Measuring up: Canadian Results of the OECD PISA 2015 Study

The Performance of Canadian 15-Year-Olds in Collaborative Problem Solving







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Note of appreciation

The Council of Ministers of Education (Canada) thanks the students, teachers, and administrators whose participation in the Programme for International Student Assessment ensured its success. The quality of your commitment has made this study possible. We are truly grateful for your contribution to a pan-Canadian understanding of educational policy and practices in science, reading, and mathematics of 15-year-olds.

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ISBN 978-0-88987-508-1

Ce rapport est également disponible en français.

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Introduction

The skills and knowledge of a population are crucial to the well-being of both individuals and society. For individuals, high skill levels contribute to economic security and personal fulfillment; for society, they promote productivity and economic growth.

In Canada—as in most countries—education systems recognize that competencies beyond knowledge and skills in core subject areas are critical: these competencies are required for learning and fully participating in modern society. The skills needed to perform non-routine tasks, adapt to new circumstances, and learn from one's mistakes are increasingly needed in today's workplace. To assess these skills, both the 2003 and the 2012 Programme for International Student Assessment (PISA) included an individual problem-solving assessment to evaluate how well students were able to solve non-routine problems on their own. Yet much of the problem-solving work carried out in the world today is performed by teams in an increasingly global and computerized economy. Therefore, today's workplaces require people who can solve problems in concert and collaboration with others by combining their ideas and efforts (OECD, 2017b).

Equipping students with collaboration skills, in addition to developing their cognitive abilities, is increasingly a goal of today's education systems. However, in general, collaboration is not a skill that is explicitly taught in schools but is, rather, acquired as a result of teaching approaches in academic subjects. For example, when teaching traditional academic subjects, teachers may often ask students to work in groups. Despite the increased importance placed on collaboration skills, very few attempts have been made to assess how well students collaborate with one another. To address this data gap, PISA 2015 introduced for the first time a collaborative problem-solving assessment to measure the ability of 15-year-olds to collaborate in order to solve problems.

This report provides a high-level description of the Canadian results from the collaborative problem-solving component of PISA 2015. All of the scores are reported at an aggregate level only, never at the student level. The following pages describe what PISA is, how collaborative problem solving is defined, and how it was measured in the assessment. A description of the PISA framework for collaborative problem solving is included in this Introduction, which provides detailed information about how the assessment was designed to ensure that the test items provided adequate coverage of the domain. The PISA 2015 test questions are highly confidential and cannot be shared. However, a publicly released collaborative problem-solving task from PISA 2015 is presented in Appendix A.

Chapter 1 provides information on the performance of Canadian 15-year-old students on the PISA 2015 assessment in collaborative problem solving. Further, it looks at the collaborative problem-solving performance of students by language of the school system, gender, immigrant status, and socioeconomic status. Chapter 1 also explores the extent to which students' performance in reading, mathematics, and science is associated with their performance in collaborative problem solving. Finally, that chapter examines the extent to which students' performance on the collaborative problem-solving assessment in PISA 2015 is correlated with the individual problem-solving assessment in PISA 2012.

Chapter 2 presents results on student attitudes toward cooperation and how these are associated with their performance in collaborative problem solving. The major findings in relation to the PISA 2015 collaborative problem-solving assessment are summarized in the Conclusion.

What is PISA?

PISA is a collaborative effort among member countries of the Organisation for Economic Co-operation and Development (OECD).¹ Conducted every three years, it is a survey of 15-year-old students from around the world. PISA assesses the students' levels of key knowledge and skills that are essential for full participation in modern societies. The survey measures the core subject areas of reading, mathematics, and science, as well as an innovative domain. In 2015, the innovative domain was computer-based collaborative problem solving.

PISA does not measure academic achievement in relation to specific school curricula. Instead, it focuses on students' abilities to apply knowledge and skills and to analyze, reason, and communicate effectively as they examine, interpret, and solve problems. Through a student background questionnaire, PISA also asks students about their motivation, beliefs about themselves, and learning strategies. The PISA results can help educators, policy-makers, and the public identify how education systems are similar and different, but these results cannot directly identify cause-and-effect relationships between policies and student performance.

In total, over 500,000 15-year-olds from 72 countries and economies participated in PISA 2015, of which approximately 20,000 were from Canada. Out of these countries and economies, 52 participated in the collaborative problem-solving option of PISA 2015.²

How does PISA define collaborative problem solving?

Problem solving was first tested in PISA 2003, when it was added to the core domains of mathematics, reading, and science. Selected students were asked to test their problem-solving skills using a paper-based assessment. In this domain of the assessment, Canadian students performed significantly above the OECD average. Only four of the 40 participating countries achieved a higher score than Canada (Bussière, Cartwright, & Knighton, 2004). In 2003, problem-solving skills were defined as follows:

An individual's capacity to use cognitive processes to confront and resolve real, cross-disciplinary situations where the solution path is not immediately obvious and where the literacy domains or curricular areas that might be applicable are not within a single domain of mathematics, science or reading. (OECD, 2003, p. 156)

In 2012, testing of problem solving was enriched by the introduction of a computer-based assessment. Once again, Canadian students performed significantly above the OECD average. This time, seven of the 44 participating countries and economies achieved a higher score than Canada (CMEC, 2014). The 2012 definition of problem-solving competencies largely reiterated the 2003 definition, but added an affective element:

Problem-solving competency is an individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one's potential as a constructive and reflective citizen. (OECD, 2013, p. 122)

¹ For further details about PISA, see O'Grady, Deussing, Scerbina, Fung, and Muhe, 2016.

² The 52 countries that participated in the collaborative problem-solving component include 32 OECD countries – Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Turkey, the United Kingdom, and the United States. In addition, 20 non-OECD countries and economies participated: Beijing, Shanghai, Jiangsu, Guangdong (BSJG)–China, Brazil, Bulgaria, Chinese Taipei, Colombia, Costa Rica, Croatia, Cyprus, Hong Kong–China, Lithuania, Macao–China, Malaysia, Montenegro, Peru, the Russian Federation, Singapore, Thailand, Tunisia, the United Arab Emirates, and Uruguay. Throughout this report, the "OECD average" refers to the 32 OECD countries that participated in PISA 2015.

In defining the domain of collaborative problem solving for PISA 2015, the aspect of collaboration is the most salient addition to previous definitions. In PISA 2015, collaborative problem-solving skills were defined as follows:

The capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution. (OECD, 2017a, p. 134)

The PISA framework for collaborative problem solving

The PISA 2015 framework for assessing collaborative problem solving identifies two major components: the cognitive aspects common to individual problem solving and the collaborative aspects unique to collaborative problem solving.

As in PISA 2012, the 2015 framework identified four processes in individual problem solving: exploring and understanding, representing and formulating, planning and executing, and monitoring and reflecting.

PISA 2015 also identified three major competencies essential to collaborative problem-solving skills: establishing and maintaining shared understanding, taking appropriate action to solve the problem, and establishing and maintaining team organization. These three collaborative problem-solving competencies were crossed with the four individual problem-solving processes to form a matrix of twelve specific skills, as illustrated in Table I.1. See Appendix A for sample tasks that are designed to assess these processes and competencies.

	Table I.1								
	Matrix of collaborative problem-solving skills for PISA 2015								
		Collat	borative problem-solving compete	encies					
		(1) Establishing and maintaining shared understanding	(2) Taking appropriate action to solve the problem	(3) Establishing and maintaining team organization					
Individual problem-solving processes	(A) Exploring and understanding	(A1) Discovering perspectives and abilities of team members	(A2) Discovering the type of collaborative interaction to solve the problem, along with goals	(A3) Understanding roles to solve the problem					
	(B) Representing and formulating	(B1) Building a shared representation and negotiating the meaning of the problem (common ground)	(B2) Identifying and describing tasks to be completed	(B3) Describing roles and team organization (communication protocol/rules of engagement)					
	(C) Planning and executing	(C1) Communicating with team members about the actions to be/being performed	(C2) Enacting plans	(C3) Following rules of engagement (e.g., prompting other team members to perform their tasks)					
	(D) Monitoring and reflecting	(D1) Monitoring and repairing the shared understanding	(D2) Monitoring results of actions and evaluating success in solving the problem	(D3) Monitoring, providing feedback on, and adapting the team organization and roles					

Source: Adapted from Figure V.3.5 in OECD, 2017b, p. 74.

Chapter 1

The Performance of Canadian Students in Collaborative Problem Solving in an International Context

This chapter presents the overall results of the PISA 2015 collaborative problem-solving assessment. In particular, the collaborative problem-solving performance of 15-year-old students across Canada and in the 10 provinces is compared to that of students in the other countries and economies that participated in the collaborative problem-solving assessment of PISA 2015. Following this summary, the performance of students enrolled in anglophone and francophone school systems in Canada is presented for those provinces in which the two groups were sampled separately. This chapter then examines how performance in collaborative problem solving is associated with student characteristics such as gender, immigrant background, and socioeconomic status. Next, given that some level of mathematical literacy and a basic reading proficiency are needed for problem solving (OECD, 2017b), the performance of students in collaborative problem solving is compared with their performance in mathematics, reading, and science. Students' performance in collaborative problem solving not only reflects their ability to solve problems but also measures their collaboration skills. As individual problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative problem-solving skills of 15-year-old students in 2012 with the collaborative prob

PISA achievement results by proficiency levels in collaborative problem solving

A continuous collaborative problem-solving scale was constructed for the 2015 PISA assessment to have a mean score of 500 among OECD countries, with about two-third of students across those countries scoring between 400 and 600. To help interpret what students' scores mean in substantive terms, the scale is divided into four proficiency levels. Tasks at the lower end of the scale (Level 1) are deemed easier and less complex than tasks at the higher end (Level 4). Students with a score within the Level 1 range (340–439) are expected to complete most Level 1 items successfully but are unlikely to be able to successfully complete items at higher levels. By contrast, students with scores in the Level 4 range (at or above 640) are likely to successfully complete any item included in the PISA assessment of collaborative problem solving. Table 1.1 provides a summary description of the tasks that students are able to do at the four proficiency levels of collaborative problem solving along with the corresponding lower score limit for each level.

		PISA 2015 collabo	rative problem-solving proficiency levels—summary description
Level	Lower score limit	Percentage of students able to perform tasks at this level or above	Task characteristics
4	640	7.9% of students across the OECD and 15.7% in Canada	At Level 4, students can successfully carry out complicated problem-solving tasks with high collaboration complexity. They can solve complex problems with multiple constraints, keeping relevant background information in mind. These students maintain an awareness of group dynamics and take actions to ensure that team members act in accordance with their agreed-upon roles. At the same time, they can monitor progress toward a solution and identify obstacles to overcome or gaps to be bridged. Level 4 students take initiative and perform actions or make requests to overcome obstacles and to resolve disagreements and conflicts. They can balance the collaboration and problem-solving aspects of a presented task, identify efficient pathways to a solution, and take actions to solve the given problem.
3	540	35.7% of students across the OECD and 49.5% in Canada	At Level 3, students can complete tasks with either complex problem-solving requirements or complex collaboration demands. These students can perform multi-step tasks that require integrating multiple pieces of information, often in complex and dynamic problems. They orchestrate roles within the team and identify information needed by particular team members to solve the problem. Level 3 students can recognize the information needed to solve a problem, request it from the appropriate team member, and identify when the provided information is incorrect. When conflicts arise, they can help team members negotiate a solution.
2	440	71.9% of students across the OECD and 81.6% in Canada	At Level 2, students can contribute to a collaborative effort to solve a problem of medium difficulty. They can help solve a problem by communicating with team members about the actions to be performed. They can volunteer information not specifically requested by another team member. Level 2 students understand that not all team members have the same information and can consider differing perspectives in their interactions. They can help the team establish a shared understanding of the steps required to solve a problem. These students can request additional information required to solve a problem and solicit agreement or confirmation from team members about the approach to be taken. Students near the top of Level 2 can take the initiative to suggest a logical next step, or propose a new approach, to solve a problem.
1	340	94.3% of students across the OECD and 96.6% in Canada	At Level 1, students can complete tasks with low problem complexity and limited collaboration complexity. They can provide requested information and take actions to enact plans when prompted. Level 1 students can confirm actions or proposals made by others. They tend to focus on their individual role within the group. With support from team members, and when working on a simple problem, these students can help find a solution to the given problem.

Source: Adapted from Figure V.3.5 in OECD, 2017b, p. 74.

Canadian students achieve a high level of proficiency in collaborative problem solving

In PISA 2015, 82 per cent of Canadian students and 72 per cent of students in OECD countries performed at or above Level 2 in collaborative problem solving, contributing to a collaborative effort to solve a problem of medium difficulty (Appendix B.1.1). Of all the participating countries and economies, only Japan, Singapore, Korea, Hong Kong–China, Macao–China, and Estonia had a significantly higher proportion of students performing at or above Level 2 than Canada. At the provincial level, the percentage of Canadian students at or above Level 2 ranged from 74 per cent in Saskatchewan to 87 per cent in British Columbia (Figure 1.1).

In this report, students performing below Level 2 are considered low achievers, whereas students performing at Level 4 are considered top performers (OECD, 2017b). In Canada, 18 per cent of students did not reach Level 2, compared to 28 per cent at the OECD average. More than 40 out of the other 51 participating countries and economies had a higher proportion of low-achieving students relative to Canada. Provincially, British Columbia (13 per cent) had a lower proportion of low achievers than the Canadian average, while Manitoba (23 per cent) and Saskatchewan (26 per cent) had a higher proportion of low achievers.



Figure 1.1

Note: Percentages may not add up to 100 because of rounding. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

Close to 16 per cent of Canadian students performed at Level 4, double that of the OECD average. Only Singapore had a greater proportion of top performers in collaborative problem solving than Canada, while five countries (New Zealand, Australia, Finland, Japan, and the United States) had a similar proportion. Provincially, close to one out of four students in British Columbia was a top performer, the highest share in Canada and across all participating countries and economies. In the remaining provinces, the proportion of top performers ranged from 10 per cent in Saskatchewan to 18 per cent in Alberta.

The PISA 2015 collaborative problem-solving assessment was not designed to assess either elementary collaboration skills or elementary problem-solving skills (OECD, 2017b). Hence, there are insufficient items to fully describe performance that fell below Level 1 on the collaborative problem-solving scale. However, this does not mean that those students not reaching Level 1 have no collaborative problem-solving skills. Across OECD countries, 6 per cent of students scored below Level 1, while this proportion was 3 per cent in Canada. Provincially, close to 5 per cent of students in Manitoba and Saskatchewan did not achieve Level 1 in collaborative problem solving, compared to 2 per cent in British Columbia.

PISA achievement results by average scores in collaborative problem solving

International studies such as PISA summarize student performance by comparing the relative standing of countries based on their average test scores. This approach can be misleading because there is a margin of error associated with each score (see "A note on statistical comparisons" in the box below).

When interpreting the differences in average performance between countries, only those differences in average performance that are statistically significant should be taken into account.

A note on statistical comparisons

The average proportions of students at proficiency levels and students' mean scores were computed from the scores of random samples of students from each country and not from the population of students in each country. It cannot be said with certainty that a sample average has the same value as the population average that would have been obtained had all 15-year-old students been assessed. Additionally, a degree of error is associated with the scores describing student performance, as these scores are estimated based on student responses to test items. Given these considerations, a statistic, called the *standard error*, is used to express the degree of uncertainty associated with both sampling and measurement error. The standard error can be used to construct a *confidence interval*, which provides a means of making inferences about the population averages and proportions in a manner that reflects the uncertainty associated with sample estimates. A 95 per cent confidence interval is used in this report and represents a range of plus or minus about two standard errors around the sample average. When using this confidence interval, it can be inferred that the population proportion or mean would lie within the confidence interval in 95 out of 100 replications of the measurement, using different samples randomly drawn from the same population.

