



An Analysis of Questionnaire and Contextual Data for Grade 9 Students in the Academic and Applied Mathematics Courses

Report Prepared for the
Education Quality and Accountability Office (EQAO) by

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MAY 2012

About the Education Quality and Accountability Office

The Education Quality and Accountability Office (EQAO) is an independent provincial agency funded by the Government of Ontario. EQAO's mandate is to conduct province-wide tests at key points in every student's primary, junior and secondary education and report the results to educators, parents and the public.

EQAO acts as a catalyst for increasing the success of Ontario students by measuring their achievement in reading, writing and mathematics in relation to *Ontario Curriculum* expectations. The resulting data provide a gauge of quality and accountability in the Ontario education system.

The objective and reliable assessment results are evidence that adds to current knowledge about student learning and serves as an important tool for improvement at all levels: for individual students, schools, boards and the province.

About EQAO Research

EQAO undertakes research for two main purposes:

- to maintain best-of-class practices and to ensure that the agency remains at the forefront of large-scale assessment and
- to promote the use of EQAO data for improved student achievement through the investigation of means to inform policy directions and decisions made by educators, parents and the government.

EQAO research projects delve into the factors that influence student achievement and education quality, and examine the statistical and psychometric processes that result in high-quality assessment data.



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February 8, 2012

Introduction

This report presents the results of the first phase of a larger research project designed to examine the relationships between student achievement on the EQAO Grade 9 Assessment of Mathematics and a number of student and teacher factors. This phase of the research involved an analysis of the use of the EQAO results as part of the final course mark for English- and French-language academic and applied mathematics courses, a summary of student demographic characteristics and questionnaire responses and cohort analyses. The second phase, which is presented in a separate report, involved an examination of the factors that influence the performance of students in the English- and French-language academic and applied courses and a comparison of the factors identified across the four groups defined by language and mathematics course. The results of the first phase are provided in three parts:

- Part 1 presents the results of an analysis of the responses to the teacher and student questionnaire items about counting the EQAO Grade 9 Assessment of Mathematics as part of students' final mathematics course marks.
- Part 2 provides a summary of the demographic characteristics of students enrolled in the Grade 9 academic and applied courses.
- Part 3 presents the results of a cohort analysis of the Grade 3, Grade 6 and Grade 9 data for the students assessed in mathematics in Grade 3 in 2004, in Grade 6 in 2007 and in Grade 9 in 2010.

The information provided in Part 3 is supplemented with the report card mathematics data obtained from the Ontario School Information System at the Ministry of Education.

Part 1

Teacher and Student Responses Concerning the Practice of Counting the EQAO Assessment and the Impact of These Practices on Achievement

This part of the report is based on the analysis of the responses to questions on the Grade 9 teacher and student questionnaires that deal with the practice of counting the EQAO Grade 9 Assessment of Mathematics as part of the students' final course marks. The following research questions were addressed:

- How prevalent is the practice among teachers, and do students know whether their EQAO results will count as part of their final course marks? Do they know for how much the assessment results will count?
- Is there a relationship between achievement on the EQAO assessment and students' awareness that the EQAO assessment will count as part of their final course marks?
- Do students and teachers feel that counting the assessment motivates students to take the assessment more seriously?
- Which components of the assessment (question types and strands) do teachers use when calculating the score to contribute to the course mark, and who decides?

Teacher and Student Responses About Counting the Assessment

The first aspect examined was the number of teachers who included EQAO assessment results in their students' course marks. The results are reported in Table 1.1 for each of the four language and course groups. While at least 80% of teachers indicated that they included the EQAO results as part of their students' final course marks, the percentage of teachers indicating that they did so was larger among academic course teachers than among applied course teachers. This difference was more marked among French-language teachers (89% vs. 82%) than English-language teachers (96% vs. 94%).

Table 1.1 Number and Percentage of Teachers Who Counted the EQAO Assessment Results as Part of Their Students' Course Marks

Course	Response	<i>n</i>	%
	No Response/Ambiguous Response	60	3.0
English	No	66	3.3
Applied	Yes	1863	93.7
	Total	1989	100.0
	No Response/Ambiguous Response	71	2.5
English	No	45	1.6
Academic	Yes	2748	95.9
	Total	2864	100.0
	No Response/Ambiguous Response	2	2.0
French	No	15	15.3
Applied	Yes	81	82.7
	Total	98	100.0
	No Response/Ambiguous Response	1	0.6
French	No	16	10.2
Academic	Yes	140	89.2
	Total	157	100.0

The students were asked if they knew that some or all of the Grade 9 assessment questions would be counted toward their course mark. Their responses are summarized in Table 1.2. About half of the students in the English- (57%) and French-language (48%) applied courses indicated they did not know, while just over 30% of the students in the two academic courses indicated they did not know. About four in 10 applied students in both languages said they knew the EQAO results would count, while slightly more than six in 10 academic students said they knew.

Table 1.2 Number and Percentage of Students Who Knew the EQAO Assessment Results Would Count as Part of Their Course Mark

Course	Response	<i>n</i>	%
English Applied	No Response/Ambiguous Response	1 129	2.6
	Don't Know	24 414	56.5
	No	1 358	3.1
	Yes	16 297	37.7
	Total	43 198	100.0
English Academic	No Response/Ambiguous Response	3 072	3.2
	Don't Know	29 872	30.8
	No	1 822	1.9
	Yes	62 371	64.2
	Total	97 137	100.0
French Applied	No Response/Ambiguous Response	48	3.4
	Don't Know	682	48.0
	No	68	4.8
	Yes	624	43.9
	Total	1 422	100.0
French Academic	No Response/Ambiguous Response	93	2.3
	Don't Know	1 236	30.8
	No	160	4.0
	Yes	2 521	62.9
	Total	4 010	100.0

While more than 80% of teachers indicated that they counted the assessment, only 40 to 60% of students indicated that they knew. The next set of results, presented in Table 1.3, examines the agreement between students and teachers. The numbers of students and teachers in Table 1.3 do not match the corresponding numbers in Tables 1.1 and 1.2, because there were cases in which students were not matched to any Teacher Questionnaire.

