

Education Quality and
Accountability Office

PROVINCIAL REPORT

on Achievement

English-Language Schools

Assessment Results:

- /// EQAO Grade 3 Reading, Writing and Mathematics
 - /// EQAO Grade 6 Mathematics
 - /// Council of Ministers of Education, Canada: School Achievement Indicators Program
 - /// Third International Mathematics and Science Study
-

1996-97

The EQAO Board of Directors

From left to right

Back row:

Anthony Manera

(former Board member),

Doretta Wilson,

Andre Lalonde

(former Board member),

Jerry Ponikvar,

Martin Cugelman,

Bette Stephenson

(Vice-Chair).

Seated:

Barb Smith

(Chair),

Joan M. Green

(CEO).

The Education Quality and Accountability Office (EQAO) is an independent, arm's-length agency established in June, 1996, by the Government of Ontario to assure greater accountability and contribute to the enhancement of the quality of publicly funded education in Ontario.

The Education Quality and Accountability Office

2 Carlton Street, Suite 1200

Toronto, ON M5B 2M9

Telephone: (416) 325-2824 or 1-888-327-7377

Internet: www.eqao.com

EQAO Publications: www.eqao.com

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Suite 1200
2 Carlton St
Toronto ON M5B 2M9
Telephone: (416) 325-2824
Facsimile: (416) 325-0831

October 31, 1997

The Honourable David J. Johnson
Minister of Education and Training
900 Bay Street, Mowat Block, 22nd Floor
Toronto, Ontario
M7A 1L2

Dear Minister,

The Board of Directors of the Education Quality and Accountability Office (EQAO) is pleased to present its first annual report and first provincial report on student performance.

Our Annual Report for 1996-1997 reviews the performance of EQAO in relation to the organization's values and goals, in keeping with EQAO's commitment to public accountability. The second report, Provincial Report on Achievement, details EQAO's assessment activities during the 1996-1997 fiscal year. This report includes detailed information on results of assessments at the board, provincial, national and international levels. It discusses factors associated with performance, and provides a range of background information about development, administration and quality control measures. We are confident that it is the first in a series of reports which will give Ontarians a much more comprehensive picture of the performance of their public education system.

The Board would like to note the invaluable contribution of its former members to establishing EQAO and bringing this report to fruition. Our alumni include Richard Johnston (former chair), André Lalonde, Anthony Manera, Hoda El Maraghy, and Fred Pomeroy. We would also like to thank you for your commitment to EQAO as an independent and objective source of information about education quality in Ontario.

EQAO's mission is twofold. Our work is designed to enhance accountability in Ontario education, while contributing to improved quality. Though we have much more work to do, and a great deal to learn, we are confident that we have discharged this mission effectively and look forward to continuing our work.

We trust you will find the information in these reports as informative, thought-provoking and useful as we do.

The Board of Directors of EQAO.

Provincial Report on Student Achievement

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THE CHAIR'S REMARKS

As our world becomes more complex, less predictable and more competitive at the end of this century, education is seen increasingly as critical to maintaining a prosperous and healthy society. Our desire to ensure that all of our children receive an education of the highest quality has led to a wide range of reforms in this field, both here in Ontario and right around the world.

Without good, reliable information to support it, real reform is both difficult and risky. We need detailed information about the quality of our current efforts and about what works and what doesn't. Educational policy-making should be based on good data, a commodity which has often been in short supply.

The Government of Ontario established the Education Quality and Accountability Office (EQAO) in legislation in June 1996 to respond to these needs. EQAO was created as an arm's-length, board-governed agency so that it could be a credible and objective voice, independent of the politics of the day, collecting, evaluating and reporting information about education quality. EQAO's Board of Directors is a small but diverse group of Ontarians. We are sincerely committed to providing timely, accessible and relevant information about the system and to using that information for accountability and program improvement.

Assessment of student achievement is at the heart of our mandate. We are proud to have developed and implemented an assessment program of high quality in a very short time span. Our work in Grades 3 and 6, and our participation in national and international tests, have yielded a wealth of data and are excellent first steps toward a fuller understanding of how to make our schools better. This report presents what we have learned from our first full year of activity.

EQAO will continue to conduct assessments, gather data and report publicly on our findings. We believe our first *Provincial Report on Achievement* to be a valuable support to informed discussion and debate about education quality in Ontario.

*Barbara Smith, Chair
Board of Directors*

COMMENTS FROM THE CEO

Since the Education Quality and Accountability Office was established as Ontario's education 'auditor,' I have spoken with many parents, educators, students and taxpayers across the province, discussing how assessments which demonstrate students' knowledge and skills can improve quality and accountability in schools. The discussion has centred on the need for focussed information for better decision making in the interests of improved teaching and learning. One of the most enlightening conversations I had was with an eight-year old Grade 3 student who told me, "*You could make schools better if you tell us what good work looks like and tell us what comes next.*" In these words, that student summed up what EQAO is all about.

EQAO believes that large-scale assessment can contribute to positive educational change when it engages educators, parents and students in thought and discussion about what takes place in the classroom. We are testing what students know and can do. We are measuring against provincial standards to obtain information on what we need to do so that all students can learn more and learn better. This requires considering all the circumstances that affect children's learning. Testing has two purposes:

- 1. It promotes accountability** by informing parents, students, educators and the general public about the academic performance of students.
- 2. It drives improvement** by providing information that serves as a catalyst or lever for educators and parents to help students learn more effectively.

We are committed to a cycle of **assessing and reporting that leads to action**. Accounting is the gathering, organizing and reporting of information that describes the past performance of a student or system. Accountability looks ahead; it involves using assessment information to make judgements, to recognize where we need to change and to construct the way forward.

Excellence is never an accident; it results from high expectations, deep commitment, intelligent direction and skillful execution. It represents wise choices among many alternatives. Good assessment develops shared responsibility and galvanizes school-wide change. In many ways, assessments can serve as a clarion call for educators, parents and students in areas where problems in student performance are demonstrated. They can also affirm good practice. What we do now depends on how we react to not having reached our achievement goals thus far. We must build on what we've learned from these assessments. In all our accountability and improvement efforts, we need to be concerned about both the provincial picture and the needs of the individual student.

All of us wish to equip our children with the tools they will need to navigate through life and work in the 21st century with confidence and competence. To this end, high-quality assessment provides a valuable picture of the range and diversity of students' academic achievements. This report makes recommendations based on clear and reliable data.

We believe that we have discharged our responsibilities with vision, rigour and in an atmosphere of collaborative planning as we came to our decisions. We are pleased to submit this report.

Joan M. Green
Chief Executive Officer
Education Quality and Accountability Office

EQAO's MISSION: ACCOUNTABILITY & IMPROVEMENT

EQAO Mission:
EQAO will assure greater accountability and contribute to the enhancement of the quality of education in Ontario. This will be done through assessments and reviews based on objective, reliable and relevant information, and the timely release of that information along with recommendations for system improvement.

When it was founded, EQAO's mandate included the development of a coherent and manageable large-scale assessment program for Ontario in both English and French. EQAO has actively sought out and learned from the experiences and the research in other jurisdictions with a longer history of large-scale assessment.

After a thorough search of the assessment literature and consultation with assessment experts in several other provinces and countries, it was clear that there is no one right way to conduct assessments. Almost all modern countries are in the process of refining, replacing, enhancing and sometimes reinventing their assessment methods. On the basis of the experience of others, EQAO determined that large-scale assessment in Ontario must be designed intentionally not only to provide information for accountability but also to foster genuine improvements in learning for all students.

This commitment to both accountability and improvement led to two vital underlying criteria for the development of any EQAO assessment: the assessment must be of high quality to ensure reliable and valid data on student achievement, and the assessment must contribute to student learning by enhancing the knowledge and skills of teachers, the educational community as a whole, and the public.

EQAO is committed to following recognized principles for assessment practices and implementing quality control activities and procedures to monitor each stage of the assessment process. EQAO adheres to the *Principles for Fair Student Assessment Practices in Canada* which are widely recognized and endorsed by measurement and educational associations in Canada. These principles give detailed guidelines for the developers and users of large-scale assessment methods. They include:

- /// Defining the intended purposes and uses of the assessment and warning against common misuses;
- /// Reviewing the materials for sensitive, offensive or misleading language;
- /// Describing the specialized skills and training necessary to make valid interpretations of scores;
- /// Providing evidence of the comparability of different forms of the assessment;
- /// Providing clear instructions for administration;
- /// Describing scoring procedures;
- /// Informing students and parents¹ about the content and nature of the assessment;
- /// Describing procedures for parents/guardians to register concern about the assessment;
- /// Informing all persons with a stake in the assessment of the uses to be made of the results; and
- /// Interpreting results in light of factors that might influence them.

EQAO's quality control measures and procedures are applied at each stage of the assessment process to monitor quality (the instrument development, the materials, the instructions, the teacher training, the administration, the scoring, and the reporting).

¹ All reference to parents in this report refers to both parents and legal guardians.

Some examples of the application of the principles of fair student assessment and quality control activities and processes follow.

EXAMPLES OF EQAO QUALITY CONTROL ACTIVITIES ¹
EQAO defined the purposes and uses for the assessments: • To provide information about student achievement and education conditions for public accountability; • To inform parents and the public about curricular expectations in Ontario; • To provide information and opportunities for public discussion about education; • To bring curricular coherence to the Ontario education system; • To encourage classroom practices that enhance student learning; and • To provide information about individual Grade 3 students to parents and teachers.
EQAO used a “multiple-methods” approach which allowed students to show what they know and how they can apply this knowledge through a wide range of assessment activities.
EQAO assessments provided students with engaging, challenging and relevant tasks through which they could demonstrate their knowledge, skills, thinking and problem solving in all aspects of the curriculum.
EQAO worked with teams of teachers, researchers and parents to consider materials that were being produced for issues of validity, clarity and fairness.
EQAO systematically field-tested and monitored the <u>quality</u> of each phase of the assessment process.
EQAO systematically monitored the consistency of the scoring decisions that were made by teacher-markers.
EQAO engaged in a number of research studies to ensure validity, reliability and comparability of the assessments.

Each stage of the assessment process (i.e., the instrument development, the materials, the instructions, the teacher training, the administration, the scoring and the reporting) was intentionally developed in ways that could contribute to teachers' knowledge and skills in assessment practices. We call this attention to teacher learning “capacity building.”

EXAMPLES OF EQAO CAPACITY-BUILDING ACTIVITIES
Under the direction of EQAO, teachers developed the Grade 3 and the Grade 6 assessments. Members of the writing teams were selected for their expertise in their subject area and in assessment.
EQAO involved many educators and community representatives in critical analysis of materials, as trainers of teachers in their own regions, as board contacts, as quality control monitors and as markers. This process gave many people the opportunity to learn about EQAO assessments and about effective testing principles and procedures.
Grades 3 and 6 teachers were given extensive training and provided with detailed materials and directions that gave them illustrations of quality assessment activities.
Over 1,200 Grade 3 teachers and 130 Grade 6 teachers received extensive training in marking that can be applied to their classroom practice.
Altogether EQAO involved 15,000 teachers and principals from both the English and French systems and from all geographic regions.

¹ Technical reports describing the results of the quality control activities are available through EQAO.

ASSESSMENT ACTIVITIES 1996-1997

PROVINCIAL

At the provincial level, EQAO developed, in conjunction with teachers from throughout Ontario, an assessment for Grade 3 students which integrated reading, writing and mathematics tasks. This assessment was administered in April 1997 and the individual student results were forwarded to schools, teachers and parents in June and September 1997. Similar but separate assessments were developed for the French and the English systems. Wide diversity across the province in both the beginning points of French Immersion programs and the proportion of daily instruction in English that takes place in these programs made it impossible, without further research, to make the assessment appropriate for all French Immersion students. School boards were asked to decide if their French Immersion students would write the English test or not participate in the assessment while an appropriate approach for French Immersion is developed for 1998.

In addition, EQAO developed a series of tasks to assess the mathematics skills of a group of Grade 6 students from randomly selected schools across the province in May 1997. School results were forwarded to the participating schools in mid-October 1997.

EQAO is in the process of developing the next reading, writing and mathematics assessment, which will occur for all Grade 3 students in May 1998, and a Grade 9 mathematics assessment for randomly sampled schools, which will be administered in the spring of 1998. Research is underway for a secondary school literacy assessment.

NATIONAL

At the national level, EQAO is responsible for Ontario's participation in the School Achievement Indicators Program (SAIP) which is conducted under the auspices of the Council of Ministers of Education, Canada (CMEC). The report from the science assessment (administered in 1996), was released in January 1997. The mathematics assessment was administered to 13-year-old and 16-year-old students in April of 1997.

EQAO participated in the preparation of the test materials for the science and mathematics assessments and is currently involved in the preparation of the next SAIP assessment in reading and writing scheduled for administration in April 1998.

INTERNATIONAL

EQAO is responsible for Ontario's participation in international assessments. In November 1996, EQAO released the results of the written component of the Third International Mathematics and Science Study (TIMSS) for Grades 7 and 8 students. In June of this year, EQAO released the results of the written component for the

Grades 3 and 4 students. EQAO released the results of the practical component of the assessment for Grades 4 and 8 students in September 1997. The results of testing for students at the end of secondary school (Grades 12 and OAC in Ontario) are scheduled for release in February 1998.

EQAO Assessment Activities 1996-1997

LEVEL	POPULATION	DOMAIN	STATUS
Provincial	All Grade 3 students	Reading, Writing, Mathematics	Assessment completed. Individual student results released in June and Sept. '97; school, board and provincial results released Oct. '97.
	Randomly sampled Grade 6 schools	Mathematics	Assessment completed. School and provincial results released Oct. '97.
	All Grade 3 students	Reading, Writing, Mathematics	Development of materials for spring '98 assessment.
	Randomly sampled Grade 9 schools	Mathematics	Development of materials for spring '98 assessment .
National (SAIP)	Randomly sampled 13- and 16-year-old students	Science	Assessment completed '96. Results released Jan. '97.
	Randomly sampled 13- and 16-year-old students	Mathematics	Assessment completed '97. Results due Jan. '98.
	Randomly sampled 13- and 16-year-old students	Reading, Writing	Development of materials for spring '98 assessment .
International (TIMSS)	Randomly sampled 9-year-old students (Grades 3 and 4)	Mathematics, Science (Written component)	Assessment completed '95. Results released June '97.
	Randomly sampled 13-year-old students (Grades 7 and 8)	Mathematics, Science (Written component)	Assessment completed '95. Results released Nov. '96.
	Randomly sampled Grades 4 and 8 students	Mathematics, Science (Practical component)	Assessment completed '95. Results released Sept. '97.
	Randomly sampled students in final year of secondary school	Mathematics, Science (Written component)	Assessment completed '95. Results due Feb. '98.

WHAT WE LEARNED: THE ASSESSMENT RESULTS

Assessment is a process of gathering information about students, including student achievement, in order to describe and interpret student achievement accurately, as a basis for improved learning.

*-Lorna Earl,
(Assessment Specialist)
1996*

Learning is a complicated process of acquiring information and skills. It depends on many factors like prior learning, student motivation, student attitudes, student engagement with school work, parent attitudes, resources available, instruction and time allocated to the subject.