When comparing scores among countries, provinces, or population subgroups, readers should consider the degree of error in each average to determine whether averages are significantly different from each other. Standard errors and confidence intervals may be used as the basis for performing these comparative statistical tests. Such tests can identify, with a known probability, whether there are actual differences in the populations being compared.

For example, when an observed difference is significant at the .05 level, it implies that the probability is less than .05 that the observed difference could have occurred because of sampling or measurement error. When comparing countries, economies, and provinces, researchers make extensive use of this type of statistical test to reduce the likelihood that differences resulting from sampling or measurement errors will be interpreted as real.

A test of significance (*t-test*) was conducted in order to determine whether differences were statistically significant. In the case of multiple t-tests, no corrections were made to reduce the false positive, or Type-I error rate. **Unless otherwise stated, only statistically significant differences at the .05 level are noted in this report, for proportions of students at proficiency levels and mean scores.**

This report makes a number of references to an *average index*. Such indices are constructed by summarizing responses from students to a series of related questions, in which several individual questionnaire items are reduced to a single index score, hence facilitating further in-depth analysis.

Canadian students perform well in collaborative problem solving in a global context

On average, Canadian 15-year-old students performed well in collaborative problem solving (Figure 1.2). Canadian students had an average score of 535, well above the OECD average of 500 (Appendix B.1.2). As Figure 1.2 shows, among 52 countries and economies that participated in the collaborative problem-solving assessment of PISA 2015, only Singapore and Japan outperformed Canada. Students in Hong Kong–China, Korea, Estonia, Finland, Macao–China, New Zealand, and Australia performed as well as students in Canada in collaborative problem solving. The averages of the students in all the remaining countries and economies were significantly below that of Canada.

Figure 1.2



Estimated average scores and confidence intervals in collaborative problem solving

Note: OECD countries appear in italics. The coverage of Malaysia is too small to ensure comparability. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

All Canadian provinces perform above the OECD average

At the provincial level, only students in British Columbia performed above the Canadian average in collaborative problem solving. With an average score of 561, they performed as well as students in Singapore and were not surpassed by any other participating country or economy.

Students in Prince Edward Island, Nova Scotia, Quebec, Ontario, and Alberta performed at the Canadian average, while students in Newfoundland and Labrador, New Brunswick, Manitoba, and Saskatchewan performed below the Canadian average. All provinces scored above the OECD average in collaborative problem solving.

Canada's top performers score higher in collaborative problem solving than their OECD counterparts

While average performance is useful in assessing the overall performance of students, it can mask significant variation within a country or economy. Further light can be shed on the performance within countries by examining the relative distribution of scores—specifically, the gap that exists between students with the highest and those with the lowest levels of performance. This gap is considered an indicator of the equity of educational outcomes, with a larger gap in performance between those in the highest decile (90th percentile) and those in the lowest decile (10th percentile) reflecting less equity.

For Canada overall, those in the highest decile scored 269 points higher in collaborative problem solving than those in the lowest decile (Appendix B.1.3). This figure compares to 246 points across all OECD countries that participated in collaborative problem solving. However, the average score of Canadian students in the lowest decile (397 points) was 23 points higher than that of students in the lowest decile across the OECD countries (375 points). It is also important to note that the higher than average disparity observed in Canada is a result of students in the highest decile scoring higher than students in the highest decile on average across the OECD countries (667 points compared to 621 points).

Figure 1.3 shows the difference in average scores between those in the lowest decile and those in the highest in collaborative problem solving for the provinces, Canada, and the OECD average. Differences range from 252 points in Quebec to 274 points in Manitoba. In all provinces, the difference in performance between high achievers and low achievers was greater than the OECD average, in large part because high achievers in the provinces performed significantly better than high achievers across the OECD countries.

Figure 1.3



Difference between high and low achievers in collaborative problem solving

Note: Canada, provinces, and the OECD average are ordered from the least to the greatest difference in average score between the 10th and 90th percentiles. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

In most Canadian provinces, students in majority-language school systems have higher performance in collaborative problem solving than students in minority-language school systems

In seven Canadian provinces (Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia), the sample was sufficiently large to allow separate reporting for students in the anglophone and francophone schools systems.³ Students belonging to the majority-language school system are those in anglophone schools in all provinces except Quebec.

At the pan-Canadian level, the difference in collaborative problem solving between students in anglophone school systems and those in francophone school systems was not statistically significant (Appendix B.1.4 and Table 1.2). However, across the provinces, students in majority-language school systems outperformed their peers in minority-language school systems in six of the seven provinces where such differences were measured. The differences between systems varied from 31 points in New Brunswick to 54 points in Nova Scotia. No statistically significant difference in performance between the two school systems was found in Quebec.

³ Within anglophone school systems, students in French Immersion programs typically completed the collaborative problem-solving component in English.

Table 1.2

					· · ·			
	Anglophone school system		Francophone s	chool system	Difference between systems			
	Average	S.E.	Average	S.E.	Score difference	S.E.		
Nova Scotia	534	(4.8)	480	(8.4)	54	(9.6)		
New Brunswick	525	(6.5)	494	(8.5)	31	(10.0)		
Quebec	526	(7.4)	535	(5.3)	-9	(9.6)		
Ontario	534	(4.6)	485	(5.9)	49	(8.0)		
Manitoba	520	(5.6)	486	(9.0)	34	(10.6)		
Alberta	543	(5.8)	490	(10.5)	53	(11.4)		
British Columbia	562	(5.8)	522	(15.5)	40	(16.9)		
Canada	537	(2.7)	529	(4.8)	8	(5.8)		

Estimated average scores in collaborative problem solving by language of the school system

Note: Results in bold indicate a statistically significant difference between the anglophone and francophone school systems. A negative difference means that the result for the francophone school system is higher. The results for Canada include students from all provinces. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

Girls outperform boys in collaborative problem solving

Girls performed significantly better than boys in collaborative problem solving in all participating countries and all provinces. On average across OECD countries, girls outperformed boys in collaborative problem solving by 29 points, while in Canada this difference was 39 points. At the provincial level, the gender gap favouring girls ranged from 24 points in Quebec to 61 points in Prince Edward Island (Appendix B.1.5).

These results are in stark contrast to the gender differences observed on the assessment of individual problem solving in PISA 2012 (CMEC, 2014; OECD, 2014), where boys scored 7 points higher than girls on average across OECD countries, and 5 points higher in Canada.

The proportion of low achievers (below Level 2) in collaborative problem solving was higher for boys than girls in Canada and all provinces, where data are available. As well, more girls than boys achieved the highest level (Level 4) of performance in collaborative problem solving in Canada and all provinces, with the exception of Newfoundland and Labrador (Appendix B.1.6).

In most provinces, there is no performance gap between immigrant and non-immigrant students in collaborative problem solving

Across OECD countries participating in the collaborative problem-solving assessment, 12 per cent of students identified themselves as having an immigrant background. Canada stands out for having almost a third (30 per cent) of its student population made up of immigrants, which is above some of the other countries with high immigration rates, such as Australia (25 per cent) and the United States (23 per cent), and well above the OECD average. However, more than one in two students had an immigrant background in Macao–China (62 per cent), United Arab Emirates (58 per cent), and Luxembourg (52 per cent). Provincially, the highest proportion of immigrant students are in British Columbia (39 per cent) and Ontario (37 per cent), followed by Alberta (28 per cent), Manitoba (24 per cent), and Quebec (23 per cent) (see Appendix B.1.7).

With respect to immigrant status, PISA 2015 grouped students into three categories, corresponding to the following definitions:

- **Non-immigrant** students have at least one parent who was born in the country in which the assessment was administered, regardless of whether the student himself or herself was born in that country.
- **Second-generation immigrant** students were born in the country in which the assessment was administered but have foreign-born parents.
- First-generation immigrant students are foreign-born students whose parents are also foreign-born.

In Canada overall, there was no difference between immigrant and non-immigrant students in average collaborative problem-solving scores (Appendix B.1.8). In contrast, across OECD countries, non-immigrant students scored on average 23 points higher than second-generation students and 46 points higher than first-generation students. Provincially, performance gaps in collaborative problem solving were observed in Saskatchewan (29 points), Manitoba (21 points), and Alberta (19 points), with non-immigrant students scoring higher than their first-generation immigrant counterparts. No statistically significant differences in performance between non-immigrant and second-generation immigrant students were found in any of the provinces.

Socioeconomically advantaged students outperform socioeconomically disadvantaged students in collaborative problem solving

In PISA, socioeconomic status is measured by an index of economic, social, and cultural status (ESCS). Based on responses to the student background questionnaire that participating students completed as part of PISA, this index was constructed from the following variables: parents' highest occupational status, parents' highest educational level, a number of home possessions that can be used as proxies for material wealth, and the number of books and other educational resources available in the home. A higher score on the index signifies higher average socioeconomic status.

The average ESCS index of OECD countries was -0.04, while Canada's ESCS index was 0.53, one of the highest in all of the participating countries and economies in PISA 2015. At the provincial level, the ESCS index varied from a high of 0.61 in British Columbia to a low of 0.32 in Saskatchewan (Appendix B.1.9).

According to the OECD, socioeconomically advantaged students were those among the 25 per cent of students with the highest ESCS score, whereas socioeconomically disadvantaged students were those among the 25 per cent of students with the lowest ESCS score (OECD, 2016). On average across OECD countries, socioeconomically advantaged students outperformed socioeconomically disadvantaged students by 69 points in collaborative problem solving; in Canada, the difference was 63 points. At the provincial level, the gap in favour of advantaged students ranged from 46 points in Newfoundland and Labrador to 68 points in Quebec, with no significant difference in collaborative problem solving observed between the two groups in Prince Edward Island (Appendix B.1.10 and Figure 1.4).

Figure 1.4



Average scores in collaborative problem solving by the index of economic, social, and cultural status (ESCS)

* Statistically significant differences.

Note: Score-point differences between advantaged and disadvantaged students, as determined by the index of economic, social, and cultural status (ESCS), are displayed in brackets. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

In line with these findings, the relationship between students' socioeconomic status and their performance in collaborative problem solving was positive in Canada, but not as strong as in other OECD countries. The ESCS index explained 7.9 per cent of the variation in collaborative problem-solving achievement results among OECD countries, with Canada registering a smaller effect, at 5.3 per cent. Among Canadian provinces, the variation in achievement in collaborative problem solving explained by ESCS ranged between 1.2 per cent in Prince Edward Island and 6.9 per cent in Quebec (Appendix B.1.10). Nevertheless, on average across OECD countries, a one-unit increase in a student's socioeconomic status was associated with a 30-point increase in the score on the collaborative problem-solving assessment, while in Canada, it was associated with a 29-point increase. Provincially, the improvement in collaborative problem solving associated with a one-unit increase in a student's socioeconomic status ranged from 14 points in Prince Edward Island to 32 points in Quebec.

Performance in collaborative problem solving relates positively to performance in other PISA subject areas but also captures unique skills not measured by the other domains

In general, collaborative problem solving is not a specific school subject, although the cognitive processes it employs are required across all subject areas. Thus, the relationship between collaborative problem solving and the other areas assessed by PISA (science, reading, and mathematics) is of interest, since it provides insights into how students apply what they know outside of subject-bound assessments. Increasingly, school curricula require students to go beyond the mastery of a repertoire of facts and procedures to handle unfamiliar situations with unpredictable outcomes. Furthermore, collaboration and communication skills are central 21st century skills (OECD, 2017a), and students emerging from schools into the workforce and public life are expected to have collaborative problem-solving skills and the ability to collaborate using appropriate technology. PISA's assessment of collaborative problem solving reflects these requirements. It measures not only the ability to use curricular knowledge to meet real-life challenges and develop problem-solving competences but also the collaborative aspects of problem solving through group thinking and the communication skills required for effective interaction between group and individual thinking.

Looking at the correlation between collaborative problem solving and mathematics, science, and reading offers the possibility of understanding how achievement in these areas can influence performance in collaborative problem solving. For example, some aspects of collaborative problem solving require mathematical skills, such as skills in mental calculation and estimation, and the assessment of reasonableness of results. Similarly, some reading skills are necessary to successfully complete the collaborative problem-solving assessment. The relationship between scientific literacy and problem solving is less direct, although both require the ability to identify the problem at hand, to interpret data and evidence, and to propose, at least in broad terms, how the question being asked might be appropriately investigated.

For OECD countries, the correlation between scores in collaborative problem solving and science was 0.77, followed by reading (0.74), and mathematics (0.70). In Canada, while similar correlations were observed between collaborative problem solving and reading (0.74), the correlations with the two other domains were somewhat lower: 0.75 in science and 0.67 in mathematics. Although these correlations are fairly high, they are lower than those among the three core areas themselves (Appendix B.1.11 and Table 1.3) and far from absolute determinants of performance: students who do well in collaborative problem solving will not automatically do well in science, reading, or mathematics. That being said, as noted in the international PISA report on collaborative problem solving (OECD, 2017b), Canada is among the few high-performing countries where students' performance in collaborative problem solving provides a good indication of their expected performance in science, reading, and mathematics.

Table 1.3

Correlation of collaborative problem-solving performance with performance in mathematics, reading, and science

		OECD average		Canada				
	Mathematics	Reading	Science	Mathematics	Reading	Science		
Collaborative problem solving	0.70	0.74	0.77	0.67	0.74	0.75		
Mathematics		0.80	0.88		0.77	0.87		
Reading			0.87			0.87		

The strength of the correlations between scores in collaborative problem solving and the three core areas varied across provinces (Appendix B.1.11). The highest correlation was observed between scores in collaborative problem solving and science (0.79) in Newfoundland and Labrador and the lowest correlation was observed between scores in collaborative problem solving and mathematics (0.63) in British Columbia.

The links between collaborative problem solving and individual problem solving

As described in the Introduction, collaborative problem solving is modelled on three competencies related to collaboration and four processes related to problem solving. Thus, a student's performance in collaborative

problem solving reflects not only his or her ability to resolve a problem or work toward a goal but also his or her collaboration skills. Given that, in PISA 2012, students in 44 countries and economies participated in an individual problem-solving assessment, it is possible to examine the extent to which individual problem-solving skills are encompassed in the measure of collaborative problem-solving skills, based on the assumption that the problem-solving capabilities of students in 2015 were similar to those of students in 2012.

Figure 1.5 plots the relationship between average individual problem-solving performance in PISA 2012 and average collaborative problem-solving performance in PISA 2015 for those countries and economies that took part in both assessments. There is a strong correlation (0.85) between the mean scores in the two assessments (OECD, 2017b): countries and economies that performed well in individual problem solving in PISA 2012 also tended to perform well in collaborative problem solving in 2015. In Canada and across all provinces, with the exception of Prince Edward Island, students performed above the OECD average on both assessments (Appendix B.1.12). In Prince Edward Island, students performed below the OECD average on the 2012 individual problem-solving assessment but above the OECD average on the 2015 collaborative problem-solving assessment.

Figure 1.5





Note: Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

Summary

In contrast to individual problem solving, which was assessed in PISA 2012, Canadian students' performance in collaborative problem solving was measured for the first time in PISA 2015. Globally, Canada is one of the top-performing countries in collaborative problem solving. Across the country, over 80 per cent of Canadian students reached Level 2 of collaborative problem-solving proficiency, solving problems of medium difficulty, while about one in six students reached Level 4, successfully carrying out complicated problem-solving tasks with high collaboration complexity.