Table 1.3 Agreement Between Teachers and Students Regarding Awareness About Counting EQAO Results as Part of Course Marks

Program	Teachers' Response	Students' Response				Total	
		Missing	Don't Know	Not Told	Yes, Told		
English Applied	Missing	<i>N</i>	37	583	32	360	1 012
		%	3.7	57.6	3.2	35.6	100.0
	Do Not Count	<i>N</i>	18	491	110	136	755
		%	2.4	65.0	14.6	18.0	100.0
	Yes, Count	<i>N</i>	924	20 076	1041	13 639	35 680
		%	2.6	56.3	2.9	38.2	100.0
Total	<i>N</i>	979	21 150	1183	14 135	37 447	
	%	2.6	56.5	3.2	37.7	100.0	
English Academic	Missing	<i>N</i>	65	687	38	1 273	2 063
		%	3.2	33.3	1.8	61.7	100.0
	Do Not Count	<i>N</i>	39	511	303	356	1 209
		%	3.2	42.3	25.1	29.4	100.0
	Yes, Count	<i>N</i>	2658	25 693	1303	54 972	84 626
		%	3.1	30.4	1.5	65.0	100.0
Total	<i>N</i>	2762	26 891	1644	56 601	87 898	
	%	3.2	30.8	1.9	64.2	100.0	
French Applied	Missing	<i>N</i>	0	8	1	5	14
		%	0.0	57.1	7.1	35.7	100.0
	Do Not Count	<i>N</i>	5	74	26	28	133
		%	3.8	55.6	19.5	21.1	100.0
	Yes, Count	<i>N</i>	28	413	24	465	930
		%	3.0	44.4	2.6	50.0	100.0
Total	<i>N</i>	33	495	51	498	1 077	
	%	3.1	46.0	4.7	46.2	100.0	

Table 1.3 (cont.)

Program	Teachers' Response		Students' Response				Total
			Missing	Don't Know	Not Told	Yes, Told	
		<i>N</i>	2	1	0	15	18
	Missing	%	11.1	5.6	0.0	83.3	100.0
		<i>N</i>	5	100	79	64	248
French Academic	Do Not Count	%	2.0	40.3	31.9	25.8	100.0
		<i>N</i>	60	972	60	2 344	3 436
	Yes, Count	%	1.7	28.3	1.7	68.2	100.0
		<i>N</i>	67	1 073	139	2 423	3 702
	Total	%	1.8	29.0	3.8	65.5	100.0

Note: The percentages in the cells are row percentages.

The percentages in the cells in Table 1.3 are row percentages. For example, of the 35 680 English-language students in the applied course who were taught by teachers who said they counted the assessment results, 38.2% indicated that their teachers had told them that the results would count.

There are inconsistencies between what the teachers indicated they said and what their students indicated they were told, with the agreement being stronger for the academic courses than for the applied courses. Whereas 63% of the English-language students and 65% of the French-language students in the academic course agreed with their teachers, 37% of the English-language students and 46% of the French-language students in the applied course agreed with their teachers.

What Is the Impact of Counting the EQAO Assessment as Part of Students' Course Marks on Student Achievement on the EQAO Assessments?

To address this question, student and teacher responses to the question about counting the assessment were cross-tabulated with student achievement (below the provincial standard and met the provincial standard). As shown in Table 1.4, the percentages of students who met the standard are greater by three percentage points (English applied) to 14 percentage points (French applied) when the teachers counted the EQAO results as part of their students' course marks than when they did not.

Correspondingly, the percentages of students who did not meet the standard are smaller by the same amount when the teachers counted the EQAO results as part of their students' course marks than when they did not.

Table 1.4 The Influence of Teachers Counting the EQAO Results as Part of Course Marks on Student Performance on the EQAO Assessments

Program	Include EQAO Results	Student Achievement on EQAO Assessments			
		Below Standard		Met Standard	
		<i>n</i>	%	<i>n</i>	%
English Applied	Missing	876	58.1	631	41.9
	No	848	59.9	567	40.1
	Yes	22 440	56.7	17 155	43.3
English Academic	Missing	603	15.8	3 217	84.2
	No	309	25.9	885	74.1
	Yes	15 491	16.9	76 389	83.1
French Applied	Missing	14	100.0	-	-
	No	131	75.3	43	24.7
	Yes	700	60.8	452	39.2
French Academic	Missing	6	33.3	12	66.7
	No	112	36.4	196	63.6
	Yes	973	27.3	2 591	72.7

Students' awareness that their teachers were counting the EQAO results as part of their course marks influenced the students' performance on the EQAO assessments to a greater degree than did their teachers' having told them. As shown in Table 1.5, the percentages of students who met the standard were greater by 11 percentage points (English academic) to 26 percentage points (French applied) when the students knew that their teachers would count the EQAO results as part of their course marks than when they did not know. Further, the percentages of students who met the provincial standard and who indicated they knew that the EQAO assessment would be counted were greater than the corresponding percentages among students who were taught by teachers who had told

them (cf., Tables 1.4 and 1.5). Clearly, students' awareness that the EQAO results would be counted had a beneficial effect on their performance.

Table 1.5 The Influence of Students' Awareness That Their Teachers Would Count the EQAO Results on Student Performance on the EQAO Assessment

Program	Awareness That EQAO Results Would Be Counted	Student Achievement on the EQAO Assessment			
		Below Standard		Met Standard	
		<i>n</i>	%	<i>n</i>	%
English Applied	Missing	739	65.5	390	34.5
	Don't Know	14 850	60.8	9 564	39.2
	No	905	66.6	453	33.4
	Yes	8 060	49.5	8 237	50.5
English Academic	Missing	606	19.7	2 466	80.3
	Don't Know	7 468	25.0	22 404	75.0
	No	430	23.6	1 392	76.4
	Yes	7 937	12.7	54 434	87.3
French Applied	Missing	36	75.0	12	25.0
	Don't Know	467	68.5	215	31.5
	No	55	80.9	13	19.1
	Yes	343	55.0	281	45.0
French Academic	Missing	26	28.0	67	72.0
	Don't Know	509	41.2	727	58.8
	No	65	40.6	95	59.4
	Yes	548	21.7	1 973	78.3

The third analysis involved combining student and teacher responses. Four student-teacher groups were formed according to the agreement between the teachers' decision whether or not the assessment results would count and the students' awareness of this decision.

- Yes/Yes: students who answered yes taught by teachers who answered yes
- No/Yes: students who answered no taught by teachers who answered yes
- Yes/No: students who answered yes taught by teachers who answered no
- No/No: students who answered no taught by teachers who answered no

The results are presented in Table 1.6. Except for the French academic course, the percentages of students meeting the provincial standard were largest for students in Group Yes/Yes. For the French academic course, the percentages were similar for Group Yes/Yes and Yes/No.

Table 1.6 Student-Teacher Response Combinations Cross-Tabulated with Achievement

Course	Student Response/ Teacher Response	Number and Percentage of Students			
		Below Standard		Met Standard	
		<i>n</i>	%	<i>n</i>	%
English Applied	Yes/Yes	6665	48.9	6 974	51.1
	No/Yes	681	65.4	360	34.6
	Yes/No	84	61.8	52	38.2
	No/No	72	65.5	38	34.5
English Academic	Yes/Yes	6867	12.5	48 105	87.5
	No/Yes	314	24.1	989	75.9
	Yes/No	74	20.8	282	79.2
	No/No	64	21.1	239	78.9
French Applied	Yes/Yes	257	55.3	208	44.7
	No/Yes	20	83.3	4	16.7
	Yes/No	22	78.6	6	21.4
	No/No	17	65.4	9	34.6
French Academic	Yes/Yes	502	21.4	1 842	78.6
	No/Yes	23	38.3	37	61.7
	Yes/No	13	20.3	51	79.7
	No/No	35	44.3	44	55.7

For the academic course, 88% of the English-language students and 79% of the French-language students in Group Yes/Yes met the provincial standard. For the applied course, these percentages were 51% and 45%, respectively. In contrast, in Group Yes/No, 79% of the English-language and 80% of the French-language students in the academic course met the standard, while the corresponding percentages for the applied course were 38% and 21%, respectively.

