CONCLUSION

This report describes the outcome of the 1999 Science Assessment. Science is the last of the three SAIP subjects to be assessed for the second time using essentially the same instruments. Thirty-one thousand 13- and 16-year-old students, English- and French-speaking, were administered the assessment instruments designed, developed, and enhanced by representatives of the ten provinces and the three territories, working together under the leadership of the development team. In spite of the diversity of student circumstances and education experiences across the country, this challenging exercise nevertheless produced an assessment of skills that are very difficult to address in large-scale testing. This assessment was made possible by the cooperation extended to the development teams by students, teachers, parents, and stakeholder representatives. In 1999, a pan-Canadian panel of representatives of various sectors of society developed a set of expectations to help interpret the results actually achieved by the students.

Results show that, for Canada as a whole, performance at higher levels in science knowledge and skills has improved significantly between 1996 and 1999. In 1999, for both age groups and genders, little significant difference in achievement can be observed for the written assessment. Slightly more 13-year-old females performed at higher levels in the practical task assessment.

Significant differences in performance at several levels can be observed between students who responded to the assessment in French and those who responded in English. There is little consistency in the pattern of these differences, however.

Many of the 1999 results do meet the expectations expressed by the pan-Canadian panel in science. In general, students did accomplish what is expected of them, in particular in the practical task assessment. In the written assessment, it was expected that slightly more students would be able to achieve at levels 4 and 5, demonstrating relatively more sophisticated science knowledge and skills.

In this assessment again, 16-year-olds performed much better than 13-year olds. Although this will come as no surprise, this process makes it possible to measure and document with reliable statistics the achievement gap in science between those age groups across Canada. We can at least infer that our educational systems do foster the development of science knowledge and skills between the ages of 13 and 16.

In the written assessment of science knowledge, more than three-quarters of 16-year-olds and more than half of 13-year-olds students reached level 3. In the practical task assessment of science investigative skills, more than three-quarters of 16-year-olds and nearly half of 13-year-old students reached level 3.

Given the fact that 13-year-olds and 16-year-olds are administered the same assessment, the School Achievement Indicators Program designers thought that the largest proportion of the younger group would achieve at level 2 and that the largest proportion of the older group would achieve at level 3. It is a pleasant surprise indeed that a sizeable percentage of 13-year-old students reached level 4 and above. It is heartening for Canadians to see the proportion of 16-year-old students who achieved level 5 in each component. This level of performance represents a significant attainment of science knowledge and skills for students in this age group.

For example, to be assigned level 3 in the written assessment, students were able to

- use chemical properties to compare and classify substances
- know that some life forms are unicellular and others are multicellular, and that life forms are involved in the transfer of energy

- compare gravitational and electrical forces
- compare changes in Earth's surface and their causes
- analyse experiments and judge their validity
- identify areas where science knowledge and technologies address societal problems

For example, to be assigned level 3 in the practical task assessment, a student demonstrated ability to

- select appropriate materials for use in investigations
- identify possible sources of error
- identify various types of variables
- identify patterns, trends, and simple relationships
- extrapolate or interpolate
- draw conclusions from experimental data

Although these definitions may seem technical, they were developed by science and curriculum specialists in order to set out specifically the concepts underlying the design of the tests and the evaluation of the results.

Comparisons between the science written component and the practical task component results should only be attempted with caution. While students may appear to have achieved higher or lower scores in practical tasks than in the written assessment, this may not be significant since different criteria were used in the two assessments, and it is impossible to equate the degree of difficulty of the questions contained in each component.

Results from, and expectations established for, the 1999 assessment will serve as points of comparison for the next science assessment.