In 2015, Canadian students in majority-language school systems outperformed their peers from minoritylanguage school systems in all provinces except Quebec, where no significant difference was observed. Girls performed significantly better than boys in collaborative problem solving in all countries and all provinces. Collaborative problem-solving performance did not differ significantly between students of different immigrant backgrounds at the pan-Canadian level, although marked differences were observed between firstgeneration immigrant students and non-immigrant students in Saskatchewan, Manitoba, and Alberta. As well, socioeconomically advantaged students outperformed socioeconomically disadvantaged students in collaborative problem solving in Canada overall and in all provinces except Prince Edward Island, where the difference was not statistically significant.

There is a strong positive correlation (0.85) between the mean scores of the individual problem-solving assessment in PISA 2012 and the mean scores of the collaborative problem-solving assessment in PISA 2015. Countries that performed well in one also tended to perform well in the other. Canada and most provinces performed well above the OECD average on both assessments.

Chapter 2 Students' Attitudes toward Collaboration

How much do 15-year-old students value teamwork and how much do they value relationships? In order to better understand student attitudes with respect to these questions, the PISA 2015 student questionnaire included eight items to gather data on students' attitudes toward collaboration. Items that clustered together in a psychologically meaningful way yielded two constructs, thus reducing eight individual questionnaire items to two indices: the "valuing teamwork" index and the "valuing relationships" index. This chapter examines the attitudes of 15-year-old students toward collaboration, as revealed by these indices, across Canada and the 10 provinces, and compares their attitudes to those of 15-year-olds from other participating countries and economies. Since boys' and girls' performances in collaborative problem solving showed significant differences (see Chapter 1), both indices of students' attitudes toward collaboration are also analyzed by gender. Lastly, this chapter explores the relationship between collaborative problem-solving performance and students' attitudes toward collaboration.

Globally, most students tend to value teamwork

To measure the extent to which students value teamwork, PISA asked students to what degree they agreed (*strongly agree, agree, disagree, strongly disagree*) with four statements that gauge how students feel about working in teams as compared to working alone (Table 2.1). In this report, *agree* and *strongly agree* responses are combined.

Table 2.1

Questionnaire items for the valuing teamwork index

To what extent do you disagree or agree with the following statements about yourself?

I prefer working as part of a team to working alone.

I find that teams make better decisions than individuals.

I find that teamwork raises my own efficiency.

I enjoy cooperating with peers.

In Canada, the provinces, and across participating countries and economies, the majority of students responded positively to the four statements above (Appendix B.2.1 and Table 2.2). When asked to what extent they agreed with the statement "I prefer working as part of a team to working alone," the same proportion of students across Canada as in the OECD countries (67 per cent) agreed or strongly agreed that they preferred working in teams. However, notable variations exist across participating countries and economies: over 80 per cent of students stated that they preferred working as part of a team rather than working alone in Malaysia⁴ (88 per cent), BSJG–China (87 per cent), Chinese Taipei (85 per cent), and Thailand (83 per cent); in Turkey and Montenegro, by contrast, students who preferred working as part of a team were in a minority (48 per cent and 44 per cent, respectively). Within Canada, Quebec was the province with the largest proportion of students

⁴ Throughout this report, please note that the coverage of Malaysia was too small to ensure comparability.

who reported that they preferred working as part of a group (71 per cent) while British Columbia was the province with the lowest proportion of students reporting this preference (63 per cent).

Overall, 72 per cent of students in Canada agreed with the statement that "teams make better decisions than individuals." This proportion was comparable to that observed on average across OECD countries, where 74 per cent of students reported that they believe that teams make better decisions than individuals. In Malaysia and Thailand, the proportion of students who believed that teams make better decisions was the highest among the participating countries and economies (91 per cent in both cases). Iceland, the Netherlands, and Sweden had the lowest proportion of students who agreed with the statement (63 per cent). In the Canadian provinces, results ranged from 79 per cent in Prince Edward Island to 69 per cent in British Columbia.

Students were also asked to indicate the extent to which they agreed with the statement "I find that teamwork raises my own efficiency." Consistent with the findings that students generally viewed teamwork positively, the majority of students thought that they were more efficient when working in teams. Both in Canada and across participating OECD countries, 70 per cent of students agreed that teamwork raises their own efficiency. However, there were some important variations across participating countries and economies, with the proportion ranging from 92 per cent in Malaysia to 54 per cent in Japan. In Canada, over two-thirds of students in every province agreed that teamwork raised their own efficiency, with the proportion ranging from 76 per cent in Prince Edward Island to 66 per cent in British Columbia.

In Canada and across OECD countries, the vast majority of students agreed that they enjoyed cooperating with peers. This proportion varied only slightly across participating countries and economies: the proportion of students who enjoyed cooperating with peers ranged from 96 per cent in Malaysia and Thailand to 80 per cent in the Russian Federation. Provincially, results ranged from 92 per cent in Prince Edward Island to 84 per cent in New Brunswick.

Table 2.2										
Proportion of students who agreed or strongly agreed with each statement on the valuing teamwork index										
	I prefer working as part of a team to working alone		I prefer working as part of a team to working alone I find that teams make better decisions than individuals		l find that t raises m efficie	eamwork ly own ency	l enjoy cooperating with peers			
	%	Standard error	%	Standard error	%	Standard error	%	Standard error		
Newfoundland and Labrador	69.0	(1.7)	72.8	(1.3)	69.9	(1.5)	88.9	(1.2)		
Prince Edward Island	68.3	(3.0)	79.2	(2.3)	76.0	(2.4)	91.7	(1.8)		
Nova Scotia	67.2	(1.4)	70.7	(1.2)	67.5	(1.4)	89.4	(0.8)		
New Brunswick	67.3	(1.5)	71.1	(1.3)	68.7	(1.2)	84.5	(1.1)		
Quebec	70.7	(1.0)	70.9	(1.1)	70.0	(1.0)	87.3	(0.9)		
Ontario	65.3	(0.9)	72.2	(0.8)	70.7	(0.9)	87.1	(0.5)		
Manitoba	66.1	(1.4)	74.5	(1.1)	71.5	(1.3)	86.4	(1.0)		
Saskatchewan	66.6	(1.4)	72.9	(1.1)	71.3	(1.2)	87.3	(0.9)		
Alberta	67.1	(1.1)	73.9	(1.0)	69.2	(1.3)	87.2	(0.6)		
British Columbia	63.1	(1.3)	69.4	(1.3)	66.5	(1.1)	87.7	(0.7)		
Canada	66.6	(0.4)	71.9	(0.5)	69.8	(0.4)	87.3	(0.3)		
OECD average	66.9	(0.1)	73.5	(0.1)	69.7	(0.1)	86.9	(0.1)		

Note: Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

As noted above, responses to these four statements were combined into an index of valuing teamwork. The index was standardized to have a mean of 0 and a standard deviation of 1 across OECD countries. Students in Canada had an average index of valuing teamwork of 0, similar to the OECD average (Appendix B.2.1). Provincially, students in Saskatchewan and British Columbia had the lowest average index of valuing teamwork, whereas students in Prince Edward Island and Quebec had the highest.

The majority of PISA students value relationships

To measure whether students engage in collaborative activities for reasons other than for their own benefit, PISA asked students to what degree they agreed (*strongly agree*, *agree*, *disagree*, *strongly disagree*) with four statements related to altruistic interactions,⁵ as shown in Table 2.3. In this report, *agree* and *strongly agree* responses are combined. These statements closely relate to the value students place in others' opinions and successes (OECD, 2017b).

Table 2.3
Questionnaire items for the valuing relationships index
To what extent do you disagree or agree with the following statements about yourself?
I am a good listener.
I enjoy seeing my classmates be successful.
I take into account what others are interested in.
I enjoy considering different perspectives.

The vast majority of students in Canada, the provinces, and all other participating countries and economies agreed or strongly agreed with the four statements that constitute the index of valuing relationships (Appendix B.2.2 and Table 2.4). Around 90 per cent of Canadian students agreed that they were good listeners, enjoyed seeing their classmates be successful, took into account others' interests, and enjoyed considering different perspectives. Across OECD countries, the proportions of students who agreed with each of the four statements show little variation and are similar to those observed in Canada, ranging from 86 per cent of students who agreed with the statement "I take into account what others are interested in" to 88 per cent who agreed with the statement "I enjoy seeing my classmates be successful."

Within Canada, there was almost no variation in responses to these statements across provinces. However, it is worth noting that Prince Edward Island had the highest proportion of students who agreed with three of the four statements, while New Brunswick had the lowest proportion of students who agreed with each of the four statements.

⁵ Altruistic interactions relate to student engagement in collaborative activities for a reason other than their own individual benefit.

Table 2.4

Proportion of students who agreed or strongly agreed with each statement on the valuing i	relationships index
---	---------------------

	l am a good listener Standard		l enjoy seeing my classmates be successful		I take into account what others are interested in		l enjoy considering different perspectives	
_			S o⁄	Standard	0/	Standard	9/	Standard
	70	enor	70	enor	70	enor	70	
Newfoundland and Labrador	87.5	(1.3)	91.9	(1.0)	88.2	(1.2)	88.9	(0.9)
Prince Edward Island	89.6	(2.1)	93.7	(1.3)	91.9	(1.6)	92.0	(1.7)
Nova Scotia	88.8	(0.9)	91.9	(0.8)	90.6	(0.8)	91.1	(1.0)
New Brunswick	86.7	(0.9)	89.4	(0.9)	86.7	(0.9)	88.3	(1.0)
Quebec	86.9	(1.0)	91.8	(0.7)	89.1	(0.9)	92.0	(0.6)
Ontario	90.2	(0.5)	89.6	(0.6)	89.7	(0.6)	89.4	(0.7)
Manitoba	89.7	(0.9)	89.5	(0.8)	87.1	(0.9)	90.2	(0.9)
Saskatchewan	89.9	(0.7)	91.3	(0.9)	88.8	(0.9)	88.9	(0.9)
Alberta	89.8	(0.7)	89.9	(0.7)	90.4	(0.7)	90.8	(0.7)
British Columbia	89.7	(0.8)	91.7	(0.7)	89.8	(0.8)	90.5	(0.8)
Canada	89.2	(0.3)	90.5	(0.3)	89.5	(0.3)	90.3	(0.4)
OECD average	87.1	(0.1)	87.8	(0.1)	86.4	(0.1)	86.7	(0.1)

Note: Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

The average valuing relationships index aggregates results with respect to the four statements described above and is standardized to have a mean of 0 and a standard deviation of 1 across OECD countries. Students in Canada had an average index of valuing relationships of 0.11, higher than the OECD average of 0.01. Students in Portugal (0.37) had the highest index of valuing relationships among all participating countries and economies, followed by Costa Rica, the United Arab Emirates, and Singapore, all of which had an average index of valuing relationships above 0.30. On the other hand, students in Latvia and the Slovak Republic had the lowest index of valuing relationships, both observing an average index of -0.30 or lower.

Provincially, students in Newfoundland and Labrador, Manitoba, and Saskatchewan had the lowest index of valuing relationships, while students in Quebec had the highest.

Gender difference in attitudes toward collaboration

In PISA 2015, collaborative problem-solving results by gender showed a significant advantage for girls, who outperformed boys across OECD countries and in Canada, by 29 points and 39 points, respectively (Appendix B.1.5). As noted in Chapter 1, PISA 2012 results had showed that, when solving problems on their own, boys scored 7 points higher than girls across OECD countries and 5 points higher in Canada (CMEC, 2014; OECD, 2014). Thus, it is of interest to examine differences in attitudes toward cooperation between boys and girls, as this could provide some insight as to why girls outperform boys in collaborative problem solving, whereas boys outperform girls in individual problem solving.

In general, boys are more likely than girls to value teamwork

On average across Canada and in almost all participating countries and economies, boys were significantly more likely than girls to report that they agreed or strongly agreed with the four statements that constitute the index of valuing teamwork (Appendix B.2.3). Furthermore, gender differences in favour of boys were more

pronounced in Canada than on average across the OECD countries with respect to this index (0.23 versus 0.11).

With the exception of Prince Edward Island, where no gender gap was observed, boys were significantly more likely than girls to value teamwork in all provinces across Canada. The gender gap in favour of boys was widest in Nova Scotia (0.28), Quebec (0.30), and Saskatchewan (0.28) and smallest in Newfoundland and Labrador (0.13), and Alberta (0.14).

In comparison to boys on average across OECD countries (0.06), boys had a higher average index of valuing teamwork in Canada (0.12), and in Nova Scotia (0.15) and Quebec (0.26). In British Columbia, however, boys had an average index of valuing teamwork (-0.01) that was significantly lower than that of boys on average across the OECD countries. Relative to girls on average across the OECD countries (-0.06), girls had a lower average index of valuing teamwork in Canada (-0.11), and in Nova Scotia (-0.13), Ontario (-0.13), Manitoba (-0.15), Saskatchewan (-0.23), and British Columbia (-0.17). In Prince Edward Island, girls had the highest average index of valuing teamwork across the provinces.

Across most countries and all provinces, more girls than boys report valuing relationships

In contrast with the findings pertaining to the gender difference in the valuing teamwork index, girls were significantly more likely than boys to agree with the four statements that constitute the index of valuing relationships (Appendix B.2.4). In particular, in Canada and across OECD countries, girls had higher values on the index of valuing relationships than boys (0.17 and 0.21 higher, respectively). Moreover, the gender difference in favour of girls was statistically significant in 44 of the 52 countries and economies that participated in the collaborative problem-solving assessment.

At the provincial level, girls were significantly more likely than boys to value relationships in Nova Scotia, Quebec, Ontario, Manitoba, and British Columbia (Appendix B.2.4).

In comparison to girls on average across OECD countries, girls observed a higher average index of valuing relationships in Canada, and in Nova Scotia (0.17), Quebec (0.32), and Ontario (0.18) (Appendix B.2.4). The index of valuing relationships for girls in Saskatchewan (0.02) was the lowest among all provinces, and significantly lower than the OECD average (0.11). At the same time, boys in Canada and across most provinces had a higher average index of valuing relationships than boys on average across the OECD countries. The only exceptions were boys in Newfoundland and Labrador, Manitoba, and Saskatchewan, who had an average index of valuing relationship similar to that of boys on average across OECD countries.

Relationship between collaborative problem-solving performance and attitudes toward cooperation

This section presents the associations between students' attitudes toward cooperation and their performance in the PISA 2015 collaborative problem-solving assessment. Such associations do not necessarily reflect a causal relationship: in fact, cause and effect may go both ways; the causal links may also be indirect, mediated by other important factors; or the links may be spurious, reflecting associations with a third, confounding factor that influences both the degree of proficiency in collaborative problem solving and the degree to which students agreed or disagreed with statements related to their attitudes toward collaboration.

Valuing teamwork is negatively correlated with performance in collaborative problem solving

In Canada, valuing teamwork was negatively related to performance in collaborative problem solving. As Figure 2.1 indicates, an increase of one unit on the index of valuing teamwork corresponds with a decline of 15 points in scores in collaborative problem solving in Canada overall. As well, the 25 per cent of Canadian students who valued teamwork the least (the bottom quartile of the index) scored 48 points higher, on

average, than the 25 per cent of students who valued teamwork the most (the top quartile of the index) (Appendix B.2.5). A similar relationship was observed across OECD countries in general: there, an increase of one unit on the index of valuing teamwork was associated with a 7-point lower score on the collaborative problem-solving assessment, and students in the bottom quartile of the index scored 19 points higher on the collaborative problem-solving assessment than students in the top quartile of the index.

