

INTRODUCTION

The value of student achievement information is greatly enhanced by linking it, as much as possible, to the context within which students live and learn. Social, educational, and personal environment all contribute to student learning and therefore to the performance on such assessments as those administered by SAIP.

In the past, SAIP assessments have collected such context data through questionnaires administered to the sampled students. Data so collected then is reported briefly in the public report, and in more detail in the subsequent technical reports.

For the 1999 SAIP Science Assessment, additional context information was collected through questionnaires completed by science teachers, and by school administrators describing the school environment. This is the first time in the SAIP that such extensive information has been collected.

While maintaining a commitment to the anonymity of individual students, teachers, and schools, this information will allow the careful examination by researchers of the complex linkages between student achievement and its context, as described by students, their teachers, and the schools in which they work.

The following pages highlight some of the results of these questionnaires. More complete information, including jurisdictional results, will appear in the accompanying document *Science Learning: The Canadian Context* and in the Technical Report. The data apply to Canada as a whole but not necessarily to any individual province. All figures represent percentages unless otherwise indicated. Percentages may be rounded.

STUDENT QUESTIONNAIRE RESPONSES

Each student who participated in the 1999 Science Assessment was also asked to complete a student questionnaire with questions about science practices and attitudes.

Percentages may not always add up to 100%. This is due to the fact that, for any question, approximately 3% of the responses may be either missing or ambiguous. Complete findings will be available in *Science Learning: The Canadian Context* and in the Technical Report.

Languages

How often do you speak [the language of the test] at home? (all students)

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|--------------------------------------|-----------------------------|--|
| 13-year-olds always or nearly always | 89 | 57 |
| 13-year-olds sometimes | 9 | 40 |
| 13-year-olds never | 2 | 40 |
| 16-year-olds always or nearly always | 89 | 81 |
| 16-year-olds sometimes | 9 | 61 |
| 16-year-olds never | 2 | 64 |

How often do you speak [Language of the test] at home? (by language)

| | <i>English</i> | <i>French</i> |
|--------------------------------------|----------------|---------------|
| 13-year-olds always or nearly always | 90 | 88 |
| 13-year-olds sometimes | 9 | 8 |
| 13-year-olds never | 1 | 4 |
| 16-year-olds always or nearly always | 90 | 86 |
| 16-year-olds sometimes | 8 | 10 |
| 16-year-olds never | 2 | 4 |

For all students, the language spoken at home seems to relate to achievement. As the first table shows, higher proportions of students reached level 3 or higher if they always or nearly always speak the language of the test at home.

The second table suggests that somewhat fewer students who wrote the assessment in French spoke French at home. Further research will address the question of the effect of this on student achievement of francophone students — particularly those living outside Quebec.

To do well in science you need natural ability

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|------------------------------------|-----------------------------|--|
| 13-year-olds who strongly disagree | 14 | 53 |
| 13-year-olds who disagree | 47 | 57 |
| 13-year-olds who agree | 35 | 56 |
| 13-year-olds who strongly agree | 5 | 43 |

| | | |
|------------------------------------|----|----|
| 16-year-olds who strongly disagree | 7 | 71 |
| 16-year-olds who disagree | 36 | 78 |
| 16-year-olds who agree | 49 | 82 |
| 16-year-olds who strongly agree | 8 | 70 |

Only 40% of 13-year-olds agree or strongly agree with this statement, but 57% of 16-year-olds agree or strongly agree that you need natural ability to do well in science.

good luck

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|------------------------------------|-----------------------------|--|
| 13-year-olds who strongly disagree | 35 | 54 |
| 13-year-olds who disagree | 50 | 57 |
| 13-year-olds who agree | 12 | 56 |
| 13-year-olds who strongly agree | 3 | 43 |
| 16-year-olds who strongly disagree | 30 | 82 |
| 16-year-olds who disagree | 54 | 81 |
| 16-year-olds who agree | 12 | 65 |
| 16-year-olds who strongly agree | 2 | 57 |

Only 15% of 13-year-olds and 14% of 16-year-olds believe luck plays a major role in doing well in science. For 16-year-olds, over 80% of those who disagreed reached level 3 or higher.

