

The logo consists of the text "YSIMSTE" in white, uppercase, sans-serif font, centered within a solid red rectangular background.

York - Seneca Institute for Mathematics, Science and Technology Education

COLLEGE MATHEMATICS PROJECT 2010

FINAL REPORT

Executive Summary

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Preface

Once again, we are pleased to present the annual report of the College Mathematics Project (CMP). In doing so, the CMP team acknowledges the critical work of many individuals and groups whose contributions have enabled the project to operate throughout the year. These include:

- the Ministry of Education and the Ministry of Training, Colleges and Universities for their ongoing support, both financial and professional;
- the CMP Steering Committee, the college Vice-Presidents, Academic and the CMP College Leads, who have ensured that CMP had the data with which to conduct its research;
- the School/College/Work Initiative (SCWI), whose Regional Planning Teams have organised forums at which CMP research has been shared with school and college educators;
- Seneca College's Information Technology Services (ITS) department, especially John Meskes, Mehrdad Ziaei and Mohsen Rezayatmand, who have enabled the CMP data to be assembled, analysed and displayed.

2010 is the second year in which the CMP has included all 24 colleges in Ontario. This report is therefore an interim report on the project's overall program of research and deliberations concerning student success in college mathematics. As in the past, we see the achievement of this goal as a shared responsibility, with schools, colleges, government, and students all having a part to play. We therefore commend our research for further deliberations over ways all these groups can contribute to improvements.

Le présent document est également disponible en français au site
<http://collegemathproject.senecac.on.ca>

Executive Summary

The College Mathematics Project (CMP) is a collaborative program of research and deliberation concerning mathematics achievement of first-year college students in Ontario. Its goals are:

- To analyse the mathematics achievement of first-semester college students, particularly in relation to their secondary school mathematics backgrounds;
- To deliberate with members of both college and school communities about ways to increase student success in college mathematics.

CMP 2010 included all 24 colleges and 72 district school boards in all regions of the province. It was funded by the Ministry of Education and the Ministry of Training, Colleges and Universities, and led by a team of researchers from the York-Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE) based at Seneca College.

The CMP employs the overall methodology of deliberative inquiry, in which research into the current situation is linked to deliberations among stakeholders over appropriate courses of future action. The CMP 2010 research analysed the secondary school and college records of almost 95,000 students who enrolled in all college program areas in fall 2009. Of these, over 35,000 took a first-semester mathematics course and the research focused on their achievement in these courses, relating this to a variety of factors, including the choice of mathematics courses taken at secondary school.

Highlights of the CMP 2010 research include the following:

- 68.6% of students achieved good grades (A, B or C) in first-semester college mathematics, while 31.4% were considered to be “at risk” (having received a D or F or having withdrawn from the course). This percentage (of good grades) represents an improvement from 67.0% last year and 64.6% the year before.
- Of the Very Recent Ontario Graduates – those who have taken the most recently revised mathematics curriculum in secondary school – 64.1% of the males and 71.0% of the females achieved good grades.
- Second Career students achieved better than other students: 83.1% of males and 87.0% of females achieved good grades.
- Graduates of French-language school boards attend English- and French-language colleges in approximately equal numbers; their mathematics achievement in both types of college is very similar.
- Older students, particularly females, achieve significantly better than younger students: 66.2% of males and 89.3% of females aged 50 and over obtained good grades.
- Patterns of achievement analysed according to secondary school mathematics pathways follow similar patterns to those found in the past:

- Many more students came to college with MAP4C than MCT4C in Grade 12 but their achievement was lower overall. The same applies to MBF3C and MCF3M in Grade 11.
- However students with high marks in MAP4C do well in college mathematics; 78.6% of those with 80% and over in MAP4C obtained good grades in college.
- Over 3,000 students in our sample took no mathematics after Grade 11; only 50.8% of those who took MBF3C as a terminal course achieved good grades in college mathematics.
- The numbers of students transferring from Grade 10 Applied Mathematics to MCF3M is increasing each year from 0 in 2007 to 289 in 2008 to 665 in 2009. 62.9% of these students go on to obtain good grades in college mathematics.
- Research began this year into students taking one-year “foundation” programs at college and some important preliminary results were observed:
 - A sharp increase in both the numbers of foundation programs and enrolment in them took place in fall 2009 (enrolments up 33% overall and up 22.4% in mathematics compared with fall 2008).
 - 10% of all first-year college students were enrolled in foundation programs and a further 10% take preparatory mathematics courses as part of regular programs.
 - Mathematics achievement across different foundation programs varied significantly, with 73.7% of pre-health students, 61.7% of pre-business students, but only 45.9% of pre-technology students obtaining good grades.
 - CMP analysis of a small number of foundation program mathematics courses showed that they share a common emphasis on the mathematics skills required for college diploma programs and the occupations for which these programs prepare students. In this respect, they are similar to the diploma-level mathematics courses but contrast with secondary school mathematics courses which have a broader range of emphases. The skills featuring most prominently in college foundation mathematics courses include many of those originally taught in elementary school.

