age Group	0.175	.002**	Final Year HS GPA	0.383	.000**	African American	-0.181	.002**	Asian	-0.141	.015*
Academic Challenge	0.082	.159	.245	309	Age Group	0.172	.003**	Final Year HS GPA	0.383	.000**	African American	-0.182	.002**	Asian	-0.141	.015*
Student-Faculty Interaction	-0.022	.705	.240	309	Age Group	0.182	.002**	Final Year HS GPA	0.386	.000**	African American	-0.182	.002**	Asian	-0.139	.016*
Support for Learners	0.020	.733	.240	309	Age Group	0.179	.002**	Final Year HS GPA	0.385	.000**	African American	-0.182	.002**	Asian	-0.142	.014*

*p < .05, **p < .01

^No other control variables included in the regression models were significant.

CCSSE Predictor	Correlation		
	Coeff.	Sig.	N
Active and Collaborative Learning	.103	.020*	508
Student Effort	.099	.026*	508
Academic Challenge	.120	.007**	508
Student-Faculty Interaction	.000	.996	508
Support for Learners	.023	.609	508

*p < .05, **p < .01

Part III: General Discussion

The Model of Effective Educational Practices (MEEP) is intended to provide college educators with a practical guide for understanding the nature of student engagement within their institutions. It is based on research conducted in the U.S. that identifies positive relationships between educational outcomes and student engagement. MEEP consists of five factors or benchmarks, which are used in CCSSE reports provided to participating colleges to compare their results with those other colleges with similar characteristics. As a Model validated in the American college context (Marti, 2009), it provides U.S. colleges with a valuable tool for identifying areas where engagement may be low and to take action for improvement. This study investigated whether MEEP exhibited good model fit based on data collected in an Ontario college in order to determine whether the Model is also valid in this context and, therefore, yield meaningful results that can be confidently used to identify strengths and weaknesses or guide action.

Results of analysis in this study confirmed that MEEP exhibits good model fit for this institutional context based on the total sample of full-time student respondents and the sex of the sample respondents, consistent with the results from Marti's (2009) study. A low number of part-time students in the sample (reflecting the low numbers in the college population) meant that model fit for this subpopulation could not be analyzed at this time, but which could be conducted if the survey is administered in the future and a sufficient respondent to variable ratio is achieved. Similarly, analysis of model fit based on the year of survey administration, which was conducted by Marti to confirm the Model's consistency from year to year, could be conducted if the survey is administered in the future and would add an additional element of confidence. Overall, however, the model fit results for full-time students and based on sex found in this study, and their consistency with the results obtained by Marti, provides strong evidence of the validity of MEEP in this institutional context.

The second part of this validity study involved analysis to identify any significant relationships between the CCSSE benchmarks that constitute MEEP and academic outcomes. A total of five academic measures were included in this analysis—self reported GPA, end of semester GPA, cumulative GPA, credit completion ratio, and percentage of courses completed with grade of 70 per cent or higher. Results of analysis in this study confirm there are direct relationships, as measured through bivariate correlation, between Active and Collaborative Learning and Academic Challenge benchmarks and all five academic measures or outcomes and between Student Effort and four of these outcomes—a direct relationship between Student Effort and credit completion ratio was not found. After controls were introduced in regression analysis, to identify the net effect of CCSSE benchmarks on each of the five academic outcomes, Active and Collaborative Learning and Academic Challenge benchmarks were identified as predictors of four of the five outcomes—no benchmarks were identified as having a net effect on percentage of courses completed with a grade of 70 per cent or higher.

Although not identical, the analytical files developed for this study approximate some of the analytical files from the U.S. studies outlined above that consist primarily of students with two or more years (four or more semesters) of student study, which provides a reasonable basis for

comparison of results. This excludes analysis based on end of semester GPA, for which no comparable analyses was conducted in any of the U.S.-based studies highlighted above. With regards to self-reported GPA, the three benchmarks identified in this study with a direct correlation, Active and Collaborative Learning, Student Effort, and Academic Challenge, were also identified in Marti's (2009) study. By contrast, Marti also found Student-Faculty Interaction to have a direct relationship and all four of these benchmarks were net predictors of self-reported GPA after controls for institutional and year-to-year differences were included. These controls were not applicable to the Humber data set.