hard work

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|------------------------------------|-----------------------------|--|
| 13-year-olds who strongly disagree | 1 | 40 |
| 13-year-olds who disagree | 3 | 53 |
| 13-year-olds who agree | 42 | 54 |
| 13-year-olds who strongly agree | 54 | 57 |
| 16-year-olds who strongly disagree | 1 | 41 |
| 16-year-olds who disagree | 2 | 76 |
| 16-year-olds who agree | 41 | 79 |
| 16-year-olds who strongly agree | 56 | 79 |

Rather more students of both age groups agreed or agreed strongly that hard work is a factor in achieving well in science. Of those who agreed or agreed strongly, a higher proportion reached level 3 or higher.

encouragement from teachers

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|------------------------------------|-----------------------------|--|
| 13-year-olds who strongly disagree | 2 | 59 |
| 13-year-olds who disagree | 8 | 55 |
| 13-year-olds who agree | 55 | 56 |
| 13-year-olds who strongly agree | 34 | 55 |
| 16-year-olds who strongly disagree | 1 | 60 |
| 16-year-olds who disagree | 7 | 84 |
| 16-year-olds who agree | 56 | 78 |
| 16-year-olds who strongly agree | 36 | 79 |

Encouragement from teachers is seen as quite important for students of both age groups.

encouragement from parents

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|------------------------------------|-----------------------------|--|
| 13-year-olds who strongly disagree | 3 | 55 |
| 13-year-olds who disagree | 11 | 55 |
| 13-year-olds who agree | 52 | 57 |
| 13-year-olds who strongly agree | 35 | 54 |
| 16-year-olds who strongly disagree | 3 | 74 |
| 16-year-olds who disagree | 15 | 83 |
| 16-year-olds who agree | 53 | 79 |
| 16-year-olds who strongly agree | 29 | 77 |

Encouragement from parents is also seen as quite important for students of both age groups.

How often do you and your parent(s) or guardian(s) work together on your science homework?

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|--------------------------------|-------------------------|--|
| <i>13-year-olds who report</i> | | |
| rarely or never | 57 | 58 |
| a few times a month | 29 | 57 |
| a few times a week | 13 | 47 |
| almost every day | 2 | 26 |
| <i>16-year-olds who report</i> | | |
| rarely or never | 80 | 79 |
| a few times a month | 16 | 82 |
| a few times a week | 4 | 62 |
| almost every day | 1 | 67 |

Only 15% of 13-year-olds and 5% of 16-year-olds report working together with their parents on science homework more than a few times a month. Since somewhat fewer of these students reached level 3 or higher, this may indicate that the increased parental involvement is a result of the difficulty these students are having with science.

work together on your homework in other subjects?

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|--------------------------------|-------------------------|--|
| <i>13-year-olds who report</i> | | |
| rarely or never | 33 | 61 |
| a few times a month | 35 | 57 |
| a few times a week | 26 | 51 |
| almost every day | 6 | 33 |
| <i>16-year-olds who report</i> | | |
| rarely or never | 60 | 81 |
| a few times a month | 30 | 78 |
| a few times a week | 10 | 68 |
| almost every day | 2 | 49 |

As might be expected, direct parental involvement decreases as students become older. However, it is interesting to note again the apparent relationship between parental involvement and achievement.

discuss your daily activities?

| | <i>% of whole group</i> | <i>% of these students at level 3 or above</i> |
|--------------------------------|-------------------------|--|
| <i>13-year-olds who report</i> | | |
| rarely or never | 10 | 48 |
| a few times a month | 15 | 48 |
| a few times a week | 32 | 55 |
| almost every day | 44 | 60 |

16-year-olds who report

| | | |
|---------------------|----|----|
| rarely or never | 10 | 67 |
| a few times a month | 15 | 75 |
| a few times a week | 33 | 76 |
| almost every day | 43 | 84 |

There appears to be a much more positive relationship between discussing, or perhaps showing interest in, daily activities in general and student achievement than there does between direct involvement in homework and student achievement. Over 75% of both 13-year-olds and 16-year-olds discuss daily activities fairly frequently. These same students also appear to attain higher achievement.