Within Canada, a negative association between valuing teamwork and performance in collaborative problem solving was observed in all provinces, with students who valued teamwork the least outperforming students who valued teamwork the most by anywhere from 37 points in Manitoba and British Columbia to over 50 points in New Brunswick and Alberta.

In examining the association between valuing teamwork and performance in collaborative problem solving, it is important to take into consideration confounding factors that influence both a student's proficiency in collaborative problem solving and the degree to which students value cooperation. For example, girls in general performed better than boys in the collaborative problem-solving assessment and were more likely to disagree or strongly disagreed with the statements in the index of valuing teamwork. Since students who disagreed or strongly disagreed with these statements also performed better in the collaborative problem-solving assessment, accounting for gender should reduce the score-point difference associated with agreeing to these statements. In fact, accounting for gender and student socioeconomic profile does reduce the performance gap, although students who disagreed or strongly disagreed with the statements in the index of valuing teamwork still performed better in collaborative problem solving than those who agreed or strongly agreed with the statements (Appendix B.2.5).



Note: The OECD average, Canada, and the provinces are ordered from the least to the greatest difference in scores. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

However, given that performance in collaborative problem solving is closely linked to performance in the three core PISA subjects of science, reading, and mathematics, it is also important to account for performance in these core subjects⁶ to establish the relationship between the distinctive aspects of collaborative problem-solving abilities and the degree to which student's value cooperation. Once students' gender, socioeconomic profile, and performance in collaborative problem solving is no longer statistically significant in Canada overall or in any province (Appendix B.2.5). On the other hand, across OECD countries, students who valued teamwork tended to perform better in collaborative problem solving when students' gender, socioeconomic profile, and performance in the core PISA subjects are taken into account.

Valuing relationships is positively correlated with performance in collaborative problem solving

At the pan-Canadian level, valuing relationships is positively related to performance in collaborative problem solving. As Figure 2.2 indicates, on average across Canada, an increase of one unit on the index of valuing relationships corresponds with a 12-point improvement in collaborative problem-solving performance, with the 25 per cent of students who reported valuing relationships the most scoring 23 points higher than the 25 per cent of students who reported valuing relationships the least (Appendix B.2.6).



Note: Statistically significant differences are marked in a darker tone. The OECD average, Canada, and provinces are ordered from the least to the greatest differences in scores. Results for the province of Quebec should be treated with caution because of a possible non-response bias (see Appendix A in O'Grady et al., 2016, for further details).

⁶ For more information on this relative collaborative problem-solving performance measure, please see OECD, 2017b, pp. 79–80.

A similar relationship was observed across OECD countries: there, an increase of one unit on the index of valuing relationships was associated with an average 16-point increase on the collaborative problem-solving assessment, and students in the top quartile of the index scored 39 points higher on the collaborative problem-solving assessment than students in the bottom quartile of the index.

Within Canada, valuing relationships was positively associated with collaborative problem solving in all provinces but Prince Edward Island, where no statistically significant association was found. However, the strength of this association varies across provinces. More specifically, in Newfoundland and Labrador and Manitoba, more than 40 points separate the 25 per cent of students who valued relationships the most from the 25 per cent who valued relationships the least, while in Prince Edward Island, Quebec, and Saskatchewan, no statistically significant difference in performance was found between these two groups (Appendix B.2.6).

Accounting for students' gender and socioeconomic profile reduces the size of the association, although it remains positive in Canada and on average across the OECD countries. Within Canada, once students' gender and socioeconomic profile are controlled for, the association between valuing relationships and collaborative problem-solving performance remains positive and statistically significant in most provinces, with the exception of Prince Edward Island, where it is still not statistically significant, and New Brunswick and Alberta, where the association is no longer statistically significant (Appendix B.2.6).

However, after accounting for students' performance in the three core PISA subjects (science, reading, and mathematics) as well as gender and socioeconomic profile, the association between valuing relationships and performance in collaborative problem solving was found to no longer be statistically significant in Canada or in any province (Appendix B.2.6). Across OECD countries, the positive association persists, although the scorepoint difference associated with agreeing to the statements in the index is reduced.

Summary

In PISA 2015, the vast majority of students in Canada and across participating countries and economies self-reported a positive attitude toward collaboration. Notable variations were found between genders in all participating countries, including Canada: a higher proportion of boys placed value on teamwork, while more girls reported valuing relationships.

In Canada, valuing teamwork was negatively associated with performance in collaborative problem solving, while valuing relationships was positively associated with it, and these associations persist, to a lesser degree, even after controlling for gender and socioeconomic status. However, once students' performance in science, reading, and mathematics was factored in, a statistically significant relationship between positive attitudes toward collaboration and performance in collaborative problem solving was no longer evident in any provinces.

Conclusion

The Programme for International Student Assessment (PISA) is an international study that measures 15-yearold students' learning outcomes in mathematics, reading, and science. The Organisation for Economic Cooperation and Development (OECD) has organized this study every three years since 2000, and Canada has participated in PISA since its inception. In 2015, a collaborative problem-solving component was added to the assessment as an innovative domain, with 52 countries and economies, including Canada, participating in this component of the assessment. The first assessment of cross-curricular problem-solving skills was undertaken in 2003, and in 2012 PISA assessed individual problem-solving skills. Advancements in technology allowed for building on the assessment of individual problem solving by administering a collaborative problem-solving assessment in a computerized environment during PISA 2015.

Within a global context, the PISA 2015 collaborative problem-solving assessment showed that Canadian students perform well when required to solve problems as part of a team. In Canada, 82 per cent of students attained Level 2 or above in collaborative problem solving, successfully solving problems of medium difficulty. This figure is significantly above the OECD average of 72 per cent. Close to 16 per cent of Canadian students performed at the highest level (Level 4), which involved taking initiatives and performing actions to overcome obstacles and conflicts in order to carry out complicated problem-solving tasks with high collaboration complexity. At the OECD level, only half this proportion of students reached such a level of achievement.

At the pan-Canadian level, students performed well above the OECD average in collaborative problem solving (with average scores of 535 and 500, respectively), and students in every Canadian province performed above the OECD average. Notably, the gap in performance between students in the highest decile and those in the lowest decile was more substantial in Canada than across the OECD countries; the larger achievement disparity in Canada can be attributed in part to the fact that students in the highest decile in Canada scored much higher than those across the OECD countries.

In the PISA 2015 collaborative problem-solving assessment, Canadian students in majority-language school systems outperformed their peers in minority-language systems in every province except Quebec, where no significant difference was observed. Also in Canada overall, there was no statistically significant performance difference between students of different immigration backgrounds, but socioeconomically advantaged students outperformed socioeconomically disadvantaged students (although to a lesser degree than at the OECD level) in every province except Prince Edward Island, where the difference was not statistically significant. We observed a fairly high correlation in Canada between performance in the three core subjects and collaborative problem solving (0.74 in reading, 0.75 in science, and 0.67 in mathematics). However, a stronger correlation exists between the mean scores in the 2012 problem-solving and 2015 collaborative problem-solving assessments (0.85): countries and economies that performed well in individual problem solving in PISA 2012 also tended to perform well in collaborative problem solving in 2015. Girls outperformed boys in collaborative problem solving in all countries and provinces. This outcome stands in contrast with gender-based differences observed in the PISA 2012 individual problem-solving assessment, where, on average, boys outperformed girls. This difference illustrates that students' results in collaborative problem solving reflect not only their individual ability to resolve a problem or work toward a goal but also their collaboration skills.

In PISA 2015, the vast majority of students in Canada and across participating countries and economies selfreported a positive attitude toward collaboration. Notable variations were found between genders: a higher proportion of boys placed value in teamwork, while more girls reported valuing relationships. In every Canadian province, valuing teamwork was negatively correlated with performance in collaborative problem solving, while valuing relationships had a positive association with performance in all provinces but Prince Edward Island, where no statistically significant association was found. However, the associations between valuing teamwork and/or relationships and students' performance in collaborative problem solving were no longer statistically significant in Canada or any of the provinces after accounting for performance in science, reading, and mathematics, and when student gender and socioeconomic profile were accounted for.

Final statement

The results of this first large-scale collaborative problem-solving assessment showed that Canadian students were among the top performers internationally, surpassed by students in only one OECD country and one non-OECD country. Students' results in every province were higher than the OECD average, and, compared to the OECD average, twice as many students in Canada were at Level 4. These results mirror those in the three PISA core subjects, where Canada was found to be near the top of each set of rankings.

In Canada, the gap between the highest and lowest decile was considerable. While the disparity can be explained partly by the relatively higher scores of students in the top decile, it should not be ignored. Although we have examined some indicators of collaborative problem-solving achievement, the nature of this report does not lend itself to establish causality with respect to the observed outcomes. Rather, the report provides comparative information for policy-makers, ministries, and all education stakeholders to work toward ensuring that today's students are well prepared for tomorrow's workplace.

As reported in the PISA 2015 international report, "in Canada, ... greater linguistic diversity at school is associated with higher collaborative problem-solving performance among non-immigrant students who speak the test language at home, after accounting for gender and students' and schools' socioeconomic profile" (OECD, 2017b, p. 104). Today's workplaces require people to have the social skills and attitudes to work together in a diverse environment and to solve problems in teams. Innovative work is often the fruit of the sharing of knowledge and creative ideas between people of different countries, cultures, and linguistic backgrounds. Education systems, parents, and the community at large need to foster the social and collaborative skills that students will need to succeed.

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Appendix A

Sample Tasks in the 2015 PISA Collaborative Problem-Solving Assessment

The OECD released the *Xandar* task of the 2015 PISA collaborative problem-solving assessment, which includes 12 items of various difficulty. All of the items are interactive. This task is available for each participating country and language at <u>http://www.oecd.org/pisa/test/other-languages/xandarurlreplacementtest.htm</u>.

Part 1, Item 1: Following Directions

Item	CC100101
Collaborative competency	Establishing and maintaining team organization
Problem-solving process	Planning and executing
Collaborative problem-solving skill	Following rules of engagement (e.g., prompting other team members to perform their tasks)
Proficiency level	Below Level 1

? **PISA 2015** Xandar - Introduction Scorecard Part 1 - Directions ŤŤŤ S You and your teammates. Alice and Zach, can use the following features: Geography People Economy · chat to communicate with one another - buttons labeled by subject to see the contest questions and find the answers on a map of Xandar · a scorecard to track your team's progress. The scorecard will show the number of correct answers your team has found. The teacher has asked teams not to search for questions and Geography People Economy answers until the contest starts. Instead she suggests taking a little time to chat about how best to approach the task. Your teammates Alice and Zach have begun the chat. To join the chat, click on the button below. Join the Chat

Part 1, Item 2: Understanding the Game

Item	CC100102
Collaborative competency	Establishing and maintaining shared understanding
Problem-solving process	Planning and executing
Collaborative problem-solving skill	Communicating with team members about the actions to be/ being performed
Proficiency level	Level 2

PISA 2015			?	
Xandar - Introduction		Scorecard		
Who's in the Chat		ŤŤŤ	9	
YOU Alice Zach	Geography	People	Economy	
Alice: Hi. I'm not sure about the best way to do this.				
Zach: Let's just get going.				
You are continuing the chat. Click on a choice below. Then click on Send.				
	Geography	People	Economy	7
	(-
*				
/ou:				
I wonder if some of the other teams have started yet.				
I hope the questions are easy.				
Maybe we should talk about strategy first.				
Alice, you can see what to do once we get started.				
Send				

Part 1, Item 3: Agreeing on a Strategy

Item	CC100103
Collaborative competency	Establishing and maintaining shared understanding
Problem-solving process	Representing and formulating
Collaborative problem-solving skill	Building a shared representation and negotiating the meaning of the problem (common ground)
Proficiency level	Level 2

PISA 2015			?	
Xandar - Introduction		Scorecard		
Part 1 - Directions				
Who's in the Chat		ŤŤŤ	<u>s</u>	
YOU Alice Zach	Geography	People	Economy	
Alice: Hi. I'm not sure about the best way to do this. Zach: Let's just get going.				
You are continuing the chat. Click on a choice below. Then click on Send.				
YOU: Maybe we should talk about strategy first.	 Geography	People	Economy	7
Alice: I'd really like to have a plan before we start.	 			-
Zach: We're supposed to answer the questions as fast as we can.				
You:				
Right, the first team to answer all the questions wins.				
True, but what's a good way to do that?				
Do you think all the teams have to answer the same questions?				
First we should find out what we'll get for winning the contest.				
Send				

Part 1, Item 4: Agreeing on a Strategy

Item	CC100104
Collaborative competency	Establishing and maintaining shared understanding
Problem-solving process	Representing and formulating
Collaborative problem-solving skill	Building a shared representation and negotiating the meaning of the problem (common ground)
Proficiency level	Level 2

PISA 2015			2	
Xandar - Introduction		Scorecard		
Part 1 - Directions				
Who's in the Chat		ŤŤŤ	9	
YOU Alice Zach	Geography	People	Economy	
YOU: Maybe we should talk about strategy first.				
Alice: I'd really like to have a plan before we start.				
Zach: We're supposed to answer the questions as fast as we can.				
YOU: True, but what's a good way to do that?	 Geography	People	Economy	
Alice: Guys, we still need to figure out how to work well as a team.				
Zach: Each of us has to work at top speed. What's so complicated?				
You:				
The rules of the contest seem pretty simple. Let's just do our best.				
We can each work our fastest, but some of us will still be faster than others.				
It doesn't matter whether one of us answers more questions than the others, so long as we win.				
We can answer more questions if we divide them among us.				
Send				

Part 1, Item 5: Identifying the Optimal Approach

Item	CC100105
Collaborative competency	Establishing and maintaining team organization
Problem-solving process	Representing and formulating
Collaborative problem-solving skill	Describing roles and team organization (communication protocol/ rules of engagement)
Proficiency level	Level 1

PISA 2015			?	
▶ Xandar - Introduction		Scorecard		
Part 1 - Directions				
Who's in the Chat		ŤŤŤ	<u>s</u>	
YOU Alice Zach	Geography	People	Economy	
YOU: True, but what's a good way to do that?				
Alice: Guys, we still need to figure out how to work well as a team.				
Zach: Each of us has to work at top speed. What's so complicated?				
YOU: We can answer more questions if we divide them among us.	Geography	People	Economy	
Alice: You know, we'll just slow ourselves down if we're all looking for the same answers at once.	seography	reopie	Leonomy	
Zach: Oh yeah I finally get it.				
You:				
We could each take one of the subjects.				
If there's a prize for winning, let's divide it equally.				
The contest lets us come up with our own team strategy.				
OK, then we're ready to begin.				
Send				

Part 2, Item 1: Choosing Subjects

Item
Collaborative competency
Problem-solving process
Collaborative problem-solving skill
Proficiency level

CC100201

Establishing and maintaining shared understanding Exploring and understanding Discovering perspectives and abilities of team members Level 3

PISA 2015			?	
Xandar - Introduction		Scorecard		
Part 2 - Directions Who's in the Chat		ŤŤŤ	9	
YOU Alice Zach	Geography	People	Economy	
Alice: I'd like to take People.				
Zach: Hey, I wanted that one.				
	Geography	People	Economy	
Ţ				
You:				
Nobody asked me what subject I want. Why should you guys choose first?				
Can each of you explain why you want that subject?				
Why are we wasting time arguing about this?				
Alice and Zach, are you going to answer questions faster than you choose subjects?				
Send				

Part 2, Item 2: Choosing Subjects

Item	CC100202
Collaborative competency	Establishing and maintaining team organization
Problem-solving process	Representing and formulating
Collaborative problem-solving skill	Describing roles and team organization (communication protocol/ rules of engagement)
Proficiency level	Level 1

