

College Mathematics Project 2006/07
Forum Backgrounder

October 2007

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and the
Connecting GTA Teachers Regional Planning Team**

**PRELIMINARY REPORT – DO
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College Mathematics Project 2006/07 Forum Backgrounder

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Project Partners

Project Lead:

Seneca College, (<http://www.senecac.on.ca>) in collaboration with the York/Seneca Institute for Mathematics, Science and Technology Education (<http://www.ysimste.ca>)

Funding:

School/College/Work Initiative - <http://www.gotocollege.ca>

Connecting GTA Teachers Regional Planning Team - <http://cgtat.org>

Project Partners - Colleges:

Centennial College - <http://www.centennialcollege.ca>

George Brown College – <http://www.georgebrown.ca>

Georgian College – <http://www.georgianc.on.ca>

Humber Institute of Technology & Advanced Learning – <http://www.humber.ca>

Seneca College - <http://www.senecac.on.ca>

Sheridan Institute of Technology & Advanced Learning – <http://sheridaninstitute.ca>

Project Partners – Boards:

Toronto District School Board – <http://www.tdsb.on.ca>

Toronto Catholic District School Board – <http://www.tcdsb.org>

York Region District School Board – <http://www.yrdsb.edu.on.ca>

York Catholic District School Board – <http://www.ycdsb.ca>

Peel District School Board – <http://www.peel.edu.on.ca>

Dufferin-Peel Catholic District School Board – <http://www.dpcdsb.org>

Halton District School Board – <http://www.haltontsb.on.ca>

Halton Catholic District School Board – <http://www.haltonrc.edu.on.ca>

Simcoe County District School Board – <http://www.scdsb.on.ca>

Simcoe – Muskoka Catholic District School Board – <http://www.smcdsb.on.ca>

Project Partners – Government and other

Ontario Ministry of Education – <http://www.edu.gov.on.ca>

Ontario Ministry of Training, Colleges and Universities -

<http://www.edu.gov.on.ca/eng/tcu/>

Colleges Ontario – <http://www.collegesontario.org>

Ontario Colleges Heads of Mathematics Coordinating Group

Ontario College Mathematics Association (OCMA) -

<http://math.mohawkcollege.ca/ocma/ocma.html>

Introduction

CMP Rationale

Success rates in first year college mathematics courses are often unacceptably low. These low success rates are usually mirrored in other subjects in which mathematics is important, and students who are unsuccessful in such key courses are often unable to complete their chosen program, resulting in an unacceptably high “drop out” rate. Apart from this human cost, throughout Ontario colleges spend significant amounts on remedial work aimed at retaining such students, taxpayers’ investment in students’ first year programs is wasted, and the economy continues to experience shortages of trained personnel, especially in key occupations.

The College Mathematics Project (CMP) was developed by the York/Seneca Institute for Mathematics, Science and Technology (YSIMSTE) to research these issues and to deliberate over ways to increase student success in the future. CMP is now in its third year. The first year of the project (2004-05) involved a small-scale pilot study of 500 students at Seneca College. In 2005-06, the project was expanded to a larger-scale involving over 5000 students enrolled in over 100 technology programs at 6 Ontario colleges¹. This year, the study has been broadened again to include records of all students entering all programs at one of the six GTA colleges (Centennial, George Brown, Georgian, Humber, Seneca, and Sheridan) in Fall 2006, who enrolled in a first semester mathematics course

CMP Goals and Methodology

The goals of the College Mathematics Project are as follows:

- ❑ To examine factors contributing to success and failure in college mathematics, including secondary school mathematics pathways and achievement.
- ❑ To use this research to inform deliberation about improving the transition between secondary school and college, thereby increasing success rates in first semester college mathematics.

These goals are achieved through a process called “Deliberative Inquiry” in which practice drives research through issue identification and research results inform practice through a deliberative process. In the case of CMP, the issue is student performance in first semester college mathematics. In the research phase, student achievement data is gathered and analyzed and the findings communicated to stakeholders in the project with the goal of deliberating the results for potential change. Stakeholders have the opportunity to change practice evaluated in light of the research results based on the efficacy of their

¹ The 2004-05 pilot study was supported by Seneca College of Applied Arts & Technology and the 2005-06 and 2006-07 projects by the School/College/Work Initiative (SCWI) of the Ministry of Education and the Ministry of Training, Colleges & Universities. (<http://cgtat.org>)

response to the research results. For more information on the model, see Appendix C.

The research is of two general types. The qualitative study examines grading policies, college admission practices, placement testing, student success strategies including remedial courses, the range of programs in each participating college, and first semester mathematics courses. The quantitative study analyses the achievement patterns of students and links secondary school academic background (in mathematics) with first semester college mathematics achievement.

A major outcome of this year's project has been the development of a web based data display system allowing for individual college queries on the data. Queries are based on the project's research questions providing links to the appropriate data display while maintaining confidentiality of students, school boards, and colleges. Each participating college and school board is able to identify data pertaining to its own students within each display. In addition, this web based query system enables colleges to conduct their own program analysis in relation to the data aggregated from the 6 participating colleges. A summary of the available reports is presented in Appendix D.

Deliberative Forum

In accordance with the Deliberative Inquiry model, CMP 2005-06 included a one-day deliberative forum held in June 2006 as an integral part of the study. This forum was attended by representatives of colleges, schools, and educational government panels. The research results were discussed with a view to identifying actions aimed at enhancing student success. Discussion groups reflected a range of areas of responsibility: curriculum (schools and colleges); guidance; at-risk/student success; and, policymakers (provincial, boards and colleges). A summary of the recommendations is presented in Appendix A.

In 2007 the goals for the CMP Forum will be to: 1) update last year's research results; (2) incorporate new data and analyses arising from the research focusing on remedial courses and their consequences for students; (3) learn about initiatives colleges and school boards have implemented since last year's research results; and, (4) discuss changes and improvements at the college level arising from the previous deliberations.

Highlights of the Qualitative Research

The qualitative research study examined grading policies, college admission practices, and placement testing, remedial courses as a response to testing and as a student success strategy, additional student success strategies, and an examination of the range of programs in each participating college and first semester mathematics courses.

Grading Policies and CMP Grading System:

In order to compare grades from colleges having different grading systems, a common “CMP Grading System” had to be developed. The grading system developed in CMP2005-06 has been adopted for the current project (see Appendix E for details on individual college grading policies).

