To: Members of the Fields Mathematics Education Forum
From: Geoff Roulet, Queen's University, Mathematics Education

The topic below is on the agenda for the Forum meeting of Saturday, Nov 23, and I will at that time provide more information, but some who may not be present at the meeting may wish to respond to the questions posed.

You are probably well aware that there is a Double Cohort Study being conducted, but you may not have looked closely at the report, which can be found at:

http://mettowas21.edu.gov.on.ca/eng/document/reports/dcohortp2.html

This study, conducted by Dr. Alan King at Queen's, is about much more than the 2003 double cohort. It really is a measure of the success/failure of the new curriculum in terms of student progress through the new secondary school program. The study has raised a number of issues for directors of education, top level Ministry of Education administrators, and the government. Some of these issues have a strong political dimension and thus the government will see a need to provide "solutions". My experience from working in the Ministry of Education leads me to expect "political" rather than "educational" solutions. That is, the first priority will be to make problems go away and not necessarily to set up a rational system that serves students' needs. Thus I think that it is important for those addressing implementation of the new 9-12 mathematics curriculum to read the Double Cohort Study reports and be prepared to suggest changes to the high school curriculum; changes that help solve the political problems but also enhance mathematics teaching and learning.

Alan King has met with me a number of times in the past 2 weeks to ask for my advice and ask me seek input from the professional mathematics leadership.

Alan has two questions: 1) How would you address the issues listed below? and 2) What other information would you like to see gathered from students in another survey to be conducted early in the new year?

1) Issues

Below I list some issues coming out of the Second Phase Report. There are other areas of concern, but these are the ones that involve mathematics most directly.

a) Little Change in Student Plans and Course Level Selection

The new program offers students routes that are linked more closely, in name at least, to potential post secondary destinations. This could be expected to help greater numbers of students select courses more compatible with their futures. In fact there has been little shift in enrolment. In Grade 10 the new Academic:Applied ratio matches that of the old Advanced:General with 79% in the upper level stream. This does not match with the past pattern of 28% going to university and 23% registering in CAAT programs. Fifty-four

percent of Grade 10 students still plan to attend university and this number has not decreased between the first and second years of the new program. In fact, in general university aspirations have increased slightly with the new program. The only significant change in plans is that now 76% of university bound students expect to graduate in 4 years whereas in the past 79% expected to be in high school for 5 years.

b) Credit Accumulation

Credit deficits have increased with the new program. At the end of Grade 10 (June 2001) only 61% of students had 16 or more credits. Under the old program the percentage was 71. At the other end of the scale the situation has not changed much with still about 15% of students after two years with 13 or less credits. Such students, for whom the graduation horizon is not in sight, are prime candidates for leaving school. Credit deficits occur with students taking both levels, Applied and Academic, but the increase has been greatest at the Applied level.

There has been some improvement in Grade 9 credit accumulation 1999 class to 2000 class, but this improvement is mainly among students taking Academic courses. A significant number of students taking Applied courses are at risk in the new program and mathematics is a major contributor to this situation.

c) Mark Distributions in Mathematics

i) Grade 9

The new program has a high failure rate and low averages at the Applied level and this situation has not improved over the two years of the new program. English and Science have similar mark distributions but have improved over the two years.

The mark distribution at the Academic level is not bad, but the trend was for lower marks in the second year of the course (2000-2001) over the first (1999-2000). The trend is the same for English and Science.

ii) Grade 10

Slightly more students in Grade 10 U are failing compared to Grade 10 Advanced, but the mark distribution has not changed much. At the General/Applied level the story is different. The failure rate in the new program is 23% versus 16% for the old and the distribution has increased its trend to the low end ie. greater peak in the 50-59 range.

iii) Grade 11

In the U course marks are generally better than in the old Advanced course, but in the U/C course the modal grade is 50-59. The U/C course has a mark distribution similar to that for the C and E courses and the old General and Basic courses, ie. a significant peak in the 50-59 range.

d) Grade 11 Course Patterns: U and U/C Courses

i) Difference from Science

In Science the U/C course (SNC3M) is only being run in about 1/3 of the schools and only 3.9% of Grade 11 students are enrolled. U-level Biology, Chemistry, and Physics each have 30-40% of the Grade 11 students. In Mathematics approximately 90% of schools have the U/C course (MCF3M) and 26% of Grade 11 students are registered. 37% of Grade 11s are in the U course (MCR3U). This difference is likely due to the OAME pathways memo of December 2000. Some people see the difference in patterns between Mathematics and Science as potentially problematic in terms of university selection criteria.

ii) Differences School to School

The class size ratios U:U/C in Grade 11 Mathematics vary widely (1:3 to 3:1). This is likely due to the presence or absence of a Mathematics Department Head who is an active member of OAME. As a result the secondary school experience of university bound students will be quite different across the province.

e) Course Selection Patterns: Essentials-Workplace Path

The large increase in enrolment from 1999 to 2000 in Grade 9 Mathematics Essentials (LDC); 0.9% to 6.3% shows the need for a full Workplace path. This is approximately the percent of students in Basic level courses in the old program. Enrolment in Grade 10 Mathematics Essentials (LDC) did not show the same increase, probably reflecting the fact that most boards declared the Grade 9 LDC as their compulsory credit. This puts a gap in the Workplace path.

Enrolment increases again at Grade 11 (6%) where the course is a compulsory credit, but numbers are not enough to warrant a separate class in all schools. Other subjects have a similar pattern, but numbers of students are lower. This means that many schools do not offer a complete self-contained Essentials-Workplace route with the attention these students require.

2) Data Collection

The past student surveys for the Double Cohort Study gathered information on: courses selected, success rates, summer school attendance, part-time work, home work, future plans, influences on future plans, and opportunities to explore possible careers. Dr. King suspects that a repeat of the survey with a different sample will not provide new data and thus he is looking for other items that people would like to measure. If we can suggest where we would like information he would attempt to construct and include appropriate questions in the next survey.

Responses

If after reading the above and studying the report you have any responses to either of Dr. King's questions (issues, data collection) please forward them to me at rouletg@educ.queensu.ca. I will put these together and pass on the collective "wisdom" of the Ontario mathematics education leaders. I will need your suggestions concerning data that you would like to see collected by **Friday, November 29** since these would require the development of new questions and printing of survey forms. The next survey is planned for January 2003.

Thank you for your help in constructing a full response to this opportunity for input.
Geoff

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