In the analysis of cumulative GPA, there were four analyses from the McClenney and Marti (2006) study that involved students with two or more years of study, which approximates the analytical file developed for this study. In the present study, three benchmarks with direct correlation with cumulative GPA were found—Active and Collaborative Learning, Student Effort, and Academic Challenge. All three of these benchmarks were significantly correlated with cumulative GPA in the four comparable analyses reported by McClenney and Marti (2006). In two of these four analyses, Student-Faculty Interaction was also significantly correlated. After controls were introduced in this study, Active and Collaborative Learning and Academic Challenge benchmarks had net effects. Both of these benchmarks had net effects in all four U.S.-based analyses, but the Student Effort benchmark also emerged as a net predictor in three of these analyses and Student-Faculty Interaction emerged in two of these studies.

Three analyses of credit completion ratio were conducted in the McClenney and Marti (2006) study that are reasonably comparable based on years of study included in the analyses. In the present study, Active and Collaborative Learning and Academic Challenge benchmarks were significantly correlated and Academic Challenge was a net predictor of credit completion ratio. This was similar to the results from one U.S.-based study which identified Active and Collaborative Learning and Academic Challenge as significantly correlated and Active and Collaborative Learning as a net predictor of credit completion ratio. These results differ substantially from the other two U.S.-based analyses; no significant correlation or net effects were identified in one analysis and in the other four benchmarks, Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction were significantly correlated and had net effects on credit completion ratio.

With regards to percentage of courses completed with a grade of 70 per cent or higher, one U.S.-based analysis was conducted involving students with two or more years of study and which focused on courses irrespective of subject/topic or level (i.e., college or pre-college/developmental). In the present study, Active and Collaborative Learning, Student Effort, and Academic Challenge were correlated with the percentage of course grades achieved with a 70 per cent or higher but no net predictors emerge after controls were introduced. In the U.S.-based analysis, Active and Collaborative Learning and Academic Challenge were significantly correlated and Active and Collaborative Learning, Student Effort, and Academic Challenge were identified as net predictors of the percentage of course grades achieved with a "C" or higher.

In general, fewer direct correlations and net predictors were found in the analyses from this study than found in comparable U.S.-based analyses. However, the benchmarks that do emerge most consistently in the present study, Active and Collaborative Learning and Academic Challenge as net

predictors and these two benchmarks along with Student Effort as direct correlates, are also, overall, the most consistent correlates and net predictors found in the U.S.-based analyses. Differences in the analytical files may account for some of the differences in the results found in the two jurisdictions, just as there were differences among the U.S.-based analytical files. However, comparison of results from the two jurisdictions highlights what may be a substantial difference between the two jurisdictions in relation to the Student Effort benchmark, which was a net predictor in several comparable U.S.-based analyses but never emerged as one in the present study. This raises the possibility that this difference may be related to structural differences found in the two jurisdictions, such as those related to program and cohort structures, or other institutional characteristics, and deserves further investigation.

Conclusions

Overall, consistent direct correlations and net predictors of academic measures were identified in this analysis based on CCSSE data collected from students in an Ontario college. Results from analyses confirm three CCSSE benchmarks (Active and Collaborative Learning, Student Effort, and Academic Challenge) are significantly correlated with all five academic measures. However, only Academic and Collaborative Learning and Academic Challenge were found to be net predictors of outcomes (Active and Collaborative Learning for GPA, end of semester GPA, and cumulative GPA; Academic Challenge for end of semester GPA, cumulative GPA, and credit completion ratio). There were no predictors for the per cent of courses completed with a grade of 70 per cent or higher. In general, fewer direct correlations and net predictors were found in this study than in a variety of analyses conducted in different studies based on U.S. college students. Structural program and cohort differences, different sample sizes, and availability of multi-institutional and multi-year data may play a role in the differences between the Humber data and the U.S. college data and deserves further research.