All marks were translated into an alpha system from A to F. This translation is described in Table 1: *Grading Policy*. All grades indicating a failure (e.g. <50%, <55%, or <60%) are translated as "F". Scores between 60%-69% are considered "C". However, this means that student scores for colleges whose pass score is greater than and/or equal to 55%, will have fewer students in the "D" range since "D" corresponds to scores between 50% and 59%. Likewise, student scores for colleges who's pass score is greater than and/or equal to 60%, will not report any students with "D" scores. This issue must be kept in mind when reporting each category of scoring. Nonetheless, students in the 54%-69% range would still be identified as being "at risk". In this way, college student marks can be identified as either "good" scores or "at risk". This “CMP grading system” was approved by the steering committee on Feb. 16/07.

Table 1: CMP Grading System

Grade	Mark Range
A	80-100%
B	70-79%
C	60-69%
D	50-59%
F	<50%

College Admission Criteria

Four features of college admission are examined for this study. The *General Admission* criteria provide an overview of Ministry of Training, Colleges, and University (MTCU) requirements for all Ontario colleges. The *Mature Adult Requirement* will describe an admission pathway for applicants who do not have a secondary school diploma; have been out of school for a minimum of one year; and, who are 19 on or before the date of college enrolment. The *Mathematics Requirements of the OSSD for In-coming College Students* provides an overview of the admission criteria by program, and outlines mathematics requirements for each college participating in the study. Appendix F: *Admission Requirements*

summarizes the colleges' admission standards. Lastly, *Other College/Program Criteria* identifies when college may institute placement testing. This analysis is currently being developed.

1. *General Admission Criteria*: All college applicants submit their application through the Ontario Colleges' Application System (OCAS). The minimum college admission requirement for in-coming students is the Ontario Secondary School Diploma (OSSD) as established by MTCU. Colleges may also request additional admission criteria if the program has particular academic rigor, is in a specialized field, or is over subscribed. For example, students may be required to submit a portfolio, résumé, or complete a questionnaire.

2. *Mature Adult Requirement*: In addition to the *General Admission* requirement, colleges also admit students under a *Mature Adult Requirement* when secondary school diploma or its equivalent is lacking. Students are generally out of school for a minimum of one year and are 19 on or before the start of classes.

3. *Mathematics Requirements of the OSSD for In-coming College Students by Program Area*:

Applied Arts: This is the only cluster which does not specify a particular mathematics requirement.

Business. In this cluster, Georgian College and Humber College specify Grade 12 academic or applied mathematics for their admission requirements. Sheridan specifies Grade 12 applied only. The remaining 3 colleges (Centennial, George Brown, and Seneca) indicate Grade 11 applied or academic mathematics to be sufficient for admissions.

Technology. The programs in this cluster generally follow similar admission criteria as do the *Business* programs. In addition, the computer related studies at Centennial College request Grade 12 academic mathematics. Seneca College specifies Grade 12 Mathematics for College Technology.

General. This cluster has no specific mathematics course admission requirement. The website for George Brown identifies Grade 11 or Grade 12, applied or academic for their admission policies. This emphasizes the fact there is no restriction on the mathematics requirements in this cluster.

A summary of admission requirements for CMP 2006/07 colleges is presented in Appendix F.

Placement Testing

Four colleges required students to take a placement test in Fall 2004. These tests were either purchased from specific assessment companies or they were developed by the college itself. The purpose of testing is to help students identify

which mathematics skills are needed for success in college mathematics courses. Students are tested using the college's specific admission test and placed into a mathematics course based on the test results. Generally, students who do not pass the test are placed into a remedial mathematics course which is not integral to the program of study. At some point in the program, the student pays for an additional course.

College policies on this issue have changed over time. Therefore, discussions for each college will identify past and current or future placement testing considerations.

Remedial Mathematics Courses

Colleges implement placement to maximize student success while admitting students from a variety of academic backgrounds. Students are admitted with varying interests; from different jurisdictions; with a variety of secondary school mathematics grades; and, from a variety of secondary school academic streams. As a result, students who do not make the college's cut-scores on placement testing are placed into a remedial mathematics course. Therefore, a remedial mathematics course is a student success and retention strategy generally accessed through college placement testing. Access to this course is determined by the placement test cut score established by the college. It provides a foundation in first semester for core mathematics course(s). It is usually not part of a program of study for students. These courses will be examined vis-à-vis first semester college mathematics courses.

Student Support Provided by Colleges

Colleges provide support for students in a variety of ways to encourage success in mathematics. Tutoring programs are provided through student service departments at colleges at a nominal cost. Tutors can be college or university students generally trained by college personnel and/or faculty. The tutor's role can be one-on-one or in groups; in libraries, mathematics drop-in centres, or classrooms. Program areas may provide other support initiatives

Highlights of the Quantitative Research

Research Questions

CMP2007 focused on examining the records of all students entering college programs in Fall 2006 who took a first semester mathematics course were reviewed and analysed as follows:

- Percentages of students passing or “at risk” as a result of failure, near-failure or withdrawal from their college mathematics course;
- Relationships between mathematics achievement in first semester and the mathematics courses completed in high school;
- Relationships between mathematics achievement in first semester and the school board/high school attended;

Data Views

Data was grouped into several sets of views as follows.

A. Participation

The first series of views provides information about student enrolment, analysed by college, program cluster, gender, participation in first semester mathematics, and age/academic background. These are defined as follows:

- **College:** As noted earlier, data from 6 colleges is contained in CMP 2007. In line with the CMP policy on data confidentiality (Appendix H), these are identified here simply as College 1, College 2, etc.
- **Program Cluster:** All college programs have been grouped into 4 major clusters (Applied Arts, Business, General and Technology) each of which is also divided into sub-clusters, as outlined in the Qualitative study (above). This information may be further refined on a “sub-cluster” basis; for example the Technology cluster consists of five sub-clusters: Applied Science, Construction, Computer Related, Electronics and Mechanical.
- **Gender:** Student participation by gender (male/female) is shown where this information has been provided.
- **Participation in first semester mathematics:** Only the records of students taking a first semester mathematics course are of interest to CMP and the overall numbers of these are shown. These are also subdivided into those whose first semester mathematics course is a *regular* course in their college program or if it is a special *remedial* course required of some students only. It should be noted that remedial mathematics courses are not provided by all colleges or for all programs.
- **Age/Academic Background:** CMP distinguishes between two groups of students, based on their age and academic background. One group (whom we call “Recent Ontario Graduates” or ROGs) is made up of students who are under the age of 23 on December 31, 2006 and who

have graduated from an Ontario Secondary School. The remainder (non-ROGs) are those who are either older or who have graduated in another jurisdiction. This distinction is important for us to be able to relate achievement in college mathematics with achievement in high school mathematics.

Table 2 shows the overall participation in the project, comprising over 20,000 students in the six colleges², by program cluster and gender. The table also shows the gender distribution and those with math grades (a total of 10,743).