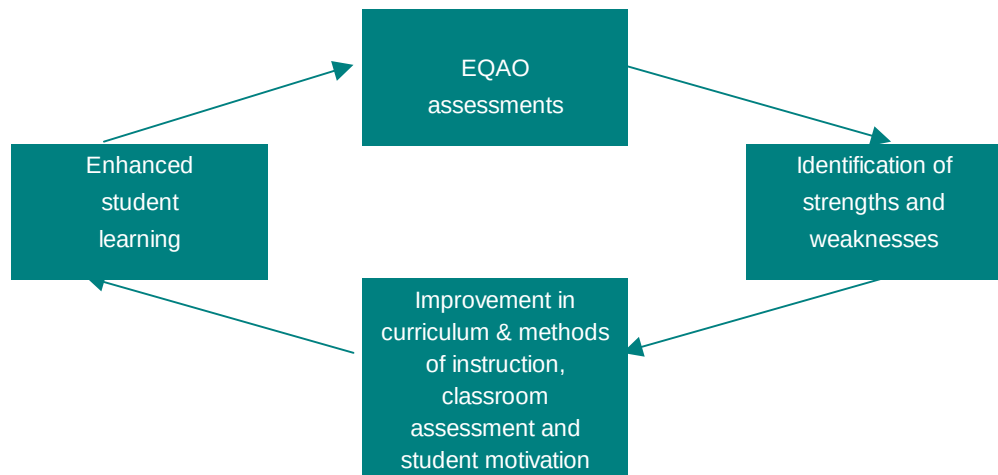
The assessments reported here have been carried out using a “cross-sectional” design in which students are evaluated at one point in time in their schooling – near the end of a particular school grade. Implicit in a cross-sectional study is a focus on the cumulative knowledge and abilities of children, recognizing that student background, as well as schoolwork, school and classroom factors during the current and all prior years are relevant.

Large-scale assessments provide a snapshot of how well students in the province are learning what is expected of them. The analysis of the assessment results identifies ways to influence instruction and other practices that can help students learn more effectively and more efficiently. It is not enough just to measure students’ achievement and continue to teach them in the same ways. Large-scale assessment must also provide a link between student performance and decisions about the most appropriate strategies to enhance achievement.

“In the end, no one knows the student’s capacities, or is in a position to assess them in all their nuances and complexity, better than the classroom teacher.

That’s why we made several recommendations designed to build teacher expertise in assessment, with a view to improving teaching and learning, and to making more information available to parents and the public about what’s being taught and learned.”

*- Ontario Royal Commission on Learning,
1994*



Assessment as Part of Learning

EQAO assessments use tests to measure student achievement and questionnaires to gather contextual information in order to identify factors that schools can change or influence that will enhance student learning.

This section of the provincial report includes the key findings for the Grade 3 Assessment in Reading, Writing and Mathematics, the Grade 6 Assessment in Mathematics, SAIP and TIMSS; interpretations of the findings; and specific recommendations for improvement based on the results from these 1996-97 assessments.

The recommendations presented in this report are based on data derived from these assessments. These data reflect both achievement and contextual factors. The recommendations also reflect what EQAO has learned from other educational research efforts. EQAO's assessments are a rich source of information. This report includes the results of the first phase of analysis. EQAO will be conducting further analyses to “dig deeper,” particularly concerning the relationship of many factors to student achievement, and will continue to communicate the results.

Results for Grades 3 and 6 in this report are for English-language schools only. Results in French for francophone schools appear in a report on French-language student achievement.

GRADE 3 READING, WRITING & MATHEMATICS RESULTS

- Administered April 1997
- 3,300 schools
- 7,000 classrooms
- 7,400 teachers
- 10-day unit of work
- Students completed assessment tasks independently
- Province-wide
- Almost 130,000 Grade 3 students
- Results expressed as % of students at Levels 1-4
- Based on outcomes and standards in provincial curriculum
- Report released in fall 1997

Exemptions and Accommodations:

- 2% of students FULLY exempt in all subjects
- 6% of students exempt in reading (2% fully exempt + 4% partially exempt)
- 4% of students exempt in writing (2% fully exempt + 2% partially exempt)
- 4% of students exempt in mathematics (2% fully exempt + 2% partially exempt)
- 30% of students with permitted accommodation(s) for the testing

Note: List of permitted accommodations provided in the appendix

The EQAO Grade 3 assessment is much more than just a test. The ten-day unit of work called “Let’s Go Exploring” was an engaging learning unit that contained test items and assessment tasks which provided estimates of students’ knowledge and applied skills. The assessment also included a number of questionnaires that addressed many of the factors that can have a bearing on student learning. In order to use assessment results to focus program and enhance student learning, EQAO gathered a good deal of information about many of the conditions that can contribute to children’s learning. Questionnaires were obtained from more than 90% of the homes and from at least 95% of the principals and the classroom teachers involved in the assessment. Questionnaires for the home were translated into nineteen languages.

The EQAO Grade 3 assessment was designed to assess student achievement of the outcomes in the provincial curriculum documents that were in use at the time of the assessment. Student work was scored on a 4-level scale that was linked to the provincial standards. According to those standards, students were expected to perform at Levels 2 and 3. Key knowledge and skills within each subject were grouped into categories called performance indicators. Students’ booklets were scored in relation to the performance indicators for reading, writing and mathematics. In addition, the mathematics booklets were scored by strand. The five strands of the mathematics curriculum are Number Sense and Numeration, Measurement, Geometry and Spatial Sense, Patterning and Algebra, and Data Management and Probability. (For descriptions of the strands and performance indicators, see *Appendix C: Individual Student Report* or refer to charts which begin on page 13.)

Exempted students included those students who were unable to respond to the assessment instruments in any way or students who, in the opinion of the principal, in consultation with the teacher and parent(s)/guardian(s), would be adversely affected by participating. Students could be exempted from the whole assessment (full exemption) or from one or more parts of the assessment (partial exemption). No achievement data resulted from students who submitted insufficient information, incomplete work or illegible work.

WHAT EQAO LEARNED ABOUT STUDENTS AND SCHOOLS

- /// 51% of the classes have over 25 students in them.
The average Grade 3 class size is 25.
- /// 30% of the Grade 3 classes contained only Grade 3 students;
28% combined Grades 2 and 3 students;
28% combined Grades 3 and 4 students;
8% combined students across three or more grades;
6% no response.
- /// 48% of the Grade 3 students who participated in the assessment were girls and 52% were boys.
- /// 76% of students indicated that they speak mostly English in the home, 7% indicated “mostly another language” and 14% said “as often in English as in another language.”
- /// 10% of students were identified by their teacher as participants in English as a Second Language (ESL) or English Skills Development (ESD) programs.
- /// 7% of students had been formally identified as exceptional and were receiving special education support.
- /// 12% of the Grade 3 students had not been identified formally as exceptional but were receiving special education support.
- /// 86% of the Grade 3 students had attended nursery school and/or kindergarten.

WHAT EQAO LEARNED ABOUT ACHIEVEMENT IN READING

(Refer to chart on opposite page for corresponding information.)

POSITIVE FINDINGS

Most of the Grade 3 students understood straightforward material, made simple personal connections to ideas in the text and used reading conventions and simple features of text like titles, headings and pictures to respond to the text (Level 2 and above).

- 80% showed evidence of Level 2 and above in understanding the text.
- 79% showed evidence of Level 2 and above in connecting the text with other knowledge and experience.
- 79% showed evidence of Level 2 and above in the use of conventions and features of text.

FINDINGS THAT CAUSE CONCERN

Approximately one-half of the Grade 3 students did not show understanding of subtle ideas/information in material of some complexity, did not extend meaning by making connections of some complexity to link the ideas with personal experiences, and did not integrate reading conventions and a variety of text features to respond to the text (Level 3 and above).

- 49%¹ did not show evidence of Level 3 and above in understanding the text.
- 49%¹ did not show evidence of Level 3 and above in connecting the text to other knowledge and experience.
- 50%¹ did not show evidence of Level 3 and above in the use of reading conventions and text features.

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

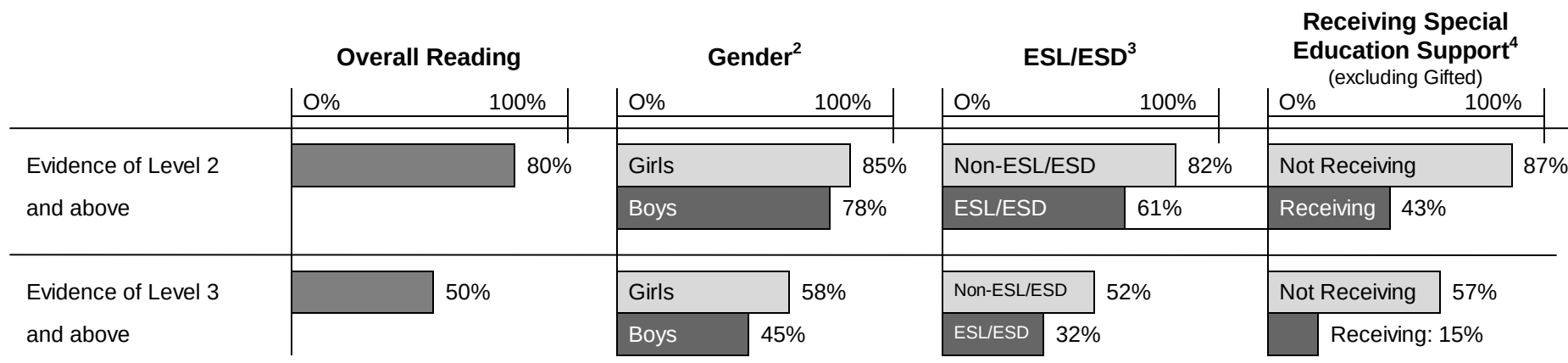
OTHER FINDINGS

There are differences in reading results for sub-groups in the Grade 3 population.

- 7% more girls than boys scored at Levels 2,3 and 4 in reading.
- 13% more girls than boys scored at Levels 3 and 4 in reading.
- 21% more non-ESL/ESD students than ESL/ESD students scored at Levels 2,3 and 4 in reading.
- 20% more non-ESL/ESD students than ESL/ESD students scored at Levels 3 and 4 in reading.
- 44% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 2,3 and 4 in reading.
- 42% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 3 and 4 in reading.

Reading: Percentage of Grade 3 Students at Each Level

Performance Levels ¹						
Performance Indicators	Exempt	No Data	1	2	3	4
Understanding the text/reading material (e.g., recognizing, finding and interpreting main ideas, organizing supporting details)	6%	5%	9%	29%	34%	17%
Connecting the text to other knowledge and experience (e.g., predicting, inferring, extending concepts from the text)	6%	6%	9%	28%	33%	18%
Using the conventions/features of the text (e.g., phonics, word and sentence order, punctuation, headings, pictures, diagrams)	6%	5%	10%	29%	34%	16%
Overall (based on median student scores)	6%	5%	9%	30%	34%	16%



¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

² Gender differences may not be precise because not all students checked off gender on the questionnaire.

³ 10% of the population were identified as English as Second Language/English Skills Development.

⁴ 19% of the population were receiving special education support.

WHAT EQAO LEARNED ABOUT ACHIEVEMENT IN WRITING

(Refer to chart on opposite page for corresponding information.)

POSITIVE FINDINGS

Most of the Grade 3 students' writing showed the organization of some simple ideas using some parts of letter and story forms; some interest in the topic and in communicating with the reader; and some use of basic writing conventions such as word order and standard spelling of familiar words (Level 2 and above).

- 82% showed evidence of Level 2 and above in the use of writing forms and organizing ideas.
- 82% showed evidence of Level 2 and above in communicating with the reader.
- 80% showed evidence of Level 2 and above in using writing conventions (spelling, punctuation, grammar, etc.).

FINDINGS THAT CAUSE CONCERN

Approximately two-thirds of the Grade 3 students did not show organization of some complex ideas with supporting detail using letter and story forms; did not show strong interest in the topic; did not get the message across; and did not use more than basic writing conventions such as spelling, sentence patterns, punctuation, grammar and paragraphs (Level 3 and above).

- 61%¹ did not show evidence of Level 3 or above in using writing forms and organizing their ideas.
- 59%¹ did not show evidence of Level 3 or above in communicating with the reader.
- 60%¹ did not show evidence of Level 3 or above in using writing conventions.

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

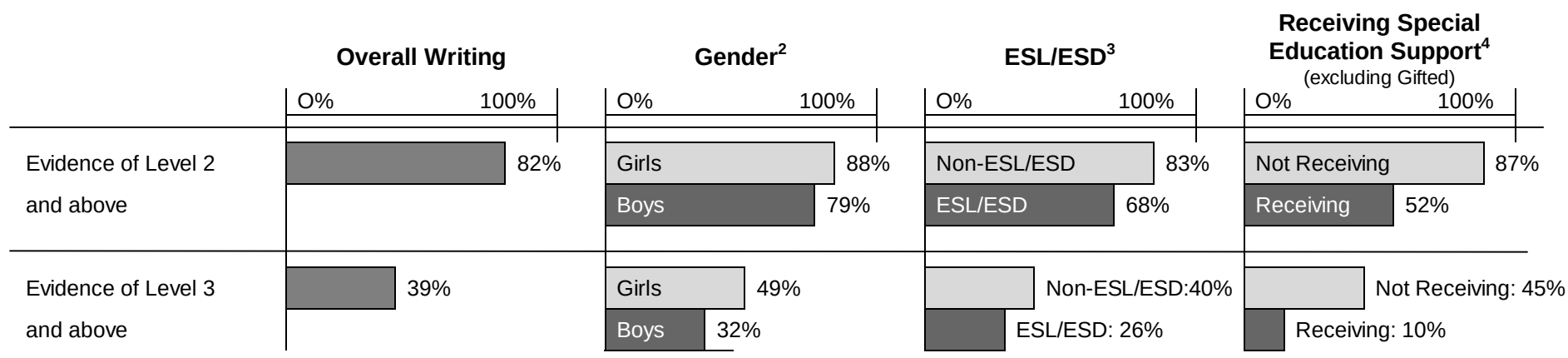
OTHER FINDINGS

There are differences in writing results for sub-groups in the Grade 3 population.

- 9% more girls than boys scored at Levels 2,3 and 4 in writing.
- 17% more girls than boys scored at Levels 3 and 4 in writing.
- 15% more non-ESL/ESD students than ESL/ESD students scored at Levels 2,3 and 4 in writing.
- 14% more non-ESL/ESD students than ESL/ESD students scored at Levels 3 and 4 in writing.
- 35% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 2,3 and 4 in writing.
- 35% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 3 and 4 in writing.

Writing: Percentage of Grade 3 Students at Each Level

Performance Levels ¹						
Performance Indicators	Exempt	No Data	1	2	3	4
Using writing forms (stories and letters) Organizing ideas/information (e.g., describing, telling the main idea and developing it with supporting details)	4%	5%	9%	43%	31%	8%
Communicating with the reader (e.g., use of vocabulary, focus on the reader, appropriate message and tone)	4%	5%	9%	41%	32%	9%
Using writing conventions (e.g., spelling, punctuation, capitalization, dialogue, paragraphing, grammar)	4%	5%	11%	40%	31%	9%
Overall (based on median student scores)	4%	5%	9%	43%	31%	8%



¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

² Gender differences may not be precise because not all students checked off gender on the questionnaire.

³ 10% of the population were identified as English as Second Language/English Skills Development.

⁴ 19% of the population were receiving special education support.

WHAT EQAO LEARNED ABOUT ACHIEVEMENT IN MATHEMATICS: STRANDS

(Refer to chart on opposite page for corresponding information.)

POSITIVE FINDINGS

Mathematics Strands

1. Number Sense and Numeration
2. Measurement
3. Geometry and Spatial Sense
4. Patterning and Algebra
5. Data Management and Probability

Most of the Grade 3 students used some of the required concepts and procedures in simple tasks in each of the 5 mathematics strands (Level 2 and above).