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Appendix A

Questions and Standardized Coefficients for Items in MEEP CFA Model, CCSSE & Humber

CCSR Items	Benchmark / Factor	CCSSE Standardized Coefficients	Humber Standardized Coefficients
4a. Asked questions in class or contributed to class discussions	Active and Collaborative Learning	.46	.49
4b. Made a class presentation	Active and Collaborative Learning	.47	.52
4f. Worked with other students on projects during class	Active and Collaborative Learning	.49	.52
4g. Worked with classmates outside class to prepare class assignments	Active and Collaborative Learning	.57	.61
4h. Tutored or taught other students (paid or voluntary)	Active and Collaborative Learning	.43	.29
4i. Participated in a community-based project as part of a regular course	Active and Collaborative Learning	.41	.29
4r. Discussed ideas from readings or ideas with others not from class	Active and Collaborative Learning	.48	.53
4c. Prepared two or more drafts of a paper/assignment before turning it in	Student Effort	.52	.58
4d. Worked on a paper or project that required integrating ideas or Information from various sources	Student Effort	.62	.67
4e. Come to class without completing readings or assignments	Student Effort	.07	.08
6b. Number of books read on your own (not assigned) for personal enjoyment or academic enrichment	Student Effort	.21	.19
10a. Preparing for class (studying, reading, writing, rehearsing, doing homework, or other activities related to your program)	Student Effort	.39	.39
13d. Frequency: Peer or other tutoring	Student Effort	.33	.16
13e. Frequency: Skill labs (writing, math, etc.)	Student Effort	.34	.14
13h. Frequency: Computer lab	Student Effort	.32	.27
4p. Worked harder than you thought you could to meet an instructor's standards or expectations	Academic Challenge	.45	.42
5b. Analyzing the basic elements of an idea, experience or theory	Academic Challenge	.70	.69
5c. Synthesizing and organizing ideas/information/experiences in new ways	Academic Challenge	.77	.74
5d. Making judgments about the value or soundness of information, arguments, or methods	Academic Challenge	.71	.64
5e. Applying theories or concepts to practical problems or in new situations	Academic Challenge	.75	.71
5f. Using information you have read or heard to perform a new skill	Academic Challenge	.65	.68
6a. Number of assigned textbooks, manuals, books, or book-length packs of course readings	Academic Challenge	.27	.22
6c. Number of written papers or reports of any length	Academic Challenge	.26	.20

7. The extent to which your examinations during the current school year have challenged you to do your best work at this college	Academic Challenge	.34	.23
9a. Encouraging you to spend significant amounts of time studying	Academic Challenge	.42	.44
4k. Used email to communicate with an instructor	Student-Faculty Interaction	.42	.52
4l. Discussed grades or assignments with an instructor	Student-Faculty Interaction	.63	.67
4m. Talked about career plans with an instructor or advisor	Student-Faculty Interaction	.65	.64
4n. Discussed ideas from your readings or classes with instructors outside of class	Student-Faculty Interaction	.66	.65
4o. Received prompt feedback (written or oral) from instructors on your performance	Student-Faculty Interaction	.47	.49
4q. Worked with instructors on activities other than coursework	Student-Faculty Interaction	.49	.40
9b. Providing the support you need to help you succeed at this college	Support for Learners	.60	.57
9c. Encouraging contact among students from different economic, social, and racial or ethnic backgrounds	Support for Learners	.65	.58
9d. Helping you cope with your non-academic responsibilities (work, etc.)	Support for Learners	.76	.76
9e. Providing the support you need to thrive socially	Support for Learners	.81	.82
9f. Providing the financial support you need to afford your education	Support for Learners	.45	.55
13a. Frequency: Academic advising/planning	Support for Learners	.35	.24
13b. Frequency: Career counselling	Support for Learners	.34	.19