For the two remaining groups (No/Yes and No/No), more than half (56% to 79%) of the academic students in both language groups met the standard, with the percentages being considerably smaller for the French-language students. These percentages were smaller than the percentages for Groups Yes/Yes and Yes/No. For students in Groups No/Yes and No/No in the applied course, the percentages who met the standard did not exceed 40% and were, with one exception, smaller than the percentages for Groups Yes/Yes and Yes/No.

Taken together, the results reveal that the percentage of students who met the provincial standard was larger if the students were aware that the assessment results would count as part of their final course mark, and somewhat more so when these students were taught by teachers who said they counted the assessment.

Does Telling Students That the Results Will Count Influence Student Motivation to Do Well on the EQAO Assessments?

The students who indicated they knew the EQAO results would be counted in their course marks and the teachers who indicated they counted the EQAO results in their students' course marks were asked if they felt that counting the EQAO assessment would motivate students to take the assessment more seriously.

As shown in Table 1.7, 83% to 94% of teachers thought counting the EQAO assessment would motivate students to take the assessments more seriously. The percentages among French-language teachers were approximately five percentage points larger than the percentages among English-language teachers. Likewise, within each language of instruction, the percentages were approximately five percentage points larger for the academic course than for the applied course.

Table 1.7 Influence of Counting the EQAO Results as Part of the Students' Course Marks on Student Motivation

Course	Response	Teachers		Students	
		<i>n</i>	%	<i>n</i>	%
English Applied	Missing	6	0.3	202	1.4
	No	114	6.5	1 779	12.7
	Undecided	179	10.3	2 225	15.8
	Yes	1442	82.8	9 853	70.1
	Total	1741	100.0	14 059	100.0
English Academic	Missing	10	0.4	766	1.3
	No	85	3.3	7 470	13.1
	Undecided	194	7.5	7 466	13.1
	Yes	2300	88.8	41 350	72.5
	Total	2589	100.0	57 052	100.0
French Applied	Missing	0	0.0	9	2.1
	No	2	2.8	41	9.7
	Undecided	7	9.7	56	13.2
	Yes	63	87.5	318	75.0
	Total	72	100.0	424	100.0
French Academic	Missing	2	1.6	36	1.9
	No	0	0.0	200	10.5
	Undecided	5	4.1	284	14.9
	Yes	116	94.3	1 390	72.8
	Total	123	100.0	1 910	100.0

While the majority of the students indicated that knowing the assessment would count motivated them to take the test more seriously, the percentages (70% to 75%) were smaller than those among teachers. The fact that at least seven out of 10 students indicated that their motivation was increased, coupled with the findings presented earlier on the discrepancy between teacher and student responses and the beneficial relationship

between counting the assessment and student achievement, highlights the importance of teachers clearly communicating their intentions to students.

How Much Do Assessment Results Count?

The teachers who indicated that they counted the EQAO results were asked about the weight the results were given in the students' course marks. Students who were aware that the assessment counted also responded to this question. Results for the teacher responses are presented in Table 1.8.

There was considerable variation in the portion of the final mark assigned for the EQAO assessment. In English-language schools, approximately 85% of teachers who counted the assessment did so for up to 10% of students' final course mark (approximately 50% counted it for 6% to 10%); very few teachers counted it for more than 15%. In French-language schools, approximately 60% of teachers who counted the assessment did so for up to 15% of students' final course mark (approximately 30% counted it for 6% to 10%); approximately 25% counted it for 25% to 30%. The pattern of responses among students was similar to that among teachers.

The teacher and student responses to this question were cross-tabulated with student achievement. Although student achievement was related to students' awareness that the EQAO assessment counted, as stated earlier in this report, there was no consistent relationship between student achievement on the EQAO assessment and the portion of the final mark assigned to the assessment.

Table 1.8 Weight Assigned to the EQAO Assessment Results

Course	Weight (%)	No. of Teachers	% of Teachers
English Applied	1 to 5	626	34.7
	6 to 10	873	48.4
	11 to 15	219	12.1
	16 to 20	38	2.1
	21 to 25	10	0.6
	25 to 30	23	1.3
	Other	15	0.8
English Academic	1 to 5	956	35.6
	6 to 10	1342	50.0
	11 to 15	274	10.2
	16 to 20	66	2.5
	21 to 25	7	0.3
	25 to 30	26	1.0
	Other	11	0.4
French Applied	1 to 5	5	6.3
	6 to 10	25	31.3
	11 to 15	20	25.0
	16 to 20	4	5.0
	21 to 25	0	0.0
	25 to 30	22	27.5
	Other	4	5.0
French Academic	1 to 5	8	5.7
	6 to 10	46	32.9
	11 to 15	29	20.7
	16 to 20	15	10.7
	21 to 25	3	2.1
	25 to 30	35	25.0
	Other	4	2.9

Note: Missing and ambiguous responses have been excluded.

What Parts of the Assessment Count?

The teachers were asked a number of questions about which components of the assessment they selected to include as part of the students' course marks. These questions related to the type of question (multiple-choice or open-response) and the strands of mathematics content.

Item Type: The results for question type are presented in Table 1.9. Teachers in both languages and both courses had a greater tendency to include all multiple-choice items (47% to 79%) than all open-response items (18% to 36%).

Table 1.9 Types of Questions Included in Students' Course Marks

Course	Portion of Questions	Number and Percentage of Teachers			
		Open-Response		Multiple-Choice	
		<i>n</i>	%	<i>n</i>	%
	Missing	251	13.5	70	3.8
English	All Questions	366	19.6	1405	75.4
Applied	Some Questions	791	42.5	368	19.8
	No Questions	455	24.4	20	1.1
	Missing	384	14.0	118	4.3
English	All Questions	493	17.9	2161	78.6
Academic	Some Questions	1146	41.7	430	15.6
	No Questions	725	26.4	39	1.4
	Missing	7	8.6	3	3.7
French	All Questions	27	33.3	38	46.9
Applied	Some Questions	38	46.9	39	48.1
	No Questions	9	11.1	1	1.2
	Missing	13	9.3	9	6.4
French	All Questions	51	36.4	77	55.0
Academic	Some Questions	58	41.4	53	37.9
	No Questions	18	12.9	1	0.7

French-language teachers showed a greater tendency to use all open-response items than did English-language teachers, but this trend was reversed for multiple-choice questions. Approximately 25% of the English-language teachers and 10% of French-language teachers said they did not use any of the open-response items, while only 1% said they did not use any multiple-choice items.

