York - Seneca Institute for Mathematics, Science and Technology Education

COLLEGE MATHEMATICS PROJECT 2009

FINAL REPORT

Executive Summary

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Preface

In publishing this report, the College Mathematics Project (CMP) project team wishes to acknowledge several individuals and groups; without whom the project could not have been undertaken. First, we have been grateful to the Ministry of Education and the Ministry of Training, Colleges and Universities, not only for funding the project but also for their ongoing support and constructive advice throughout the year.

Second, the CMP Steering Committee and the college Vice-Presidents, Academic and their appointed CMP College Leads have worked hard to ensure that CMP had the data with which to conduct its research and we appreciate this enormously.

The School/College/Work Initiative has been an important partner at each stage but particularly in the organisation of the forums where its Regional Planning Teams played a key role.

The CMP has been conducted by researchers from the York/Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE), whose co-Director at York University is Professor Margaret Sinclair. She has been involved with CMP since the outset and her critical advice and careful reading of the report has been invaluable.

Finally, the support of Seneca College's Academic Computing Services (ACS) department; especially John Meskes, Mehrdad Ziaei and Mohsen Rezayatmand; have provided the unseen work without which the CMP research could not have been conducted nor its results displayed.

Le present 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.

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, CMP 2009 included all 24 colleges and 72 district school boards in all regions of the province.

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 2009 research analysed the secondary school and college records of almost 80,000 students who enrolled in all college program areas in fall 2008. Of these, over 30,000 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 research include the following:

- 67% of students achieved "good grades" (A, B or C) in first-semester mathematics in college, while 33% received grades of D or F or withdrew from the course, placing them at risk of not completing their chosen program. This represents a small improvement over last year's results.
- Recent Ontario graduates (students under the age of 23 on December 31, 2008 *and* who graduated from an Ontario secondary school) formed 69% of first-semester mathematics students.
- 65% of recent Ontario graduates (ROGs) achieved good grades, compared with 72% of older students or those from outside Ontario.
- While males outnumber females in first-semester mathematics by almost 2:1, females out-perform males in all age groups.
- The proportion of students attaining good grades rises sharply with age, with 79% of males in their 30s and 87% of females in the 40s obtaining good grades.

- Choices of school mathematics courses and achievement in the chosen courses have a major impact on first-semester college achievement. For example:
    - The proportion of students taking MCT4C has increased significantly over last year, particularly among those students who had taken the revised mathematics curriculum.
    - Achievement levels of those who have taken both MAP4C and MCT4C have also improved, relative to last year.
    - Students with high marks in MAP4C also tend to be successful in college; 78% of those scoring over 80% in MAP4C obtained good grades in college.
    - Choice of course in Grade 11 is also very important; the most commonly taken sequence (MBF3C + MAP4C) led to 55% good grades in college, compared with the less commonly taken sequence (MCF3M+MCT4C) which led to 70% good grades.
    - The recently revised curriculum opened up a pathway from Grade 10 Applied Mathematics (MFM2P) to MCF3M; 289 students followed this path (compared with none last year) and 66% of them obtained good grades in college.
- The CMP research database is now accessible to approved users at colleges and school boards. This provides systematic feedback to all school boards and secondary schools about the success of their graduates in first-semester college mathematics.

Following completion of the research, the CMP held nine deliberative forums in all parts of the province, in which representatives of participating colleges and school boards, along with provincial organizations, received reports of the CMP research and listened to panels of students describing their own mathematics experiences at school and college. They also discussed ways of improving student achievement, and examined a range of initiatives that had been implemented by the institutions.

From these deliberations, the CMP team concludes that there is a consensus that both schools and colleges are actively seeking ways to increase student success and that there is a continuing interest in sharing both research and experiences in this area. The annual report of CMP 2009 concludes with a discussion of four themes that emerged from these deliberative forums:

- School Mathematics and Real World Mathematics
  Most students learn best when mathematics is embedded in the context of a practical field of interest to them. CMP is encouraging school and college teachers to work together to strengthen the range of available examples, faculties of education to support greater understanding of colleges and college programs through their I/S teacher education programs and the development of authentic Contextualised Learning Activities related to sector specific college programs.

- Focus on Foundations
  Many of the students who are identified by CMP as being "at risk" have inadequate understanding of concepts they were first taught in elementary school – key concepts such as fractions, ratio and proportion, and percentages, among others. CMP is encouraging students and parents, and elementary and secondary teachers to recognize the importance of these topics and to revisit them as necessary throughout a student's education to ensure that they are mastered before students reach the postsecondary level.

- Learning Skills Revisited
  The report of CMP 2008 raised awareness of the importance of "Learning Skills" – self-discipline, time management, study skills, independent learning, among others – to success at the college level. This report reiterates this importance and encourages teachers at all levels to integrate these skills into their courses; it also suggests that the Ministry of Education, colleges and schools act to ensure that students and parents are aware of their importance to student success and career development.

- Learning: K to Career
  Concerns raised at CMP forums in the past concerning the complexity of admissions to postsecondary institutions and the difficulties this causes for schools and students were repeated often at this year's forums. CMP has come to recognize that decisions by individual colleges concerning admissions policies, decisions by the Ministry of Education about which courses should make up the overall school curriculum, decisions by individual schools on which of these courses to offer, and decisions by individual students on which courses to take in preparation for college are all inter-related. Yet there is no forum where all these issues can be discussed with a view to making the transition from secondary school as seamless and successful as possible for all students. CMP is therefore recommending the creation of a Provincial Roundtable on Secondary/Postsecondary Transitions with broad representation and a mandate to deliberate and recommend policy changes aimed at ensuring that adequate numbers of appropriately prepared students transition successfully from secondary schools to postsecondary institutions.