Introduction

Approximately 6,500 responses were received to this questionnaire, which was addressed to teachers of the students who were selected to write the 1999 SAIP Science Assessment. The information collected deals with the work of the teachers and their approach to science teaching.

As with the other questionnaire data, detailed information will be available in the accompanying supplement to this report and in the technical report.

Selected Data

The information below was selected for inclusion in the public report to provide some indication of the types of questions asked and a range of the responses to them.

Note: The median is the value of the middle element of a set of responses, the element for which equal numbers of responses are below and above.

For example, when asked how many hours per week they were scheduled to teach biology/life science classes, the median was 5.5, in other words half of the teachers responding reported fewer than 5.5 hours, and half reported 5.5 or more hours.

Class Size

What is the AVERAGE number of students in the science classes you teach this year?

Median size is 24; 80% of teachers reported an average of 29 or fewer students.

LARGEST class size

Median size is 28; 20% of teachers reported a largest class of 33 or more students.

SMALLEST class size

Median size is 20; 75% of teachers reported a smallest class of 24 or fewer students.

Most classes appear to have between 20 and 30 students, although a few teachers reported classes as small as 10 and as large as 40.

Contact with Parents

About what percentage of parents would you say you have contact with, over a full school year, other than during regularly scheduled parent-teacher interviews?

At regularly scheduled parent-teacher interviews?

Median is 30%; with 60% of teachers reporting they had contact in this manner with 40% or fewer parents.

At times other than during regularly scheduled interviews?

Median is 9%; with 80% of teachers reporting they had contact in this manner with 28% or fewer parents.

Teachers report relatively little parental contact, which is worth noting, particularly considering comments by students and teachers about the importance of parental involvement.

Teacher Attitudes toward Science Teaching

About how often do you meet with other teachers to plan lessons, units, tests, or other program matters?

| | |
|---------------------------|------|
| never | 7.8 |
| once or twice a year | 22.6 |
| about every other month | 11.9 |
| about once a month | 18.2 |
| about once a week | 20.7 |
| two or three times a week | 10.8 |
| almost every day | 7.0 |

43% of teachers collaborate with colleagues less than once a month for program planning. This may reflect the fact that many teachers are the only science teacher in a small school.

To what extent do you agree or disagree with each of the following statements?

| | <i>strongly disagree</i> | <i>disagree</i> | <i>agree</i> | <i>strongly agree</i> |
|---|--------------------------|-----------------|--------------|-----------------------|
| Science is primarily a body of knowledge and concepts. | 9.5 | 47.8 | 38.7 | 4.0 |
| Science is better thought of as a process than as a body of knowledge and concepts. | 0.7 | 9.6 | 59.3 | 30.4 |
| Science is primarily concerned with finding theories to explain observed events. | 3.3 | 36.6 | 53.6 | 6.5 |
| There are limits to what a teacher can accomplish because student ability has a large influence on achievement. | 3.7 | 29.7 | 54.9 | 11.8 |
| Students need natural talent to do well in science courses | 17.0 | 64.6 | 17.3 | 1.1 |
| Students need to work hard to do well in science courses. | 0.8 | 11.8 | 68.0 | 19.5 |
| A student's home environment has an influence on achievement. | 0.4 | 2.0 | 46.5 | 51.0 |
| High school students should be streamed into different programs based on their abilities. | 3.3 | 20.6 | 54.2 | 21.9 |

The preceding table provides a number of interesting sidelights on teacher attitudes toward their students and the subject of science.