The table shows that the Colleges enrolled almost equal numbers of males (10,156 - 49.9%) and females (10,207 - 50.1%). However, differences in the proportions of males and females are evident in most program clusters with the exception of Business, where almost equal numbers of males and females were represented.

Corresponding tables (not included in this Backgrounder) show the same information for those taking regular College math courses (8,693 – 81% of the total) and remedial math courses (2,055 – 19% of the total).

Participation by Age/Academic Background

A corresponding series of data views have been prepared corresponding to those students who were under 23 on December 31, 2006 and who also graduated from Ontario secondary schools. In the jargon of CMP, these Recent Ontario Graduates (ROGs) totaled 13,864 or 68% of the overall student sample. Of these, 7,538 (70%) took first semester mathematics.

Table 3 shows how the numbers of ROGs taking regular or remedial mathematics courses compared with the overall sample.

² In accordance with the CMP policy on the confidentiality of data (see Appendix E), the names of individual colleges are not shown. Where comparative charts, such as this one, are used, representatives of each college will be informed of the data pertaining to their own college.

Table 2: Participation in College Mathematics Project 2006/07 – Major Program Clusters

Major Cluster	College 1		College 2		College 3		College 4		College 5		College 6		TOTAL (all colleges)		
	M	F	M	F	M	F	M	F	M	F	M	F	Male	Female	
Applied Arts	905	1696	486	1071	49	77	862	2456	16	34	0	0	2318	5334	
	2601		1557		126		3318		50		0		7652		
	76		0		0		874		51		0		1001		with any Math grade
	2601		1564		126		3336		51		0		7678		Total # of records
Business	952	853	273	269	331	484	328	399	576	434	566	476	3026	2915	
	1805		542		815		727		1010		1042		5941		
	1658		386		195		612		1013		903		4767		with any Math grade
	1805		542		815		734		1013		1046		5955		Total # of records
General	423	484	82	235	0	0	163	304	0	0	183	182	851	1205	
	907		317		0		467		0		365		2056		
	674		216		0		353		0		201		1444		with any Math grade
	907		319		0		470		0		371		2067		Total # of records
Technology	1092	319	444	73	511	140	882	74	554	38	478	109	3961	753	
	1411		517		651		956		592		587		4714		
	923		378		360		795		532		543		3531		with any Math grade
	1411		517		651		961		592		590		4722		Total # of records
Totals	3372	3352	1285	1648	891	701	2235	3233	1146	506	1227	767	10156	10207	
	6724		2933		1592		5468		1652		1994		20363		
	3331		980		555		2634		1596		1647		10743		with any Math grade
	6724		2942		1592		5501		1656		2007		20422		Total # of records

Table 3: All Students' Enrolment in Regular and Remedial Mathematics Courses

	ROGs		Non-ROGs		Total	
Regular Math	5899	78%	2794	87%	8693	81%
Remedial Math	1641	22%	414	13%	2055	19%
Total	7538	100%	3205	100%	10743	100%

It can be seen that a higher proportion of ROGs were required to take remedial mathematics courses than that of the non-ROGs. In the tables that follow (4 and 5), the distributions of enrolments in regular and remedial mathematics courses is shown by program cluster (Business and Technology program clusters are specially featured as enrolments in these are highest). It should be noted that the relatively higher remedial math enrolments by Business students reflects the greater availability of remedial mathematics in that program cluster across the colleges.

Table 4: Business Students' Enrolment in Regular and Remedial Mathematics Courses

	ROGs		Non-ROGs		Total	
Regular Math	2439	73%	1227	86%	3666	77%
Remedial Math	907	27%	199	14%	1106	23%
Total	3344	100%	1423	100%	4767	100%

Table 5: Technology Students' Enrolment in Regular and Remedial Mathematics Courses

	ROGs		Non-ROGs		Total	
Regular Math	2087	85%	964	89%	3051	86%
Remedial Math	361	15%	119	11%	480	14%
Total	2448	100%	1083	100%	3531	100%

B. Mathematics Achievement

Because of the frequently bi-modal distribution of mathematics grades across all colleges and program clusters, CMP has found it useful to describe achievement in mathematics in terms of two groups of students:

- Students achieving an A, B or C grade and who are in a strong position to progress in their chosen program are described as having “good passing grades”.
- Students achieving a D or F grade or who did not complete the course are described as being “at risk” of not completing their chosen program.

The following section provides highlights of CMP 2007 data concerning achievement.

Table 6 shows the distribution of students having “good passing grades”. As before, students are analysed into ROGs and non-ROGs and into those taking regular and remedial courses.

Table 6: Good Passing Grades in 1st Semester College Mathematics

	ROGs		Non-ROGs		Total	
Regular Math	3776	63%	2113	75%	5889	67%
Remedial Math	997	68%	287	78%	1284	70%
Total	4773	64%	2400	75%	7172	67%

Note: Percentage calculations for each group are based on the total number in that group enrolled.

Table 7 shows the distribution of students considered to be “at risk.” As before, students are analysed into ROGs and non-ROGs and into those taking regular and remedial courses.

Table 7: Students “at risk” in 1st Semester College Mathematics

	ROGs		Non-ROGs		Total	
Regular Math	2202	37%	696	25%	2898	33%
Remedial Math	476	32%	83	22%	559	30%
Total	2678	36%	779	25%	3456	33%

Note: Percentage calculations for each group are based on the total number in that group enrolled.

Analysis of student achievement by program cluster is shown in Tables 8 (for Business) and 9 (for Technology). The reader will note that there are only small differences among program clusters in achievement, both in regular and remedial courses but that non-ROGs tend to do better than ROGs in both.

There is a much wider range of achievement differences across Colleges than might be expected both in regular and remedial mathematics courses and this is being investigated further.

Table 8: Business Students with Good Passing Grades and At Risk

	ROGs		Non-ROGs		Total	
Good Grades (Regular Math)	1510	62%	928	76%	2438	67%
Good Grades (Remedial Math)	562	66%	138	73%	700	67%
At Risk (Regular Math)	924	38%	294	24%	1218	33%
At Risk (Remedial Math)	291	34%	50	27%	341	33%
Total	3287		1410		4697	

Note: Percentage calculations for each group is based on the total number in that group enrolled.

Table 9: Technology Students with Good Passing Grades and At Risk

	ROGs		Non-ROGs		Total	
Good Grades (Regular Math)	1375	63%	731	74%	2106	67%
Good Grades (Remedial Math)	223	79%	91	90%	314	82%
At Risk (Regular Math)	800	37%	256	26%	1056	33%
At Risk (Remedial Math)	58	21%	10	10%	68	18%
Total	2456		1088		3544	

Note: Percentage calculations for each group is based on the total number in that group enrolled).

