



Council of Ministers of Education, Canada

School Achievement Indicators Program (SAIP)

Science III Assessment

FACT SHEET

General facts about SAIP

- **What is SAIP?** SAIP is a cyclical program of pan-Canadian assessments of student achievement in mathematics, reading, writing, and science that has been conducted by the Council of Ministers of Education, Canada (CMEC) since 1993.
- **Why did CMEC develop SAIP?** The provinces and territories, through CMEC, developed SAIP to assess the performance of 13- and 16-year-old students in these important subject areas. The information gained from SAIP, together with the review mechanisms of individual jurisdictions, gives each minister of education a basis for examining the teaching and learning in these areas and other aspects of the school system.
- **Is the science assessment a one-time-only test?** The science assessment was administered for a third time in the spring of 2004. Previous versions of the science assessment were administered in 1996 and 1999. Because the vast majority of questions on the assessment have been retained from one year to the next, it is possible to compare and report on student performance over time. This is a very important feature of SAIP.
- **How can student performance across Canada be compared?** School curricula differ from one part of the country to another, so comparing test data resulting from these diverse curricula is a complex and delicate task. Young Canadians in different jurisdictions do, however, learn many similar skills in reading, writing, mathematics, and science. Throughout the history of SAIP assessments, development teams composed of representatives from various jurisdictions have consulted with all provinces and territories to establish a common framework and set of criteria for each subject area. These are intended to be representative of the commonly accepted knowledge and skills that students should acquire during their elementary and secondary education. However, when jurisdictional comparisons are made, it is important to consider the context of science education prevailing in each province and territory.
- **Will SAIP replace provincial and territorial assessments?** SAIP is designed to complement existing assessments in each province and territory, providing Canada-wide data on the achievement levels attained by 13- and 16-year-old students across the country and on the

extent to which skills and knowledge develop between the ages of 13 and 16.

- **Who wrote the test?** During the spring of 2004, a random sample of approximately 13,900 thirteen-year-olds and 11,800 sixteen-year-olds from all provinces and territories (with the exception of Nunavut) were tested on their scientific knowledge and skills. About three-quarters of the students completed the assessment in English, and one quarter in French.
- **What did we learn from this assessment?** SAIP assessments continue to confirm that it is possible, despite some differences in curriculum, to reliably assess students' knowledge and skills in science across Canadian jurisdictions. Jurisdictions can analyze and compare SAIP results in several different ways: the proportion of students achieving each of the levels of performance, a comparison of these results with other jurisdictions, a comparison of their results over time, and a comparison between their results and pan-Canadian expectations.
- **How was science assessed?** The science assessment consisted of a two-and-a-half-hour paper-and-pencil test. First, students were asked to complete a short placement test. Based on their score on this placement test, they were directed to continue with a particular set of questions in their test booklet. Students' knowledge of science concepts and their application to society around them, as well as their understanding of the nature of science, was measured by responses to multiple-choice and short, written-response questions. The questions were presented in groups within simple and common scenarios that required the application of knowledge to situations familiar to young people. Unlike the previous SAIP Science assessments of 1996 and 1999, where a practical tasks component was administered, student responded only to a written component.

As is the case in all SAIP assessments, science achievement was described over five levels, representing a continuum of knowledge and skills acquired by students over the entire elementary and secondary school experience. Level 1 criteria were representative of knowledge and skills typically acquired during early elementary education, while level 5 criteria were typical of those acquired in advanced and university entrance courses. Students responded to questions with an increasing level of complexity, allowing all students to show their best work, and their performance was determined by the number of correct responses at each level.

- **What kind of information does the report contain?** SAIP is a program assessment, not a student achievement assessment. SAIP assessments essentially measure student performance in a subject and reflect this back to each jurisdiction. These assessments do not replace, but rather complement, individual student assessments, which are the responsibility of teachers, school boards, and ministries and departments of education. The results are reported at the pan-Canadian and jurisdictional levels only. In SAIP, results are not available by school or school district. The achievement of individual students is not identified, and no attempt is made to relate an individual's achievement to that of other students. Information obtained from the student, teacher, and school questionnaires on school experience and attitudes toward science is also linked to student achievement in science.
- **What are the results of this third assessment of science?** Given that 13- and 16-year-olds are administered the same assessment, the SAIP designers thought that the largest proportion of

13-year-olds would achieve at least level 2 and that the largest proportion of 16-year-olds would achieve at least level 3. Generally, there is a consistent distribution across the five levels of performance, although significant differences in performance at several levels can be observed. Over 70% of 13-year-olds did reach level 2 or above, while almost two-thirds of 16-year-olds reached level 3 or above. Notably, more than 40% of the younger students also reached level 3 or above, while more than 20% of older students performed at levels 4 or 5.

The proportion of 13-year-old students not achieving level 1 is about 30% in several jurisdictions. This is a serious concern that needs to be looked into further as it suggests that a significant number of students may not possess a very basic level of scientific knowledge and skills. Results for this assessment show that there is no significant difference in achievement between males and females at most levels.

While achievement levels between 1996 and 1999 showed an improvement at almost all levels and for both age groups between SAIP Science I (1996) and SAIP Science II (1999), at most levels there was a significant decrease in achievement in SAIP Science III (2004). Exceptions to the above trends occurred for 16-year-olds at level 2, where achievement levels were relatively constant, and at level 5, where there was a slight increase in achievement in 2004.

- **How will the results be used?** Analysis of the results will lead to further discussion among the provinces and territories about what are appropriate expectations for student achievement in science. The report on SAIP Science, together with the review mechanisms of the individual provinces and territories, will give each of the ministers of education a basis for examining the curriculum and other aspects of the school system.
- **What are expectations -settings sessions?** For each assessment, a pan-Canadian panel of about one hundred representatives from various sectors of society meet to examine the assessment criteria, the items used to assess student performance, some of the contextual variables, and the overall student performance results. The members of the panel, which comprises both educators and non-educators, are then asked to state their expectations of student results based on their interpretation of the information that is provided. The expectations set in the various regions are aggregated into one series of pan-Canadian expectations and published in the public report.

In this 2004 Science assessment, the 13-year-old students met the expectations of the panel at levels 1, 2, and 3, while the panel expected significantly more students to reach levels 4 and 5. Panelists were satisfied with the performance of 16-year-old students at levels 2, 3, 4, and 5. At level 1, there was a small but significant difference that indicates that expectations only slightly exceeded performance.

- **When is the next SAIP assessment?** Ministers of education recently announced that SAIP will be replaced with the new Pan-Canadian Assessment Program (PCAP). PCAP is scheduled to be introduced in 2007.
- **Who is funding SAIP?** Funds for SAIP have been provided by participating jurisdictions through CMEC. Until 2004, the Government of Canada through Human Resources and Skills

Development Canada also contributed financially to the assessment.

CMEC wishes to acknowledge the support provided by the National Research Council of Canada and Health Canada in providing support documents for the assessment.

- **What is the total cost of the Science III Assessment?** The total expenditure on this science assessment, in direct costs, from the planning work begun in April 2002 through to the report in June 2005, was approximately \$2 million. When divided by the total number of 13- and 16-year-olds in Canada, this assessment costs approximately \$2.50 per student.