Mathematics Strands: The results for mathematics strands are presented in Table 1.10. The majority of teachers across languages and courses used questions from each of the strands in the course they taught. However, the pattern of inclusion varied between the language groups.

Table 1.10 Questions by Strand Included in Students' Course Marks

Course	Quantity of Questions	Number and Percentage of Teachers							
		Number Sense		Linear Geometry		Analytic Relations		Geometry	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
English Applied	Missing	214	14.2	218	14.4	213	14.1		
	All Questions	534	35.4	515	34.1	537	35.6	N/A	N/A
	Some Questions	752	49.8	766	50.7	751	49.7		
	No Questions	10	0.7	11	0.7	9	0.6		
English Academic	Missing	365	16.0	359	15.7	365	16.0	347	15.2
	All Questions	833	36.5	803	35.1	809	35.4	816	35.7
	Some Questions	1077	47.1	1116	48.8	1102	48.2	1117	48.9
	No Questions	10	0.4	7	0.3	9	0.4	5	0.2
French Applied	Missing	9	16.1	9	16.1	11	19.6		
	All Questions	5	8.9	6	10.7	6	10.7	N/A	N/A
	Some Questions	42	75.0	41	73.2	39	69.6		
French Academic	No Questions	0	0	0	0.0	0	0.0		
	Missing	21	22.1	21	22.1	22	23.2	21	22.1
	All Questions	15	15.8	15	15.8	15	15.8	15	15.8
	Some Questions	59	62.1	59	62.1	57	60	59	62.1
	No Questions	0	0	0	0	1	1.1	0	0

Approximately 50% of teachers of English applied and academic mathematics who counted the assessment indicated that they used all the questions from each of the strands, and approximately 35% indicated that they used some of the questions.

Approximately 10% to 15% of teachers of French applied and academic mathematics who counted the assessment indicated that they used all the questions from each of the strands, and 60% to 75% indicated that they used some of the questions.

Who Made the Decision to Count the EQAO Assessment Results?

The teachers who counted EQAO assessment results as part of their students' final course marks were asked who was involved in the decision about whether or not the results would be counted. As can be seen from Table 1.11, there were differences between the responses among English and French teachers.

For the English-language courses, the largest percentages of teachers said that the decision was made by the mathematics department (45% for the applied course and 65% for the academic course). The next largest percentage (18% for applied and 27% for academic) was by a group of teachers, followed closely (15% and 24%, respectively) by the school board. For the French-language courses, the percentages of people involved in the decision were more equally distributed among the most frequently mentioned decision makers. An approximately equal percentage of teachers indicated that the decision was made by a group of teachers (27% for applied and 28% for academic) and by the principal or vice-principal (26% and 27%, respectively). Approximately 21% indicated that the decision was made by the mathematics department, while another 15% indicated that they made the decision themselves.

Table 1.11 Teacher Responses Concerning the Decision to Count the EQAO Assessment Results as Part of the Students' Course Marks

Course	Who Made the Decision?	Number and Percentage of Teachers	
		<i>n</i>	%
English Applied	Don't Know	105	4.0
	Math Department	1187	45.3
	Math Teacher	171	6.5
	Teacher Group	475	18.1
	Principal/VP	248	9.5
	School Board	405	15.4
	Other	31	1.2
	English Academic	Don't Know	147
Math Department	1712	65.3	
Math Teacher	163	6.2	
Teacher Group	698	26.6	
Principal/VP	329	12.5	
School Board	616	23.5	
Other	46	1.8	
French Applied	Don't Know	0	0.0
	Math Department	31	22.3
	Math Teacher	22	15.8
	Teacher Group	38	27.3
	Principal/VP	36	25.9
	School Board	10	7.2
	Other	2	1.4
	French Academic	Don't Know	5
Math Department	48	21.0	
Math Teacher	32	14.0	
Teacher Group	65	28.4	
Principal/VP	61	26.6	
School Board	16	7.0	
Other	2	0.9	

Note: Missing and ambiguous responses have been excluded.

Part 2
Demographic Characteristics of Grade 9 Students Enrolled in the
Academic and Applied Courses

Part 2 of the present report presents data on student background characteristics to address the following question:

- What are the differences and similarities between selected background characteristics of students enrolled in the Grade 9 academic course and their counterparts in the applied mathematics course?

Table 2.1 presents the numbers and percentages of students with special education needs identified by an Identification, Placement and Review Committee (IPRC), of students with an Individual Education Plan but without IPRC identification (IEP only), and of English and French language learners (ELL; ALF/PANA). This information was provided by schools through the Student Data Collection system. As shown in Table 2.1, the percentages of students with special education needs in the applied courses are approximately four times those in the academic courses. For example, of English-language students and French-language students in the applied courses, 32% and 37%, respectively, had an IEP only. In the academic course, these percentages were 8% of English-language students and 9% of French-language students. Similar differences were observed among students identified by an IPRC. There was less difference between the percentages of students who were ELLs or in ALF/PANA in the applied course and in the academic course in both language groups.

Table 2.1 Enrolment of Students with Special Education Needs

Background Information	English Applied		English Academic		French Applied		French Academic	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
IPRC	9 316	20.7	5999	6.0	390	26.5	272	6.6
IEP Only	14 459	32.1	8025	8.0	549	37.3	368	9.0
ELL; ALF/PANA	2 666	5.9	3770	3.8	26	1.8	65	1.6

Note: Percentages are of the total number of students who participated in each assessment. Therefore the sums will not add to 100%.

Since the percentage of students achieving the provincial standard is considerably smaller among students with special education needs than among other students, the above may account for some of the difference between the percentages of students achieving the provincial standard in the applied and the academic courses.

The following additional factors were examined: access to technology at home, completion of homework, absenteeism, number of schools attended and language spoken at home. The distributions of students by language and course are summarized in Table 2.2. A larger percentage of students in the academic courses than in the applied courses had computers at home that they used for school work, with the difference being more pronounced among the English- than French-language students (60% vs. 46%, English-language; 40% vs. 36% French-language).

Students in the academic courses were more likely to complete their homework than students in the applied courses. Of the English-language students in the academic course, 63% reported they often or always complete their homework, which is approximately 12 percentage points larger than among English-language students in the applied course. Of French-language students in the academic course, 70% often or always completed their homework, which is six percentage points larger than among French-language students in the applied course.

Likewise, students in the academic course were absent less often than students in the applied course. Of English-language students in the academic course, 27% reported that they missed class five or more times, which is 13 percentage points smaller than among students in the applied course. There was less difference between the percentages of French-language students: 28% of students in the academic course missed class five or more times, which is five percentage points smaller than among students in the applied course.