C. Secondary School Pathways

Information on students' selection of secondary school mathematics courses and their subsequent achievement in college is important for school boards, schools, teachers, guidance counselors, students and parents. As well, colleges can use this information to inform admission requirements and for curriculum revision.

CMP examined the pathways chosen by the entire ROG sample in the study but focuses particularly on those culminating in the two college destination courses: Mathematics for College and Apprenticeship (MAP4C) and Mathematics for College Technology (MCT4C). Analysis of these for each program cluster allows us to report on the pathways that are the most effective for various types of college programs.

The following are the highlights of this analysis.

- In total, more than 250 “pathways” or selection of courses are recorded in the CMP data base. Many of these pathways (153) were taken by fewer than 10 students.
- The number of math courses taken by individual students ranged from 1 to 10.
- The most popular pathway (771 students) includes Grade 9 and 10 Applied Mathematics, Mathematics of Personal Finance (MBF3C) and Mathematics for College and Apprenticeship.
- The second most popular pathway (506 students) consisted of the Grade 11 Mathematics of Personal Finance and Mathematics for College and Apprenticeship.
- 3,439 students took Mathematics for College and Apprenticeship (MAP4C) while only 484 had taken Mathematics for College Technology (MCT4C);
- 509 students were admitted into their college programs with MBF3C as their final course in secondary school
- Many students had taken Grade 12 U courses prior to enrolling at college; 1,693 students had enrolled exclusively in Grade 11 M/U and Grade 12 courses (with Grade 9 and 10 courses, if recorded on the data base at the academic level).

Table 10 presents the distribution of student achievement in each program cluster for each of the 6 most popular secondary school mathematics pathways. These all culminate in MAP4C. Table 11 presents the corresponding distribution for pathways culminating in MCT4C. The reader should be aware that in this table, with the exception of the technology program cluster, many of the numbers shown are very small.

The tables show that for Applied Arts, Business and General program clusters, MAP4C is an appropriate destination course but that, for Technology, MCT4C is

the preferred course. This finding is consistent with the CMP Research Brief issued in February 2007 (see Appendix G).

Table 10: % of students achieving good grades and at risk in college mathematics analysed by secondary school mathematics pathway culminating in MAP4C

	Pathway	#1	#2	#3	#4	#5	#6
Grade 9		MFM1P		MPM1D		MPM1D	MPM1D
Grade 10		MFM2P		MFM2P		MPM2D	MPM2D
Grade 11		MBF3C	MBF3C	MBF3C		MBF3C	MCF3M
Grade 12		MAP4C	MAP4C	MAP4C	MAP4C	MAP4C	MAP4C
<i>Numbers of students</i>		714	502	463	245	263	214
Applied Arts	ABC	63%	67%	70%	60%	67%	80%
	At Risk	37%	33%	30%	40%	33%	20%
Business	ABC	58%	50%	59%	55%	67%	75%
	At Risk	42%	50%	41%	45%	33%	25%
General	ABC	49%	60%	58%	69%	55%	56%
	At Risk	51%	40%	42%	31%	45%	44%
Technology	ABC	47%	44%	59%	57%	64%	72%
	At Risk	53%	56%	41%	43%	36%	28%

Table 11: % of students achieving good grades and at risk in college mathematics analysed by secondary school mathematics pathway culminating in MCT4C

	Pathway	#1	#2	#3	#4	#5	#6
Grade 9		MPM1D			MPM1D		
Grade 10		MPM2D			MPM2D		
Grade 11		MCF3M	MCF3M		MCR3U	MCR3U	MBF3C
Grade 12		MCT4C	MCT4C	MCT4C	MCT4C	MCT4C	MAP4C
							MCT4C
<i>Numbers of students</i>		62	49	40	19	17	14
Applied Arts	ABC	80%	71%	100%		100%	
	At Risk	20%	29%	0%		0%	
Business	ABC	55%	75%	88%	80%	50%	67%
	At Risk	45%	25%	12%	20%	50%	33%
General	ABC	100%	57%	60%	50%		100%
	At Risk	0%	43%	40%	50%		0%
Technology	ABC	73%	65%	70%	83%	86%	64%
	At Risk	27%	35%	30%	17%	14%	36%

D: Mathematics Achievement by School Board

Table 12 shows the achievement of students in first semester College mathematics based on the school board from which they graduated. Once again, the names of the boards have been masked in accordance with the CMP policy on confidentiality. Table 13 shows the achievement of students enrolled in college level and remedial mathematics based on the school board from which they graduated.

Table 12: Distribution of Achievement by School Board

All Boards All major clusters	Totals		<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>	<u>B8</u>	<u>B9</u>	<u>B10</u>	<u>B11</u>	<u>B12</u>	<u>B13</u>
<u>Applied Arts</u>	%good	72.3%	74.5%	76.8%	70.4%	68.4%	82.6%	85.3%	100.0%	53.3%	80.0%	73.4%	75.8%	68.8%	80.1%
	646		41	63	38	26	19	64	7	8	4	174	25	11	109
	%at risk	23.7%	25.5%	23.2%	29.6%	31.6%	17.4%	14.7%		46.7%	20.0%	26.6%	24.3%	31.2%	19.9%
201		14	19	16	12	4	11		7	1	63	8	5	27	
<u>Business</u>	%good	65.2%	61.4%	67.5%	68.4%	65.2%	63.5%	59.3%	63.7%	68.8%	64.2%	67.5%	50.0%	59.1%	69.2%
	2514		250	187	332	30	61	198	72	11	34	520	98	55	473
	%at risk	34.8%	38.6%	32.5%	31.6%	34.8%	36.5%	40.7%	36.3%	31.2%	35.8%	32.5%	50.0%	40.9%	30.8%
1344		157	90	149	16	35	136	41	5	19	250	98	38	211	
<u>General</u>	%good	61.1%	57.5%	55%	65.1%	57.9%	59.4%	60.3%	60.4%	35.3%	38.1%	64.7%	56.7%	52.6%	64.6%
	745		61	61	69	11	19	85	32	6	8	132	68	10	82
	%at risk	38.8%	42.5%	45%	34.9%	42.9%	40.4%	39.7%	39.6%	64.7%	61.9%	35.3%	43.3%	47.4%	35.4%
473		45	50	37	8	13	56	21	11	13	72	52	9	45	
<u>Technology</u>	%good	66.1%	64.6%	64.5%	71.1%	58.3%	75.0%	63.1%	64.5%	48.1%	64.3%	66.5%	57.2%	61.1%	71.3%
	1958		199	142	234	49	51	159	71	13	27	365	79	33	325
	%at risk	33.9%	35.4%	35.5%	28.9%	41.7%	25.0%	36.9%	35.5%	51.9%	35.7%	33.5%	42.8%	38.9%	28.7%
1004		109	78	95	35	17	93	39	14	15	184	59	21	131	
Totals	%good	66%	62.9%	65.7%	69.4%	62.0%	68.5%	63.1%	64.3%	50.7%	60.3%	67.6%	55.4%	59.9%	70.5%
	5863		551	453	673	116	150	506	182	38	73	1191	270	109	989
	%at risk	34%	37.1%	34.3%	30.6%	38.0%	31.5%	36.9%	35.7%	49.3%	39.7%	32.3%	45.5%	40.1%	29.5%
3022		325	237	297	71	69	296	101	37	48	569	217	73	414	

Those school board officials with access to the database can also examine the records for individual schools within their board.