The CMP 2010 report concludes with some reflection on themes and recommendations from the past two years, comments on progress made, and suggestions for ways forward. This part of the report is organised into three aspects of the overall strategy for supporting student success in college mathematics: articulation, alignment, and integration.

Articulation refers to the ways in which the structures of secondary and postsecondary education provide for a smooth and successful transition of students from one sector to the other. The School/College/Work Initiative (SCWI) has for many years been an important means for promoting improved articulation between schools and colleges, particularly in its work of enabling dual credit courses. But CMP forums over the years have identified a number of articulation issues that call for a

broader forum for discussion and for making concrete the vision of student success from Kindergarten through elementary, secondary and postsecondary education to career entry. To this end, last year the CMP proposed a Provincial Roundtable on Secondary/Postsecondary Transitions, an idea that has now been endorsed by Colleges Ontario. The CMP report also argues for the need for a permanent tracking system for students moving through the various levels of education based on the work initiated by CMP.

Alignment refers to the need for the curriculum and instructional systems of secondary and postsecondary education to be sufficiently coordinated that students can move smoothly and successfully from one to the other. The CMP's work in analysis of students' secondary school mathematics backgrounds has been aimed at helping to improve alignment, as is our current work in the analysis of foundational mathematics courses at college. This has revealed the much more intensive emphasis on mathematical skills in college courses than is the case at the secondary school level and the need for students to reach high standards in the required skills in order to be assured of success in college programs. This analysis is ongoing and the CMP will report further on this in its report next year. In the meantime, further dialogue between secondary school and college mathematics teachers continues to be of great value.

Integration is the third strategic component of the overall strategy for student success in college. For several years, CMP has highlighted the crucial importance of Learning Skills in the successful integration of students into postsecondary education. We believe that it is the good development of these skills that enables older students – and Second Career students in particular – to be more successful than younger students in first semester mathematics. We have noted a growing awareness amongst all stakeholders of this importance but we also note the need for more research and development in the areas of the acquisition and assessment of these skills at both secondary and postsecondary levels.

Overall, the CMP is encouraged by the progress being made by students entering college. However if the increased postsecondary targets contained in the Open Ontario Program are to be realised, we believe that more attention (in both policy and practice) to articulation, alignment and integration issues is required.

Recommendations

1. *The Government of Ontario should follow up on its announcement of the Open Ontario program by establishing the proposed Roundtable on Secondary/ Postsecondary Transitions, by monitoring student achievement in relation to these transitions, by supporting continuing stakeholders' deliberations concerning increased student success, and by undertaking a public awareness campaign aimed at encouraging all students to plan to obtain postsecondary education and training.*
2. *The CMP should undertake further research into the content and emphasis of initial mathematics courses at the college level; further research should also be extended to the secondary school level to enable clear conclusions to be drawn concerning the alignment of college mathematics with elementary and secondary mathematics in Ontario schools.*
3. *The CMP should seek information and commentary from all stakeholders in mathematics education on the subject of alignment in order to provide clear advice to the Ministry of Education when the mathematics curriculum is next revised.*
4. *Teachers of mathematics at secondary school and college increase their efforts to understand each other's curriculum and instructional methods, so as to support students' successful transition from school to college.*
5. *Ministries, Colleges and Schools should continue to give prominence to the importance of the acquisition of learning/employability skills by students through further consideration of policies concerning recording and reporting, together with professional development, and communications to students, parents and the public.*
6. *Given its importance to student success and retention at postsecondary level, the Higher Education Quality Council of Ontario should sponsor further research addressing promising practices in the acquisition and assessment of learning/employability skills at postsecondary institutions.*