Approximately 40% of the students in the applied courses attended three or more elementary schools, which is approximately five percentage points larger than among students in the academic courses.

Table 2.2 Additional Background Information for Students in Academic and Applied Courses

Background Information	Students' Responses	English Applied		English Academic		French Applied		French Academic	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
		Computer at Home*	Yes	19 795	46.3	57 757	60.2	507	36.1
	No	22 942	53.7	38 264	39.8	897	63.9	2396	60.5
Homework Complete	Never	2 205	5.2	2 693	2.8	62	4.4	88	2.2
	Seldom	4 666	10.9	9 236	9.6	121	8.6	306	7.7
	Sometimes	13 745	32.2	23 365	24.4	322	23.0	796	20.1
	Often	15 169	35.6	37 685	39.4	609	43.5	1805	45.6
	Always	6 850	16.1	22 755	23.8	286	20.4	967	24.4
Absent From Math Class	Never	4 909	11.5	13 013	13.6	202	14.4	528	13.3
	One to Four Times	20 550	48.2	56 710	59.3	741	52.9	2326	58.8
	Five to Nine Times	10 234	24.0	18 715	19.6	300	21.4	824	20.8
	10 or More times	6 981	16.4	7 118	7.4	159	11.3	278	7.0
Number of Elementary Schools Attended	One	11 638	27.3	27 574	28.9	383	27.5	1185	30.0
	Two	14 050	33.0	34 751	36.5	461	33.1	1411	35.7
	Three	8 266	19.4	18 543	19.5	287	20.6	837	21.2
	Four	4 315	10.1	8 189	8.6	145	10.4	308	7.8
	Five or More	4 304	10.1	6 251	6.6	116	8.3	207	5.2
Languages Spoken at Home	Only or Mostly English/French	34 888	81.5	72 866	76.1	415	29.6	1291	32.6
	One or More Other Languages as Often as English/French	5 041	11.8	14 612	15.3	431	30.7	984	24.8
	Only or Mostly Other Languages	2 856	6.7	8 327	8.7	557	39.7	1685	42.6

* Computer used for school work.

The differences between the English- and French-language students regarding languages spoken at home are more pronounced. Whereas 82% of English-language students in the applied mathematics course and 76% of English-language students in the academic course reported they spoke only or mostly English at home, 30% of French-language students in the applied course and 33% of French-language students in the academic course reported they spoke only or mostly French at home. In the case of

English-language students, 12% (applied) and 15% (academic) spoke another language as often as English, and 7% (applied) and 9% (academic) spoke only or mostly another language at home. In contrast, the percentages of French-language students who spoke another language as often as French at home or spoke only or mostly another language at home were greater than the corresponding percentages in English, ranging from 25% to 42%. Clearly, French schools have a larger percentage of students who do not speak the language of instruction at home.

An analysis of student achievement and questionnaire responses showed a number of positive relationships. Students with the following responses to the student questionnaire tended to have higher achievement results:

- completed their mathematics homework more often;
- were absent from mathematics class less often;
- had more positive attitudes toward mathematics and
- were more confident in their ability to do well in mathematics.

Part 3

Cohort Tracking

EQAO has tracked the progress of the same students beginning with the primary assessment and then moving to the junior assessment and then finally the Grade 9 assessment in the case of mathematics and the OSSLT in the case of reading and writing. Presented in Part 3 of this report are the results for the cohort of students for whom mathematics results are available for primary, 2004; junior, 2007; and Grade 9, 2010. Both achievement and attitudes toward mathematics were examined. The achievement results are provided first, followed by the results for attitude. There were 109 793 students in the English-language cohort and 3741 in the French-language cohort. In addition, report card mathematics marks for Grades 8 and 9 were obtained from the Ministry of Education for the students who wrote the Grade 9 Assessment of Mathematics in 2010.

Achievement

The results for the cohort of students who participated in the primary, junior and Grade 9 assessments are provided in Table 3.1 for the English-language students and in Table 3.2 for the French-language students. The students were first classified into the following four groups according to their combined performance in the primary and junior mathematics assessment components:

- met the provincial standard on both the primary and junior mathematics components (maintained standard);
- did not meet the standard on the primary mathematics component but did on the junior mathematics component (rose to standard);
- met the standard on the primary mathematics component but did not on the junior mathematics component (dropped from standard) and
- did not meet the standard on the primary mathematics component and did not on the junior mathematics component (never met the standard).

Tables 3.1 and 3.2 include the number of students in each of these groups, how these students were distributed between the academic and applied courses in Grades 9 and their results on the Grade 9 assessment.

Table 3.1 Grade 9 Course Enrolment by Primary and Junior Assessment Progress Category and Grade 9 Achievement Results in 2010—English-Language Students

Primary and Junior Results	Grade 9			
	Course Enrolment	Result	<i>n</i>	%
Maintained Standard <i>n</i> = 59 135 (54%)	Applied Mathematics <i>n</i> = 5603 (9%)	Met the Standard	4 198	74.9
		Did Not Meet the Standard	1 405	25.1
	Academic Mathematics <i>n</i> = 53 532 (91%)	Met the Standard	48 807	91.2
		Did Not Meet the Standard	4 725	8.8
Rose to Standard <i>n</i> = 11 863 (11%)	Applied Mathematics <i>n</i> = 3303 (28%)	Met the Standard	1 961	59.4
		Did Not Meet the Standard	1 342	40.6
	Academic Mathematics <i>n</i> = 8560 (72%)	Met the Standard	6 762	79.0
		Did Not Meet the Standard	1 798	21.0
Dropped from Standard <i>n</i> = 16 720 (15%)	Applied Mathematics <i>n</i> = 7754 (46%)	Met the Standard	3 686	47.5
		Did Not Meet the Standard	4 068	52.5
	Academic Mathematics <i>n</i> = 8966 (54%)	Met the Standard	5 720	63.8
		Did Not Meet the Standard	3 246	36.2
Never Met Standard <i>n</i> = 22 075 (20%)	Applied Mathematics <i>n</i> = 14 716 (67%)	Met the Standard	4 236	28.8
		Did Not Meet the Standard	10 480	71.2
	Academic Mathematics <i>n</i> = 7359 (33%)	Met the Standard	3 778	51.3
		Did Not Meet the Standard	3 581	48.7

Students who had met the standard in Grades 3 and 6 had a greater tendency to enroll in the academic course than in the applied course in Grade 9, and those who had never met the standard had a greater tendency to enroll in the applied course. For example, 91% of the English-language students who had maintained the standard enrolled in academic mathematics and 9% enrolled in applied mathematics, while 33% of the students who had never met the standard enrolled in academic mathematics and 67%

enrolled in applied mathematics (see the second column in the tables). The corresponding percentages for French-language students who had maintained the standard were the same for the academic course and were 37% and 63%, respectively, for the applied course. A comparison of the students who had risen to the standard and those who had dropped from it points to the importance of attaining the provincial standard in elementary school, particularly at the junior level—72% of the English- and French-language students who had risen to the standard enrolled in the academic course in Grade 9, while 54% of the English-language and 57% of the French-language students who had dropped enrolled in the academic course in Grade 9.