Table 13: Distribution of Achievement in College Level and Remedial Mathematics by School Board of Student Graduation

All Boards All major clusters	Totals n	% All boards	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
College Level Math	good 4203	65.0%	60.2%	65.1%	67.6%	60.5%	68.6%	61.9%	63.1%	48.0%	58.8%	66.7%	56.2%	56.8%	70.8%
	at risk 2265	35.0%	448	306	570	89	142	371	171	24	67	890	178	96	851
Remedial Math	good 1099	78.0%	66.8%	81.1%	67.5%	66.7%	66.5%	91.7%	56.00%	85.7%	70.8%	54.1%	100%	68.8%	
	at risk 489	69.2%	103	147	103	27	8	135	11	14	6	301	92	13	139
		22%	33.2%	18.9%	32.5%	33.3%	33.50%	8.3%	44.00%	14.3%	29.2%	45.9%		31.2%	
		30.8%	29	73	24	13	4	68	1	11	1	124	78		63

Note: the n values from this table and calculations for % “good” and % “at risk” are for all boards and are presented so that the selected boards may compare their results to that of the total.

Appendix A – Forum Introduction and Summary of Recommendations

Connecting GTA Teachers
**College Mathematics Project (CMP)
Forum**

Sponsored by School / College / Work Initiative

Friday, October 26, 2007
Seneca College – King Campus

INTRODUCTION

The CMP 2007 Forum will build on the CMP 2006 Forum which brought together teachers of mathematics, administrators and others from Colleges and District School Boards to deliberate about the mathematics interface between schools and colleges and about how to increase student success in mathematics as they move from school to college. The deliberations last year drew on the results of the CMP research program from 2005-2006 that documented the generally disappointing performance of many students in first semester college mathematics.

CMP 2007 has once again conducted a research program, whose results are available in full on the CMP web site

< <http://collegemathproject.senecac.on.ca/board/portal.php> >, are summarized in the 2007 Forum Backgrounder to be distributed soon, and will be discussed at the Forum itself. This year, the research has covered students at 6 GTA colleges and 10 district school boards, and has covered all students whose programs include a first-semester mathematics course. Discussions at the last forum took place in four stakeholder groups – mathematics curriculum; guidance; students at risk/student success; policy issues for the province, boards, and colleges – and the resulting recommendations organized into three general areas of responsibility – Secondary Schools; Colleges; and Ministries (MoE, MTCU) (see below).

The focus of the CMP Forum 2007 will to review the recommendations from last year (below) in light of the new research from CMP 2007 and ask **what progress is being made and what remains to be done?** Accordingly, each of the colleges, school boards and provincial agencies participating in CMP 2007 Forum are invited to:

- Review the recommendations of CMP 2006 summarised below;
- Comment briefly on activities undertaken in the past year that have been designed to enhance student success in Mathematics;
- Suggest what is most needed, going forward, both at the local level and provincially.

Given the large number of institutions participating in the forum and the very short amounts of time available for discussion, we would invite each institution to:

- Submit an electronic report on their activities to the forum, which will be added to the CMP web site for general reading;

- Speak at the Forum for no more than 5 minutes about one particular activity that it considers to have had the greatest impact;
- Participate in subsequent deliberations with other delegates about the areas for CMP to focus on in the future.

We trust that these suggestions will help focus our time together into a productive and stimulating deliberation.

CMP 2006 Forum Recommendations

Secondary Schools

- Increase dialogue with colleges
- Increase partnering with colleges for dual credit pilots.
- Honour all destinations, not just University:
 - Help students understand that MCT4C will better prepare them for college technology programs
 - Schedule courses for college pathways even when there is low enrollment.
 - Begin career education on college destinations early – work together to inform kids about pathways and where they lead.
 - Publicize - parents must understand that the doors are still open to students in the applied stream and that certain levels of achievement are required for success in later courses.
 - Encourage teachers to visit college classrooms
- Ensure that students follow Ministry pathways
- Market 11M – e.g., as a pre calculus course, offered concurrently with a calculus course to allow transfers mid semester.
- Address student needs:
 - Use a learning style inventory and ensure that all learning styles are honoured in the instructional strategies used by teachers.
 - Consider a non-semestered math program to provide continuity.
 - Develop diagnostic tests appropriate for different programs that gives students feedback on what they know (and need to know)
 - Remediation at grade level isn't possible – provide remediation at level needed.

Colleges

- Increase dialogue with school boards and secondary schools
- Build on the continuum of secondary – college mathematics. Consistency of results should be an expectation.
 - Encourage college teachers to visit secondary classrooms
 - Offer a mandatory summer upgrading course at all colleges for students not at the appropriate developmental level (based on diagnostic testing).
 - Include a mandatory Learning Strategies/Intro to college course OR a transition time for students in the first couple of weeks.
 - Provide samples of college assessments to secondary teachers.
 - Use research to inform practice, e.g., on use of technology, on attention to aspects of mathematics beyond procedural fluency, in order to support a seamless transition for students.
- Make a commitment to MCT4C as a prerequisite for college technology programs
- Work with elementary and secondary students:
 - Offer career days for grade 7 and 8's; follow up with parents
 - Have senior students shadow college students for 1 – 2 days
 - Offer orientation programs for grades 10 and 11
 - Combine groups of schools and groups of colleges when providing information
- Raise awareness with advertising that:
 - Corrects assumptions about the profile of a college student,

- Provides information about college – university, and university – college pathways
- Provides information about college support systems
- Provide PD opportunities for college teachers.

