
▲ THE COLLEGE MATHEMATICS PROJECT

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Dr. Margaret Sinclair is an Assistant Professor in the Faculty of Education at York University. She brings to this work almost twenty years of experience as an elementary and secondary classroom teacher and a secondary administrator. Her research focuses on the use of technology in elementary and secondary school mathematics, and on the use and design of mathematics learning objects. Dr. Sinclair recently served as a member of the Ontario Ministry of Education's Expert Panel on Mathematics in the Junior Division.

Laurel Schollen has been the Dean of Applied Sciences and Engineering Technology at Seneca College since 2002 and Co-Director of the York/Seneca Institute for Mathematics, Science and Technology Education since its inception in 1999. Laurel has been a member of the provincial Heads of Technology group for the past three years and most recently has served the group as chair of the Central Region and Treasurer. It was through her work with Heads of Technology that she became interested in examining the relationship between secondary school mathematics experience and first year college technology mathematics performance with a view to create a seamless math experience for students.

Graham Orpwood is Associate Professor of Science Education at York University and former Director of the York/Seneca Institute for Mathematics, Science and Technology Education (YSIMSTE). He is interested in curriculum and assessment policy and practice, especially in the areas of mathematics and science.

On June 15, 2006, more than 100 representatives from 11 colleges, 10 school boards, provincial associations and government ministries attended the *College Mathematics Project (CMP) Regional Forum* held at Seneca College's King Campus. The *Forum*,

sponsored and coordinated by the Connecting GTA Teachers Regional Planning Team and funded by the School/College/Work Initiative was held to discuss the implications of the College Mathematics Project study and to make recommendations for further action.

A key recommendation of the *Forum* was to increase dialogue among stakeholders. Another was to raise awareness of MCT4C as a prerequisite for college technology programs. We hope, through this article, to address both of these recommendations.

The College Mathematics Project

Success rates in first year college technology 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 usually unable to complete their chosen program, resulting in an unacceptably high drop out rate. The lack of research-based information on the factors contributing to this problem became evident during the SQC review of the secondary mathematics curriculum when the colleges were asked to provide feedback on the new mathematics curriculum.

Since there are no formal linkages between the Ministry of Education and MTCU to investigate issues such as this, a team from the York-Seneca Institute for Mathematics, Science, and Technology Education (YSIMSTE) set out to systematically examine the issue of student success in college technology programs. Our goal was to enable stakeholders to discuss factors leading to student success or failure from a factual and statistically relevant, rather than an anecdotal, perspective.

The College Mathematics Project, Pilot B, carried out in 2005-2006, and led by Seneca College, involved six participating Colleges of Applied Arts and Technology (Seneca, Sheridan, George Brown, Georgian, St. Clair and Fanshawe). The research included both a qualitative analysis of college policies and programs and a quantitative analysis of student data.

The results of the qualitative component found a wide range of policies, practices, curriculum, and support at the six participating colleges. For example, more than 30 different first semester mathematics courses were offered in technology programs!

The quantitative component involved developing a database of student mathematics experience, from Grade 9 to first year college for more than 5000 students

registered in more than 100 programs at six colleges, and then:

- Comparing achievement in secondary mathematics with achievement in first semester college mathematics
- Looking at pathways (secondary school mathematics course selections) to determine which (if any) are more predictive of success

Since this is an ongoing study, all CMP data must be viewed as preliminary at this time; nevertheless, while we continue to refine the research, the YSIMSTE team believes that it is critical to share our initial findings with those involved in mathematics education. Thus, we released a research brief in early March, 2007. It included the following statements:

- 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.

Although there have been changes in the high school math curriculum, we believe that the central implication of the message in this research brief - that college technology programs are challenging and require the

level of mathematics preparation provided by courses such as MCT4C - is vital to communicate to the OAME membership.

In addition, we would like to share with you some of the additional *Forum* recommendations for secondary schools:

- Increase dialogue with colleges, and encourage teachers to visit college classrooms.
- Honour all destinations, not just university, by:
 - helping students understand that MCT4C will better prepare them for college technology programs;
 - scheduling courses for college pathways even when there is low enrollment;
 - helping parents 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; and,
 - beginning career education on college destinations early – working together to inform students about pathways and where they lead.

By acting on these recommendations you can all help to improve the outcomes for those students interested in college technology, and thereby to address Canada's need for skilled technology graduates.

Note: This year we are expanding our research to include all college programs that require students to take mathematics, and hope to have additional information available by fall of 2007. ▲

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