ISA 2015				?
Xandar - Introduction			Scorecard	
Part 2 - Directions	_	Æ	***	
Who's in the Chat		Casaranhu	TTT	S
YOU Alice Zach		Geography	Реоріе	Economy
Alice: I'd like to take People.				
Zach: Hey, I wanted that one.	-			
YOU: Can each of you explain why you want that subject?				
Zach: I just thought the questions on People would be easiest.		Seography	People	Economy
Alice: I'm really interested in the people and lifestyles of different countries. That's mostly what I read about				,
*				
ou:				
It sounds as though People should be Alice's subject. Zach, are you OK with that?				
Alice, maybe you could study abroad in a visiting students program.				
Yes, it's good to know what your interests are.				
People in Xandar probably aren't very different from people anywhere else.				
Send				

Part 2, Item 3: Choosing Subjects

Item	CC100203
Collaborative competency	Establishing and maintaining team organization
Problem-solving process	Representing and formulating
Collaborative problem-solving skill	Describing roles and team organization (communication protocol/ rules of engagement)
Proficiency level	Level 2

PISA 2015)			?	
Xandar - Introduction			Scorecard		
Part 2 - Directions		Æ	***		
Who's in the Chat		Geography	Reople	Economy	
YOU Alice Zach		Geography	1 copic	Leonomy	
Zacii. ney, i wanteu trat one.	*				
YOU: Can each of you explain why you want that subject?					
Zach: I just thought the questions on People would be easiest.					
Alice: I'm really interested in the people and lifestyles of different					
YOU: It sounds as though People should be Alice's subject. Zach, are you OK with that?		Geography	People	Economy	
Zach: I guess Economy would be all right. I like money.	•				
You:					
Well, everyone likes money.					
Liking money doesn't mean you understand the economy.					
We need to stop debating and make a decision.					
I'll take Geography.					
Send					

Part 3, Item 1: Directions

Item	CC100301
Collaborative competency	Establishing and maintaining team organization
Problem-solving process	Planning and executing
Collaborative problem-solving skill	Following rules of engagement (e.g., prompting other team members to perform their tasks)
Proficiency level	Level 1

PISA 2015			?	
Xandar - Introduction		Scorecard		
Part 3 - Directions				
Your team has reached the following agreement.		ŤŤŤ		
Geography will be your subject.	Geography	Реоріе	Economy	
†††† People will be Alice's subject.				
Economy will be Zach's subject.				
The contest has started! Please click on a subject button to begin				
oogni.	Geography	People	Economy	

Part 3, Item 2: Playing the Game

Item
Collaborative competency
Problem-solving process
Collaborative problem-solving skill
Proficiency level

CC100302

Establishing and maintaining shared understanding Monitoring and reflecting Monitoring and repairing the shared understanding Level 4

PISA 2015				?	
Xandar - Introduction			Scorecard		
Part 3 - Directions			Scorecura		
Who's in the Chat			ŤŤŤ	<u>s</u>	
YOU Alice Zach		Geography	People	Economy	
Alice: We got one let's keep going!		•			_
	(Geography	People	Economy	
	What is Xandar	's longest river?		Korfu	River
· · · · · · · · · · · · · · · · · · ·	What is Xandar	's tallest mountain'	?		
You:	What is Xandar	's rainy season?			
The clock is tickinglet's not waste time on chat messages.	What proportion	of Xandar is dese	ert?		
Whoever answered a Geography question, nice work!					
Since somebody answered a Geography question, I'm going to switch subjects.		ana 17			
I should answer the Geography questions. Let's work on the subjects we chose.					
			han		

Part 4, Item 1: Introduction

Item
Collaborative competency
Problem-solving process
Collaborative problem-solving skill
Proficiency level

CC100401

Taking appropriate action to solve the problem

Monitoring and reflecting

Monitoring results of actions and evaluating success in solving the problem Level 4

PISA 2015		?			
Xandar - Introduction	Scorecard				
Who's in the Chat					
YOU Alice Zach	Geography People	Economy			
Alice: Is my scorecard right? How are we doing?					
	Geography People	Economy			
You:	What is Xandar's longest river? What is Xandar's tallest mountain?	Korfu	ı River nt Mojo		
I think your scorecard is workingmine is.	What is Xandar's rainy season? Summer What proportion of Xandar is desert?				
Great, we're halfway there.	AL HEAR	-			
We look fine, except for Economy.			ALC: NO		
I'm not sure since I don't know the other teams' scores. Send					

Part 4, Item 2: Assessing Progress

Item
Collaborative competency
Problem-solving process
Collaborative problem-solving skill
Proficiency level

CC100402

Establishing and maintaining team organization

Monitoring and reflecting

Monitoring, providing feedback on, and adapting the team organization and roles Level 3

?

Proficiency level

PISA 2015

Xandar - Introduction			Scorecard			
Who's in the Chat		Æ				
YOU Alice Zach		Coography	TTT	S		
Zaabu Saasamu is bard. I'm baying taukin		Geography	People	Leonomy		
Zach. Economy is naro. I'm naving trouble.						
		•	V			
	_					
		Geography	People	Economy		
	What is Xanda	r's longest river?		Korfu	I River	
You:	What is Xandar's tallest mountain? Mount					
Keep trying. When Alice and Lare done we'll help youright Alice?	What is Xanda	nmer				
	What proportio	n of Xandar is dese	rt?			
Zach, aren't you the one who said we all had to work fast?		64	Terras Po	and the second		
Do you expect us to stop what we're doing and help you instead?					NA.	
Are you behind because you were working on my Geography questions?		J.S.	Der and		AR A	
	aler a					
Send		Service and			Ator	
	The age	ALL A	B			
		- Sing				
			and and			

Appendix B PISA 2015 Collaborative Problem Solving—Data Tables

Table B.1.1

				Pi	roficiency l	evels				
	Below Level 1		Le	evel 1	Le	evel 2	Level 3		Level 4	
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Japan	1.2	(0.2)	8.9	(0.7)	31.4	(1.0)	44.4	(1.1)	14.0	(0.8)
Singapore	1.6	(0.2)	9.7	(0.5)	27.8	(0.6)	39.5	(0.7)	21.4	(0.6)
Korea	1.5	(0.3)	11.4	(0.7)	35.1	(0.9)	41.6	(1.0)	10.4	(0.8)
British Columbia	2.3	(0.7)	10.6	(1.3)	27.4	(1.8)	37.2	(1.9)	22.5	(1.9)
Hong Kong–China	1.9	(0.3)	11.7	(0.8)	33.6	(1.1)	39.7	(1.1)	13.0	(0.8)
Macao–China	2.2	(0.3)	12.7	(0.5)	35.6	(0.9)	38.4	(0.9)	11.1	(0.6)
Estonia	1.8	(0.3)	13.5	(0.7)	35.4	(1.1)	37.2	(1.0)	12.2	(0.8)
Chinese Taipei	2.7	(0.3)	14.2	(0.7)	37.2	(1.0)	36.3	(1.0)	9.6	(0.8)
Alberta	3.2	(0.7)	13.8	(1.4)	30.4	(1.8)	34.5	(2.0)	18.2	(1.7)
Quebec	3.1	(0.5)	14.1	(1.4)	33.6	(1.6)	36.0	(1.6)	13.3	(1.4)
Finland	3.4	(0.4)	14.7	(0.8)	32.2	(1.0)	35.2	(1.0)	14.4	(0.8)
Canada	3.4	(0.3)	15.0	(0.7)	32.0	(0.8)	33.8	(0.9)	15.7	(0.7)
Prince Edward Island	‡	(1.2)	15.4	(2.2)	34.8	(3.5)	34.4	(3.8)	12.3	(2.2)
Denmark	2.7	(0.3)	16.3	(0.8)	38.8	(0.9)	33.4	(0.9)	8.9	(0.7)
Nova Scotia	3.3	(0.7)	15.7	(1.5)	32.7	(1.8)	33.0	(2.5)	15.3	(1.6)
New Zealand	3.8	(0.4)	15.9	(0.7)	31.3	(0.9)	33.2	(1.0)	15.8	(0.9)
Ontario	3.7	(0.5)	16.1	(1.3)	32.2	(1.5)	32.6	(1.5)	15.5	(1.4)
Australia	4.3	(0.3)	15.6	(0.6)	31.2	(0.6)	33.6	(0.8)	15.3	(0.7)
Germany	3.6	(0.4)	16.9	(0.8)	34.3	(0.9)	32.4	(0.8)	12.7	(0.7)
Newfoundland and Labrador	4.0	(0.8)	16.8	(1.8)	35.8	(2.1)	31.7	(1.9)	11.7	(1.5)
The Netherlands	3.4	(0.4)	18.6	(0.9)	35.7	(0.9)	32.3	(1.0)	10.0	(0.7)
New Brunswick	4.3	(1.0)	18.1	(1.6)	35.8	(2.2)	30.8	(2.2)	11.1	(1.6)
United Kingdom	4.2	(0.4)	18.3	(0.8)	34.6	(0.8)	30.9	(0.9)	12.0	(0.7)
Manitoba	4.6	(1.0)	18.5	(1.6)	34.4	(1.8)	29.5	(1.8)	12.9	(1.5)
United States	4.9	(0.5)	18.9	(1.0)	32.7	(0.8)	29.7	(1.0)	13.8	(1.0)
Sweden	4.5	(0.5)	20.1	(1.0)	35.9	(1.1)	30.3	(1.1)	9.1	(0.9)
Austria	4.5	(0.4)	20.2	(0.9)	35.8	(1.0)	30.4	(1.0)	9.1	(0.7)
Norway	4.4	(0.5)	21.0	(0.8)	39.5	(1.1)	28.3	(1.0)	6.8	(0.6)
Slovenia	4.4	(0.4)	21.2	(0.8)	38.6	(1.2)	29.3	(0.9)	6.4	(0.7)
Spain	4.4	(0.4)	21.4	(0.9)	41.6	(0.8)	28.3	(0.8)	4.3	(0.4)
Saskatchewan	4.7	(1.0)	21.3	(1.6)	35.6	(1.3)	28.7	(1.6)	9.7	(1.0)
Portugal	4.6	(0.4)	21.5	(0.9)	40.2	(0.8)	28.4	(1.0)	5.2	(0.5)

Table B.1.1 (cont'd)

	Proficiency levels										
	Below	v Level 1	Le	evel 1	Le	evel 2	Le	evel 3	Le	vel 4	
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	
Czech Republic	4.6	(0.5)	21.6	(0.8)	39.7	(1.0)	28.8	(1.0)	5.4	(0.4)	
Belgium	5.7	(0.5)	21.1	(0.8)	36.7	(0.7)	29.4	(0.8)	7.1	(0.6)	
Iceland	4.6	(0.5)	22.5	(1.0)	38.1	(1.2)	28.2	(1.0)	6.5	(0.6)	
BSJG–China	5.8	(0.7)	22.4	(1.1)	37.9	(1.2)	27.4	(1.3)	6.4	(0.9)	
France	7.0	(0.5)	22.6	(0.7)	36.2	(0.9)	27.6	(1.0)	6.6	(0.5)	
Latvia	5.6	(0.5)	25.4	(0.9)	41.3	(0.9)	23.8	(1.0)	3.9	(0.5)	
Luxembourg	6.5	(0.5)	24.8	(0.7)	36.3	(0.7)	25.5	(0.7)	6.8	(0.4)	
Italy	7.8	(0.6)	26.9	(1.0)	38.5	(1.0)	22.6	(0.9)	4.2	(0.5)	
Croatia	6.6	(0.6)	28.7	(1.0)	41.8	(1.0)	20.4	(0.9)	2.4	(0.3)	
Russian Federation	7.3	(0.7)	29.2	(1.3)	39.6	(1.2)	20.3	(1.2)	3.6	(0.5)	
Hungary	8.7	(0.6)	28.6	(1.0)	37.4	(0.9)	22.0	(0.9)	3.3	(0.4)	
Lithuania	8.3	(0.6)	30.2	(0.9)	39.3	(1.0)	19.7	(0.9)	2.5	(0.3)	
Slovak Republic	9.5	(0.7)	31.1	(1.0)	38.4	(1.1)	18.4	(0.9)	2.6	(0.4)	
Israel	11.5	(0.9)	30.2	(1.1)	30.7	(1.2)	22.1	(1.0)	5.4	(0.5)	
Greece	10.4	(1.0)	31.6	(1.2)	37.9	(1.1)	18.1	(1.0)	2.0	(0.3)	
Chile	8.4	(0.7)	33.9	(1.2)	40.5	(1.0)	16.0	(1.0)	1.2	(0.2)	
Cyprus	13.0	(0.6)	36.0	(1.1)	35.5	(1.0)	14.0	(0.7)	1.5	(0.2)	
Bulgaria	15.3	(1.1)	34.1	(1.2)	32.6	(1.2)	16.0	(1.0)	2.0	(0.3)	
Malaysia	10.7	(0.9)	39.1	(1.4)	39.6	(1.3)	10.1	(1.0)	U	(0.2)	
Costa Rica	9.4	(0.6)	40.6	(1.1)	39.6	(1.1)	9.9	(0.7)	0.5	(0.2)	
Uruguay	12.9	(0.7)	37.7	(0.9)	34.2	(0.9)	13.6	(0.7)	1.7	(0.3)	
Mexico	12.2	(0.9)	41.2	(1.4)	37.4	(1.2)	8.8	(0.6)	U	(0.1)	
United Arab Emirates	16.2	(0.8)	37.7	(0.9)	31.6	(1.0)	12.8	(0.6)	1.8	(0.2)	
Thailand	12.2	(1.0)	41.9	(1.2)	34.5	(1.2)	10.4	(0.9)	0.9	(0.3)	
Colombia	14.1	(0.9)	42.3	(1.0)	33.8	(1.0)	9.2	(0.6)	0.6	(0.2)	
Turkey	14.9	(1.1)	44.5	(1.4)	33.6	(1.5)	6.9	(0.8)	‡	(0.1)	
Peru	18.1	(1.0)	43.3	(1.1)	30.6	(1.1)	7.6	(0.7)	0.4 ‡	(0.1)	
Montenegro	17.6	(0.6)	44.7	(0.9)	31.6	(0.8)	5.9	(0.5)	‡	(0.1)	
Brazil	21.2	(0.8)	43.0	(0.7)	27.7	(0.7)	7.5	(0.5)	0.6	(0.1)	
Tunisia	24.5	(1.3)	59.5	(1.5)	15.2	(1.1)	0.8	(0.2)	‡	(0.0)	
OECD average	5.7	(0.1)	22.4	(0.2)	36.2	(0.2)	27.8	(0.2)	7.9	(0.1)	

‡ There are fewer than 30 observations.

U Too unreliable to be published.