Appendix B

Comparison of the Three Studies used by McClenney and Marti (2006)

Study	Data Source	N	Control Factors	Details of Analysis	Key Results
1	Florida Community College System Validation Study (28 colleges)	4,823	<ul style="list-style-type: none"> Sex Race/ethnicity (black/Hispanic/Native American) Age at entry Number of years since high school completion Computerized placement tests Credit hour load 	<p><i>Variables</i></p> <ul style="list-style-type: none"> GPA Credit completion ratio Completion of courses with a “C” or higher <p><i>Sampling</i></p> <ol style="list-style-type: none"> Several years of academic study dating back to 1996 for students who completed CCSSE in 2002, 2003 or 2004 The first three terms of study dating back to 2002 for students that completed CCSSE in 2002, 2003 and 2004 A cross-section representing one year of study from the winter 2004 survey 	<ul style="list-style-type: none"> GPA was correlated with and net effects indentified for Active and Collaborative Learning and Student Effort Academic Challenge and Student-Faculty Interaction were also identified in the cross-sectional analysis Cross-sectional analysis identified Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction as predictors of credit completion ratio Only one benchmark was identified as a predictor in each of the other two analyses: Active and Collaborative Learning was a predictor of credit completion ratios for students with several years of study and Support for Learners was a predictor for students with three terms of study (the only time Support for Learners acted as a predictor in any study) Active and Collaborative Learning, Student Effort and Academic Challenge benchmarks were identified as bivariate and net predictors of the percentage of courses with a letter grade of “C” and higher for students with several years of study and as net predictors in the cross-sectional analysis but only Active and Collaborative Learning and Academic Challenge had a bivariate correlation in the cross-sectional analysis

Study	Data Source	N	Control Factors	Details of Analysis	Key Results
2	Achieving the Dream Validation Study (24 colleges)	1,623	<ul style="list-style-type: none"> Sex Race/ethnicity Age Math placement level Part-time status 	<p><i>Variables</i></p> <ul style="list-style-type: none"> GPA Credit completion ratio Completion of courses with a “C” or higher <p><i>Sampling</i></p> <ol style="list-style-type: none"> Students with more than two years (four semesters) of study who completed CCSSE in 2002, 2003 or 2004 Students with two years of study who completed CCSSE in 2002, 2003 or 2004 Students with one year of study who completed CCSSE in 2002, 2003 or 2004 	<ul style="list-style-type: none"> Across the three analyses, significant bivariate correlations and positive net effects were identified for Active and Collaborative Learning and Academic Challenge Student Effort was a significant bivariate and net predictor of cumulative GPA for students with one and two years of study Student-Faculty Interaction was as a significant correlate and net predictor of cumulative GPA for students with more than two years of study Active and Collaborative Learning, Student Effort, Academic Challenge and Student-Faculty Interaction were identified as correlates and net predictors of credit completion ratio for students with two years and more than two years of study Active and Collaborative Learning was significantly correlated with College Algebra with a “C” or higher Student Effort and Academic Challenge were correlated with the completion of developmental mathematics courses with a “B” or better Student Effort was correlated with the completion of developmental reading courses one and two levels below college with a “B” or higher

Study	Data Source	N	Control Factors	Details of Analysis	Key Results
3	The CCSSE Hispanic Student Success (HSS) Consortium Validation Study (16 colleges)	3,279	<ul style="list-style-type: none"> • Race/ethnicity • Domestic/international student status 	<p><i>Variables</i></p> <ul style="list-style-type: none"> • GPA <p><i>Sampling</i></p> <ol style="list-style-type: none"> 1. Students who completed CCSSE in 2002, 2003 and 2004 	<ul style="list-style-type: none"> • Active and Collaborative Learning, Student Effort, Academic Challenge, and Student-Faculty Interaction were positively correlated and have net effects on GPA