- 77% showed evidence of Level 2 and above in Number Sense and Numeration (e.g., addition, subtraction, multiplication and division of whole numbers, decimals, fractions).
- 76% showed evidence of Level 2 and above in Geometry and Spatial Sense (e.g., 2-dimensional and 3-dimensional figures, spatial relationships).
- 72% showed evidence of Level 2 and above in Measurement (e.g., estimating, measuring and recording using standard and non-standard units).
- 78% showed evidence of Level 2 and above in Patterning and Algebra (e.g., identifying, extending and creating patterns with shapes, numbers leading to an understanding of algebra).
- 79% showed evidence of Level 2 and above in Data Management and Probability (e.g., using a variety of methods to gather, analyze, display and communicate information).

FINDINGS THAT CAUSE CONCERN

Approximately two-thirds of the Grade 3 students did not use required concepts and procedures to complete tasks of some complexity, with accuracy (Level 3 and above).

- 62%¹ did not show evidence of Level 3 and above in Number Sense and Numeration (e.g., addition, subtraction, multiplication and division of whole numbers, decimals, fractions).
- 67%¹ did not show evidence of Level 3 and above in Geometry and Spatial Sense (e.g., 2-dimensional and 3-dimensional figures, spatial relationships).
- 69%¹ did not show evidence of Level 3 and above in Measurement (e.g., estimating, measuring and recording using standard and non-standard units).
- 64%¹ did not show evidence of Level 3 and above in Patterning and Algebra (e.g., identifying, extending and creating patterns with shapes, numbers leading to an understanding of algebra).
- 64%¹ did not show evidence of Level 3 and above in Data Management and Probability (e.g., using a variety of methods to gather, analyze, display and communicate information).

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

Mathematics Strands: Percentage of Grade 3 Students at Each Level

Performance Levels ¹						
Strands (areas of study)	Exempt	No Data	1	2	3	4
Number Sense and Numeration (e.g., addition, subtraction, multiplication and division of whole numbers, decimals, fractions)	4%	3%	shows basic number concepts and procedures in some simple tasks 16%	shows some required number concepts and procedures in simple tasks 39%	shows required number concepts and procedures to complete tasks of some complexity with accuracy 31%	shows, beyond what is required, complex number concepts and procedures to complete complex tasks accurately 7%
Geometry and Spatial Sense (e.g., 2-dimensional and 3-dimensional figures, knowledge of spatial relationships)	4%	3%	shows basic geometry concepts and procedures in some simple tasks 17%	shows some required geometry concepts and procedures in simple tasks 43%	shows required geometry concepts and procedures to complete tasks of some complexity with accuracy 29%	shows, beyond what is required, a variety of geometry concepts and procedures to complete complex tasks accurately 4%
Measurement (e.g., estimating, measuring and recording using standard and non-standard units)	4%	4%	shows basic measurement concepts and procedures in some simple tasks 20%	shows some required measurement concepts and procedures in simple tasks 41%	shows required measurement concepts and procedures to complete tasks of some complexity with accuracy 26%	shows, beyond what is required, a variety of measurement concepts and procedures to complete complex tasks accurately 5%
Patterning and Algebra (e.g., identifying, extending and creating patterns with shapes, numbers leading to an understanding of algebra)	4%	3%	shows basic patterning concepts and procedures in some simple tasks 15%	shows some required patterning concepts and procedures in simple tasks 42%	shows required patterning concepts and procedures to complete tasks of some complexity with accuracy 31%	shows, beyond what is required, a variety of patterning concepts and procedures to complete complex tasks accurately 5%
Data Management and Probability (e.g., using a variety of methods to gather, analyze, display and communicate information)	4%	2%	shows basic data management concepts and procedures in some simple tasks 15%	shows some required data management concepts and procedures in simple tasks 43%	shows required data management concepts and procedures to complete tasks of some complexity with accuracy 31%	shows, beyond what is required, a variety of data management concepts and procedures to complete complex tasks accurately 5%

¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

WHAT EQAO LEARNED ABOUT ACHIEVEMENT IN MATHEMATICS: INDICATORS

(Refer to chart on opposite page for corresponding information.)

POSITIVE FINDINGS

Most of the Grade 3 students showed understanding of some of the required mathematical concepts, some application of procedures and use of some simple mathematical language (Level 2 and above).

- 78% showed evidence of Level 2 or above in understanding mathematical concepts.
- 76% showed evidence of Level 2 or above in applying mathematical procedures.
- 73% showed evidence of Level 2 or above in communicating mathematical language.

FINDINGS THAT CAUSE CONCERN

Approximately two-thirds of the Grade 3 students did not show understanding of the required mathematical concepts, regular application of procedures and varied use of mathematical language to communicate (Level 3 and above).

- 64%¹ did not show evidence of Level 3 and above in understanding mathematical concepts.
- 67%¹ did not show evidence of Level 3 and above in applying mathematical procedures.
- 69%¹ did not show evidence of Level 3 and above in communicating mathematical language.

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

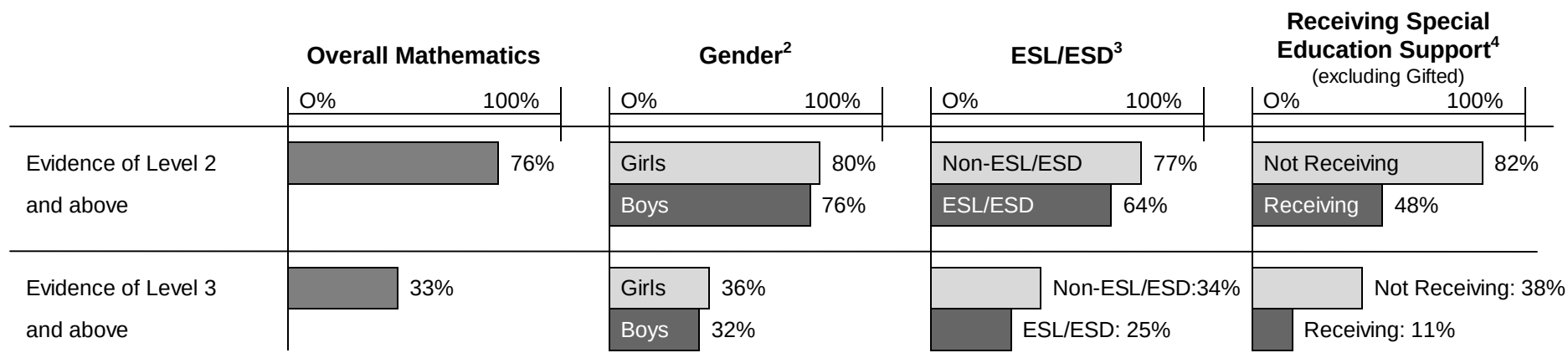
OTHER FINDINGS

There are differences in mathematics results for sub-groups in the Grade 3 population.

- 4% more girls than boys scored at Levels 2,3 and 4 in mathematics.
- 4% more girls than boys scored at Levels 3 and 4 in mathematics.
- 13% more non-ESL/ESD students than ESL/ESD students scored at Levels 2,3 and 4 in mathematics.
- 9% more non-ESL/ESD students than ESL/ESD students scored at Levels 3 and 4 in mathematics.
- 34% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 2,3 and 4 in mathematics.
- 27% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 3 and 4 in mathematics.

Mathematics Indicators: Percentage of Grade 3 Students at Each Level

Performance Levels ¹						
Performance Indicators	Exempt	No Data	1	2	3	4
Understanding mathematical concepts (e.g., knowledge of ideas, procedures and tools)	4%	3%	15%	42%	31%	5%
Applying procedures (e.g., selecting and using appropriate problem-solving processes)	4%	3%	17%	43%	29%	4%
Communicating in mathematics (e.g., using mathematical language to convey and explain answers in pictures, words and symbols)	4%	3%	20%	42%	26%	5%
Overall (based on median student scores)	4%	3%	17%	43%	28%	5%



¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

² Gender differences may not be precise because not all students checked off gender on the questionnaire.

³ 10% of the population were identified as English as Second Language/English Skills Development.

⁴ 19% of the population were receiving special education support.

WHAT EQAO LEARNED ABOUT THE LEARNING CONTEXT

POSITIVE FINDINGS

There is assessment support for teachers in most of the schools and school boards in the province.

- 73% of principals indicated on the school questionnaire that their board had a board-wide assessment plan.
- 79% of principals indicated that board assessment resource staff were available to assist teachers.
- 92% of principals indicated that the provincial standards documents for language and mathematics were available in the school to assist teachers in assessing students.
- 87-89% of principals said that classroom resources were available for assessing reading, writing and mathematics .
- 64% of the principals said that their school had a school-wide assessment plan/policy.

Grade 3 teachers are experienced educators and have engaged in professional development.

- Over half of the Grade 3 teachers in the province have taught in the primary division for 10 or more years and 43% had taught Grade 3 for 10 or more years.
- Most Grade 3 teachers report that they have pursued professional development courses, attended workshops or done professional reading with a focus on teaching or assessing reading and writing or mathematics.

Most parents are involved with and are satisfied with the contact that they have with their child's school.

- 99% read school newsletters and brochures.
- 99% read their child's report card.
- 89% speak or write to their child's teacher or principal.
- 86% attend teacher-parent conferences.
- At least 85% are satisfied with the way information is communicated to them about their child's performance in reading, writing and mathematics.

There is support for student learning in most homes.

- 99% of homes have writing materials; 84% have calculators; 56% have more than 100 books or other publications; and 51% have computers.
- Over half of the parents talk about reading with their Grade 3 children at least once a week by discussing what they are reading, helping them understand it and encouraging children to read materials that are not part of their school work.
- Over 75% of parents enjoy reading a lot and read for pleasure at home at least weekly.
- Over half of the parents get involved with their children's writing by encouraging them to do writing that is not part of their school work and by talking to them about what they write and giving them ideas to improve their writing.
- Over half of the parents help children solve mathematics problems, help them understand number questions and encourage them to do mathematics that is not part of school work.

In most classes, Grade 3 teachers have students read every day in school.

- 98% have students read stories every day.
- 87% have students read instructions every day.

In many classes, Grade 3 teachers have students write at least a few times a week in school.

- 57% have students write stories at least a few times a week.
- 73% have students write journals or diaries at least a few times a week.

Most Grade 3 teachers teach mathematics and involve their students in mathematics at least a few times a week.

- 88% teach the appropriate use of mathematical forms and symbols at least a few times a week.
- 86% teach mathematical methods or procedures at least a few times a week.
- 76% have students use concrete materials to understand and explain new concepts at least a few times a week.
- 70% have students apply mathematical rules in real-life contexts at least a few times a week.

Most Grade 3 teachers teach reading skills and provide opportunities for practice at least a few times a week.

- 90% teach students to use phonics cues at least a few times a week.
- 86% have students engage in pre-reading activities at least a few times a week.
- 83% read aloud to the class at least a few times a week.
- 77% have students define words in the context of their reading at least a few times a week.
- 75% have students make predictions about their reading at least a few times a week.
- 72% teach students to use context cues, like pictures, graphs, titles and tables of contents, to enhance their understanding at least a few times a week.

Most Grade 3 teachers teach writing skills and provide opportunities for practice at least a few times a week.

- 94% teach spelling at least a few times a week (63% teach spelling every day).
- 87% teach basic punctuation at least a few times a week (53% teach basic punctuation every day).
- 76% teach grammar at least a few times a week (37% teach grammar every day).
- 76% have students use resources to revise and edit their writing at least a few times a week.
- 70% teach vocabulary building strategies at least a few times a week.

Grade 3 teachers are comfortable teaching reading and writing and some parts of mathematics.

- Over 75% are “very comfortable” with *teaching* to support learning for the reading and writing indicators in the language document.
- Most Grade 3 teachers are at ease *teaching* number sense and numeration and mathematical concepts (85% and 84% “very comfortable,” respectively).

FINDINGS THAT CAUSE CONCERN

There are a number of reading activities that many teachers use infrequently.

- More than 50% of teachers do the following no more than a few times a month:
 - have students read information articles, poetry or plays.
 - have students recognize patterns like sequence and repetition in the text.
 - have students extend their understanding of their reading by role-playing or writing about it.
 - have students solve problems by combining information from their reading with their own experience.
 - teach the conventions of dialogue.
 - teach the structure and organization of different kinds of writing, like stories, reports, letters.
 - teach elements of style, like author’s voice, special ordering or organization of words, images or metaphors.
 - teach students to recognize various levels of meaning in what they read, like literal and inferential, explicit and implicit.

There are a number of instructional activities in writing that many teachers use infrequently.

- More than 50% of teachers do the following no more than a few times a month:
 - have students write to give information, write poetry, letters, instructions, plays.
 - have students write for different purposes like informing, persuading or entertaining or for different audiences.
 - have students use material from other media to enhance their writing.
 - have students do pre-writing or revise their initial draft.

Grade 3 teachers use a wide range of approaches to distribute the time spent on the components of mathematics.

- 59% of Grade 3 teachers have students work collaboratively to solve problems at least a few times a week but, for 37%, students work collaboratively to solve problems no more than a few times a month.
- 58% of Grade 3 teachers have students use problem-solving strategies for finding answers at least a few times a week but, for 38%, this happens no more than a few times a month.
- 58% of Grade 3 teachers have students discuss their problem solving strategy choices in class at least a few times a week, but for 38%, this happens no more than a few times a month.
- 66% of Grade 3 teachers have students practise number sense and numeration concepts like those in the assessment at least a few times a week; but most of them (71%- 82%, depending on the strand) have students practise concepts in the other strands, such as geometry, measurement, patterning and algebra and data management, no more than a few times a month, with some (32%-49%) doing this only a few times a year.

Grade 3 teachers indicated some discomfort with teaching mathematics.

- 29% of the Grade 3 teachers are “not comfortable” or only “somewhat comfortable” *teaching* geometry and spatial sense.
- 44% of the Grade 3 teachers are “not comfortable” or only “somewhat comfortable” *teaching* patterning and algebra.
- 48% of the Grade 3 teachers are “not comfortable” or only “somewhat comfortable” *teaching* mathematical procedures.
- 40% of the Grade 3 teachers are “not comfortable” or only “somewhat comfortable” *teaching* communicating in mathematics.
- 54% of the Grade 3 teachers are “not comfortable” or only “somewhat comfortable” *teaching* data management and probability.

Grade 3 teachers indicated discomfort with assessing reading, writing and most of mathematics.

- 25-32% of the Grade 3 teachers were "not comfortable" or only "somewhat comfortable" with *assessing* reading.
- 29-44% of the Grade 3 teachers were "not comfortable" or only "somewhat comfortable" with *assessing* writing.
- 25-45% of the Grade 3 teachers were "not comfortable" or only "somewhat comfortable" with *assessing* mathematics, except for number sense and numeration.

OTHER FINDINGS

Most Grade 3 teachers spend more than 40 minutes per day on each of reading, writing and mathematics-related activities.

- 86% spend more than 40 minutes per day on reading-related activities.
- 69% spend more than 40 minutes per day on writing-related activities.
- 75% spend more than 40 minutes per day on mathematics-related activities.

Some Grade 3 teachers spend less than 40 minutes per day on each of reading, writing and mathematics-related activities.

- 14% spend less than 40 minutes per day on reading-related activities.
- 31% spend less than 40 minutes per day on writing-related activities.
- 25% spend less than 40 minutes per day on mathematics-related activities.

Parents reported on their attitudes towards reading, writing and mathematics and their involvement in their child's school.

- 70% of the parents report that they read to their children at least once a week and about a quarter report doing so less than once a week.
- 52% of the parents report that they write at home less than once a week.
- Many parents report that they do not help their children in recognizing patterns, understanding how to measure things or working with shapes.
- 43% report that they are not very involved in their child's school.