Note: Countries, economies, and provinces have been sorted in descending order by the total percentage of students who attained Level 2 or higher. BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Estimated average scores and	d confidence	intervals in	collaborative	problem	solving
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Country, economy, or province	Average	Standard error	– Confidence interval 95% lower limit	– Confidence interval 95% upper limit
Singapore	561	(1.2)	559	564
British Columbia	561	(5.8)	550	573
Japan	552	(2.7)	546	557
Alberta	543	(5.8)	531	554
Hong Kong–China	541	(2.9)	535	547
Korea	538	(2.5)	533	543
Canada	535	(2.3)	531	540
Estonia	535	(2.5)	530	540
Finland	534	(2.6)	529	539
Macao–China	534	(1.2)	531	536
Quebec	534	(4.7)	525	543
Nova Scotia	533	(4.6)	524	542
New Zealand	533	(2.4)	528	538
Ontario	532	(4.4)	523	541
Australia	531	(1.9)	528	535
Prince Edward Island	529	(5.9)	517	541
Chinese Taipei	527	(2.5)	522	531
Germany	525	(2.8)	519	530
Newfoundland and Labrador	521	(4.4)	513	530
United States	520	(3.6)	513	527
Denmark	520	(2.5)	515	525
United Kingdom	519	(2.7)	514	524
Manitoba	519	(5.5)	508	529
The Netherlands	518	(2.4)	513	522
New Brunswick	517	(5.5)	507	528
Sweden	510	(3.4)	503	516
Austria	509	(2.6)	504	514
Saskatchewan	508	(3.7)	501	515
Norway	502	(2.5)	497	507
Slovenia	502	(1.8)	499	505
Belgium	501	(2.4)	496	506
Iceland	499	(2.3)	495	504
Czech Republic	499	(2.2)	494	503
Portugal	498	(2.6)	493	503
Spain	496	(2.1)	492	501
BSJG–China	496	(4.0)	488	504
France	494	(2.4)	489	499
Luxembourg	491	(1.5)	488	494
Latvia	485	(2.3)	480	489

Table B.1.2 (cont'd)

Estimated average scores and confidence intervals in collaborative problem solving

Country, economy, or province	Average	Standard error	Confidence interval – 95% lower limit	– Confidence interval 95% upper limit
Italy	478	(2.5)	473	483
Russian Federation	473	(3.4)	467	480
Croatia	473	(2.5)	468	478
Hungary	472	(2.4)	468	477
Israel	469	(3.6)	462	476
Lithuania	467	(2.5)	463	472
Slovak Republic	463	(2.4)	458	467
Greece	459	(3.6)	452	466
Chile	457	(2.7)	452	462
Cyprus	444	(1.7)	441	448
Bulgaria	444	(3.9)	437	452
Uruguay	443	(2.3)	438	447
Costa Rica	441	(2.4)	436	446
Malaysia	440	(3.3)	433	446
Thailand	436	(3.5)	429	442
United Arab Emirates	435	(2.4)	430	440
Mexico	433	(2.5)	428	438
Colombia	429	(2.3)	425	434
Turkey	422	(3.4)	416	429
Peru	418	(2.5)	413	423
Montenegro	416	(1.3)	413	418
Brazil	412	(2.3)	407	416
Tunisia	382	(1.9)	378	385
OECD average	500	(0.5)	499	501

Note: Countries, economies, and provinces have been sorted in descending order by average score. BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

	Percentiles									Difference in score points			
	5	th	10th		25	ith	7	′5th	90th		95th		between the 10th
Country, economy, or province	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	and 90th percentiles
Tunisia	291	(2.8)	310	(2.6)	341	(2.1)	419	(2.8)	459	(3.6)	485	(4.4)	149
Costa Rica	316	(3.8)	343	(2.9)	387	(2.6)	494	(2.8)	542	(3.6)	570	(4.3)	199
Turkey	298	(4.0)	323	(3.8)	367	(3.6)	477	(4.4)	526	(4.3)	553	(5.0)	203
Montenegro	291	(2.5)	315	(2.3)	359	(1.5)	471	(2.4)	520	(2.8)	548	(3.4)	205
Mexico	305	(3.9)	331	(3.3)	378	(3.1)	488	(3.2)	536	(3.4)	564	(3.7)	205
Malaysia	310	(3.9)	337	(3.6)	384	(3.5)	495	(3.8)	543	(4.8)	569	(4.7)	205
Colombia	300	(3.6)	325	(3.2)	370	(2.7)	486	(2.9)	539	(3.2)	571	(3.7)	214
Japan	402	(5.5)	440	(4.6)	499	(3.3)	610	(2.6)	655	(3.1)	680	(3.9)	215
Thailand	307	(4.0)	332	(3.4)	375	(3.4)	492	(4.5)	547	(5.1)	580	(5.7)	215
Korea	390	(4.9)	425	(3.8)	484	(3.3)	598	(2.5)	641	(3.1)	667	(3.4)	216
Peru	287	(2.9)	313	(2.8)	358	(2.5)	475	(3.7)	529	(4.6)	561	(4.6)	216
Chile	319	(3.6)	348	(3.4)	398	(3.3)	516	(3.3)	567	(3.6)	596	(4.0)	219
Brazil	277	(2.4)	304	(2.2)	350	(2.1)	470	(3.1)	529	(3.9)	564	(4.8)	225
Croatia	328	(4.3)	359	(4.1)	412	(3.3)	534	(2.6)	585	(3.3)	614	(3.7)	225
Spain	345	(3.9)	379	(3.6)	438	(3.0)	559	(2.3)	607	(2.6)	635	(2.9)	228
Macao–China	377	(3.4)	415	(2.8)	476	(2.1)	596	(1.8)	645	(2.6)	672	(3.4)	230
Chinese Taipei	370	(3.9)	407	(3.5)	468	(2.9)	590	(3.0)	639	(3.5)	667	(4.1)	232
Hong Kong–China	382	(4.9)	420	(5.0)	483	(4.0)	604	(3.2)	652	(3.2)	681	(3.6)	232
Denmark	367	(3.9)	402	(3.7)	460	(3.3)	583	(3.1)	634	(3.6)	663	(4.3)	232
Latvia	335	(3.7)	367	(3.8)	423	(3.1)	547	(2.8)	599	(3.2)	631	(4.4)	233
Estonia	382	(3.9)	416	(3.5)	475	(3.1)	598	(3.4)	650	(3.8)	679	(3.7)	234
Lithuania	319	(4.0)	349	(3.1)	404	(3.2)	532	(3.0)	584	(3.7)	613	(4.4)	235
Uruguay	301	(3.4)	328	(2.7)	376	(2.5)	506	(3.1)	564	(3.7)	597	(4.8)	236
Portugal	343	(4.3)	377	(4.0)	437	(3.2)	562	(3.2)	613	(2.9)	641	(3.7)	236
Cyprus	298	(2.9)	328	(2.5)	379	(2.0)	508	(2.7)	564	(3.3)	596	(3.4)	236
Czech Republic	344	(4.2)	377	(3.7)	436	(3.0)	563	(2.6)	614	(2.9)	643	(3.1)	237
Russian Federation	324	(4.6)	355	(4.2)	410	(3.7)	537	(4.5)	593	(4.4)	626	(5.7)	238
Greece	307	(5.6)	338	(5.1)	394	(4.5)	524	(3.7)	578	(4.1)	609	(4.1)	240
Slovak Republic	311	(4.0)	343	(3.4)	398	(2.9)	528	(3.1)	583	(4.0)	615	(4.4)	241
Norway	345	(4.9)	380	(3.5)	439	(3.1)	568	(3.2)	621	(3.4)	653	(4.3)	242
Slovenia	345	(3.6)	378	(3.0)	438	(2.8)	568	(2.7)	620	(3.7)	649	(4.3)	242
Iceland	343	(4.3)	375	(4.1)	433	(3.3)	566	(3.4)	620	(4.3)	652	(5.1)	244
United Arab Emirates	289	(3.2)	317	(3.0)	366	(2.6)	500	(3.2)	563	(2.7)	598	(3.4)	246
Hungary	316	(4.3)	347	(3.4)	404	(3.0)	541	(2.8)	594	(3.5)	625	(3.5)	247
Singapore	392	(3.2)	432	(2.6)	499	(1.9)	630	(1.9)	680	(2.8)	709	(3.2)	248
Italy	319	(4.6)	353	(3.7)	412	(3.3)	545	(2.9)	601	(4.0)	633	(4.5)	248
The Netherlands	355	(4.3)	389	(4.2)	450	(3.5)	586	(2.9)	640	(3.8)	672	(4.4)	251
Quebec	363	(7.7)	403	(7.3)	470	(5.9)	601	(5.3)	655	(5.9)	688	(7.3)	252
BSJG–China	333	(5.4)	368	(5.0)	429	(4.7)	564	(4.9)	620	(5.2)	651	(6.0)	252
Bulgaria	290	(5.5)	319	(4.0)	370	(4.5)	515	(4.8)	575	(4.1)	606	(4.3)	256
Belgium	334	(4.2)	369	(3.6)	434	(3.2)	572	(2.4)	625	(3.0)	655	(3.3)	256
Austria	345	(4.0)	379	(3.8)	441	(3.4)	580	(3.1)	635	(3.4)	667	(4.3)	256
Sweden	344	(5.1)	379	(4.4)	441	(4.3)	579	(4.4)	635	(5.0)	667	(6.1)	256

Table B.1.3 (cont'd)

		Var	iation i	n student	perform	nance in c	ollabora	tive prob	lem solv	/ing				
	Percentiles											Difference in score points		
		5th	1	10th	2	25th		75th		90th		95th	between the 10th	
Country, economy, or province	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	and 90th percentiles	
Newfoundland and Labrador	352	(8.7)	391	(8.0)	454	(6.2)	591	(5.9)	647	(6.7)	681	(8.3)	256	
Prince Edward Island	362	(17.2)	394	(14.4)	463	(9.4)	597	(9.2)	651	(14.4)	689	(16.8)	257	
Luxembourg	328	(3.6)	361	(2.5)	420	(2.0)	561	(2.0)	621	(2.5)	654	(3.7)	259	
New Brunswick	347	(10.6)	385	(7.7)	449	(7.7)	588	(7.2)	645	(9.0)	679	(7.8)	261	
Finland	359	(5.0)	399	(4.4)	466	(3.4)	605	(2.9)	660	(3.4)	693	(3.9)	261	
France	325	(4.0)	359	(3.5)	424	(3.2)	566	(2.8)	620	(3.1)	651	(4.0)	261	
Saskatchewan	342	(7.6)	376	(5.7)	436	(5.6)	580	(4.9)	638	(5.9)	673	(5.8)	262	
Germany	354	(4.8)	390	(4.5)	456	(3.7)	595	(3.4)	653	(3.2)	686	(3.5)	262	
United Kingdom	348	(4.1)	384	(3.9)	449	(3.4)	591	(3.4)	651	(3.4)	686	(3.9)	267	
Canada	358	(3.5)	397	(3.5)	465	(2.8)	607	(2.4)	667	(3.2)	702	(3.1)	269	
British Columbia	380	(11.2)	421	(10.0)	494	(7.4)	632	(6.5)	692	(6.7)	728	(9.7)	271	
Nova Scotia	358	(8.0)	393	(7.7)	462	(6.1)	606	(5.8)	665	(7.7)	699	(8.8)	271	
Ontario	353	(6.1)	393	(5.6)	460	(5.3)	605	(4.9)	666	(6.6)	702	(6.6)	273	
Alberta	363	(8.8)	402	(8.6)	471	(7.9)	616	(6.6)	676	(7.2)	711	(8.8)	273	
Manitoba	343	(10.3)	381	(7.4)	446	(6.8)	593	(6.3)	655	(8.1)	690	(11.0)	274	
New Zealand	353	(5.1)	391	(4.1)	460	(3.5)	608	(3.6)	666	(3.5)	700	(4.0)	275	
Israel	307	(3.9)	334	(4.0)	386	(4.6)	548	(4.2)	609	(4.4)	643	(4.6)	275	
Australia	347	(3.2)	388	(3.8)	460	(2.7)	607	(2.2)	664	(2.7)	698	(3.2)	277	
United States	341	(4.6)	376	(4.4)	445	(4.3)	596	(4.2)	659	(4.6)	696	(5.6)	283	
OECD average	341	(0.8)	375	(0.7)	435	(0.6)	567	(0.6)	621	(0.6)	652	(0.7)	246	

Note: Countries, economies, and provinces have been sorted in ascending order by the difference in score points between the 10th and 90th percentiles. BSJG—China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Table B.1.4

Estimated average scores in collaborative problem solving by language of the school system

	Anglophone	school system	Francophone	e school system	Difference between systems		
Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error	
Canada	537	(2.7)	529	(4.8)	8	(5.8)	
Nova Scotia	534	(4.8)	480	(8.4)	54*	(9.6)	
New Brunswick	525	(6.5)	494	(8.5)	31*	(10.0)	
Quebec	526	(7.4)	535	(5.3)	-9	(9.6)	
Ontario	534	(4.6)	485	(5.9)	49*	(8.0)	
Manitoba	520	(5.6)	486	(9.0)	34*	(10.6)	
Alberta	543	(5.8)	490	(10.5)	53*	(11.4)	
British Columbia	562	(5.8)	522	(15.5)	40*	(16.9)	

* Statistically significant differences.

	Estimated a	verage scores in coll	aborative proble	m solving by gender			
	Fe	males	N	1ales	Difference (females-males)		
country, economy, or province	Average	Standard error	Average	Standard error	Difference	Standard error	
Canada	555	(2.4)	516	(2.8)	3 9*	(2.6)	
Newfoundland and Labrador	537	(5.0)	505	(6.4)	32*	(7.2)	
Prince Edward Island	560	(8.0)	499	(9.0)	61*	(12.4)	
Nova Scotia	555	(5.2)	511	(6.2)	44*	(6.6)	
New Brunswick	536	(6.3)	499	(6.6)	37*	(7.4)	
Quebec	545	(5.6)	521	(5.1)	24*	(5.5)	
Ontario	554	(4.8)	510	(4.8)	44*	(4.3)	
Manitoba	540	(6.6)	498	(6.5)	42*	(6.7)	
Saskatchewan	530	(4.5)	489	(5.2)	41*	(6.3)	
Alberta	563	(6.1)	522	(6.6)	42*	(5.4)	
British Columbia	581	(6.1)	541	(7.4)	41*	(6.5)	
Australia	552	(2.5)	511	(2.5)	41*	(3.1)	
Austria	521	(3.4)	498	(3.4)	24*	(4.4)	
Belgium	514	(2.9)	489	(3.0)	25*	(3.7)	
Brazil	421	(2.6)	402	(2.5)	18*	(2.3)	
BSJG–China	508	(4.6)	486	(3.9)	22*	(3.2)	
Bulgaria	461	(3.9)	429	(4.6)	31*	(4.2)	
Chile	464	(3.1)	450	(3.1)	14*	(3.0)	
Chinese Taipei	541	(3.4)	513	(3.4)	28*	(4.9)	
Colombia	433	(2.7)	425	(2.9)	8*	(3.3)	
Costa Rica	445	(2.7)	437	(2.8)	7*	(2.7)	
Croatia	486	(2.6)	459	(3.3)	27*	(3.3)	
Cyprus	464	(2.2)	424	(2.0)	40*	(2.4)	
Czech Republic	512	(2.7)	486	(2.9)	26*	(3.6)	
Denmark	530	(3.3)	509	(2.9)	21*	(3.5)	
Estonia	549	(2.7)	522	(2.9)	27*	(2.8)	
Finland	559	(3.0)	511	(3.2)	48*	(3.6)	
France	508	(2.8)	480	(3.4)	29*	(3.9)	
Germany	540	(3.0)	510	(3.4)	30*	(3.2)	
Greece	475	(3.7)	444	(4.2)	31*	(3.7)	
Hong Kong–China	559	(3.4)	523	(3.7)	36*	(4.4)	
Hungary	485	(2.8)	459	(3.3)	26*	(4.1)	
Iceland	512	(2.6)	485	(3.0)	27*	(3.4)	
Israel	481	(4.7)	459	(4.3)	22*	(5.4)	
Italy	489	(3.4)	466	(3.4)	23*	(4.5)	
Japan	565	(2.6)	539	(3.6)	26*	(3.7)	
Korea	556	(3.3)	522	(3.5)	33*	(4.4)	
Latvia	505	(2.9)	465	(2.6)	40*	(3.2)	

Table B.1.5 (cont'd)