Table 3.2 Grade 9 Course Enrolment by Primary and Junior Assessment Progress Category and Grade 9 Achievement Results in 2010—French-Language Students

Primary and Junior Results	Grade 9			
	Course Enrolment	Result	<i>n</i>	%
Maintain Standard <i>n</i> = 2025	Applied Mathematics	Met the Standard	107	56.0
	<i>n</i> = 191 (9%)	Did Not Meet the Standard	84	44.0
Rose to Standard <i>n</i> = 952	Academic Mathematics	Met the Standard	1475	80.4
	<i>n</i> = 1834 (91%)	Did Not Meet the Standard	359	19.6
Dropped from Standard <i>n</i> = 174 (5%)	Applied Mathematics	Met the Standard	116	43.3
	<i>n</i> = 268 (28%)	Did Not Meet the Standard	152	56.7
Never Met Standard <i>n</i> = 590	Academic Mathematics	Met the Standard	452	66.1
	<i>n</i> = 684 (72%)	Did Not Meet the Standard	232	33.9
Dropped from Standard <i>n</i> = 174 (5%)	Applied Mathematics	Met the Standard	19	25.7
	<i>n</i> = 74 (43%)	Did Not Meet the Standard	55	74.3
Never Met Standard <i>n</i> = 590	Academic Mathematics	Met the Standard	43	43.0
	<i>n</i> = 100 (57%)	Did Not Meet the Standard	57	57.0
Never Met Standard <i>n</i> = 590	Applied Mathematics	Met the Standard	83	22.4
	<i>n</i> = 371 (63%)	Did Not Meet the Standard	288	77.6
Never Met Standard <i>n</i> = 590	Academic Mathematics	Met the Standard	49	22.4
	<i>n</i> = 219 (37%)	Did Not Meet the Standard	170	77.6

In both courses and in both languages, the percentage of students achieving the standard in Grade 9 was considerably larger among students who had maintained the standard than among students who had never met it—by 34% to 58%. There was a decline in success in Grade 9 across the four groups of students in both languages and both courses. For the English-language students, 91% of students who had maintained the standard, 79% students who had risen, 64% of students who had dropped and 51% of students who had never met the standard did so in the Grade 9 academic course. This was also observed in the applied course: 75%, 59%, 48% and 29%, respectively. The results for the French-language students were somewhat lower, but followed the same pattern; 80% maintaining, 66% rising 43% dropping and 22% of the students never meeting the standard did so in the Grade 9 academic course. For the applied course, the percentages were 56%, 43%, 26% and 22%, respectively.

Taken together, the results for both language groups point to the importance of attaining the provincial standard in elementary school, particularly at the junior level. Students who met the standard in Grade 6 have a high probability of meeting the standard in Grade 9, even if they had not met the standard in Grade 3. These results also show that interventions can make a difference; a significant number of students who had not met the standard in Grade 3 and/or Grade 6 were able to in the academic course in Grade 9. Targeted interventions should be provided to students in elementary school who are not meeting the standard.

Student performance in the applied course is of particular concern. A companion study is currently underway to identify factors measured in the student and teacher questionnaires that might shed light on why the performance of students in the applied course is so much lower than that in the academic course.

Report Card Marks

EQAO obtained mathematics report card marks for Grades 8 and 9 from the Ministry of Education for the majority of the students who wrote the Grade 9 assessment in 2010. The Grade 9 report card marks were used to draw a comparison of overall achievement results in Grade 9 mathematics as measured by the EQAO assessment and marks assigned by classroom teachers. The percentage of students receiving Level 3 or 4

on the Grade 9 EQAO assessment was compared with the percentage of students receiving 70% or higher on their report card for Grade 9 mathematics.

The percentage of students receiving 70% or higher on their report card was much smaller for the applied course than for the academic course in both languages, which is consistent with EQAO results. This has been the case in the EQAO results since the assessment program was introduced in 2000–2001. The EQAO and report-card results were very similar in the applied course for English-language students and in the academic course for French-language students. While the EQAO results were higher than the report-card results for English-language students in the academic course, the report-card results were higher than the EQAO results for French-language students in the applied course.

The Grade 8 report card marks were used to further analyze the comparisons of the Grade 6 and Grade 9 EQAO assessment results to determine whether they could provide additional information to explain achievement patterns. As was shown in Table 3.1, English-language students who had not met the provincial standard in mathematics in the elementary grades and enrolled in the academic course demonstrated a higher level of achievement than those of this population who enrolled in the applied course (51% of these students in the academic course met the standard while 29% in the applied course did). In both the applied and academic courses, among French-language students who had not met the mathematics standard in the early grades, 22% did in Grade 9 in both the applied and academic courses.

An analysis of the Grade 8 report card marks of English-language students who had not met the standard in Grade 6 showed that those who enrolled in the academic course tended to have higher Grade 8 report card marks than those who enrolled in the applied course, which partially accounts for the higher level of achievement in the Grade 9 academic course. Of the students who had not met the standard in Grade 6 who enrolled in the academic course in Grade 9, 82% received an average of Level 3 or 4 across the mathematics stands in the Grade 8 report card. Of the students who had not met the standard in Grade 6 who enrolled in the applied course in Grade 9, 49% received an average of Level 3 or 4 in Grade 8 mathematics.

Perceptions

Responses to the following two perception questions included in the Student Questionnaires for all three grade levels were analyzed for the cohort:

- I like math.
- I am good at math.

For this analysis, four groups of students were created based on the achievement results at all three grade levels:

- met the provincial standard for mathematics on the primary, junior and Grade 9 assessments (consistently met standard (Y/Y/Y);
- did not meet the provincial standard for mathematics on the primary assessment, did not on the junior assessment, but did on the Grade 9 assessment (N/N/Y);
- met the standard for mathematics on both the primary and junior assessments, but did not meet the standard on the Grade 9 assessment (Y/Y/N) and
- did not meet the standard for mathematics on any of the assessments—primary, junior or Grade 9 (N/N/N).

The responses to the perception questions at each grade level were summarized for each of the four groups. The results for the two language groups for “I am good at math” are reported in Tables 3.4 and 3.5 and those for “I am good at math” in Tables 3.6 and 3.7.