MOE and MTCU

- Increase dialogue
- Support more qualitative analysis of assessment and pedagogy practices in college classrooms, to inform implementation of new strategies.
 - Provide a new name for the new 11M course – if it remains the same it will complicate data analysis
- Consider developing a grade 11 college technology course
- Encourage dual-credit opportunities
- RE: Faculties of Education
 - Broaden admission criteria for Faculties of Education to include students with college backgrounds.
 - Include training in instructional strategies for applied learning.
 - Establish pre-service practicum experiences in colleges
- RE: Professional Development for college teachers
 - Set up a teacher education program for college teachers.
 - Allow college teachers to take the AQ courses designed for secondary teachers, and develop additional AQ courses specific to college teaching
- Work towards better alignment of instructional strategies and assessment between college and secondary mathematics programs.
- Encourage school/college partnerships
- Engage accreditation bodies in dialogue on the issue of technology use in college mathematics courses.

Appendix B - Forum Agenda

Connecting GTA Teachers
College Mathematics Project (CMP)
Regional Forum

Sponsored by School / College / Work Initiative

Friday, October 26, 2007
 Seneca College – King Campus

AGENDA

8:30	Registration Light breakfast Networking with colleagues	Lower Level Garriock Hall (main building) Seneca King
9:00	Welcome to the CMP Forum Cindy Hazell, Senior Vice President, Seneca	Pod C
9:15	The College Mathematics Project - Research - CMP Overview and Context - CMP Research Questions - Presentation of Report - Question and Answer CMP Project Team	Pod C
10:30	Refreshment Break	Pod C
10:45	The College Mathematics Project –Implementation Local Action Plans and Best Practices by CMP Colleges and Boards	Pod C
12:15	Buffet Lunch	Pod B
1:00	Implementing the Revised Math Curriculum Anthony Azzopardi, Education Officer, Ministry of Education	Pod C
1:30- 2:30	Breakout Sessions	See below
3:00	Recommendations: Reports from each breakout group	Pod C
4:00	Wrap-up	Pod C

Breakout sessions

- Participants will attend the breakout session they selected upon registration.
- The breakout session selected will be printed on the participant's name badge, along with the room number.
- With the guidance of a Facilitator, participants will brainstorm key questions, recommendations and an action plan for their scope of expertise and influence.
- Each breakout session group will present their findings to the whole forum at the plenary session which follows.
- Forum proceedings will be published and shared with forum participants.

<p>Session A- Careers</p>	<p>Implications for Guidance Teachers</p> <p><i>Participants:</i> Secondary school guidance heads/counselors, college liaison and recruitment officers</p> <p><i>Facilitator :</i> Carol Henry, Seneca</p>	<p>Pod C</p>
<p>Session B- Curriculum</p>	<p>Implications for Mathematics Teachers</p> <p><i>Participants (2 groups):</i> Secondary school Mathematics curriculum leaders and teachers, college Mathematics faculty, program coordinators, program administrators</p> <p><i>Facilitators :</i></p> <p>Trish Byers, Georgian College (CMP Project Team) Margaret Sinclair, York University (CMP Project Team) Kevin Maguire, TDSB</p> <p>Amy Lin, Halton DSB</p>	<p>TBC</p>
<p>Session C- At Risk</p>	<p>Implications for Student Success Leaders</p> <p><i>Participants:</i> Secondary School Student Success Leaders, College student advisors and/or counsellors</p> <p><i>Facilitators:</i> Lorri McLeod (Georgian College)</p>	<p>TBC</p>

<p>Session D-Province</p>	<p>Implications for the Province, Boards and Colleges</p> <p><i>Participants:</i> MTCU, Ministry of Education, Colleges Ontario CRALO, HEQCO, SCWI, board superintendents, senior college administrators</p> <p><i>Facilitators :</i> Graham Orpwood & Laurel Schollen, CMP Project Team Members</p>	<p>TBC</p>
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Appendix C- Deliberative Inquiry Model

Components of Deliberative Inquiry

1. Issue Identification
2. Development of Research Questions
3. Using Theory
4. Payoff for Theory
5. Communication for Deliberation
6. Payoff for Practice

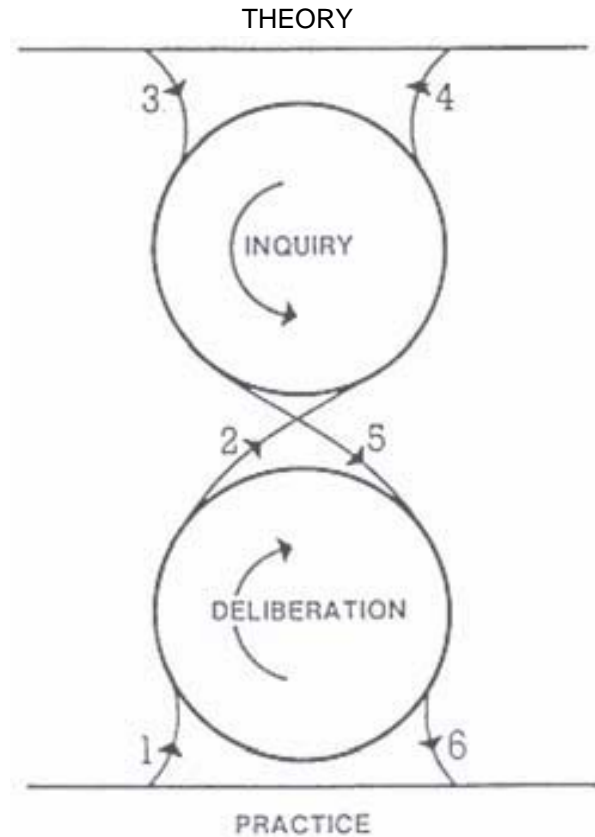


Figure 1

In the Deliberative Inquiry model, practice drives research through issue identification; a “real” problem. Research questions are developed. Data is gathered and analysed and a review of literature is completed. This research adds to the body of scholarly work in the field through the publication of findings in peer reviewed journals (the pay off for theory). Research findings are communicated to practice, which in turn deliberates on response to the findings. Practice then responds by implementing recommendations or action plans flowing from the research (payoff for practice). The efficacy of such responses can be measured through another “cycle” of inquiry. This model has been used by the Science Council of Canada.

[1] Graham Orpwood. “Toward the Renewal of Canadian Science Education: 1. Deliberative Inquiry Model” *Science Education* 69 (4): 477-489 (1985).

College Math Project

List of all available reports

A: PARTICIPATION

A1: What are the total number of students in our sample, by college, gender, and program cluster?

A2: What are the numbers of students under the age of 23 (December 31, 2006) and who are graduates of Ontario High Schools (ROGs) by college, gender and program cluster?

B: COLLEGE MATH ACHIEVEMENT

B1: What is the grade distribution for all students, and for ROGs, by college and program cluster?

B2: What are the % of students achieving a "good passing grade" (A, B, C) for all students and ROGs, by college and program cluster?

B3: What is the % of students "at risk" (D, F, and W) for all students and for ROGs, by college and program cluster?