WHAT EQAO LEARNED ABOUT STUDENT ATTITUDES AND BEHAVIOUR

POSITIVE FINDINGS

Many Grade 3 students in Ontario like reading, writing and mathematics and believe they are good at them.

- 75% of the Grade 3 students like reading, 65% like writing and 63% like mathematics.

About two-thirds of the Grade 3 students use the steps in the writing process when they write.

- 70% of the Grade 3 students plan before writing.
- 65% of the Grade 3 students work to improve their writing.
- 64% of the Grade 3 students read and correct their writing when they finish.

FINDINGS THAT CAUSE CONCERN

Less than half of the Grade 3 students use strategies that are often associated with being good at reading, writing and mathematics.

- Only 38% of the Grade 3 students said that they intentionally look for clues to help determine what the text is about.
- Only 41% of the Grade 3 students indicated that they think about what they have read after they have finished.
- Only 33% of the Grade 3 students reported liking to talk to people about what they read.
- Only 25% of the Grade 3 students talk about a topic before they write.
- Only 30% of the Grade 3 students use mathematics to solve problems outside school.

Only slightly more than half of the Grade 3 students think that they are good at reading (60%), writing (55%) and mathematics (51%).

OTHER FINDINGS

There are noticeable gender differences in attitudes toward reading, writing and mathematics.

- More girls (79%) than boys (64%) like reading.
- More girls (72%) than boys (59%) like writing.
- More boys (66%) than girls (62%) like mathematics.
- Girls (60%) are more likely than boys (55%) to say that they are good at reading and they do better in reading.
- Girls (56%) are more likely than boys (49%) to say that they are good at writing and they do better in writing.
- Boys (58%) are more likely than girls (46%) to say that they are good at mathematics, although girls do better in mathematics.

Girls and boys like reading and writing different kinds of materials and doing different kinds of mathematics activities.

- Reading
 - ▶ More girls (73%) than boys (62%) report that they like to read chapter books.
 - ▶ More boys (71%) than girls (46%) report that they like to read comic books.
 - ▶ More girls (58%) than boys (32%) report that they like to read poems.
 - ▶ More boys (27%) than girls (18%) report that they like to read newspapers.
 - ▶ More girls (58%) than boys (41%) report that they like to read stories written by other students.
- Writing
 - ▶ More girls (76%) than boys (55%) report that they like to write letters and cards.
 - ▶ More girls (70%) than boys (40%) report that they like to write journals and diaries.
 - ▶ More girls (69%) than boys (60%) report that they like to write stories.
 - ▶ More girls (48%) than boys (25%) report that they like to write poems.
- Mathematics
 - ▶ More boys (75%) than girls (57%) report that they like to build structures.
 - ▶ More girls (69%) than boys (55%) report that they like to make patterns.
 - ▶ More girls (59%) than boys (53%) report that they like to work with shapes.

SUGGESTED ACTIONS FOR PRIMARY AND JUNIOR PROGRAMS

In this section, EQAO identifies recommendations that principals, teachers, parents, students and school boards can act on almost immediately. These suggestions are based directly on the findings and can support discussion and planning in every school in the province, not only for the primary division teachers (K-3), but also for the junior division, especially Grade 4 teachers.

Recommendations for policy and research, which will take time to implement and require action by many different groups and organizations in the educational community in Ontario, are found in the final section of this report.

READING

- R1.** That teachers use regular and precise observation of individual students' reading skills to identify students who require intervention to be successful.
- R2.** That teachers use a variety of individual and group approaches to teach skills and to extend students' understanding of what they've read (e.g., recognizing main ideas and supporting detail, dramatizing the story, writing to express their understanding).
- R3.** That teachers frequently use a wide range of reading materials and text forms, in addition to stories (e.g., information articles, poetry, letters, plays).
- R4.** That teachers and parents pay attention to the kinds of material that girls and boys find interesting and use this knowledge to motivate and encourage both girls and boys to read.
- R5.** That primary teachers collaborate to create scoring scales for reading and work regularly in teams throughout the year to assess their students' work at various stages.
- R6.** That educators and school councils work to increase adult awareness of the value of reading daily to children, in any language, regardless of the child's ability to read independently.
- R7.** That parents talk about reading regularly with their children by discussing what they are reading, helping them understand it and encouraging them to read a wide range of materials in any language.
- R8.** That parents regularly listen to their children read.
- R9.** That teachers work together to develop ways (e.g., scoring scales and models) to describe good work in reading to help all their students become better self-assessors.
- R10.** That teachers become competent in the use of a range of assessment strategies for evaluating reading performance (e.g., oral reading, miscue analysis, cloze passages, retelling, predicting, inference).

WRITING

- W1.** That teachers use regular and precise observation of individual students' writing skills to identify students who require intervention to be successful.
- W2.** That teachers give students detailed feedback, both orally and in writing, about early stages and drafts of their writing and monitor improvements in subsequent efforts.
- W3.** That teachers give students instruction and practice in correcting and revising both the organization and the conventions of their own writing.
- W4.** That teachers keep dated and annotated samples of each student's writing and use them to show the student and the parent(s) the progress that has been made.
- W5.** That teachers and parents work together to engage students in enjoyable and useful writing activities such as lists and notes about everyday activities, poems, letters, neighbourhood newsletters, or classroom publications.
- W6.** That students do more writing and write frequently in a variety of forms (e.g., instructions, informational items, letters).
- W7.** That teachers work together to develop ways (e.g., scoring scales and models) to describe good work in writing to help all their students become better self-assessors.
- W8.** That teachers use scoring scales (descriptions of achievement levels) and anchor papers (examples of writing at each level) to assess student work and to improve assessment of student work and provide better feedback.

MATHEMATICS

- M1.** That teachers use regular and precise observation of individual students' mathematics skills to identify students who require intervention to be successful.
- M2.** That teachers distribute time that they spend on mathematics across all five strands so that all of the concepts and procedures are taught.
- M3.** That teachers use a range of activities (e.g., practical problem solving, drill) to extend students' understanding and application of number sense and numeration.
- M4.** That teachers regularly integrate activities that involve mathematics across all subject areas in the school.
- M5.** That teachers work together to develop ways (e.g., scoring scales and models) to describe good work in mathematics to help all their students become better self-assessors.
- M6.** That boards provide specific staff development programs for primary teachers in the areas where they indicate discomfort or where the children's results are clustered in Levels 1 and 2.

- M7. That schools have mathematics fairs that involve parents and/or initiate family mathematics programs (in which parents and children work together on mathematical concepts).
- M8. That teachers communicate with parents, describing home-based and out of school activities they can do with the children to develop mathematical skills in number sense, measurement, patterning, geometry, graphs and probability.
- M9. That teachers and parents work together to engage students in enjoyable and useful mathematics activities (e.g., mathematical journal writing and mathematics field trips) and using mathematics in the home (e.g., measuring for new carpets, working with recipes) and asking children to explain their thinking.

GRADE 6 MATHEMATICS

- Administered May 1997
- 470 Grade 6 mathematics teachers in 78 boards
- Complex assessment tasks completed over 8 class periods
- A sample of 200 publicly funded, schools
- 9,700 Grade 6 students
- Scoring conducted both analytically and holistically and expressed at 4 levels of performance
- Based on the outcomes and standards in the provincial curriculum
- Report released in fall 1997

The 1996-97 Grade 6 Provincial Mathematics Assessment was administered to a sample of schools to provide information on provincial achievement in mathematics at the end of the junior division. It was designed to challenge students across the five strands of mathematics (Number Sense and Numeration, Geometry and Spatial Sense, Measurement, Patterning and Algebra, and Data Management and Probability). The assessment was designed to assess student achievement of the outcomes in the provincial curriculum documents that were in use at the time of the assessment. Student work was scored on a 4-level scale that was linked to the provincial standards. According to those standards, students were expected to perform at Levels 2 and 3. Student work in each of the strands was scored holistically along a continuum of 4 levels of achievement and analytically to probe further into the concepts and procedures for strengths and weaknesses. Holistic scoring was used to produce data on student achievement according to levels and analytic scoring was used to produce data on percentages of students able to complete specific items within the various strands. In addition to the performance tasks, the Grade 6 students completed a set of items drawn from the mathematics instruments that were used in the 1988-89 Provincial Review. Questionnaires were completed by the principals, teachers, students and parents/guardians of the students.

The data in this section are compiled from the results of student performance on the assessment and responses to the questionnaires from the randomly sampled schools.

Exempted students included those students who were unable to respond to the assessment instruments in any way or students who, in the opinion of the principal, in consultation with the teacher and parent(s)/guardian(s), would be adversely affected by participating. No achievement data resulted from students who submitted insufficient information, incomplete work or illegible work.

WHAT EQAO LEARNED ABOUT SCHOOLS AND STUDENTS

Exemptions and Accommodations:

- 4% of students FULLY exempt in mathematics
- 13% of students with permitted accommodation(s) for the testing

Note: List of permitted accommodations provided in the appendix

- /// 68% of Grade 6 mathematics classes have 21-30 students in them.
- /// 22% of Grade 6 mathematics classes have between 31 and 35 students in them.
- /// 44% of the Grade 6 mathematics classes are split- or multi-grade classrooms.
- /// 49% of the Grade 6 students who participated in the assessment were girls and 51% were boys.
- /// 77% of students indicated that they speak mostly English in the home, 7% indicated "mostly in another language" and 14% said "as often in English as in another language." (2% of the students did not complete the question.)
- /// 9% of the students were identified by their teacher as participants in English as a Second Language (ESL) or English Skills Development (ESD) programs.
- /// 15% of the students had been formally identified as exceptional and were receiving special educational support.
- /// 7% of the students had not been formally identified but were receiving special educational support.
- /// 86% of the Grade 6 students had attended nursery school or kindergarten before Grade 1.

WHAT EQAO LEARNED ABOUT STUDENT ACHIEVEMENT IN MATHEMATICS: STRANDS

(Refer to chart on page 33 for overall achievement results.)

POSITIVE FINDINGS

Many of the Grade 6 students used at least some of the required concepts and showed the ability to apply some of the procedures in simple tasks in three of the strands (Level 2 and above).

- 64% showed evidence of achievement at Level 2 or above in number sense and numeration (e.g., addition, subtraction, multiplication and division of whole numbers, decimals, fractions).
- 63% showed evidence of achievement at Level 2 or above in measurement (e.g., estimating, measuring and recording using standard and non-standard units).
- 65% showed evidence of achievement at Level 2 or above in patterning and algebra (e.g., identifying, extending and creating patterns with shapes, numbers, leading to an understanding of algebra).

Most Grade 6 students were able to do a number of specific mathematics tasks accurately.

- Number Sense and Numeration:
 - 78% demonstrated basic understanding of the meaning of numbers.
 - 81% performed mathematical operations that involved computation with whole numbers.
 - 70% could perform mathematical operations that involved fractions.
- Patterning and Algebra:
 - 90% could complete a patterning activity.
 - 86% could identify and describe patterns in objects and places in the world around them.
- Measurement:
 - 76% could measure and estimate length accurately.
 - 66% could find the area of a rectangle.
- Geometry and Spatial Sense:
 - 73% could recognize two-dimensional geometric shapes.
 - 78% could recognize three-dimensional geometric shapes.
- Data Management and Probability:
 - 82% could interpret data in simple graph form.

There is a group of Grade 6 students who do very well in every strand of mathematics.

- About 20% showed evidence of achievement at Level 3 or above in all five strands.

FINDINGS THAT CAUSE CONCERN

Approximately three-quarters of the Grade 6 students did not use required concepts and procedures to complete tasks of some complexity with accuracy in each of the strands (Level 3 and above).

- 73%¹ did not show evidence of Level 3 and above in number sense concepts and procedures.
- 81%¹ did not show evidence of Level 3 and above in geometry and spatial sense concepts and procedures.
- 76%¹ did not show evidence of Level 3 and above in measurement concepts and procedures.
- 73%¹ did not show evidence of Level 3 and above in patterning and algebra concepts and procedures.
- 81%¹ did not show evidence of Level 3 and above in data management and probability concepts and procedures.

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

About one-third of the students showed use of only basic concepts and procedures in some simple tasks in all strands of mathematics (Level 1).

- 28% showed only Level 1 or some evidence of Level 1 in number sense and numeration.
- 36% showed only Level 1 or some evidence of Level 1 in geometry and spatial sense.
- 30% showed only Level 1 or some evidence of Level 1 in measurement.
- 28% showed only Level 1 or some evidence of Level 1 in patterning and algebra.
- 35% showed only Level 1 or some evidence of Level 1 in data management and probability.

Mathematics Strands: Percentage of Grade 6 Students at Each Level

Performance Levels ¹						
Strands (areas of study)	Exempt	No Data	1	2	3	4
Number Sense and Numeration (e.g., operations with whole numbers, decimals and fractions)	4%	4%	28%	37%	21%	6%
Geometry and Spatial Sense (e.g., 2-D and 3-D figures, knowledge of motion geometry and coordinate systems)	4%	4%	36%	37%	16%	3%
Measurement (e.g., estimating, measuring, calculating and recording using standard units)	4%	3%	30%	39%	20%	4%
Patterning and Algebra (e.g., investigating and explaining the relationship among patterns; identifying formulas as generalizations)	4%	3%	28%	38%	21%	6%
Data Management and Probability (e.g., using a variety of technologies and methods to analyze, interpret and display data; investigating probability)	4%	4%	35%	38%	16%	3%

¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

Many Grade 6 students were unable to do a number of specific mathematical tasks accurately.

- Number Sense and Numeration:
 - 49% were unable to demonstrate their understanding of numeration when given an authentic problem that involved a student attempting to save \$154.00 over a three-week period and 4 possible ways of generating the necessary cash.
 - 32% of students were unable to perform operations involving decimals such as “ $66.6 \div 100 = \underline{\hspace{1cm}}$.”
 - 73% were unable to convert a fraction to a percent of floor space.
 - 79% of those who could convert a fraction to a percent of floor space were unable to explain why being able to change a fraction to a percent helped them complete the task.
- Patterning and Algebra:
 - 68% were unable to extend a simple pattern and perform an estimation such as “estimate the number of pieces of wood that are needed to make a ladder with one thousand rungs.”
 - 91% were unable to extend a more complex pattern to estimate the number of trees that will be planted in the 20th year of a staged planting process.
- Measurement:
 - 55% were unable to convert centimetres to millimetres.
 - 54% were unable to estimate distances on a park map and convert them to kilometres using a scale (students were allowed to use calculators).
- Geometry and Spatial Sense:
 - 53% were unable to name and measure five different angles using a protractor. The angles included acute angles, a right angle, a straight angle and an obtuse angle.
 - 87% were unable to identify and use mathematical language to explain symmetry found in nature or a game or a sport.
 - 64% were unable to create patterns using flips, slides and turns in motion geometry.
- Data Management and Probability:
 - 54% were unable to read and interpret information from a scatter graph and describe the relationship depicted on the graph.
 - 83% were unable to create accurately a graph using twelve pieces of information.
 - 51% were unable to respond with any accuracy to questions involving probability such as “What is the probability of you getting one or two of the activities you liked best?”

WHAT EQAO LEARNED ABOUT STUDENT ACHIEVEMENT IN MATHEMATICS: INDICATORS

(Refer to chart on page 37 for corresponding information.)

The students' work was scored by applying three indicators across the five strands: understanding mathematical concepts, applying mathematical procedures and communicating in mathematics. Each indicator was scored holistically.

Understanding mathematical concepts includes: knowledge of ideas and relationships (e.g., symmetry), principles (e.g., counting and grouping), procedures (e.g., problem solving strategies) and tools (e.g., manipulatives, technology.)