Like math. As might be expected, the largest percentage of English-language students to say they liked mathematics was among the students who maintained the provincial standard through primary, junior and Grade 9 academic (see Table 3.4). Further, the percentage of students in the Y/Y/Y group who said they liked mathematics in Grade 9 and who enrolled in the academic course in Grade 9 was greater than that among such students who enrolled in the applied course. The percentages for the other three groups were similar for students in the academic and applied courses. For students in the Y/Y/Y group, the percentage of students who said they liked mathematics was similar in Grades 3 and 9 among students in the academic course, but there was a decrease in this percentage from Grades 3 to 9 among students in the applied course. The percentages for the remaining three groups tended to decrease from Grades 3 to 9 according to degree of consistency in meeting the standard. This decrease was particularly large for students who did not meet the provincial standard in Grade 9

(Y/Y/N and N/N/N). For students in the Y/Y/Y and N/N/Y groups, the percentage of students who said they liked mathematics decreased from Grades 3 to 6 and then increased in Grade 9. Taken together, the results for the English-language students indicate that fewer than half of the students said they liked mathematics in Grades 6 and 9.

Table 3.4 I Like Math—English-Language Students

Group	Mathematics Course		Primary		Junior		Grade 9	
	Enrolment	Like Math	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
Y/Y/Y	Applied	Yes	1 349	58.1	938	40.4	1 121	48.3
		Sometimes/Undecided	630	27.1	816	35.1	614	26.4
		No	343	14.8	568	24.5	587	25.3
	Academic	Yes	17 174	64.5	14 767	55.5	16 584	62.3
		Sometimes/Undecided	6 822	25.6	8 461	31.8	5 805	21.8
		No	2 621	9.8	3 389	12.7	4 228	15.9
N/N/Y	Applied	Yes	1 042	54.8	577	30.4	866	45.6
		Sometimes/Undecided	512	26.9	735	38.7	556	29.2
		No	347	18.2	589	31.0	479	25.2
	Academic	Yes	988	55.9	643	36.4	781	44.2
		Sometimes/Undecided	516	29.2	692	39.1	547	30.9
		No	264	14.9	433	24.5	440	24.9
Y/Y/N	Applied	Yes	392	59.4	234	35.4	202	30.6
		Sometimes/Undecided	165	25.0	240	36.4	181	27.4
		No	103	15.6	186	28.2	277	42.0
	Academic	Yes	1 434	60.0	1 037	43.4	717	30.0
		Sometimes/Undecided	647	27.0	904	37.8	707	29.6
		No	311	13.0	451	18.8	968	40.5
N/N/N	Applied	Yes	2 220	52.5	1 110	26.3	1 142	27.0
		Sometimes/Undecided	1 152	27.2	1 662	39.3	1 274	30.1
		No	855	20.2	1 455	34.4	1 811	42.8
	Academic	Yes	966	58.3	567	34.2	432	26.1
		Sometimes/Undecided	447	27.0	676	40.8	521	31.4
		No	245	14.8	415	25.0	705	42.5

As shown in Table 3.5, the trends for French-language students were similar to those presented above for English-language students, but, in all four groups, the percentages of French-language students who said they liked mathematics were larger than those of English-language students.

Table 3.5 I Like Math—French-Language Students

Group	Mathematics Course		Primary		Junior		Grade 9	
	Enrolment	Like Math	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Y/Y/Y	Applied	Yes	40	72.7	32	58.2	37	67.3
		Sometimes/Undecided	8	14.6	16	29.1	10	18.2
		No	7	12.7	7	12.7	8	14.6
	Academic	Yes	609	74.3	536	65.4	564	68.8
		Sometimes/Undecided	161	19.6	213	26.0	157	19.2
		No	50	6.1	71	8.7	99	12.1
N/N/Y	Applied	Yes	21	61.8	16	47.1	18	52.9
		Sometimes/Undecided	7	20.6	9	26.5	11	32.4
		No	6	17.6	9	26.5	5	14.7
	Academic	Yes	15	75.0	35	40.0	32	75.0
		Sometimes/Undecided	5	25.0	30	55.0	23	5.0
		No	-	-	14	5.0	24	20.0
Y/Y/N	Applied	Yes	34	70.8	24	50.0	22	45.8
		Sometimes/Undecided	7	14.6	9	18.8	10	20.8
		No	7	14.6	15	31.2	16	33.3
	Academic	Yes	114	64.8	87	49.4	58	33.0
		Sometimes/Undecided	43	24.4	59	33.5	44	25.0
		No	19	10.8	30	17.0	74	42.0
N/N/N	Applied	Yes	68	53.1	35	27.3	45	35.2
		Sometimes/Undecided	31	24.2	58	45.3	41	32.0
		No	29	22.7	35	27.3	42	32.8
	Academic	Yes	44	55.7	35	44.3	32	40.5
		Sometimes/Undecided	16	20.2	30	33.0	23	29.1
		No	19	24.0	14	17.7	24	30.4

There were some differences in the patterns of relative percentages across courses for English- and French-language students. The percentages of French-language students in the Y/Y/Y group who said they liked mathematics were similar for the two courses (just under 70%), while there was a considerable difference for English-language students (62% for academic and 48% for applied). For the N/N/Y group, the percentages of English-language students who said they liked mathematics were similar for the two courses (approximately 45%), while there was a considerable difference for French-language students (75% for academic and 53% for applied).

Taken together, the results for the French-language students indicate that approximately half indicated they liked mathematics, which was a slightly larger proportion than among English-language students.

I am good at math. As with “I like math,” the percentages of English-language students who indicated that they were good at mathematics were not large, with the largest among students who consistently met the provincial standard (see Table 3.6). There were generally decreases in these percentages from Grades 3 to 9 among students who continued not to meet the provincial standard or failed to meet the provincial standard in later grades after having done so in earlier grades. In all but the Y/Y/Y group, the percentage of students who said they were good at mathematics was larger for the applied course than for the academic course. Fewer than one-quarter of the N/N/N students indicated that they were good in mathematics in Grade 9. Overall, fewer than half of the English-language students indicated that they were good at mathematics.

Table 3.6 I Am Good at Math—English-Language Students

Mathematics			Primary		Junior		Grade 9	
Group	Course	Good at Math	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Y/Y/Y	Applied	Yes	1 256	53.9	1 022	43.9	1 469	63.0
		Sometimes/Undecided	975	41.8	1 157	49.7	605	26.0
		No	99	4.2	151	6.5	256	11.0
	Academic	Yes	17 800	66.8	19 317	72.5	17 648	66.3
		Sometimes/Undecided	8 345	31.3	6 983	26.2	6 369	23.9
		No	485	1.8	330	1.2	2 613	9.8
N/N/Y	Applied	Yes	734	38.5	436	22.8	941	49.3
		Sometimes/Undecided	969	50.8	1 196	62.7	610	32.0
		No	205	10.7	276	14.5	357	18.7
	Academic	Yes	750	42.2	596	33.6	564	31.8
		Sometimes/Undecided	906	51.0	1 042	58.7	743	41.9
		No	119	6.7	137	7.7	468	26.4
Y/Y/N	Applied	Yes	306	46.2	214	32.3	198	29.9
		Sometimes/Undecided	325	49.1	383	57.8	260	39.3
		No	31	4.7	65	9.8	204	30.8
	Academic	Yes	1 350	56.2	1 191	49.6	494	20.6
		Sometimes/Undecided	978	40.7	1 125	46.8	926	38.6
		No	74	3.1	86	3.6	982	40.9
N/N/N	Applied	Yes	1 484	35.0	660	15.5	920	21.7
		Sometimes/Undecided	2 181	51.4	2 728	64.2	1 571	37.0
		No	581	13.7	858	20.2	1 755	41.3
	Academic	Yes	663	39.9	423	25.4	252	15.2
		Sometimes/Undecided	854	51.4	1 058	63.7	595	35.8
		No	145	8.7	181	10.9	815	49.0

The highest percentage of French-language students who said they were good at mathematics was among students in the Y/Y/Y group. In most groups, the percentages among French-language students were larger than those among English-language students (see Table 3.7).