C: HIGH SCHOOL MATHEMATICS PATHWAYS

C1: What are the most populous Mathematics pathways by program cluster and overall?

C2: What are the most successful high school mathematics pathways, based on the % of students passing well (A, B, and C), by program cluster and overall?

C3: What are the least successful high school mathematics pathways, based on the % of students at risk (D, F, & W), by program cluster and overall?

C4: What are the results of students taking pathways that culminate in MAP4C?

C4: What are the results of students taking pathways that culminate in MCT4C?

D: RESULTS BY SCHOOL BOARD AND SCHOOL

D1: What are the % of students with a "good passing grade" (A, B, C) and "at risk" (D, F and WD) from each of the partner school boards and secondary schools in each of the partner school boards in the project?

Appendix E - Grading Policies for CMP 2006/07 Colleges

CMP 2007 (Grade/Marking Range)	Centennial¹	George Brown²	Georgian³	Humber⁴	Seneca⁵	Sheridan⁶
A (80-100%)	A+ Outstanding achievement (90 – 100%)	A+ (90 – 100%)	A 80% - 100%	A 80% - 100%	A+ (90-100%)	A+ Outstanding achievement (90 – 100%)
	A Excellent achievement (80-89%)	A (86- 89%)			A (80%-89%)	A Excellent achievement (80-89%)
		A- (80- 85%)				
B (70%-79%)	B+ Very good achievement (75-79%)	B+ (77 – 79%)	B 70% - 79%	B 70% - 79%	B+ (75-79%)	B+ Very good achievement (75-79%)
	B Good achievement (70-74%)	B (73- 76%)			B (70-74%)	B Good achievement (70-74%)
		B- (70- 72%)				
C (60%-69%)	C+ Satisfactory achievement (65-69%)	C+ (67 – 69%)	C 60% - 69%	C 60% - 69%	C+ (65-69%)	C+ Satisfactory achievement (65-69%)
	C Acceptable achievement (60 – 64%)	C (63- 66%)			C (60 – 64%)	C Acceptable achievement (60 – 64%)
		C- (60- 62%)				
D (50%-59%)	D+ (55%-59%)	D+ (57%-59%)	F less than 60%	F less than 60%	D (55%-59%)	D+ Pass (55-59%)
	D (50%-54%)	D (50%-56%)			D (50%-54%)	D Pass (50 – 54%)
F (0%-49%)	F (0%-49%)	F (0%-49%)				F (0%-54%)

Additional/Alternative Grading Policies

Centennial¹	George Brown²	Georgian³	Humber⁴	Seneca⁵	Sheridan⁶
F – Unsatisfactory S - Satisfactory I – temporary for work not yet completed		A Performance above minimum course requirements B Minimum course requirements achieved F – Unsatisfactory P – Course requirements met S – Co-op term successful U – Co-op term unsuccessful		EXC - Excellent SAT - Satisfactory UNSAT - Satisfactory	S – Satisfactory I – Incomplete*
CIP - Course in progress SUB - Substitution of one requirement course		AS Advanced standing. Credit awarded ATT – Course with no evaluation factor	INC = Incomplete (Diploma and Certificate Studies Only)	SUP – Supplemental privilege granted for whatever reason (see policy for details) DEF - Deferred examination granted INC - Specific work needs to be completed before final grade will be assigned	CIP - Course in progress SUB - Substitution of one requirement course
AEG - Aegrotat standing AUD - Audit status GNR - Grade not reported WNP - Withdrew without academic penalty NGR - No grade required TCR - Transfer credit (formerly advanced *standing) EXW - Exceptional waiver		AEG - Aegrotat standing AU – Course audited DNA – Did not attend EX – Exemption granted based on previous academic or co-op credits MT – Mid-term of course NMS – No mark submitted IN – Incomplete IP – Course in progress WD – Withdrawal in accordance with College conditions	AUD = Audit AEG = Aegrotat DEF = Deferred (Degree Studies Only) GNE = Grade Not Earned EXM = Exemption SAT = Satisfactory WTH = Course Withdraw UNS = Unsatisfactory	DNA - Registered but did not attend and did not officially withdraw WD - Withdrew from subject officially before deadline (without penalty) DNC - Did not complete *** - Officially withdrew from College ADV - Advanced Standing EXM – Exemption ATT - Attendance Satisfactory AEG - Aegrotat	AEG - Aegrotat standing AUD - Audit status GNR - Grade not reported WNP - Withdrew without academic penalty NGR - No grade required TCR - Transfer credit (formerly advanced *standing) EXW - Exceptional waiver

*doing satisfactory work, but was unable to complete course work for reasons beyond student's control. The student has 12 calendar months after the scheduled end of the course to complete requirements as determined by the instructor who assigned the 'T' and to thereby qualify for a passing grade. After 12 calendar months, an outstanding 'T' grade will be converted to 'U', and thereafter, the course must be repeated to achieve a passing grade.

¹<http://www.centennialcollege.ca/upload/File/tearsfears.pdf>

² <http://coned.georgebrown.ca/info/policies.html#grades>

³ http://www.georgianc.on.ca/academics/policies/pdfs/course_grading.pdf

⁴<http://fulltimestudents.humber.ca/2006-2007%20Academic%20Regulations.pdf>

⁵http://www.senecac.on.ca/home/academic_policy/2000_grade.html

⁶<http://www1.sheridaninstitute.ca/students/current/academic.cfm#GradingSystem>

Appendix F: Admission Requirements for CMP 2006/07 Colleges

	Centennial	George Brown	Georgian	Humber	Seneca	Sheridan
Business	Gr 11C	Gr 11 M or U Gr. 12 C or U	Gr. 12C or U	Gr. 12C or U	Gr. 12C or U ** or Grade 11 (U) or (M) or any Grade 12 (U) Mathematics.	Gr. 12C or U ** or Grade 11 (U) or (M) or any Grade 12 (U) Mathematics.
Technology	Gr. 12C or Gr 11U Gr. 12U (Computer related studies)	Gr 11 M or U Gr. 12 C or U	Gr. 12C or U	Gr. 12C or U	Gr. 12C MCT4C ** or Grade 11 (U) or (M) or any Grade 12 (U) Mathematics.	Gr. 12C MCT4C ** or Grade 11 (U) or (M) or any Grade 12 (U) Mathematics.
Applied Arts	No math	No math	No math		Gr. 11	Gr. 12C or U ** or Grade 11 (U) or (M) or any Grade 12 (U) Mathematics.
General	No math	Gr 11 M or U Gr. 12 C or U	No math		No math	
Apprentice- ship	Gr. 12C or Gr 11U	Gr. 12				
Other Information	Orientation Session English and/or math assessment	English and/or math assessment	English assessment	Admission testing in math	English and/or math assessment	

¹http://www.ontariocolleges.ca/pls/portal/url/page/toplevelpages/OCAS_findprogram_admission

Appendix G – Research Brief

York/Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE)

RESEARCH BRIEF

Choosing the right math course in Grade 12 can dramatically affect students' chances of future success in college technology programs, according to a recent analysis of research data collected by the College Mathematics Project (CMP).