Estimated average scores in conductative providing solving by genaci
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	Fei	males	М	ales	Difference (females-males)		
Country, economy, or province	Average	Standard error	Average	Standard error	Difference	Standard error	
Lithuania	482	(2.8)	453	(2.9)	29*	(3.1)	
Luxembourg	504	(1.9)	478	(2.5)	25*	(3.3)	
Macao–China	553	(2.0)	515	(1.9)	38*	(2.9)	
Malaysia	450	(3.4)	429	(3.6)	21*	(2.7)	
Mexico	440	(2.7)	426	(2.9)	14*	(2.9)	
Montenegro	429	(2.0)	403	(1.8)	26*	(2.9)	
The Netherlands	531	(2.8)	504	(3.0)	27*	(3.3)	
New Zealand	553	(3.0)	513	(3.2)	41*	(3.8)	
Norway	518	(3.2)	487	(3.0)	30*	(3.7)	
Peru	421	(3.0)	414	(2.8)	7*	(3.0)	
Portugal	507	(2.7)	489	(3.2)	19*	(2.8)	
Russian Federation	486	(3.9)	460	(3.8)	25*	(3.9)	
Singapore	572	(2.1)	552	(1.7)	20*	(2.9)	
Slovak Republic	478	(3.4)	448	(2.8)	30*	(4.2)	
Slovenia	521	(2.2)	484	(2.2)	36*	(2.6)	
Spain	508	(2.6)	485	(2.7)	22*	(3.0)	
Sweden	531	(3.8)	489	(4.0)	42*	(3.9)	
Thailand	451	(3.6)	416	(4.1)	35*	(3.6)	
Tunisia	387	(2.3)	375	(2.3)	12*	(2.4)	
Turkey	434	(4.1)	411	(4.0)	23*	(4.3)	
United Arab Emirates	454	(3.1)	416	(2.9)	38*	(4.1)	
United Kingdom	536	(3.3)	503	(3.1)	34*	(3.5)	
United States	533	(4.0)	507	(4.4)	26*	(4.3)	
Uruguay	451	(2.7)	434	(3.3)	17*	(3.9)	
OECD average	515	(0.5)	486	(0.6)	29*	(0.6)	

* Statistically significant differences. *Note*: BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Percentage of males and females who performed below Level 2 and at Level 4 in collaborative problem solving

	Below Level 2						Level 4						
	Fem	ales	Ma	ales	Differen (F-M)	ce	Fema	lles	Ma	les	Differen (F-M)	ce	
Country, economy, or province	S %	tandard error	s %	itandard error	S difference	tandard error	Si %	tandard error	s %	andard error	Si difference	tandard error	
Canada	12.9	(0.8)	24.0	(1.0)	-11.0*	(1.0)	19.8	(0.8)	11.7	(0.7)	8.1*	(0.9)	
Newfoundland and Labrador	15.6	(2.1)	26.1	(2.6)	-10.5*	(3.2)	13.7	(2.2)	9.6	(1.6)	4.1	(2.4)	
Prince Edward Island	9.0 [‡]	(2.4)	27.6	(4.3)	-18.6*	(5.1)	17.8	(3.5)	+	(2.4)	‡ *	(4.0)	
Nova Scotia	12.8	(2.0)	25.3	(2.1)	-12.6*	(2.5)	19.8	(2.5)	10.8	(1.8)	9.0*	(3.0)	
New Brunswick	14.9	(1.9)	29.6	(3.0)	-14.7*	(3.0)	13.6	(2.2)	8.7	(1.7)	4.9*	(2.2)	
Quebec	13.4	(1.7)	21.2	(1.9)	-7.7*	(2.1)	15.1	(1.8)	11.4	(1.3)	3.6*	(1.7)	
Ontario	13.6	(1.5)	25.8	(1.9)	-12.2*	(1.8)	20.3	(1.9)	10.8	(1.2)	9.6*	(1.8)	
Manitoba	17.0	(2.2)	28.9	(2.9)	-11.9*	(3.3)	16.9	(2.0)	9.2	(1.8)	7.7*	(2.3)	
Saskatchewan	17.9	(2.0)	33.3	(2.1)	-15.4*	(2.7)	12.8	(1.5)	6.9	(1.4)	5.9*	(2.1)	
Alberta	12.1	(1.9)	21.9	(2.1)	-9.7*	(2.2)	23.4	(2.2)	13.0	(2.0)	10.4*	(2.4)	
British Columbia	7.8	(1.3)	18.3	(2.5)	-10.5*	(2.3)	27.4	(2.8)	17.5	(2.1)	9.9*	(3.1)	
Australia	13.7	(0.8)	26.0	(0.9)	-12.2*	(1.0)	19.3	(1.2)	11.3	(0.6)	8.0*	(1.2)	
Austria	20.2	(1.3)	29.1	(1.4)	-8.9*	(1.9)	10.5	(1.0)	7.7	(0.8)	2.9*	(1.2)	
Belgium	22.6	(1.1)	30.9	(1.3)	-8.3*	(1.5)	8.9	(0.8)	5.4	(0.6)	3.5*	(0.9)	
Brazil	60.6	(1.2)	68.0	(1.2)	-7.4*	(1.1)	0.7	(0.2)	0.5	(0.1)	0.2	(0.2)	
BSJG-China	24.2	(1.7)	31.7	(1.7)	-7.5*	(1.6)	8.2	(1.2)	4.9	(0.7)	3.2*	(0.8)	
Bulgaria	42.0	(1.9)	56.0	(2.2)	-14.0*	(1.9)	2.6	(0.6)	1.5	(0.3)	1.2	(0.6)	
Chile	38.6	(1.7)	46.0	(1.7)	-7.4*	(2.0)	1.3	(0.3)	1.0	(0.3)	0.4	(0.4)	
Chinese Taipei	12.3	(1.0)	21.4	(1.1)	-9.2*	(1.3)	11.8	(1.2)	7.6	(1.0)	4.2*	(1.5)	
Colombia	54.6	(1.5)	58.4	(1.6)	-3.7*	(1.8)	0.7	(0.2)	U	(0.2)	U	(0.3)	
Costa Rica	47.8	(1.6)	52.1	(1.7)	-4.3*	(1.8)	0.6‡	(0.2)	+	(0.2)	U	(0.2)	
Croatia	29.2	(1.3)	42.0	(1.8)	-12.8*	(1.9)	2.9	(0.5)	1.8	(0.4)	1.1	(0.6)	
Cyprus	39.7	(1.2)	58.3	(1.5)	-18.5	(1.6)	2.1	(0.4)	U	(0.3)	U*	(0.5)	
Czech Republic	20.9	(1.1)	31.3	(1.4)	-10.5*	(1.5)	6.4	(0.6)	4.4	(0.5)	2.0*	(0.9)	
Denmark	15.5	(1.2)	22.4	(1.2)	-6.9*	(1.6)	10.4	(0.9)	7.4	(0.8)	3.0*	(1.1)	
Estonia	11.0	(0.8)	19.3	(1.1)	-8.3*	(1.1)	14.5	(1.1)	10.0	(0.9)	4.6*	(1.2)	
Finland	10.6	(0.9)	25.1	(1.3)	-14.5*	(1.3)	19.1	(1.2)	10.1	(0.9)	8.9*	(1.5)	
France	23.8	(1.2)	35.4	(1.5)	-11.7*	(1.9)	7.8	(0.8)	5.4	(0.6)	2.4*	(0.9)	
Germany	16.1	(1.1)	24.8	(1.3)	-8.7*	(1.3)	15.5	(0.9)	10.1	(0.8)	5.4*	(1.0)	
Greece	34.7	(1.8)	48.7	(2.0)	-14.0*	(1.9)	2.5	(0.5)	1.5	(0.3)	1.0	(0.6)	
Hong Kong–China	9.1	(1.0)	18.2	(1.4)	-9.1*	(1.4)	17.0	(1.2)	9.1	(0.7)	7.9*	(1.4)	
Hungary	31.6	(1.4)	42.9	(1.7)	-11.2*	(2.2)	4.4	(0.6)	2.3	(0.4)	2.1*	(0.6)	
Iceland	21.8	(1.3)	32.9	(1.7)	-11.0*	(2.0)	7.8	(0.9)	5.2	(0.8)	2.7*	(1.1)	
Israel	37.3	(2.0)	45.9	(1.8)	-8.6*	(2.2)	6.3	(0.8)	4.5	(0.7)	1.8	(1.0)	
Italy	29.8	(1.7)	39.8	(1.6)	-10.0*	(2.2)	5.2	(0.8)	3.2	(0.5)	1.9*	(0.8)	

Table B.1.6 (cont'd)

Percentage of males and females who performed below Level 2 and at Level 4 in collaborative problem solving

			Belo	ow Level 2					Lo	evel 4		
	Ferr	nales	Ma	ales	Differen (F-M)	ce	Fem	ales	Ma	lles	Differer (F-M)	nce
Country, economy, or province	s %	itandard error	%	Standard error	S difference	tandard error	%	itandard error	%	Standard error	s difference	andard error
Japan	6.9	(0.7)	13.3	(1.1)	-6.3*	(1.0)	16.7	(1.1)	11.4	(1.2)	5.4*	(1.6)
Korea	7.7	(0.9)	17.6	(1.3)	-9.9*	(1.5)	13.1	(1.3)	7.9	(0.8)	5.1*	(1.3)
Latvia	22.1	(1.2)	39.9	(1.3)	-17.8*	(1.7)	5.4	(0.8)	2.5	(0.5)	2.9*	(0.8)
Lithuania	31.9	(1.4)	44.9	(1.5)	-13.0*	(1.6)	3.0	(0.5)	1.9	(0.4)	1.1	(0.6)
Luxembourg	26.4	(1.0)	36.5	(1.2)	-10.1*	(1.6)	7.9	(0.6)	5.6	(0.6)	2.4*	(0.9)
Macao–China	8.8	(0.7)	21.0	(0.9)	-12.2*	(1.2)	14.1	(0.9)	8.1	(0.8)	6.0*	(1.2)
Malaysia	44.5	(2.0)	55.9	(1.9)	-11.4*	(1.7)	‡	(0.2)	‡	(0.2)	U	(0.2)
Mexico	49.9	(1.8)	57.0	(1.7)	-7.1*	(1.8)	‡	(0.2)	‡	(0.2)	U	(0.2)
Montenegro	55.6	(1.3)	68.7	(1.2)	-13.1*	(1.9)	‡	(0.1)	‡	(0.1)	U	(0.2)
The Netherlands	17.1	(1.1)	26.9	(1.4)	-9.8*	(1.4)	11.9	(1.1)	8.2	(0.9)	3.8*	(1.4)
New Zealand	13.4	(0.9)	25.9	(1.3)	-12.4*	(1.6)	19.7	(1.3)	12.1	(1.0)	7.6*	(1.4)
Norway	19.2	(1.2)	31.4	(1.3)	-12.1*	(1.5)	8.4	(0.7)	5.3	(0.7)	3.1*	(0.8)
Peru	59.5	(1.7)	63.2	(1.6)	-3.6*	(1.8)	‡	(0.2)	‡	(0.2)	U	(0.2)
Portugal	21.9	(1.1)	30.4	(1.5)	-8.5*	(1.6)	5.7	(0.6)	4.7	(0.7)	1.0	(0.8)
Russian Federation	31.1	(1.9)	42.1	(1.8)	-11.0*	(2.1)	4.7	(0.7)	2.5	(0.5)	2.2*	(0.7)
Singapore	8.6	(0.6)	13.9	(0.8)	-5.4*	(1.1)	24.0	(1.1)	19.0	(0.9)	5.0*	(1.6)
Slovak Republic	33.1	(1.4)	47.7	(1.6)	-14.6*	(2.1)	3.5	(0.6)	1.7	(0.3)	1.8*	(0.7)
Slovenia	18.5	(1.1)	32.4	(1.2)	-13.9*	(1.5)	8.3	(0.9)	4.6	(0.8)	3.7*	(1.0)
Spain	21.0	(1.2)	30.6	(1.2)	-9.6*	(1.2)	5.1	(0.5)	3.5	(0.5)	1.5*	(0.7)
Sweden	16.8	(1.3)	32.3	(1.6)	-15.5*	(1.6)	11.8	(1.3)	6.4	(0.9)	5.4*	(1.5)
Thailand	46.9	(1.8)	63.6	(2.2)	-16.7*	(2.1)	1.4	(0.4)	U	(0.2)	* *	(0.4)
Tunisia	82.2	(1.4)	86.1	(1.2)	-3.9*	(1.4)	‡	(0.0)	+	_	_	-
Turkey	53.5	(2.4)	65.3	(2.2)	-11.8*	(2.5)	‡	(0.2)	‡	(0.1)	U	(0.2)
United Arab Emirates	45.2	(1.6)	62.8	(1.4)	-17.6*	(2.0)	2.0	(0.2)	1.6	(0.3)	0.4	(0.3)
United Kingdom	17.4	(1.1)	27.3	(1.3)	-9.9*	(1.4)	15.2	(1.0)	8.9	(1.0)	6.3*	(1.3)
United States	19.0	(1.4)	28.4	(1.4)	-9.3*	(1.6)	15.6	(1.3)	12.1	(1.1)	3.5*	(1.3)
Uruguay	46.9	(1.4)	54.6	(1.5)	-7.7*	(1.9)	1.9	(0.3)	1.4	(0.4)	0.4	(0.5)
OECD average	22.7	(0.2)	33.3	(0.3)	-10.7*	(0.3)	9.6	(0.2)	6.1	(0.1)	3.5*	(0.2)

- Data not available.

‡ There are fewer than 30 observations or there are fewer than 30 observations in the reference/comparison group(s).

U Too unreliable to be published.

* Statistically significant differences.