Applying mathematical procedures includes: selection and use of appropriate operations and strategies and problem solving processes, including judging and justifying the reasonableness of solutions.

Communicating in Mathematics includes: using appropriate mathematical language and conventions to express representations in concrete, pictorial, verbal, symbolic and graphic forms. Special attention was paid to each day's mathematics journal entry.

POSITIVE FINDINGS

About two-thirds of the Grade 6 students showed an understanding of at least some mathematical concepts, applied some procedures in simple tasks and used simple mathematical language to communicate basic concepts and procedures (Level 2 and above).

- 68% showed evidence of Level 2 and above in understanding mathematical concepts.
- 64% showed evidence of Level 2 and above in applying some procedures.
- 58% showed evidence of Level 2 and above in communicating in mathematics.

FINDINGS THAT CAUSE CONCERN

Approximately three-quarters of the Grade 6 students did not show an understanding of required mathematical concepts, did not apply procedures regularly or did not use mathematical language to communicate a variety of concepts and procedures (Level 3 and above).

- 75%¹ did not show evidence of Level 3 and above in understanding mathematical concepts.
- 79%¹ did not show evidence of Level 3 and above in applying some procedures.
- 81%¹ did not show evidence of Level 3 and above in communicating in mathematics.

¹ Includes students who were exempted and students for whom no level was assigned due to insufficient information.

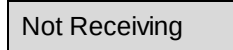
OTHER FINDINGS

There are differences in mathematics results for sub-groups in the Grade 6 population.

- 6% more girls than boys scored at Levels 2,3 and 4 in mathematics.
- 4% more girls than boys scored at Levels 3 and 4 in mathematics.
- 28% more non-ESL students than ESL/ESD students scored at Levels 2,3 and 4 in mathematics.
- 12% more non-ESL students than ESL/ESD students scored at Levels 3 and 4 in mathematics.
- 37% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 2,3 and 4 in mathematics.
- 20% more students who were not receiving special education support than students who were receiving special education support (excluding gifted) scored at Levels 3 and 4 in mathematics.

Mathematics Indicators: Percentage of Grade 6 Students at Each Level

Performance Levels ¹						
Performance Indicators	Exempt	No Data	1	2	3	4
Understanding mathematical concepts (e.g., knowledge of ideas, procedures and tools)	4%	2%	26%	43%	21%	4%
Applying procedures (e.g., selecting and using appropriate problem-solving processes)	4%	2%	30%	43%	18%	3%
Communicating in mathematics (e.g., using mathematical language to convey and explain answers in pictures, words and symbols)	4%	2%	36%	39%	16%	3%
Overall (based on median student scores)	4%	2%	30%	43%	18%	3%

	Overall Mathematics	Gender ²	ESL/ESD ³	Receiving Special Education Support ⁴ (excluding Gifted)
	0% 100%	0% 100%	0% 100%	0% 100%
Evidence of Level 2 and above	 64%	Girls  68% Boys  62%	Non-ESL/ESD  66% ESL/ESD:  38%	Not Receiving  70% Receiving:  33%
Evidence of Level 3 and above	 21%	Girls  24% Boys  20%	Non-ESL/ESD:  22% ESL/ESD:  10%	Not Receiving:  25% Receiving:  5%

¹ Each performance level includes all student work that demonstrated evidence of performance at the level.

² Gender differences may not be precise because not all students checked off gender on the questionnaire.

³ 9% of the population were identified as English as Second Language/English Skills Development.

⁴ 22% of the population were receiving special education support.

WHAT EQAO LEARNED ABOUT STUDENT ACHIEVEMENT IN MATHEMATICS IN COMPARISON WITH ACHIEVEMENT IN 1989

The Grade 6 students completed a set of items drawn from the mathematics instruments that were used in the 1988-89 Provincial Review. The 1988-89 mathematics assessment generated student achievement scores in geometry, number sense and numeration, and problem solving.

FINDINGS THAT CAUSE CONCERN

Grade 6 student achievement in 1997 remained the same as in 1989 in problem solving and geometry, and lower than in 1989 in number sense and numeration, and measurement.

- In 1997, students answered 40% of the problem solving questions correctly; in 1989, they answered 40% correctly.
- In 1997, students answered 69% of the geometry questions correctly; in 1989, they answered 68% correctly.
- In 1997, students answered 73% of the number sense and numeration questions correctly; in 1989, students answered 79% correctly.
- In 1997, students answered 65% of the measurement questions correctly; in 1989, they answered 70% correctly.

WHAT EQAO LEARNED ABOUT THE LEARNING CONTEXT

POSITIVE FINDINGS

There is assessment support for teachers in most of the schools and school boards in the province.

- 75% of the principals indicated that their board had a board-wide assessment plan.
- 79% of the principals indicated that board assessment resource staff were available to assist teachers.
- 91% of the principals indicated that the provincial standards document for mathematics was available in the school to assist teachers in assessing students.
- 92% of the principals indicated that classroom resources were available for assessing mathematics.
- 61% of the principals indicated that their school had a school-wide assessment plan/policy.

Grade 6 teachers are experienced and have engaged in professional development activities.

- The average number of years of teaching for participating Grade 6 teachers was 16 years of experience overall with an average of 10 years of experience in the junior division.
- 75% of the teachers have attended professional development in mathematics assessment and evaluation through seminars, workshops and conferences.

Parents of Grade 6 students enjoy mathematics and are supportive of the school mathematics program.

- 88% of parents indicated that they enjoyed doing mathematics and solving mathematics problems.
- 73% of parents indicated that “considering my child’s age, he/she is good in mathematics.”
- 70% of parents help their child to understand number questions at least a few times or more each month.

FINDINGS THAT CAUSE CONCERN

Very few Grade 6 teachers have received formal training in teaching or assessing mathematics.

- Only 9% have university courses in mathematics instruction.
- Only 7% have graduate courses in assessing or evaluating mathematics.
- Less than 1% have a specialist Additional Qualifications certificate in mathematics.

Many Grade 6 teachers expressed discomfort *teaching* various strands or indicators in mathematics.

- 54% were only “somewhat comfortable” or “not comfortable” teaching data management and probability.
- 38% were only “somewhat comfortable” or “not comfortable” teaching communication in mathematics.

Grade 6 teachers expressed discomfort in *assessing* various strands or indicators in mathematics.

- 56% were only “somewhat comfortable” or “not comfortable” in assessing data management and probability.
- 39% were only “somewhat comfortable” or “not comfortable” in assessing patterning and algebra.

Parents tend to limit their support of learning mathematics to school work.

- Only 45% of parents regularly encourage their child to do mathematics that is not part of his or her work for school.

OTHER FINDINGS

Many Grade 6 teachers spend more than 40 minutes a day on mathematics-related activities.

- 69% indicated that they spend over 40 minutes a day on mathematics-related activities.

Some Grade 6 teachers spend less than 40 minutes a day on mathematics-related activities.

- 31% indicated that they spend less than 40 minutes a day on mathematics-related activities.

WHAT EQAO LEARNED ABOUT STUDENT ATTITUDES AND BEHAVIOUR

FINDINGS THAT CAUSE CONCERN

Fewer than half of the students indicated they liked mathematics or felt they were good at the subject.

- 46% indicated liking mathematics.
- Only 39% thought they were good at mathematics.

OTHER FINDINGS

More boys than girls indicated liking mathematics and said they were good at it, even though girls out-performed boys on all strands and indicators of mathematics.

- Only 43% of girls and 49% of boys indicated liking mathematics.
- Only 35% of girls and 43% of boys thought they were good at mathematics.

SUGGESTED ACTIONS FOR JUNIOR AND INTERMEDIATE PROGRAMS

These recommendations can be implemented almost immediately by principals, teachers, parents, students and school boards in Ontario. They are based directly on the findings from the Grade 6 mathematics assessment and can support discussion and planning in every junior and intermediate division in the province.

Recommendations for policy and research, which will take time to implement and require action by many different groups and organizations in the educational community in Ontario, are found in the final section of this report.

Mathematics

1. That teachers have students work on real-life applications and complex tasks to extend their knowledge of mathematics and problem solving.
2. That teachers model and emphasize all aspects of problem solving, including formulating and posing problems, solving problems, using different strategies, verifying and interpreting results, generalizing solutions and communicating all aspects of the process.
3. That teachers increase the emphasis on mathematical operations as they pertain to decimals, percent and ratio.
4. That teachers encourage students to use and provide opportunities to practise using a variety of methods or strategies, such as mental mathematics, estimation, technology and modelling.
5. That teachers encourage the use of a variety of tools, such as calculators, computers and other technological devices, and encourage students to select the means they find most useful for working on or discussing a particular mathematical activity.
6. That teachers model and emphasize journal writing in mathematics to improve communication skills in mathematics.
7. That teachers and parents encourage and assist students to engage in regular activities that involve mathematics, especially outside regular school work.
8. That school boards provide specific staff development programs for junior teachers in the areas of the curriculum where they indicate discomfort – particularly teaching and assessing data management and probability and mathematical communication.
9. That teachers provide parents with information on home-based mathematical activities that they can do with their children.
10. That teachers and administrators take every opportunity to increase adult awareness of the nature of mathematics programs and of the problem solving process.
11. That teachers and parents work together to engage students in enjoyable and useful mathematics activities (e.g., mathematical journal writing and mathematics field trips) and using mathematics in the home (e.g., measuring for new carpets, working with recipes) and asking children to explain their thinking.

SAIP

School Achievement Indicators Program (SAIP) – Science: Written and practical task components for 13-year-olds and 16-year-olds

- Administered in 1996
- Random provincial sample of approximately 7,700 students (4,000 English, 3,700 French) in 380 schools (200 English, 180 French)
- Performance described across five levels representing a continuum of science literacy over the entire elementary and secondary school curriculum
- Assessment consistent with science programs across Canada
- Focus on knowledge and concepts of science, nature of science, relationship of science to technology and societal issues and science inquiry skills
- Report released in January 1997

The SAIP Science assessment, initiated by the Council of Ministers of Education, Canada, is part of an ongoing national program to assess the achievement of 13- and 16-year-old students in mathematics, reading and writing, and science. It was designed to provide information about student achievement at the national and provincial/territorial levels.

WHAT EQAO LEARNED ABOUT SCIENCE ACHIEVEMENT

(Refer to the charts on the following pages for overall science results.)

POSITIVE FINDINGS

13-year-olds (Expected level of performance: Level 2)

- On the written component, two-thirds (67%) of the English students in Ontario performed at Level 2 or higher.
- On the practical component, 91% of the Ontario English students performed at Level 2 or higher.
- Girls performed as well as boys on the practical component of the test.

16-year-olds (Expected level of performance: Level 3)

- On the written component, almost two-thirds (65%) of Ontario English students performed at Level 3 or higher.
- On the practical component, two-thirds (68%) of Ontario English students performed at Level 3 or higher.
- Girls performed as well as boys on the practical component of the test.

FINDINGS THAT CAUSE CONCERN

Ontario's 13- and 16-year-old English-language students performed slightly less well than Canadian students as a whole on the written component of the test.

Ontario's francophone 13- and 16-year-olds performed significantly lower than Canadian students as a whole on both the written and practical task components.

PROVINCES/TERRITORIES COMPARED WITH CANADA OVERALL

WRITTEN COMPONENT:

Proportion of 13-year-olds attaining Level 2 and above

Proportion of 16-year-olds attaining Level 3 and above

Jurisdictions Scoring Higher Than Canada	Jurisdictions Scoring The Same As Canada	Jurisdictions Scoring Lower Than Canada
Age 13:		
73.4%-85.2%	71.1%-72.7%	35.6%-70.2%
Alberta Saskatchewan Prince Edward Island Nova Scotia (French)	British Columbia Manitoba (English) Quebec (English) Quebec (French) New Brunswick (English) Nova Scotia (English) Newfoundland Yukon	Manitoba (French) Ontario (English - 67%) Ontario (French) New Brunswick (French) Northwest Territories
Age 16:		
70.8%-81.0%	68.2%-69.8%	37.3%-67.9%
Alberta Nova Scotia (French) Quebec (French)	British Columbia Saskatchewan Manitoba (English) Manitoba (French) Quebec (English) New Brunswick (English) Nova Scotia (English) Prince Edward Island Yukon	Ontario (English - 65%) Ontario (French) New Brunswick (French) Newfoundland Northwest Territories

Notes:

In designing the assessment, the developers expected that most 13-year-old students should be able to attain at least level 2, and that most 16-year-old students should be able to attain at least level 3. The charts indicate how the results of the provinces and territories compare with Canada at these two key performance levels.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

Definition of “Confidence Interval”

Just like in a poll, the percentages were calculated from the results of random samples of students, and therefore are only estimates of the actual achievement students would have demonstrated had all of a jurisdiction's students at a given age/grade taken the test. Because an estimate is rarely exact, it is common practice to provide a range of percentages within which the actual achievement results might fall. This range of percentages is called a “confidence interval” and represents the high- and low-end points between which the actual achievement results should fall 95% of the time (or 19 times out of 20).

PROVINCES/TERRITORIES COMPARED WITH CANADA OVERALL

PRACTICAL TASK COMPONENT:

Proportion of 13-year-olds attaining Level 2 and above

Proportion of 16-year-olds attaining Level 3 and above

Jurisdictions Scoring Higher Than Canada	Jurisdictions Scoring The Same As Canada	Jurisdictions Scoring Lower Than Canada
Age 13:		
95.0%	92.1%-93.5%	82.1%-90.4%
Nova Scotia (French)	Saskatchewan Ontario (English – 91%) Nova Scotia (English)	Ontario (French) New Brunswick (French)
Age 16:		
	63.4%-65.8%	47.1%-57.1%
	Saskatchewan Ontario (English – 68%) Nova Scotia (English)	Nova Scotia (French) Ontario (French) New Brunswick (French)

Notes:

All provinces/territories contributed to a national sample for the practical task component. Only four provinces sampled sufficient numbers of students to obtain provincial data.

Although for age 16, some provinces' percentage scores are higher than Canada's, they are essentially the same when sampling error/statistical significance is accounted for. This explains why there are no provinces/territories listed as being higher than Canada for 16-year-old students.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

WHAT EQAO LEARNED ABOUT ATTITUDES AND BEHAVIOUR

POSITIVE FINDINGS

Most 13- and 16-year-olds like science, feel confident in it and believe hard work is necessary to do well in science.

- 77% of 13-year-olds and 74% of 16-year-olds in Canada like science.
- 93% of 13-year-olds and 87% of 16-year-olds in Canada feel confident about their abilities in science.
- 87% of 13-year-olds and 90% of 16-year-olds in Canada think that hard work and studying is necessary to do well in science.

OTHER FINDINGS

Many students report that doing well in science is related to ability, memorization and luck.

- 55% of 13-year-olds and 61% of 16-year-olds believe you need lots of natural ability to do well in science.
- 46% of 13-year-olds and 50% of 16-year-olds believe you need to memorize textbooks and notes to do well in science.
- 19% of 13-year-olds and 16% of 16-year-olds believe you need good luck to do well in science.

19% of 13-year-olds and 26% of 16-year-olds in Canada are considering a career in science.

WHAT EQAO LEARNED ABOUT THE LEARNING CONTEXT

POSITIVE FINDINGS

There are many science resources available to students.

- 68% of 13-year-olds and 68% of 16-year-olds report that they have access to science books in the school library.
- 85% of 13-year-olds and 90% of 16-year-olds report that they have access to science books in the municipal library.
- 75% of 13-year-olds and 83% of 16-year-olds report that they have access to computers.

