The International Computer and Information Literacy Study (ICILS) is a computer-based assessment that investigates the ways in which young people understand and use information and communication technology (ICT) in the digital age. This study is the first of its kind to assess Grade 8 students’ acquisition of computer information literacy (CIL) skills using an international comparative research perspective.

ICILS is a program of the International Association for the Evaluation of Educational Achievement (IEA) and was first administered in 2013. It was designed because of the increasing need for ICT-related literacies to be developed for citizens to function effectively in the digital age and in order to help policy makers and educators better understand the contexts and outcomes of ICT-related education programs.

The Council of Ministers of Education, Canada (CMEC) coordinated Canada’s participation in ICILS 2013. Ontario was one of two Canadian provinces that participated. Ontario’s participation was coordinated by EQAO on behalf of the provincial government. This report presents an overview of the Ontario results. Full Ontario results are available in the report *ICILS 2013—Preparing for Life in a Digital Age: Results from Ontario and Newfoundland and Labrador.*
ICILS assesses Grade 8 students’ CIL skills. CIL is defined as the ability to use computers to investigate, create and communicate in order to participate effectively at home, at school, in the workplace and in society.1

The facets of CIL evaluated in ICILS 2013 were categorized under two main strands, each with various aspects.

### Collecting and Managing Information

#### Understanding computer use
- e.g., knowledge of the general characteristics and functions of computers

#### Accessing and evaluating information
- e.g., the ability to find, retrieve and judge the relevance, integrity and usefulness of computer-based information

#### Managing information
- e.g., the ability to adapt the organization and storage of information so that it can be used or reused efficiently

### Producing and Exchanging Information

#### Transforming information
- e.g., the ability to use computers to change how information is presented so that it is clearer for specific audiences and purposes

#### Creating information
- e.g., the ability to use computers to design and generate original information products for specified purposes and audiences

#### Sharing information
- e.g., the ability to use computers to communicate and exchange information with others

#### Using information safely and securely
- e.g., an understanding of the legal and ethical issues of computer-based communication
ICILS was designed to provide students with a computer-based assessment experience that would closely mirror their real-life experiences using CIL and allow them to demonstrate their skills in realistic settings. Students were asked to complete three types of tasks in ICILS 2013.

### Information-Based and Response Tasks
- Included multiple-choice, constructed-response or drag-and-drop questions
- Assessed students’ basic knowledge and understanding of CIL

### Skills Tasks
- Included completing a series of actions (e.g., copying or saving a document)
- Required students to execute specific commands while processing information

### Authoring Tasks
- Included modifying and creating information products
- Required students to use multiple applications at once (e.g., e-mail or web pages)

Student responses on these tasks were combined to produce an overall CIL score.

Four questionnaires were also administered as part of ICILS 2013 to provide important contextual information to support the interpretation of the achievement results.

### Student Questionnaire
- Administered to participating Grade 8 students
- Covered background characteristics, experience and attitudes about the use of computers

### Teacher Questionnaire
- Administered to a random sample of Grade 8 teachers in selected schools
- Focused on background characteristics, the use of ICT in teaching and attitudes about the use of ICT in teaching and learning

### Principal Questionnaire
- Completed by the principal of each participating school
- Covered school characteristics and school approaches to the use of ICT in teaching

### ICT-Coordinator Questionnaire
- Administered to the ICT coordinator of each participating school
- Focused on the ICT available in schools and the resources and support available for its use

A National Context Survey was also completed by the national research centre of each participating country. In Canada, the Council of Ministers of Education, Canada (CMEC) was appointed by the provinces to act as the national research centre and coordinate this study.
Twenty countries participated in ICILS 2013.

In Canada, only two provinces participated—Ontario and Newfoundland and Labrador.

Since a representative sample of Ontario students (English and French) participated in ICILS 2013, valid and reliable comparisons between Ontario and the other participating jurisdictions are possible.

In total, approximately 60,000 students from about 3,300 schools participated in ICILS 2013. In Ontario, approximately 3,700 students from nearly 200 schools participated.

Achievement Results

Ontario’s performance on ICILS 2013 was significantly above the international average.

ICILS 2013 scores are on a scale with an average of 500 points and a standard deviation of 100, meaning that approximately two-thirds of all students scored between 400 and 600 points.

Students in Ontario had an average score of 547 points, which is 47 points above the international average.

Note: The ICILS assessment was not designed to test equal proportions of all aspects of the CIL construct, so comparisons of achievement at the strand or aspect level are not possible.
No participating jurisdiction performed better than Ontario on ICILS 2013.

The Czech Republic and Australia performed as well as Ontario. A difference is statistically significant when there is no overlap of confidence intervals.

More Ontario students achieved the highest levels of proficiency in CIL than the international average.

More than one-third of Ontario students achieved the two highest levels of proficiency (Levels 3 and 4). The international average was less than one-quarter.
In Ontario, female students outperformed male students in CIL.

The trend of female students outperforming male students was evident in most countries. Ontario’s gender gap of 25 points was larger than the international average (18 points).