The latest CMP analyses show that, of more than 700 students entering first-year technology programs at five Ontario colleges in fall 2004, fewer than one quarter had taken MCT4C (Mathematics for College Technology). Sixty-nine per cent of these students achieved an A, B or C grade in their first semester college mathematics course, with 31 per cent obtaining a D or F or withdrawing from the course.

By contrast, the Grade 12 mathematics course taken by over half of the students was MAP4C (College and Apprenticeship Mathematics). Of this group, fewer than 35 per cent achieved a good grade (A, B or C) in first semester college mathematics and 65 per cent obtained a D or F or withdrew from the course.

The implication for students who plan to take a college technology program after high school is that taking MCT4C (instead of MAP4C) greatly increases their chance of success.

The implication for schools is that they should ensure that MCT4C is offered and that students considering technology careers are strongly advised to take this course.

The College Mathematics Project is an ongoing program of research supported by the School College Work Initiative (SCWI) of the Ministry of Education and the Ministry of Training, Colleges & Universities. The research is conducted by the York/Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE) at Seneca College and York University. The project is a collaboration involving colleges and school boards in the Greater Toronto Area and is designed to promote student success in college mathematics through research and deliberation.

The York/Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE) is a partnership of York University (Faculty of Education and Faculty of Science and Engineering) and Seneca College of Applied Arts and Technology (Faculty of Technology). YSIMSTE strives to create and undertake initiatives in teaching, curriculum, applied R&D, and outreach, with a view to improving the quantity and quality of education in mathematics, science and technology at all levels of education - elementary, secondary, post-secondary, and industrial training. <http://www.ysimste.ca>

For more information about the College Mathematics Project, please contact:
Laurel Schollen, Director
YSIMSTE, College Mathematics Project
laurel.schollen@senecac.on.ca
(416) 491-5050 (ext 2430 or 3775)

Appendix H: Policy on Reporting of Confidential Data

York/Seneca Institute for Mathematics, Science and Technology (YSIMSTE)

COLLEGE MATHEMATICS PROJECT-CMP2006/07 ***Proposed Policy on Reporting of Confidential Data***

A. Student Data

It is a fundamental principle of the College Mathematics Project that confidentiality of students' data must be strictly maintained.

Accordingly, student data sent from any College to the CMP Data Analysis Centre at Seneca College is stripped of all student identifiers and a new student ID code number substituted, according to the protocol to be prepared by the CMP Technical Committee. Thus it should be impossible to identify any student personally.

B. College Data

Some of the data being supplied by each College to the College Mathematics project is normally considered to be confidential to each College (e.g. pass rates in specific programs). There is therefore a need to respect such College confidentiality in the ways in which CMP data and analyses are presented, both publicly and to the CMP participating Colleges.

Data will be aggregated and analysed by College and Program and reported as follows. Public documents and documents reporting to the Steering Committee will contain data aggregated across all six colleges. No College will be identified specifically. In addition, analyses reported to each College will include that College's data together with the aggregated data. In other words, Colleges will get to see their own data and the aggregate data but not that of other Colleges.

Some comparative analyses that specifically require individual College data to be displayed will have College identifiers removed.

This policy may be suspended for specific purposes by consent of College representatives on the Steering Committee.

C. School Data

While school and board identifiers are present on extracts from student admission files, these will not be published in the analysis of board and school data. In addition, data such as total numbers of students will be removed as to ensure that a board cannot be identified specifically. Analyses reported to each school board will include that board's (including specific school data) together with the aggregated data. In other words, boards will get to see their own data (including school identification) and the aggregate data but not that of other boards.

D. Reporting to Government, Agencies, Media

Dissemination of information is essential to the attainment of the long term goals of CMP and to meet funding requirements. To this end the CMP project team will prepare reports, research briefs and presentations. The identities of individual colleges, boards and schools will be protected; names/existing identifiers and be replaced with a code and total numbers removed in order to ensure that no college, board or school can be specifically identified.

Appendix I - CMP2007 Steering Committee		
Institution	Name	Position
Committee Members		
Centennial College	Martha Shephard	Chair, General Arts & Science Prgms
Centennial College	Phil Cox	Chair
George Brown College	Elizabeth Speers	Chair, School of Business
George Brown College	Jeff Litwin	Associate Dean, Technology
Georgian College		
Georgian College	Trish Byers	Mathematics faculty, Eng Technology
Humber College	Mohammad Hussain	Coordinator, Math & Science
Humber College	Crystal Bradley	Associate Dean, Math
Seneca College	Riaz Saloojee	Mathematics faculty, Gen Arts&Science
Seneca College	Laurel Schollen	Dean, Applied Science & Engineering
Sheridan College	Carolann Waite	School of Business
Sheridan College	Donald Curzon	Director of Institutional Research
TDSB	Kevin Maguire	Instructional Leader, Mathematics
TDSB	Rob Brown	Board Researcher
TCDSB	Richard Lachapelle	Program Coordinator: Mathematics
YRSB	Kathryn Stewart	IS Math Curriculum Leader
YCDSB	Pietrina Orlandi	Mathematics Consultant
Peel DSB	Cathy Dunne	Instructional Resource
Dufferin-Peel CDSB	Dwight Stead	Mathematical Literacy Consultant
Halton DSB	Amy Lin	Numeracy & Math Consultant
Halton CDSB		
Simcoe DSB	Trish Steele	Math Literacy Consultant, 7-12
Simcoe/Muskoka CDSB	Richard Gallant	Secondary Curriculum Consultant
Ministry of Education	Anthony Azzopardi	Education Officer
MTCU	Sunita Kosaraju	Research Analyst, Colleges Branch
Colleges Ontario	Sheila Susini	Senior Research and Policy Advisor
SCWI	Susan Thomas	Manager, Career Services & Pathways
Heads of Mathematics	Paul Balog	Chair, Heads of Mathematics
OCMA	John Kezys	
Heads of Language	John Struthers	Chair, Central HOL
Project Team Members		
	Laurel Schollen	CMP Project Director
	Graham Orpwood	CMP Project Manager
	Margaret Sinclair	CMP Associate Director
	Hassan Assiri	Manager Academic Computer Systems
	Trish Byers	CMP Researcher