FINDINGS THAT CAUSE CONCERN

There are some science resources that are seldom used.

- 67% of 13-year-olds and 54% of 16-year-olds report they do not have access to the Internet.
- 70% of 13-year-olds and 60% of 16-year-olds report they have not participated in a science field trip this past year.
- 70% of 13-year-olds and 54% of 16-year-olds report they have not participated in a science fair this past year.

OTHER FINDINGS

Science teachers use a range of learning activities.

Student report of learning activities:	13-year-olds who indicate 3 or more times a week	16-year-olds who indicate 3 or more times a week
• I copy notes from the board.	54%	67%
• I work on my own from worksheets or textbooks.	50%	53%
• I work in pairs or in small groups.	45%	44%
• Teacher shows how to do science problems.	37%	56%
• Teacher gives demonstrations of experiments.	33%	26%
• I participate in science projects.	31%	22%
• I use things from everyday life in solving science problems.	25%	19%
• I do practical investigations.	16%	11%

“Suggested Actions for Junior and Intermediate Programs” that emerge from the SAIP results are included at the end of the TIMSS summary.

TIMSS

- Administered in 1995
- Multi-matrix assessments containing multiple-choice items and free-response items presented in 8 booklets. Each student completed one booklet
- A sample of approximately 8,500 students (5,000 English and 3,500 French) in Grades 3 and 4, from 214 randomly selected Ontario schools (120 English and 94 French)
- A sample of approximately 8,400 students (5,400 English and 3,000 French) in Grades 7 and 8, from 200 randomly selected Ontario schools (120 English and 80 French)
- Scores expressed as the percent of items answered correctly
- Developed cooperatively by all of the countries involved
- Report for Grades 3 and 4 released in June 1997; for Grades 7 and 8, in November 1996
- Grades 4 and 8 students from approximately 33 Ontario English-language schools (1,188 students) and 26 French-language schools (858 students) participated in the performance/practical assessment; report released in September 1997

Third International Mathematics and Science Study (TIMSS)

Written Component: Grades 3 and 4 students and Grades 7 and 8 students

Performance/Practical Component: Grade 4 and Grade 8 students

TIMSS was the largest and most ambitious international study of mathematics and science performance ever. It was conducted by the International Association for the Evaluation of Educational Achievement (IEA) and was designed to provide information about student achievement at the national level and at the provincial level (if provinces chose to involve a large enough sample to report provincially) to allow international comparisons of achievement, teaching methods and curriculum.

WHAT EQAO LEARNED ABOUT SCHOOLS AND STUDENTS

- Of all the provinces, Ontario had the highest proportion of Grades 3 and 4 students who were born outside Canada (11%) and who reported that they speak neither English nor French at home (21%).
- There are not many science specialists in Grade 8 classes. Only 25% of the teachers involved taught mainly science.
- The majority of Grade 8 mathematics teachers (62%) and science teachers (63%) are male.

WHAT EQAO LEARNED ABOUT SCIENCE ACHIEVEMENT: WRITTEN COMPONENT (Grades 3/4 and 7/8)

(Refer to the charts on the following pages for overall science results.)

POSITIVE FINDINGS

Ontario Grades 3 and 4 students scored higher than the international average in Environmental Issues and the Nature of Science. Ontario Grade 4 students also scored higher than the international average in Earth Science and Life Science.

Ontario Grades 7 and 8 students scored higher than the international average in Environmental Issues and the Nature of Science and Physics. Ontario Grade 7 students also scored higher than the international average in Life Science.

There were no science content areas in which Ontario Grade 7 students scored lower than the international average.

There were no science content areas in which Ontario Grades 3 and 4 students scored below the international average.

FINDINGS THAT CAUSE CONCERN

Ontario Grades 3 and 4 students scored at about the international and the Canadian averages.

Ontario Grades 3 and 4 students scored lower than those in Alberta and about the same as those in the other participating provinces: Newfoundland, New Brunswick (English) and British Columbia.

Ontario Grade 7 students scored the same as, and Grade 8 students scored lower than, Canada as a whole.

Ontario Grade 7 students scored lower than those in Alberta, and Grade 8 students scored lower than those in both Alberta and British Columbia.

Ontario Grade 8 students performed at about the international average, but below it in some specific areas (e.g., Earth Science and Chemistry).

Ontario francophone Grades 3 and 4 and Grades 7 and 8 students scored below the results for Ontario anglophone students and for Canada overall.

OTHER FINDINGS

There were no significant differences between the achievement of boys and girls.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 3 Science (Percent Correct)

International Average:	50%
Canadian Average:	53%
Ontario Average:	51%
Ontario (English):	51%
Ontario (French):	43%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
52.5%-68.0%	49.6%-52.4%	28.6%-49.5%
Korea Japan Alberta United States British Columbia Czech Republic England Australia* Austria* Netherlands*	Canada Newfoundland Ontario (English) New Brunswick (English) Singapore Hong Kong Ireland New Zealand Latvia* Scotland* Slovenia* Hungary*	Norway Greece Ontario (French) Iceland Portugal Cyprus Iran Thailand*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 4 Science (Percent Correct)

International Average:	59%
Canadian Average:	64%
Ontario Average:	62%
Ontario (English):	62%
Ontario (French):	52%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
63.4%-74.8%	60.5-63.3%	38.0-60.4%
Korea Japan Alberta United States Czech Republic Australia* Austria* Netherlands*	Singapore British Columbia Canada Newfoundland Ontario (English) New Brunswick (English) England Hong Kong Ireland Norway New Zealand Scotland Slovenia* Hungary*	Iceland Greece Ontario (French) Cyprus Portugal Iran Latvia* Israel* Kuwait* Thailand*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 7 Science (Percent Correct)

International Average:	50%
Canadian Average:	54%
Ontario Average:	52%
Ontario (English):	52%
Ontario (French):	45%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
53.6%-61.0%	50.7%-53.5%	35.0%-49.0%
Singapore Korea Japan Alberta Czech Republic Slovenia* Belgium* (Flemish) England* Hungary Bulgaria* Netherlands* Austria* Australia*	Slovak Republic United States* Canada Newfoundland Hong Kong British Columbia Germany* Thailand* Ireland Ontario (English) Sweden New Brunswick (English) New Zealand Norway Switzerland* Russian Federation	Spain Scotland* Iceland France Ontario (French) Belgium (French)* Romania* Greece* Denmark* Iran Latvia* Portugal Cyprus Lithuania* Mexico Colombia*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 8 Science (Percent Correct)

International Average:	56%
Canadian Average:	59%
Ontario Average:	56%
Ontario (English):	56%
Ontario (French):	49%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
57.0%-70.0%	54.1%-56.9%	27.0%-52.0%
Singapore Korea Japan Alberta Czech Republic Netherlands* British Columbia Bulgaria* Slovenia* Austria* England* Hungary Belgium (Flemish) Australia* Slovak Republic Sweden Canada	Newfoundland Ireland United States* Russian Federation Germany* New Zealand Norway Hong Kong Thailand* New Brunswick (English) Israel* Switzerland Ontario (English) Spain Scotland* France	Iceland Greece* Denmark* Belgium (French)* Latvia Portugal Romania* Ontario (French) Lithuania Iran Cyprus Kuwait* Colombia* South Africa*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

WHAT EQAO LEARNED ABOUT MATHEMATICS ACHIEVEMENT: WRITTEN COMPONENT (Grades 3/4 and 7/8)

(Refer to the charts on the following pages for overall mathematics results.)

POSITIVE FINDINGS

Ontario Grades 3 and 4 students scored higher than the international average in Geometry.

Ontario Grades 7 and 8 students scored higher than the international average in Data Representation, Analysis and Probability.

FINDINGS THAT CAUSE CONCERN

Ontario Grade 4 students scored at about, and Ontario Grade 3 students scored below, the Canadian and international averages.

Ontario Grades 3 and 4 students scored below the international average in Whole Numbers, Fractions and Proportionality, Measurement, Estimation and Number Sense. Ontario Grade 3 students were also below the international average in Data Representation, Analysis and Probability, and Patterns, Relations and Functions.

Ontario Grades 7 and 8 students scored at about the international average and lower than Canada as a whole.

Ontario Grades 7 and 8 students scored below the international average in Geometry, Algebra, and Measurement.

OTHER FINDINGS

There was no statistically significant difference between the results of Ontario francophone and anglophone students at Grades 3, 7 and 8.

There were no significant differences between the achievement of boys and girls.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 3 Mathematics (Percent Correct)

International Average:	47%
Canadian Average:	47%
Ontario Average:	42%
Ontario (English):	42%
Ontario (French):	41%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
43.4%-68.0%	40.5%-43.3%	25.8%-40.4%
Korea Japan Singapore Hong Kong Czech Republic Alberta United States Ireland New Brunswick Canada England Australia* Austria* Latvia* Netherlands* Scotland* Slovenia* Hungary*	Newfoundland British Columbia Ontario (English) Ontario (French) New Zealand Thailand*	Cyprus Portugal Greece Norway Iceland Iran

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 4 Mathematics (Percent Correct)

International Average:	59%
Canadian Average:	60%
Ontario Average:	57%
Ontario (English):	57%
Ontario (French):	54%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
58.8%-77.6%	55.5%-58.7%	31.0%-55.4%
Korea Singapore Japan Hong Kong Czech Republic Alberta Ireland United States Australia* Austria* Netherlands* Slovenia* Hungary*	Canada Newfoundland New Brunswick (English) Ontario (English) British Columbia Scotland England Latvia* Israel*	Ontario (French) Cyprus Norway New Zealand Greece Thailand* Iceland Portugal Iran Kuwait*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 7 Mathematics (Percent Correct)

International Average:	49%
Canadian Average:	52%
Ontario Average:	48%
Ontario (English):	48%
Ontario (French):	47%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
49.9%-73.0%	46.6%-49.8%	26.0%-44.0%
Singapore Japan Korea Hong Kong Belgium (Flemish)* Czech Republic Austria* Bulgaria* Netherlands* Belgium (French)* Alberta Slovak Republic Hungary Ireland Slovenia* Switzerland* Russian Federation Canada Australia*	Thailand* France Germany* United States* Ontario (English) British Columbia New Brunswick (English) Newfoundland England* Sweden Ontario (French) New Zealand	Denmark* Scotland* Norway Latvia* Iceland Romania* Spain Cyprus Greece* Lithuania* Portugal Iran Mexico Colombia*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

PROVINCES AND COUNTRIES COMPARED WITH ONTARIO OVERALL

WRITTEN COMPONENT:

Grade 8 Mathematics (Percent Correct)

International Average:	55%
Canadian Average:	59%
Ontario Average:	54%
Ontario (English):	54%
Ontario (French):	54%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
55.2%-79.0%	52.7%-55.1%	24.0%-51.0%
Singapore Japan Korea Hong Kong Belgium (Flemish)* Czech Republic British Columbia Slovak Republic Switzerland Austria* Hungary France Slovenia* Alberta Russian Federation Netherlands* Bulgaria* Canada Ireland Ireland Belgium (French)* Australia*	Thailand* Israel* Newfoundland Sweden Ontario (English) Ontario (French) New Brunswick (English) Germany* New Zealand Norway England* United States* Denmark* Scotland*	Latvia Spain Iceland Greece* Romania* Lithuania Cyprus Portugal Iran Kuwait* Colombia* South Africa*

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

WHAT EQAO LEARNED ABOUT ACHIEVEMENT IN PERFORMANCE/PRACTICAL TASKS (Grades 4 and 8)

(Refer to the charts on the following pages for overall performance/practical assessment results.)

POSITIVE FINDINGS

Ontario Grades 4 and 8 students performed at about the Canadian and international averages over all tasks.

Ontario Grades 4 and 8 students performed relatively well on procedural tasks involving measurement, the use of mathematics and science materials and equipment, and routine problem solving.

FINDINGS THAT CAUSE CONCERN

Ontario Grades 4 and 8 students, like those of many other countries, appeared to be relatively weak in their written communication skills in mathematics and science; they had difficulty providing descriptions of procedures and trends, explaining findings and articulating general rules for summarizing results.

OTHER FINDINGS

Although the overall percent correct for Ontario anglophone Grade 4 and Grade 8 students was slightly higher than that of francophone students, there was no difference when standard error of measurement and confidence intervals were considered.

Overall, there were no significant gender differences.

COUNTRIES COMPARED WITH ONTARIO OVERALL

PERFORMANCE ASSESSMENT COMPONENT:

Grade 4 (Percent Correct)

International Average: 40%
 Canadian Average: 45%
 Ontario Average: 42%
 Ontario (English): 42%
 Ontario (French): 39%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
	38.8% - 45.2%	27.2% - 38.7%
	Canada Ontario (English) Ontario (French) New Zealand Iran Slovenia* Australia* Hong Kong* United States*	Cyprus Portugal

Notes:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

COUNTRIES COMPARED WITH ONTARIO OVERALLPERFORMANCE ASSESSMENT COMPONENT:
Grade 8 (Percent Correct)

International Average: 59%
 Canadian Average: 60%
 Ontario Average: 60%
 Ontario (English): 60%
 Ontario (French): 58%

Jurisdictions Scoring Higher Than Ontario	Jurisdictions Scoring The Same As Ontario	Jurisdictions Scoring Lower Than Ontario
61.5% - 74.4%	58.6% - 61.4%	35.4% - 58.5%
Singapore Switzerland Sweden Australia* England*	Scotland Norway Czech Republic Canada Ontario (English) Ontario (French) New Zealand Netherlands* Romania* Slovenia*	Spain Iran Portugal Cyprus United States* Colombia*

Note:

* indicates the jurisdiction did not meet the guidelines for student participation rates, age/grade, or sampling at the classroom level.

The above groupings take sampling error and confidence intervals into account. The confidence intervals of the jurisdictions listed in each column overlap with the confidence interval at the head of each column.

WHAT EQAO LEARNED ABOUT THE LEARNING CONTEXT

FINDINGS THAT CAUSE CONCERN

When the amount of class time was estimated for the several components of the Ontario mathematics curriculum, it was found that close to one-half of the class time at both Grades 7 and 8 involved content not included in the TIMSS assessment.

Computers are not being used much for mathematics or science instruction in Canadian schools.

Teachers in high-performing jurisdictions spent considerably more time teaching science and placed a greater focus on homework and different forms of assessment than did Ontario teachers. Students in high-performing jurisdictions spent significantly more time involved in science during the regular school day and at home. The amount of class time individual Ontario teachers allotted to the various topics and strands of mathematics varied widely.

Few mathematics or science high school courses were required for entrance into Ontario teacher education programs; almost no mathematics or science prerequisites were required for entry into consecutive programs.

OTHER FINDINGS

Jurisdictions (i.e., provinces/countries) that had higher levels of student performance also had clearly articulated elementary science curriculum requirements for content and amounts of class time devoted to teaching and assessing the topics.

There was a strong, positive relationship between student achievement in mathematics and science and the following elements:

- Number of books in the home.
- Items such as a calculator, computer, study desk and dictionary in the home.
- Positive attitudes toward mathematics and science on the part of students, their friends and their parents.

WHAT EQAO LEARNED ABOUT STUDENT ATTITUDES AND BEHAVIOUR

POSITIVE FINDINGS

Canadian Grades 3 and 4 students and Grades 7 and 8 students had positive attitudes towards mathematics and science and see it as important.

- Both Grades 3 and 4 students and Grades 7 and 8 students reported liking mathematics (89% and 74%, respectively) and liking science (80% and 72%, respectively).
- Nearly all Grades 3 and 4 students and Grades 7 and 8 students indicated that it is important to do well in mathematics (97% and 95%, respectively) and science (95% and 80%, respectively).