Table 3.7 I Am Good at Math — French-language Students

Mathematics			Primary		Junior		Grade 9	
Group	Enrolment	Good at Math	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Y/Y/Y	Applied	Yes	33	60.0	33	60.0	41	74.6
		Sometimes/Undecided	20	36.4	20	36.4	11	20.0
		No	2	3.6	2	3.6	3	5.4
	Academic	Yes	596	73.1	637	78.2	609	74.7
		Sometimes/Undecided	211	25.9	174	21.4	149	18.3
		No	8	1.0	4	0.5	57	7.0
N/N/Y	Applied	Yes	14	41.2	11	32.4	16	47.1
		Sometimes/Undecided	16	47.2	20	58.8	14	41.2
		No	4	11.7	3	8.8	4	11.8
	Academic	Yes	12	60.0	9	45.0	13	65.0
		Sometimes/Undecided	8	40.0	11	55.0	7	35.0
		No	-	-	-	-	-	-
Y/Y/N	Applied	Yes	24	50.0	17	35.4	20	41.7
		Sometimes/Undecided	19	39.6	21	43.8	15	31.2
		No	5	10.4	10	20.8	13	27.1
	Academic	Yes	101	57.7	93	53.1	51	29.1
		Sometimes/Undecided	69	39.4	72	41.1	71	40.6
		No	5	2.9	10	5.7	53	30.3
N/N/N	Applied	Yes	47	37.0	25	19.7	28	22.0
		Sometimes/Undecided	60	47.2	81	63.8	47	37.0
		No	20	15.8	21	16.5	52	40.9
	Academic	Yes	28	35.0	25	31.2	17	21.2
		Sometimes/Undecided	45	56.2	48	60.0	33	41.2
		No	7	8.8	7	8.8	30	37.5

As with the English-language students, there were generally decreases in these percentages from Grades 3 to 9 among students who continued not to meet the provincial standard or who failed to meet the provincial standard in later grades after having done so earlier. In the N/N/Y group, the percentage of students who said they were good at

mathematics was larger for the academic course than for the applied course. Fewer than one-quarter of the N/N/N students indicated that they were good in mathematics in Grade 9. Overall, just more than half of the French-language students indicated that they were good at mathematics.

Summary

The above results identify a number of student background and questionnaire response variables that are related to student achievement in both the academic and the applied courses. Although the relationships are similar for the two courses, the student background characteristics and the percentage of students selecting each response to the questionnaire items varies considerably between the two courses. Therefore, the patterns in the data for the variables examined in this study provide some indications of factors that might account for some of the differences between the achievement results on the EQAO Grade 9 Assessment of Mathematics of students in the academic course and those in the applied course (results for students in the academic course having been consistently better). These factors are summarized below:

- The percentage of students in the applied course who said they knew that the EQAO assessment would count for part of their final course mark was considerably smaller than that of students in the academic course. A larger portion of students who knew the assessment would count achieved the provincial standard in both courses.
- Students in the academic course showed a greater tendency to complete homework and reported fewer absences from mathematics class. Both completion of homework and regular attendance are related to higher achievement levels.
- A larger portion of students in the applied course than in the academic course did not meet the standard in Grade 3 and did not meet the standard in Grade 6. In addition, of the students who did not meet the standard in Grade 6, those who enrolled in the applied course were likely to have been less successful in Grade 8 mathematics than those who enrolled in the academic course. Success in earlier grades is a strong predictor of success in later grades.

- Students in the academic course have more positive attitudes toward mathematics than students in the applied course. More positive attitudes are associated with higher achievement levels.
- The percentage of students with special education needs in the applied course is approximately four times the percentage in the academic course. The percentage of students achieving the provincial standard is considerably smaller among students with special education needs.

Implications for Practice

The findings presented in this report provide information useful to educators as they review classroom practices and program delivery in schools. The relationships between background and questionnaire variables on the one hand and achievement on the other can inform decision making for school improvement planning and practices that individual teachers employ in their classrooms.

It is clear that many students do not know whether the Grade 9 Assessment of Mathematics will contribute to their final course marks. It is very important that teachers clearly communicate their intentions, in writing, to students and parents at the beginning of the course. Teachers should also remind students and parents of their intentions when they inform them of the administration dates for the assessment. This is particularly important for the applied course. Although most teachers said that they did count the assessment as part of their students' final course mark, only 40% of the students in the applied course said they knew that it would count.

This communication is important because students should understand how they will be assessed. The questionnaire results show that students' awareness of the EQAO assessment counting has the potential to improve their results. Also, approximately 70% of students indicated that such awareness increased their motivation to take the assessment more seriously.

The results of cohort tracking demonstrate the importance of early awareness of learning difficulties and appropriated interventions. The results show that a large number of students who had not met the provincial standard in mathematics in Grades 3 and/or 6

were able to succeed in the Grade 9 mathematics courses, including the academic course. This was particularly true for students who experienced success in Grade 8. However, many students who did not meet the standard in the early grades continued to experience challenges in the later grades. It is critical that these students be identified early in their schooling and that interventions be made to improve their knowledge and skills so that they can build on these in later grades.

Initiatives to encourage and assist students to complete homework and to attend class more regularly have potential to improve their achievement.

The strong and persistent relationships among achievement, students' attitude toward mathematics and their confidence in their ability to do well in mathematics also provide potential opportunities to improve student achievement. When reviewing the relevant data, it is important to give consideration to the following question: Do students who have developed positive attitudes toward mathematics learn mathematics more effectively, or is it that students who do well in mathematics develop positive attitudes? While it is not possible to claim a cause and effect relationship between more positive attitudes and higher achievement, it is likely that each reinforces the other. That is, it is likely that students who are taught mathematics in an engaging way that builds positive attitudes will have higher achievement. Also if students are given opportunities to succeed in mathematics, they may develop more confidence and achieve higher results. As students achieve higher levels, it is likely that their attitudes will become more positive.



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