In Ontario, students in the English school system outperformed students in the French school system in CIL.

This achievement gap in Ontario is consistent with previous large-scale assessments. The results of the Programme for International Student Assessment (PISA) 2012 show that Ontario students enrolled in the English-language school system outperformed those enrolled in the French-language school system in both computer-based mathematics and digital reading.

There is a significant difference in CIL scores for Ontario students based on immigration status.

The results show a significant difference in CIL scores between students with at least one parent born in Canada and students with both/only parents born in another country. In contrast, the problem-solving component of PISA 2012 found no difference in the results in computer-based problem solving between students born in Canada and students with an immigrant background.

Note: While the confidence bands in Chart 6 overlap slightly, an additional statistical test confirmed the difference is significant.
The vast majority of Grade 8 students in Ontario reported they have extensive experience with computers.

Ontario students’ experience with computers is more extensive than the international average.

Fully 95% of Ontario students have been using computers for at least three years.

More than half of Ontario students (58%) have been using computers for seven years or more, which means since the beginning of their formal schooling, compared to 36% internationally.

There was a positive relationship between the number of years students have used computers and average CIL scores in Ontario and internationally on ICILS 2013.

In Ontario, students who have used computers for less than three years had an average score of 498, while students who have used computers for seven years or more had an average score of 554. One year of computer experience in Ontario is associated with an increase of seven CIL score points.
Most Ontario students reported they have high levels of confidence using computers to do basic tasks.

Ontario students’ confidence using computers to do basic tasks is higher than the international average (based on an aggregate scale).

There is no difference in student confidence using computers to do basic tasks between the genders in Ontario or internationally.

There was a positive relationship between basic ICT skills and students’ CIL achievement scores in Ontario and internationally on ICILS 2013.

A difference of 50 points was found between the lowest and highest quartiles for Ontario, compared to 60 points internationally. This means that there is a smaller difference in achievement between students with low self-efficacy and those with high self-efficacy in Ontario than in other participating jurisdictions.
While most Ontario students reported confidence using computers to do basic tasks, fewer Ontario students reported confidence using computers to do advanced tasks.

Ontario students’ confidence using computers to do advanced tasks is lower than the international average in most cases (based on an aggregate scale).

More male students in Ontario reported being confident using computers to do advanced tasks than females. This difference, favouring males, was consistent in all participating countries.

This is particularly interesting considering that female students outperformed male students in CIL in most countries.
Most Ontario students reported they have high interest and enjoyment using computers.

Ontario students’ interest and enjoyment using computers is slightly higher than other participating countries (based on an aggregate scale).

In Ontario, more male students reported favourable attitudes toward computers than female students. This gender difference was consistent across all participating countries and with findings from other studies.

The statements about interest and enjoyment using computers that the highest percentage of Ontario students agreed with are:

- I think using a computer is fun (96%)
- I enjoy using the Internet to find out information (93%)
- I like learning how to do new things using a computer (93%)

The statement about interest and enjoyment using computers that the lowest percentage of Ontario students agreed with is:

- I use a computer because I am very interested in the technology (72%)
Students’ interest and enjoyment in using ICT is positively associated with their CIL achievement scores in Ontario and internationally. This means that students who enjoy computers more and are more interested in using them performed better on the assessment internationally and in Ontario. The difference between the lowest quartile and the highest quartile of interest and enjoyment is 19 points for Ontario and 17 internationally.

The vast majority of Ontario teachers reported that they have solid experience using computers for teaching. Fully 95% of teachers in Ontario have been using computers for teaching for at least two years (the highest category reported).
Ontario teachers reported high levels of confidence performing ICT tasks.

Ontario teachers’ reported confidence is higher than that of teachers in other participating jurisdictions (based on an aggregate scale).

Chart 15: Percentage of Teachers Who Said They Could Perform Each ICT Task

The ICT tasks that the highest percentage of Ontario teachers reported they were confident with are:

- Producing a letter using a word-processing program (99%)
- E-mailing a file as an attachment (98%)
- Finding useful teaching resources on the Internet (97%)
- Using the Internet for on-line purchases and payments (96%)

The ICT task that the lowest percentage of Ontario teachers reported they were confident with is:

- Using a spreadsheet program for keeping records or analyzing data (80%)
In Ontario, teachers have highly positive attitudes about ICT in teaching and learning at school. Ontario teachers’ attitudes about ICT in teaching and learning at school are more positive than those of teachers in other countries (based on an aggregate scale).

Chart 16: Percentage of Teachers Who Agreed with Positive and Negative Statements About ICT

At least 70% of surveyed teachers in Ontario agreed with each positive view about the use of ICT in teaching and learning, while less than 33% agreed with each negative view about the use of ICT in teaching and learning.

The statements about the attitudes toward the use of ICT in teaching that the highest percentage of Ontario teachers agreed with are:
- Gives students better access to sources of information (98%)
- Helps students develop greater interest in learning (95%)
- Helps students to consolidate and process information more effectively (92%)

The statements about the attitudes toward the use of ICT in teaching that the lowest percentage of Ontario teachers agreed with are:
- Only distracts students from learning (11%)
- Only introduces organizational problems for schools (12%)
School Policies and Practices for ICT Use

Most Ontario schools have various ICT resources available, including technology resources, software resources and computer resources, according to ICT coordinators.