FINDINGS THAT CAUSE CONCERN

41% of Canadian Grades 7 and 8 students reported finding science to be boring, higher than in most other countries.

OTHER FINDINGS

Canadian Grades 3 and 4 students and Grades 7 and 8 students indicated that they were good at mathematics (94% and 84%, respectively) and science (88% and 82%, respectively).

SUGGESTED ACTIONS FOR JUNIOR AND INTERMEDIATE PROGRAMS

These recommendations can be implemented almost immediately by principals, teachers, parents, students and school boards in Ontario. They are based directly on the findings from the SAIP and TIMSS assessments and can support discussion and planning in every junior and intermediate division in the province.

Recommendations for policy and research, which will take time to implement and require action by many different groups and organizations in the educational community in Ontario, are found in the final section of this report.

1. That teachers spend more time, on a regular basis, on activities that are related to mathematics and science.
2. That teachers carefully review their program with respect to expectations for mathematics and science.
3. That boards provide specific staff development programs in areas of teaching and assessing mathematics and science.
4. That boards inventory mathematics and science resources in all schools and ensure that there are resources available to every teacher.
5. That teachers pay specific attention to practical applications of mathematics and science concepts.
6. That teachers and administrators take advantage of every opportunity to increase adult awareness that science education involves focussed inquiry and use of appropriate methods of investigation, as well as factual content.
7. That teachers and parents encourage students to be involved in mathematics and science activities outside of school.

OVERALL RECOMMENDATIONS

A major part of EQAO's mandate is to make recommendations for changes that will contribute to the enhancement of learning for students in Ontario's schools. Recommendations that teachers and parents can act on immediately are presented at the end of each of the "Findings" sections. Those which follow are based on all of the assessments reported in this document and existing relevant research. They address more general, long-term and systemic changes. Although some of these recommendations have been made before and were not acted upon, the evidence which supports these recommendations calls for strong action.

Having reviewed the results of local, national and international assessments and having gathered much information about teaching practice, school organization, parental support, curriculum, teacher education and training, we are recommending measures which fall under the following headings:

- /// Creating a Culture of Assessment
- /// Building Teaching and Assessment Skills
- /// Focussing the Curriculum
- /// Supporting Student Learning
- /// Communicating and Interpreting Assessment Findings.

We also identify some follow-up actions for EQAO to undertake.

CREATING A CULTURE OF ASSESSMENT

Teachers, students and parents should come to regard assessment as essential feedback, natural and necessary to learning.

A constructive view of assessment and evaluation is one in which:

- /// Assessment criteria are clearly stated, with many examples of what good work looks like.
- /// Assessment is used as feedback to enhance student learning.
- /// Students become accurate assessors of the quality of their own work.

To advance this view and create a culture of assessment, we recommend:

1. That parents and teachers review individual student results from EQAO's Grade 3 assessment in combination with classroom assessment information to enhance their understanding of the students' achievement and to create individual learning plans.
2. That schools and school boards, in consultation with teachers, parents and the community, respond to the results of large-scale assessment by establishing action plans and reviewing them on a regular basis.
3. That faculties of education, the Ontario College of Teachers and school boards give high priority to helping teachers develop a full range of assessment strategies and to develop the skills to interpret and use results for program improvement.
4. That the Ontario College of Teachers include responsibility for effective assessment in its standards of practice for the profession.
5. That teachers build timely assessment strategies into their classroom activities as a way of finding out where students are in their learning and what they need to do next.
6. That school and system administrators encourage their teachers to adopt team-based assessment approaches.
7. That the Ministry of Education and Training develop assessment resource materials that include a variety of approaches, reflect clear expectations and reinforce student learning for all areas of the Ontario curriculum.
8. That the Ministry of Education and Training establish improvement goals related to provincial standards and allocate appropriate resources to achieve them.
9. That the Ministry of Education and Training include science in the next expansion of the provincial assessment program.

BUILDING TEACHING & ASSESSMENT SKILLS

Assessment demands in schools have become more complex. Unlike most areas of teachers' work, assessment is a domain in which teachers typically have had very little formal training. The training that they have received is often unrelated to their actual assessment and reporting responsibilities. Teachers routinely express discomfort with their assessment knowledge and skills and seek workshops and professional development opportunities in this area. Focussed professional development in effective classroom assessment is central to the improvement of teaching and learning.

To help build teaching and assessment skills, we recommend:

10. That the Ontario College of Teachers and the faculties of education revise policies regarding admission requirements for elementary teacher education programs to ensure that all teachers take courses that prepare them for teaching and assessing mathematics and science.
11. That the Ontario College of Teachers and the faculties of education place emphasis on skills associated with the teaching and assessing of mathematics and science as part of pre-service elementary teacher education programs.
12. That faculties of education, the teachers' federations and school boards provide in-service training for teachers in teaching and assessing mathematics and science, and that the training be recognized by the Ontario College of Teachers.
13. That the Ontario College of Teachers in their certification processes and faculties of education in their teacher education programs emphasize assessment of student achievement.
14. That school boards, in collaboration with the faculties of education and with the support of teachers' federations, make updated professional learning a criterion for the selection of associate teachers to work as teacher candidates.
15. That the Ontario College of Teachers recognize, through credit and in other ways, the professional development value of teacher involvement in large-scale assessment programs (e.g., the development of assessment items and scoring scales, field-testing, marking and development of reporting procedures).
16. That school boards, faculties of education and teachers' federations conduct research in schools and classrooms to determine which changes in organization, instruction and assessment practices have positive effects on teaching and learning.

FOCUSSING THE CURRICULUM

Curriculum is the foundation of instruction, resources, assessment and classroom activities. It is also a representation of what society believes students should be learning.

To help focus the curriculum, we recommend:

17. That the Ministry of Education and Training stabilize the new Ontario curriculum to give teachers and principals the opportunity to become competent in implementing it.
18. That the Ministry of Education and Training provide resources and materials needed to implement fully the Ontario curriculum.
19. That the Ministry of Education and Training set minimum standards for the allotment of class time for the teaching and assessing of reading, writing, mathematics and science in elementary schools.
20. That teachers examine student time-on-task in their classrooms in relation to student achievement results to ensure the most effective use of the instructional day.
21. That the Ministry of Education and Training continue to explore curriculum directions in other jurisdictions and to participate in those national and international studies and assessments that provide additional perspectives on Ontario's curriculum and how to improve student achievement.
22. That teachers regularly use the expectations outlined in the Ontario curriculum to plan and revise instruction and develop classroom assessment strategies.
23. That the faculties of education and the Ontario College of Teachers ensure that their pre-service and in-service programs pay appropriate attention to the content and sequence of the Ontario curriculum.

SUPPORTING STUDENT LEARNING

Student learning is a complex process that can be influenced by many factors both inside and outside the school. Students achieve more when they and their parents have a “can-do” attitude and believe that they have some control over learning and success in school. When students have a clear and realistic understanding of their own skills and knowledge, they are motivated to stay engaged with their schooling. Factors like teaching approaches, teacher expertise, school climate and curriculum expectations also influence student performance. In addition, many students, through no fault of their own, do not have access to the kinds of support outside the school that could contribute to their learning.

To support student learning, we recommend:

24. That the Ministry of Education and Training review its policy and enhance its early childhood education programs in Ontario.
25. That teachers and principals provide more varied and relevant learning opportunities by involving community members as active participants in the school.
26. That teachers and principals use every opportunity to show students and parents that effort and motivation are key factors in students' success.
27. That teachers make use of assessment scales and concrete examples of excellent work when they explain expectations to their students.
28. That principals work with teachers to monitor the daily classroom program and the level of involvement and motivation of the students.
29. That principals and teachers, working with parents and school councils, create as many opportunities as possible for students to use computers as learning tools in their classrooms and elsewhere in the community.
30. That teachers continue to seek effective ways of diagnosing strengths and weaknesses in student performance and focussing instruction for individuals and for groups of students.
31. That school boards and teachers continue to monitor the progress of students with special needs and students in ESL/ESD programs as they progress toward the standard.
32. That teachers teach students how to assess their own work and provide them with many opportunities to practise these skills.
33. That principals, teachers and board administrators review mathematics programs to identify strategies that foster improved student attitudes toward the subject.

“The evidence shows that the early years of schooling – including pre-school education and early intervention programmes at the primary level – are crucial not only for foundation learning, but also for further learning, especially in the case of disadvantaged children.”
-Organisations for Economic Co-operation and Development, Fall 1997

COMMUNICATING & INTERPRETING ASSESSMENT FINDINGS

This is the first time elementary schools in Ontario have involved all their students at one grade level in a province-wide assessment. This experience can help everyone involved in education to learn to interpret data wisely and use it to improve teaching and learning.

"Accountability looks forward and uses assessment information along with other knowledge and the hard thinking required to inform judgements about current performance and improvement plans. It is a deeply human enterprise that depends on open sharing of information and continuing conversations."
-Lorna Earl and Paul LeMahieu,
(Assessment Specialists)
1997

Large-scale assessments yield data which can be extremely valuable if interpreted accurately. Large-scale assessment results should be used to support decision making, and care must be taken not to draw unwarranted conclusions, as student achievement is influenced by many variables. We need to be cautious about comparing boards and schools based on a single assessment, no matter how well designed.

Assessment results provide a starting point for careful thinking. In fact, they can often stimulate questions that require further analysis before decisions are taken, questions like

- "Is this different for boys and girls?"
- "What is the influence of particular classroom practices?"
- "What is the impact of regional differences?"
- "What is the relationship of poverty to achievement in Ontario schools?"

To help build "assessment literacy" and create a climate for critical analysis among educators and the public, we recommend:

34. That the Ministry of Education and Training, faculties of education and the teachers' federations collaborate to conduct further exploration of the findings derived from these assessments.
35. That school boards and schools continue to identify school and community factors which are directly related to their students' achievement.
36. That the Ministry of Education and Training, school boards and schools communicate with parents and the broader community about the purposes of assessment, the expectations for students, the quality of student work and the ways that the school and the home provide support for learning.
37. That the dialogue about achievement and improvement strategies at the school, board and provincial levels continue.

EQAO'S RESPONSIBILITIES

EQAO recognizes its own responsibilities for articulating the value of assessment and promoting appropriate uses of results.

EQAO will:

1. Develop a provincial indicator system to provide a fuller context for reporting student achievement and for assessing quality in the Ontario school system.
2. Continue to undertake short- and long-term research in collaboration with institutions and organizations to identify factors that influence student achievement.
3. Continue to share knowledge and information about good assessment practices.
4. Continue to provide high quality province-wide assessments that can serve as models for teachers to follow.
5. Continue to seek input from educators and parents about EQAO assessment processes to assist in planning future assessments.
6. Continue to involve as many teachers as possible in development, field-testing, training and marking opportunities associated with province-wide assessments.
7. Provide a wide range of data, including socio-economic information and specific regional factors, to accompany future assessment results.
8. Continue to supply parents with detailed information about student achievement.

APPENDIX A

THE EDUCATION QUALITY & ACCOUNTABILITY OFFICE (EQAO)

OUR MISSION

EQAO will assure greater accountability and contribute to the enhancement of the quality of education in Ontario.

OUR MANDATE

It is the legislated mandate of the Education Quality and Accountability Office ¹ to report and make recommendations, to the public and the Minister of Education and Training on:

- /// the quality and effectiveness of elementary and secondary education in Ontario and
- /// the public accountability of Ontario's boards of education.

OUR CORE VALUES

EQAO values the well-being of learners above all other interests.

EQAO values only that information which has the potential to bring about constructive change and collective improvement in teaching and learning.

EQAO values the dedication and expertise of Ontario's educators and will work to involve them in all of its activities.

EQAO values the delivery of its programs and services with equivalent quality in both English and French.

¹ Bill 30, Chapter 11: An Act to establish the Education Quality and Accountability Office and to amend the Education Act with respect to the Assessment of Academic Achievement. June 1996

OUR FOCUS

To meet its mission and mandate, EQAO will:

- /// Develop and implement a comprehensive program of provincial student assessment.
- /// Lead Ontario's participation in national and international assessment and indicators work.
- /// Develop and implement a provincial Education Quality Indicators Program (EQIP) to facilitate school, board and provincial accountability to the public.

OUR ACCOUNTABILITY

The *Provincial Report on Student Achievement* details the results of EQAO's assessments of student achievement. EQAO is also publicly accountable for its own activities. This accountability is addressed in a separate report entitled, "Annual Report of the Education Quality and Accountability Office," 1996-1997.

Appendix B

THE EQAO ASSESSMENT PROCESS

DEVELOPMENT OF INSTRUMENTS

EQAO assessments were developed to provide students with engaging, challenging and relevant tasks through which they could demonstrate their knowledge, thinking, and problem-solving skills. The assessments were developed to cover specific outcomes in the provincial curriculum and to give teachers examples of quality assessments that could be adapted and used in the classroom.

Both the Grade 3 and 6 performance-based assessments included the following components:

- /// student assessment booklets to be completed independently by the student;
- /// student readings (Grade 3 only);
- /// Administration Guide for Teachers and Administrators which outlined EQAO policies and administration procedures;
- /// Teacher's Daily Plan which provided introductory activities (including some group activities), detailed instructions and time frames for each activity in the assessment unit;
- /// student, home, teacher and principal questionnaires which were used to gather information about the context in which the student was learning.

For each of the assessments, a sample unit was developed and distributed to schools. The Grade 3 unit provided teachers with a two- to three-day assessment unit of work that teachers could use with their students prior to the administration of the actual assessment. The Grade 6 unit provided activities for each of the 5 strands in mathematics.

The assessments were developed under the guidance and direction of EQAO. The Grade 3 assessment entitled “Let’s Go Exploring” integrated activities to measure a student’s knowledge and applied skills in reading, writing and mathematics¹.

The Grade 6 mathematics assessment entitled “A Visit to the Park” was a series of tasks in each of the strands of mathematics. The writing team was made up of teachers who were selected for their expertise in mathematics and in assessment.

¹The Assessment Consortium (Durham, Halton, Lakehead, North York, Scarborough school boards) were awarded the contract to develop the Grade 3 assessment.

For the development of both assessments, teachers on the writing teams ensured that:

- /// the questions and tasks were clear and unambiguous;
- /// students had several opportunities to demonstrate their knowledge and skills;
- /// the assessment was related to real-life activities with which the students were familiar; and
- /// the assessments were based on the curriculum and involved activities similar to students' daily classroom experience.

Throughout the development phase, EQAO involved many teachers, principals, consultants, and community members on advisory teams in the critical task of validation and providing feedback to the developers. The issues which the teams addressed included special education, ESL/ESD and equity issues. The EQAO approach to large-scale assessment paid particular attention to ensure the tasks were

- /// age appropriate;
- /// based on the Grade 3 reading and writing standards;
- /// based on the Grade 3 mathematics standards;
- /// valid; and
- /// bias-free.

The involvement of teachers in all phases of the development also provided an opportunity for them to gain further confidence and understanding of quality assessment generally.

FIELD TESTING

Once the instruments were developed and validated by specialists, all components of the assessment processes and procedures were field tested. The field tests, administered in October, included all materials, administration, training, distribution and receipt, training and marking, and data preparation.

A large number of Grade 4 and Grade 7 classes volunteered to field test the Grades 3 and 6 assessments respectively. The field test sites were chosen to represent every region of the province. Prior to the administration of the field test, teachers received one day of training to prepare them to administer the assessment units. Approximately 1,300 students participated in each field test.

Once the field tests were completed, approximately 20 teachers assisted in the identification of anchor booklets, i.e., actual student work that exemplified performance at the each of the 4 levels.