- *Over 42% of teachers agree that science is primarily a body of knowledge and concepts, but nearly 90% say science is better thought of as a process.*
- *Nearly 90% agree that a student's home environment has an influence on achievement (see parental contact, above).*
- *Over 75% feel high school students should be streamed, based on abilities.*

Classroom Strategies

How often do the following things happen in your science classes?

| | <i>rarely or never</i> | <i>a few times a month</i> | <i>a few times a week</i> | <i>almost every class</i> |
|--|------------------------|----------------------------|---------------------------|---------------------------|
| I give notes. | 4.3 | 20.6 | 45.3 | 29.9 |
| I show students how to do problems. | 2.9 | 19.6 | 48.1 | 29.5 |
| Students work on long-term science projects. | 41.5 | 52.3 | 5.5 | 0.8 |
| Students work in pairs or small groups. | 3.5 | 30.8 | 42.8 | 22.9 |
| Students do laboratory experiments. | 6.6 | 52.0 | 35.4 | 6.0 |
| I demonstrate an experiment. | 16.5 | 61.6 | 20.0 | 1.9 |
| We discuss a coming quiz or test. | 4.3 | 69.1 | 23.4 | 3.3 |
| I give feedback to the class on assignments, tests, or other evaluations. | 1.4 | 44.0 | 39.5 | 15.1 |
| I attempt to diagnose and correct individual student problems or weaknesses in learning. | 4.6 | 30.2 | 39.3 | 25.9 |

| | <i>rarely or never</i> | <i>a few times a month</i> | <i>a few times a week</i> | <i>almost every class</i> |
|---|--------------------------------|------------------------------------|-----------------------------------|-----------------------------------|
| Students work alone on assigned work. | 9.2 | 29.1 | 49.1 | 12.6 |
| Students study the textbook. | 29.1 | 32.4 | 30.5 | 8.0 |
| I read from or summarize the textbook. | 37.9 | 29.3 | 25.0 | 7.8 |
| I help students develop general learning strategies. | 3.8 | 34.8 | 37.7 | 23.7 |
| We go outdoors or on a field trip. | 79.4 | 19.2 | 1.3 | 0.2 |
| I work with individual students. | 3.6 | 25.6 | 37.8 | 33.0 |
| We discuss or do things other than the topic of the lesson. | 19.2 | 47.5 | 25.7 | 7.7 |

This table show that teachers use a wide variety of strategies in the classroom. Perhaps most interesting is that nearly 80% of teachers rarely or never take classes outdoors or on a field trip.

Assessment Strategies

In assessing the work of students in your science courses, how much weight do you give each of the following?

| | <i>none</i> | <i>a little</i> | <i>quite a lot</i> | <i>great deal</i> |
|---|-------------|---------------------|------------------------|-----------------------|
| standardized tests produced outside the school | 58.4 | 27.1 | 10.9 | 3.6 |
| teacher-made short answer or essay tests that require students to explain their reasoning | 2.5 | 25.9 | 57.5 | 14.1 |
| teacher-made multiple-choice, true-false, or matching tests | 5.4 | 33.8 | 50.1 | 10.7 |
| homework assignments | 6.9 | 51.5 | 36.4 | 5.2 |
| projects or laboratory exercises | 2.2 | 35.0 | 54.2 | 8.6 |
| portfolios of student work | 65.2 | 25.1 | 7.8 | 1.9 |
| observations or interviews of students | 47.1 | 40.9 | 10.7 | 1.3 |
| attendance in class | 54.2 | 28.6 | 11.1 | 6.1 |
| participation of students in class activities | 22.0 | 47.8 | 23.2 | 7.0 |
| effort | 19.1 | 42.7 | 27.7 | 10.5 |
| improvement over the year or term | 31.6 | 37.8 | 23.6 | 7.0 |
| other | 60.2 | 30.2 | 7.9 | 1.7 |
| student self-assessment | 57.4 | 35.6 | 5.9 | 1.1 |
| peer evaluation | 63.2 | 33.1 | 3.3 | 0.5 |

Again, as one would expect, this table shows that teachers use a great variety of assessment strategies. Some particularly interesting data:

- Only about 14% of teachers give much weight to external standardized tests when assessing students.
- 37% give little or no weight to projects or laboratory exercises.
- Only 12% give much weight to observations or interviews with students.
- Only 7% give much weight to self-assessment.

Teacher Qualifications

Which of the following degrees or diplomas do you hold?