The Ontario averages for availability of ICT resources were generally equal to or higher than the international averages.

Technology Resources

The technology resources that the most schools reported having available are:

- Access to the World Wide Web (100%)
- Access to an education site or network (99%)
- Computer-based information resources (99%)
- Mail accounts for teachers (99%)

The technology resource that the fewest schools reported having available is:

- E-mail accounts for students (58%)
Software Resources

The software resources that the most schools reported having available are:

» Presentation software (99%)
» Word-processing, databases and spreadsheets (99%)
» Communication software (97%)
» Digital learning games (96%)
» Graphing or drawing software (94%)

The software resource that the fewest schools reported having available is:

» Simulations and modelling software (67%)

Computer Resources

The computer resources that the most schools reported having available are:

» Access to a local area network (97%)
» Space on a school network for students (96%)
» Internet-based applications for collaborative work (79%)

The computer resource that the fewest schools reported having available is:

» A learning management system (46%)
Most Ontario schools also have procedures in place for the use of ICT, according to principals.

In some areas of ICT use, more Ontario schools have procedures than other participating jurisdictions. In other areas of ICT use, fewer Ontario schools have such procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>International (%)</th>
<th>Ontario (%)</th>
</tr>
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<tbody>
<tr>
<td>Providing students with laptop computers and/or mobile devices for use at school and at home</td>
<td>35</td>
<td>69</td>
</tr>
<tr>
<td>Giving the local community access to school computers and/or the Internet</td>
<td>47</td>
<td>41</td>
</tr>
<tr>
<td>Playing games on school computers</td>
<td>68</td>
<td>82</td>
</tr>
<tr>
<td>Prohibiting access to inappropriate material (e.g., pornography)</td>
<td>97</td>
<td>100</td>
</tr>
<tr>
<td>Honouring intellectual property rights (e.g., software copyrights)</td>
<td>89</td>
<td>95</td>
</tr>
<tr>
<td>Granting student access to school computers outside school hours</td>
<td>52</td>
<td>41</td>
</tr>
<tr>
<td>Offering student access to school computers outside class hours</td>
<td>68</td>
<td>80</td>
</tr>
<tr>
<td>Restricting the number of hours students are allowed to sit at a computer</td>
<td>29</td>
<td>52</td>
</tr>
<tr>
<td>Setting up security measures to prevent unauthorized system access</td>
<td>94</td>
<td>97</td>
</tr>
</tbody>
</table>

The areas of ICT use in which the most Ontario schools reported having procedures are:

- Prohibiting access to inappropriate material (100%)
- Setting up security measures to prevent unauthorized system access (97%)
- Honouring of intellectual property rights (95%)

The area of ICT use in which the fewest Ontario schools reported having procedures is:

- Restricting the number of hours students are allowed to sit at a computer (29%)
Most Ontario schools put a priority on facilitating the use of ICT for teaching and learning, according to principals.

However, the priority Ontario schools put on facilitating the use of ICT in teaching and learning was generally lower than that of the ICILS participating countries.

The areas in which the most Ontario schools put medium or high priority on the use of ICT are:

- Increasing the range of digital learning resources (93%)
- Increasing the number of computers per student in the school (90%)
- Providing for participation in professional development on pedagogical use of ICT (86%)

The area in which the fewest Ontario schools put priority on the use of ICT is:

- Providing more time for teachers to prepare lessons in which ICT is used (55%)
Obstacles to the Use of ICT for Teaching and Learning

Significant percentages of Ontario schools face various types of obstacles to the use of ICT for teaching and learning, according to both teachers and ICT coordinators.

The percentage of Ontario teachers who reported that various obstacles hinder the use of ICT for teaching and learning was higher than the percentage of teachers in other jurisdictions. The percentage of ICT coordinators in Ontario who reported that various obstacles hinder the use of ICT for teaching and learning was higher than the international average in about half the cases and lower in the other half of cases.

Among Ontario teachers, the two most highly reported obstacles to the use of ICT are:

- Insufficient provision for me to develop expertise in ICT (62%)
- Insufficient time to prepare lessons that incorporate ICT (60%)

The least highly reported obstacle to the use of ICT is:

- ICT is not considered a priority for use in teaching (20%)
Obstacles to the Use of ICT for Teaching and Learning  Continued

Among Ontario ICT coordinators, the two most highly reported obstacles to the use of ICT are:

- A lack of ICT skills among teachers (80%)
- Not enough computers for instruction (66%)

The least highly reported obstacle to the use of ICT is:

- Too few computers connected to the Internet (29%)

Full Ontario achievement and questionnaire results are available in the report ICILS 2013—Preparing for Life in a Digital Age: Results from Ontario and Newfoundland and Labrador. The Canadian results of the National Context Survey are also included in the full report.