For each of the Grade 3 and 6 assessments, approximately 70 teachers received two days of training and then participated in the marking of the field tests.

Quality control measures were important during the field test as all of the materials and processes were being examined. The following processes were in place:

1. Field test teachers kept field test journals and detailed notes written within the Daily Plan and the Questionnaire. They provided EQAO with information on time requirements, levels of student engagement with the tasks, the levels of difficulty, the efficiency of the administration guide, the clarity of the daily plans and overall comments and recommendations.
2. Quality Control Officers from EQAO made site visits during the administration of the field test and reports were forwarded to EQAO for compilation. This provided information on clarity of administration materials and processes and on the design and clarity of assessment materials and processes.
3. Teachers who took part in the anchor selection and scoring processes were asked for feedback and recommendations to streamline and improve the processes.
4. During the scoring, markers kept journals and completed questionnaires about the processes.
5. A detailed analysis of the student responses was conducted to improve the instruments.
6. Question-by-question scoring was undertaken with a sample of student booklets to examine the language, the level of difficulty of the questions and their relevance to the provincial curriculum. These results were also analyzed to improve the instruments.
7. On-site monitoring was conducted of the reliability procedures used during the scoring of the field test.

The field test provided a thorough analysis of all assessment materials and instruments and all planned administration, marking and data analysis processes. Extra questions and materials were field tested so that any materials and questions that were problematic could be replaced without engaging in further field testing of new materials and items.

Teachers who participated in the administration or scoring of the field test signed an agreement of confidentiality to protect the security of the assessment materials. They were trained in the use of the instruments, the links to the standards and the curriculum and in the scoring processes. These teachers have told us repeatedly that such training is often the best kind of professional development they have received in a long time. It is one of the best ways to be at the forefront of curriculum change in the province and to receive firsthand training on the use of the provincial standards in a classroom setting.

After the review of quantitative and qualitative data from the field test, the assessments were revised to ensure that they would provide valid data about the performance of students.

ADMINISTRATION

EQAO ensured province-wide consistency through:

- /// regular communication;
- /// extensive training and professional development; and
- /// implementation of quality control measures.

COMMUNICATION

EQAO provided communication on a regular basis. Ongoing support and communication was accomplished through a variety of measures: website, telephone, fax, newsletters and bulletins, training and communication packages for use with teachers and parents, video, sample units, and information inserts in local newspapers.

All major communication with parents (letters recommending full or partial exemptions, the Home Questionnaire, and the Individual Student Reports) were translated into 18 languages. The newspaper insert was available in 9 languages.

TRAINING AND PROFESSIONAL DEVELOPMENT

EQAO provided training province-wide to all Grades 3¹ and 6 teachers administering the assessment units. The training was implemented to:

- /// familiarize teachers with the assessment unit and the scoring scales;
- /// detail each teacher's role in reliably administering the assessment unit;
- /// ensure understanding and consistent application of EQAO's policy on exemptions and accommodations;
- /// develop teacher confidence in the administration of the assessment unit; and
- /// provide sample assessment units to help teachers understand the actual assessment process.

All principals with Grade 3 students in their school were invited to attend an information session. Joan Green, CEO, and EQAO staff provided an opportunity for principals to become familiar with the policies and procedures for the Grade 3 assessment. The information sessions were held in a variety of sites across the province in February 1997.

¹In Grade 3, the training for administration was provided with support from the Federation Cooperative (consisting of the four English-language provincial teachers' federations: Federation of Women Teacher's Association of Ontario (FWTAO), Ontario English Catholic Teacher's Association (OECTA), Ontario Public School Teacher's Federation (OPSTF), and Ontario Secondary School Teacher's Federation (OSSTF). The Federation Cooperative also supported training for scoring.

QUALITY CONTROL

EQAO made extensive use of procedures and instruments such as questionnaires and on-site observations to monitor the training and the administration of the tests. Information sessions were set up to train the trainers in how to instruct teachers to administer the assessment. Monitoring the consistency of assessment administration was conducted during the actual assessment period. Observers made one-day visits

to a percentage of classrooms and completed an Observer's Checklist that provided EQAO with data to determine the degree of consistency in administration achieved provincially.

Following the administration of the assessments, questionnaires were sent to participating teachers, school and board contacts, principals and administrators in order to obtain feedback that would help EQAO prepare for next year's administration of tests in Grades 3 and 9. A *Detailed Response Form* was also available to any individual or group wishing to respond in greater detail.

SCORING

Prior to marking of the assessments, approximately 30 educators for each of the Grades 3 and 6 assessments reviewed the scoring scales and identified anchor booklets for each subject. A rationale was developed for each anchor booklet. The rationales provided a link between student performance and the language in the assessment scale. Other student booklets were randomly selected and scored for use as training booklets, orientation booklets and reliability booklets.

Markers were selected from all geographic regions of the province. The selection included criteria such as regional representation of the province, knowledge and skill in the subject(s) being assessed, knowledge of the provincial curriculum, primary and/or junior expertise, and a recommendation from the principal or supervisory officer (Grade 3 only). In May, the Grade 3 marking took place over eleven days in Toronto. The Grade 6 marking was held in Sudbury over an eleven-day time period in July. Markers received extensive training.

Using an holistic scoring method, the student booklets were scored in Grade 3 for three indicators for each of reading, writing and mathematics plus each strand in mathematics. In Grade 6 mathematics scores were generated holistically for each of three indicators and each strand. To determine the score for a level or strand, scorers looked at a student's response to a group of questions to determine the overall quality of the performance in relation to the scoring scales and the anchor booklets. In addition to holistic scoring, analytic scoring was used to produce data on percentages of students able to complete specific tasks within the various strands.

The scoring scales for the assessments were developed in relation to the provincial curriculum in place at the time of the assessment and to reflect the outcomes being assessed. The performance indicators characterized the key components of knowledge and skills for each subject. These scales were developed by educators and reviewed by researchers.

Reliability and consistency in marking is critical for valid interpretations of results. To ensure that marking was conducted in a reliable manner, EQAO provided a minimum of two days of training to all teachers involved in the marking.

Five reliability checks were embedded into each day of the marking:

1. ORIENTATION BOOKLETS

Each day began with all scorers marking a pre-selected and pre-scored booklet. Markers recorded their score for each indicator on an Individual Reliability Form. Group leaders then generated a group median and this was also recorded on the Individual Reliability Form. As a result, each marker had two scores to compare. A discussion followed each orientation marking focussing on any “difficult to score” aspects of the selected booklet or group and individual trends in marking booklets. EQAO collected group median scores as one measure of intergroup reliability.

2. PAIRED-MARKING

Each day, following the completion of the Orientation Booklet, markers scored at least one booklet with a partner. Markers had a new partner each scoring day. Paired-marking was taken as another step in ensuring that markers were consistent in their interpretation of student performance and the scoring scales. Group leaders could use paired-marking as an opportunity to re-assign a scorer who demonstrated marking biases, to a strong marking partner.

3. RELIABILITY BOOKLETS

A pre-selected and pre-scored booklet was individually scored by all markers and group leaders each marking day. Marking was completed on a designated Reliability Scoring Sheet prepared for electronic scanning and also recorded by each scorer on the Individual Marker Reliability Form. Data from this exercise were used to generate a report outlining any overall trends or issues that needed to be addressed. Reliability reports were shared with group leaders who in turn took the information back to their marking group. Strategies were also discussed with group leaders when an entire group demonstrated a “drift” or individual markers demonstrated a bias in their scoring. The reliability booklet ensured consistency in marking within groups and between all marking groups within the subject.

4. CALIBRATION BOOKLETS

A random selection of student booklets was remarked each day. For example, in the English Grade 3 marking, two hundred booklets were anonymously reinserted and marked nine times over the course of the marking period.

5. ANOMALY REPORTS

Once sufficient scoring had been completed for normal scoring patterns to emerge, Anomaly Reports were generated indicating all instances of significant marker bias. In these cases, all batches or booklets scored by these individuals were pulled and remarked. Of the 1,100 markers for the English Grade 3 marking, the work of seven markers of reading, nine markers of writing, and twenty markers of mathematics were rescored. Group leaders or EQAO subject leaders worked with these markers to get them back on track and then carefully monitored future marking.

Training, orientation and paired-marking were great opportunities for teachers to develop new marking skills and to discuss student achievement.

REPORTING

EQAO has prepared a number of different kinds of reports to communicate to educators, parents, students and all stakeholders about the achievement of Ontario students. Each report provides a context for achievement.

INDIVIDUAL STUDENT REPORTS

A report was prepared for each student participating in the Grade 3 assessment. This report provided fourteen pieces of information about the performance of each student in reading, writing and mathematics. The reports were sent to schools in June and September for distribution to the home. The detailed report indicated the student's performance based on the assessment unit. It allowed parents, teachers and students to reflect on student achievement in relation to classroom work and also to analyze student achievement in relation to what needs to be accomplished to assist the student to move forward.

Since the Grade 6 Mathematics assessment was administered to students in randomly selected schools, individual reports were not prepared.

SCHOOL REPORTS

EQAO provided aggregated student achievement data and aggregated contextual information based on the questionnaires completed by the students and the parents/guardians to all schools with Grade 3 and to those schools with Grade 6 students who were part of the provincial sample. EQAO also provided ideas for schools to assist them in preparing a school report for their community.

BOARD REPORTS

EQAO provided each school board with aggregated summary data of the Grade 3 student achievement. The report also included a summary of contextual information that was collected through teacher, principal, student and parent/guardian questionnaires of Grade 3 students.

(Board reports were not provided for the Grade 6 sample assessment.)

PROVINCIAL REPORT

The report that is presented here is the provincial report on student performance and detailed contextual information for the Grades 3 and 6 assessments. EQAO anticipates that this report will serve as a catalyst for a discussion on improvement.

Appendix C

GRADE 3 ASSESSMENT OF READING, WRITING AND MATHEMATICS

PERMITTED ACCOMMODATIONS FOR GRADE 3 ASSESSMENT

The following accommodations were permitted for individual students with special needs, in order to ensure that all students received equitable assessments:

Additional time (to a maximum of twice the time) to complete some of the assessment items.

Directions or prompts with respect to the pace of the activity.

Use of any assistive device ordinarily used in the classroom such as a speech synthesizer or a Bliss board.

Use of American Sign Language or Signed English.

Provision of the test in a different format as required (e.g., large print, Braille, audio-cassette, or white paper for visually impaired children).

Extended use of technology resources (e.g., voice-activated computer).

Verbatim reading of the questions to a student in the mathematics assessment.

Verbatim reading of the instructions/directions to a student in the writing assessment.

Verbatim scribing of the responses of a student in the mathematics assessment.

Verbatim scribing of responses for a student in the reading assessment.

Translation of mathematical/technical terms (French Immersion only).

INDIVIDUAL STUDENT REPORT FORM FOR GRADE 3 ASSESSMENT

NOT AVAILABLE IN ELECTRONIC FORMAT

QUESTIONNAIRES FOR GRADE 3 ASSESSMENT

NOT AVAILABLE IN ELECTRONIC FORMAT

Appendix D

ALPHABETICAL LIST OF BOARD RESULTS FOR THE GRADE 3 ASSESSMENT OF READING, WRITING AND MATHEMATICS

**AVAILABLE FOR DOWNLOAD
IN SEPARATE DOCUMENT**

Appendix E

GRADE 6 ASSESSMENT IN MATHEMATICS

PERMITTED ACCOMMODATIONS FOR GRADE 6 ASSESSMENT

The following accommodations were permitted for individual students with special needs, in order to ensure that all students received equitable assessments:

Additional time (to a maximum of twice the time) to complete some of the assessment items.

Directions or prompts with respect to the pace of the activity.

Access to a quiet workplace removed from the classroom to complete some assignments.

Use of any assistive device ordinarily used in the classroom such as a speech synthesizer or a Bliss board.

Use of American Sign Language or Signed English.

Provision of the test in a different format as required (e.g., large print, Braille, audio-cassette, or white paper for visually impaired children).

Extended use of technology resources (e.g., voice-activated computer).

Verbatim reading of the questions to a student.

Verbatim scribing of the responses of a student.

STRANDS FOR GRADE 6 ASSESSMENT

The data on student achievement by strand was gathered by means of holistic and analytic scoring of student work. Holistic scoring was used to produce data on student achievement according to levels and analytic scoring was used to produce data on percentages of students able to complete specific items within the various strands.

NUMBER SENSE AND NUMERATION

By the end of Grade 6, students will

- Select appropriate calculation methods to solve problems with whole numbers, fractions, and decimals.
- Demonstrate understanding of fractions and decimals and use them in a variety of practical applications, including problem solving and estimation.

More specifically, students will:

- Formulate and solve a wide variety of single- and multi-step problems based on everyday situations using whole numbers, decimals and fractions.
- Demonstrate number sense in operating with whole numbers, decimals, and fractions.
- Demonstrate an understanding of place value in operations, mental mathematics and estimation.
- Choose the most appropriate calculation method from among mental mathematics, estimation, calculator, or pencil-and-paper procedures, in problem-solving activities.
- Demonstrate some understanding of per cent and ratio and rate.

PATTERNING AND ALGEBRA

By the end of Grade 6, students will:

- Investigate and explain the relationships among patterns in mathematics and in natural and human-made environments.

More specifically, students will:

- Identify, extend, and create patterns in geometry.
- Identify, extend, and create number patterns involving whole numbers and decimals.
- Describe patterns.
- Solve problems by applying a patterning strategy.
- Recognize and identify patterns in material from other subject areas and in the world around them;
- Identify formulae as generalizations about observed patterns.

MEASUREMENT

By the end of Grade 6, students will:

- Estimate, measure and/or calculate, and record temperature, time, length, perimeter, area, capacity and volume, mass, amounts of money, distance, and speed, using appropriate units of measurement.

More specifically, students will:

- Use a variety of tools to estimate and measure length, perimeter, area, capacity, volume, mass, a period of time, and temperature using standard units in problem-solving activities.
- Use comparisons with familiar objects in measurement activities.
- Explain the differences between estimation and precise measurement.
- Apply simple measurement formulae to solve problems.
- Use an understanding of the relationship among various metric units to compare measurements of objects.
- Use measurement skills in other areas of the curriculum and to solve everyday problems.

GEOMETRY AND SPATIAL SENSE

By the end of Grade 6, students will:

- Describe, make models of, and construct, two-and three-dimensional figures and make comparisons among them.
- Use co-ordinate systems to describe locations of points as figures.
- Use their knowledge of motion geometry to identify the properties of figures and to create patterns and designs.

More specifically, students will:

- Measure and construct angles using a protractor.
- Identify, describe, and classify two-dimensional and three-dimensional figures.
- Recognize alternative ways of classifying shapes.
- Use co-ordinate systems to describe points and figures.
- Apply slides, flips, and turns in a variety of ways.
- Posse and solve problems in a geometric context.
- Examine three-dimensional models from different perspectives.
- Identify intersecting, parallel, and perpendicular lines and use them in a variety of geometry activities.

DATA MANAGEMENT AND PROBABILITY

By the end of Grade 6, students will:

- Use a variety of technologies to gather, analyze, interpret, evaluate, and display data.
- Investigate how chance and probability operate in a variety of situations and explain their findings.

More specifically, students will:

- Collect, organize, describe, read, and interpret data using a variety of methods and tools.
- Discuss chance and probability in everyday situations.
- Describe the chances of winning in games and the probability that particular events will occur in experiments.
- Apply data-management skills and skills in determining probability to other areas of the curriculum.

QUESTIONNAIRES FOR GRADE 6 ASSESSMENT

NOT AVAILABLE IN ELECTRONIC FORMAT