(Check all that apply)

| | |
|--|------|
| B.A. or equivalent | 18.4 |
| B.Sc. or equivalent | 49.2 |
| B.Ed. or equivalent (e.g., at least one year teacher training) | 71.2 |
| Trade or technical diploma or equivalent | 3.4 |
| Master's degree in education | 9.3 |
| Master's degree in another subject | 6.5 |
| Ph.D. or equivalent | 1.1 |
| Other degree or diploma | 14.8 |
| No degree or diploma | 0.5 |

This table contains some rather startling data. Only half hold a science degree, and less than three-quarters have the equivalent of one year of teacher training.

Introduction

Approximately 2,000 responses were received to this questionnaire, which was addressed to the school principal. The information collected deals with the nature of the community, the school itself, and the resources available.

As with the other questionnaire data, detailed information will be available in the accompanying supplement to this report and in the technical report.

Selected Data

The information below was selected for inclusion in the public report to provide some indication of the types of questions asked, and a range of the responses to them.

Note: The median is the value of the middle element of a set of responses, the element for which equal numbers of responses are below and above.

For example, when asked how many full-time students were in their school, the median was 398 students, i.e., half of the schools reported more than 398, and half reported 398 or fewer students.

Principals were asked approximately what percentage of their students:

a) live within walking distance (about 1 km) of the school? Median = 24%

As many as 25% of schools reported that 60% or more of their students did so.

b) travel to and from school by subsidized transportation? Median = 60%

As many as 45% of schools reported that more than half their students did so.

c) have a first language other than the language of the school? Median = 1%

Yet more than 10% of schools reported that this was true for more than 80% of their students.

d) have learning problems that need special attention? Median = 9%

More than 10% of schools reported that more than 25% of their students had special needs.

e) come from single parent families? Median = 19%

More than 25% of schools reported that more than 30% of students came from such families.

f) have health or nutrition problems that inhibit learning? Median = 4%

More than 80% of the schools reported less than 10% of their students with these problems.

Principals were asked how much influence each of the following had on their overall activities and programs.

The following figures represent the percentages who reported “some” or “a lot” on a four-point scale for selected categories.

| | | |
|----|--|----|
| a) | provincial/territory ministry or department of education | 91 |
| b) | school board or governing body | 86 |
| c) | principal | 96 |
| d) | teachers collectively | 94 |
| e) | parent advisory committee or school council | 55 |
| f) | students (e.g. demand for particular courses) | 53 |
| g) | teacher groups external to the school | 23 |
| h) | external examinations, tests, or standards | 56 |

Principals were asked to what degree the school’s capacity to provide instruction is limited by the following:

The following figures represent the percentages who reported “some” or “a lot” on a four-point scale for selected categories.

| | | |
|----|---|----|
| a) | lack of parental support for the school | 41 |
| b) | range of student abilities in the school | 46 |
| c) | students’ home backgrounds | 58 |
| d) | community conditions (e.g. language, migration) | 34 |
| e) | bussing of students | 24 |

Principals were asked to what degree the school’s capacity to provide instruction is limited by shortage or inadequacy of the following:

The following figures represent the percentages who reported “some” or “a lot” on a four-point scale for selected categories.

| | | |
|----|--|----|
| a) | teachers specialized in science | 28 |
| b) | numbers of computers for science instruction | 66 |
| c) | quality of computers for science instruction | 52 |
| d) | science laboratory space | 38 |
| e) | science laboratory equipment | 45 |

Over half of the schools reported more than 50 working computers in their school, with over three-quarters reporting more than 100 working computers.

Principals were asked to what extent they agree with a series of statements.

The following percentages represent those who “agreed” or “agreed strongly” on a four-point scale.

| | |
|---|----|
| There are limits to what a school can accomplish because a student’s home environment has a large influence on achievement. | 78 |
| Students can achieve at high levels if they work hard. | 93 |
| High school students should be streamed into different programs based on their abilities and aptitudes. | 93 |
| Students can achieve at high levels if they are taught well. | 74 |
| Student ability has a large influence on achievement. | 86 |
| This school is supported by the community. | 91 |
| Staff morale is high in this school. | 87 |
| There is a strong school spirit in this school. | 88 |
| Students and staff take pride in this school. | 94 |