Note: BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

		Percentage of	immigrant and	non-immigra	int students			
	Non-immigra	int students	Second-ger immigrant	neration students	First-gener immigrant s	ration tudents	Immigrant (tot	students al)
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Canada	69.9	(1.3)	15.9	(0.9)	14.2	(0.7)	30.1	(1.3)
Newfoundland and Labrador	97.5	(1.2)	‡	(0.3)	‡	(1.1)	+	(1.2)
Prince Edward Island	94.8	(1.2)	‡	(0.2)	5.0 [‡]	(1.2)	5.2 [‡]	(1.2)
Nova Scotia	91.7	(1.2)	2.4 [‡]	(0.6)	5.9	(0.9)	8.3	(1.2)
New Brunswick	94.4	(0.8)	‡	(0.2)	5.0	(0.8)	5.6	(0.8)
Quebec	76.7	(3.9)	12.2	(2.4)	11.1	(1.7)	23.3	(3.9)
Ontario	62.9	(2.4)	21.1	(1.6)	16.0	(1.3)	37.1	(2.4)
Manitoba	76.1	(1.2)	7.8	(0.6)	16.1	(1.1)	23.9	(1.2)
Saskatchewan	86.2	(1.0)	2.1	(0.3)	11.7	(1.0)	13.8	(1.0)
Alberta	72.0	(1.8)	12.9	(1.1)	15.1	(1.1)	28.0	(1.8)
British Columbia	60.6	(2.7)	21.4	(2.2)	18.0	(1.6)	39.4	(2.7)
Australia	75.0	(0.7)	12.7	(0.6)	12.3	(0.4)	25.0	(0.7)
Austria	79.7	(1.1)	12.7	(0.7)	7.6	(0.6)	20.3	(1.1)
Belgium	82.3	(0.9)	9.0	(0.6)	8.7	(0.6)	17.7	(0.9)
Brazil	99.2	(0.1)	0.5	(0.1)	0.3	(0.1)	0.8	(0.1)
BSJG–China	99.7	(0.1)	‡	-	‡	-	0.3	(0.1)
Bulgaria	99.0	(0.1)	‡	-	‡	-	1.0	(0.1)
Chile	97.9	(0.5)	0.5	(0.2)	1.6	(0.4)	2.1	(0.5)
Chinese Taipei	99.7	(0.1)	+	-	+	-	‡	-
Colombia	99.4	(0.1)	0.4	(0.1)	+	-	0.6	(0.1)
Costa Rica	92.0	(0.6)	5.4	(0.4)	2.6	(0.3)	8.0	(0.6)
Croatia	89.2	(0.6)	9.0	(0.5)	1.8	(0.2)	10.8	(0.6)
Cyprus	88.7	(0.4)	3.2	(0.3)	8.0	(0.3)	11.3	(0.4)
Czech Republic	96.6	(0.3)	1.7	(0.2)	1.7	(0.2)	3.4	(0.3)
Denmark	89.3	(0.6)	7.9	(0.5)	2.8	(0.2)	10.7	(0.6)
Estonia	90.0	(0.5)	9.3	(0.5)	0.7	(0.1)	10.0	(0.5)
Finland	96.0	(0.4)	1.8	(0.3)	2.2	(0.3)	4.0	(0.4)
France	86.8	(1.0)	8.7	(0.8)	4.5	(0.4)	13.2	(1.0)
Germany	83.1	(0.9)	13.2	(0.7)	3.7	(0.4)	16.9	(0.9)
Greece	89.2	(0.7)	7.0	(0.5)	3.8	(0.4)	10.8	(0.7)
Hong Kong–China	64.9	(1.3)	21.3	(1.0)	13.8	(0.8)	35.1	(1.3)
Hungary	97.3	(0.2)	1.5	(0.2)	1.1	(0.2)	2.7	(0.2)
Iceland	95.9	(0.3)	1.2	(0.2)	2.8	(0.3)	4.1	(0.3)
Israel	82.3	(1.1)	13.3	(0.8)	4.5	(0.6)	17.7	(1.1)
Italy	92.0	(0.5)	3.2	(0.3)	4.8	(0.4)	8.0	(0.5)
Japan	99.5	(0.1)	‡	-	+	-	0.5	(0.1)
Korea	99.9	(0.0)	‡	_	+	-	‡	-

Table B.1.7 (cont'd)

		Percentage of	immigrant ar	nd non-immigra	ant students			
	Non-immigr	ant students	Second-g immigran	eneration t students	First-ger immigran	neration t students	Immigran (to	t students tal)
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Latvia	95.0	(0.4)	4.0	(0.4)	1.0	(0.1)	5.0	(0.4)
Lithuania	98.2	(0.2)	1.4	(0.1)	0.4	(0.1)	1.8	(0.2)
Luxembourg	48.0	(0.6)	30.6	(0.6)	21.4	(0.5)	52.0	(0.6)
Macao–China	37.8	(0.7)	43.4	(0.6)	18.9	(0.5)	62.2	(0.7)
Malaysia	99.1	(0.2)	0.8	(0.2)	‡	-	0.9	(0.2)
Mexico	98.8	(0.1)	‡	-	0.9	(0.1)	1.2	(0.1)
Montenegro	94.4	(0.3)	3.7	(0.3)	1.9	(0.2)	5.6	(0.3)
The Netherlands	89.3	(0.9)	8.6	(0.8)	2.2	(0.3)	10.7	(0.9)
New Zealand	72.9	(1.2)	11.0	(0.7)	16.2	(0.7)	27.1	(1.2)
Norway	88.0	(1.0)	6.0	(0.7)	6.1	(0.4)	12.0	(1.0)
Peru	99.5	(0.1)	‡	-	+	-	0.5	(0.1)
Portugal	92.7	(0.4)	3.3	(0.2)	4.1	(0.3)	7.3	(0.4)
Russian Federation	93.1	(0.5)	3.8	(0.3)	3.1	(0.3)	6.9	(0.5)
Singapore	79.1	(1.0)	6.7	(0.3)	14.1	(0.9)	20.9	(1.0)
Slovak Republic	98.8	(0.2)	0.6	(0.1)	0.6	(0.1)	1.2	(0.2)
Slovenia	92.2	(0.5)	4.5	(0.3)	3.3	(0.4)	7.8	(0.5)
Spain	89.0	(0.8)	1.9	(0.2)	9.1	(0.7)	11.0	(0.8)
Sweden	82.6	(1.2)	9.8	(0.8)	7.6	(0.7)	17.4	(1.2)
Thailand	99.2	(0.3)	0.7	(0.2)	‡	_	0.8	(0.3)
Tunisia	98.5	(0.2)	1.0	(0.2)	+	-	1.5	(0.2)
Turkey	99.2	(0.2)	0.5	(0.1)	+	-	0.8	(0.2)
United Arab Emirates	42.4	(0.9)	23.1	(0.7)	34.4	(0.9)	57.6	(0.9)
United Kingdom	83.3	(1.0)	8.0	(0.7)	8.8	(0.7)	16.7	(1.0)
United States	76.9	(1.5)	15.7	(1.0)	7.4	(0.7)	23.1	(1.5)
Uruguay	99.4	(0.1)	‡	_	‡	_	0.6	(0.1)
OECD average	87.8	(0.1)	7.0	(0.1)	5.2	(0.1)	12.2	(0.1)

– Data not available.

[‡] There are fewer than 30 observations or there are fewer than 30 observations in the reference/comparison group(s).
 Note: BSIG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

				Estim	ated avera	ige scores	in collab	orative pr	oblem solv	ing by imr	nigrant statı	SL				
	Non-imr stude	nigrant ents	Immig stude	rant nts	Secol genera immig stude	nd- Ition nts	First-gen immig stude	eration rant :nts	Differe (immigrani non-imm studen	ince t minus igrant tts)	Difference (generation s minus n immigrant sl	second- tudents on- udents)	Difference generation s minus n immigrant st	(first- tudents on- udents)	Difference generation s minus se generation s	(first- tudents cond- tudents)
Country, economy, or province	Average	Standard error	Average	Standard error	Average	Standard error	Average	Standard error	Difference	Standard error	Difference	Standard error	Difference	Standard error	Difference	Standard error
Canada	539	(2.4)	536	(3.6)	540	(4.7)	532	(4.2)	'n	(3.8)	1	(4.8)	<i>L-</i>	(4.4)	ø	(5.2)
Newfoundland and Labrador	525	(4.6)	#	#	++	I	++	I	#		I	I	I	I	I	I
Prince Edward Island	528	(6.1)	++	++	++	I	++	I	++		I	I	I	I	I	I
Nova Scotia	538	(4.6)	527	(4.6)	++	I	526	(20.3)	-11	(18.0)	I	I	-12	(21.1)	I	I
New Brunswick	518	(5.7)	528	(5.7)	++	I	531	(15.0)	10	(16.0)	I	I	13	(16.3)	I	I
Quebec	537	(4.8)	531	(4.8)	535	(6.7)	527	(11.5)	9-	(8.8)	-2	(9.5)	-10	(11.4)	ø	(11.1)
Ontario	538	(4.9)	531	(4.9)	532	(6.5)	530	(7.4)	<i>L</i> -	(6.1)	9-	(8.9)	ø	(7.5)	-2	(7.4)
Manitoba	527	(6.1)	510	(6.1)	518	(14.0)	506	(9.5)	-17	(9.5)	Ŷ	(14.2)	-21*	(10.7)	-13	(15.6)
Saskatchewan	512	(4.3)	492	(4.3)	537	(18.9)	483	(8.2)	-21	(9.6)	25	(20.3)	-29*	(9.5)	-53*	(20.4)
Alberta	548	(5.9)	537	(5.9)	546	(8.6)	529	(0.1)	-11	(0.0)	Ļ	(0.6)	-19*	(8.6)	-17	(10.8)
British Columbia	565	(9.9)	567	(9.9)	571	(8.8)	563	(10.0)	2	(9.2)	9	(10.6)	-2	(10.7)	ø	(10.5)
Australia	534	(2.1)	534	(3.4)	547	(4.4)	521	(4.5)	0	(3.7)	13*	(4.7)	-13*	(4.7)	-26*	(0.9)
Austria	521	(2.8)	468	(5.1)	477	(4.8)	453	(8.5)	-52	(0.9)	-43*	(2.6)	-68*	(6.1)	-24*	(8.5)
Belgium	513	(2.3)	456	(4.9)	459	(5.9)	453	(9.9)	-57	(4.9)	-54*	(2.6)	-60*	(6.9)	<i>L-</i>	(7.7)
Brazil	416	(2.4)	365	(12.6)	370	(14.5)	356	(20.9)	-51	(12.6)	-46*	(14.5)	-60*	(20.8)	-14	(24.0)
BSJG-China	498	(3.9)	373	(24.8)	++	I	++	I	-125	(24.9)	I	I	I	I	I	I
Bulgaria	448	(3.7)	406	(14.2)	++	I	++	Ι	-42	(13.6)	Ι	Ι	I	I	Ι	Ι
Chile	459	(2.7)	436	(12.9)	449	(27.2)	431	(13.1)	-23	(13.2)	6-	(27.3)	-28*	(13.5)	-18	(28.2)
Chinese Taipei	527	(2.5)	++	++	++	I	++	Ι			Ι	Ι	I	I	Ι	Ι
Colombia	431	(2.3)	404	(16.4)	393	(18.1)	++	I	-27	(16.1)	-37*	(17.9)	I	I	Ι	Ι
Costa Rica	443	(2.4)	427	(2.6)	420	(5.5)	442	(12.0)	-16	(4.9)	-23*	(4.9)	-1	(11.6)	22	(13.0)
Croatia	477	(2.5)	454	(4.9)	456	(5.5)	444	(10.8)	-23	(4.6)	-21*	(5.2)	-33*	(10.7)	-13	(12.2)
Cyprus	446	(1.8)	446	(4.9)	468	(2.6)	437	(0.9)	0	(4.8)	22*	(7.8)	6-	(5.8)	-31	
Czech Republic	500	(2.1)	488	(11.2)	505	(13.4)	472	(13.7)	-11	(10.7)	ß	(12.7)	-27*	(13.5)	-33*	(15.7)
Denmark	527	(2.7)	466	(3.8)	470	(4.2)	455	(0.1)	-61	(4.3)	-57*	(4.4)	-72*	(9.6)	-15	(10.2)
Estonia	542	(2.7)	493	(4.4)	491	(4.5)	511	(20.6)	-49	(2.0)	-50*	(2.0)	-30	(20.8)	20	(20.7)
Finland	538	(2.5)	457	(6.6)	468	(12.2)	447	(12.1)	-81	(8.6)	*69-	(11.9)	-91*	(12.2)	-21	(14.4)
France	503	(2.5)	452	(6.7)	464	(7.5)	430	(0.1)	-51	(6.9)	-39*	(2.6)	-73*	(6.3)	-34*	(8.6)
Germany	540	(2.8)	491	(6.1)	497	(6.1)	470	(10.6)	-49	(6.2)	-43*	(6.1)	-70*	(10.6)	-27*	(10.1)
Greece	465	(3.8)	424	(5.4)	433	(2.0)	407	(0.6)	-40	(5.9)	-31*	(7.4)	-57*	(9.4)	-26*	(11.9)
Hong Kong-China	547	(3.2)	533	(3.9)	536	(4.4)	529	(4.6)	-14	(3.9)	-11*	(4.2)	-18*	(4.7)	<i>L</i> -	(4.5)
Hungary	472	(2.4)	484	(11.5)	496	(12.8)	469	(19.9)	12	(11.5)	23	(12.7)	'n	(19.9)	-27	(23.7)

				Estima	ited avera	ge scores	in collabo	orative pr	oblem solvi	ng by imr	nigrant statı	SI				
	Non-imr studer	ligrant nts	Immig studei	rant nts	Secor genera immig	rd- rant nts	First-gene immig stude	eration rant nts	Differer (immigrant non-immi studen	ice minus grant ts)	Difference (generation s minus n immigrant st	second- tudents on- udents)	Difference generation si minus n immigrant st	(first- :udents on- udents)	Difference generation s minus sec generation s	(first- tudents ond- udents)
Country, economy, or province	Average	standard error	Average	Standard error	Average	standard error	Average	standard error	Difference	Standard error	Difference	Standard error	Difference	standard error	Difference	Standard error
Iceland	503	(2.4)	449	(9.2)	469	(18.3)	440	(11.8)	-54	(6.7)	-35	(18.7)	-63*	(12.0)	-28	(23.1)
Israel	473	(3.6)	468	(7.5)	488	(6.9)	411	(12.7)	4	(7.1)	15*	(6.8)	-62*	(12.3)	-77*	(13.0)
Italy	481	(2.6)	468	(5.1)	467	(7.7)	468	(6.9)	-13	(4.9)	-14	(8.0)	-13*	(6.5)	0	(10.5)
Japan	553	(2.6)	432	(38.1)	++	I	++	I	-121	(37.6)	I	I	I	I	I	Ι
Korea	539	(2.6)	++	++	I	I	++	++	++	++	I	I	I	I	I	I
Latvia	487	(2.2)	472	(7.4)	476	(7.2)	455	(20.8)	-15	(7.4)	-10	(7.6)	-32	(20.3)	-22	(21.4)
Lithuania	470	(2.4)	459	(11.0)	470	(10.5)	420	(29.7)	-11	(10.6)	0	(10.4)	-50	(29.1)	-50	(31.4)
Luxembourg	506	(2.2)	481	(2.1)	482	(2.9)	479	(3.4)	-25	(2.9)	-24*	(3.8)	-27*	(3.7)	¢,	(4.7)
Macao-China	523	(2.2)	540	(1.9)	541	(2.4)	538	(3.2)	17	(3.3)	18*	(3.7)	15*	(4.0)	с <u>-</u>	(4.0)
Malaysia	442	(3.3)	432	(14.7)	428	(15.3)	++	I	-10	(14.9)	-13	(15.4)	I	I	I	I
Mexico	435	(2.5)	372	(11.9)	++	I	367	(14.0)	-63	(12.2)	Ι	Ι	-68*	(14.4)	I	Ι
Montenegro	417	(1.3)	431	(6.1)	438	(7.5)	419	(9.6)	15	(6.3)	21*	(7.5)	2	(6.6)	-19	(11.9)
The Netherlands	523	(2.6)	483	(6.5)	488	(6.9)	464	(11.9)	-40	(7.1)	-35*	(7.6)	-60*	(12.0)	-25	(12.7)
New Zealand	539	(2.8)	529	(4.6)	531	(6.8)	528	(5.3)	-10	(5.3)	6-	(7.3)	-11	(5.8)	'n	(7.5)
Norway	510	(2.5)	462	(5.7)	476	(7.6)	449	(7.4)	-48	(5.7)	-34*	(7.9)	-61*	(7.1)	-27*	(6.6)
Peru	419	(2.5)	386	(18.6)	++	I	++	I	-32	(18.1)	I	I	I	I	I	Ι
Portugal	501	(2.7)	481	(6.1)	501	(9.2)	464	(8.2)	-20	(6.2)	1	(8.9)	-36*	(8.6)	-37*	(12.3)
Russian Federation	475	(3.6)	477	(8.4)	473	(11.7)	483	(12.1)	ſ	(8.9)	-2	(12.9)	6	(11.3)	11	(16.9)
Singapore	559	(1.4)	575	(3.6)	588	(5.7)	569	(4.4)	16	(4.0)	29*	(5.9)	10*	(4.7)	-19*	(7.2)
Slovak Republic	466	(2.3)	398	(14.8)	400	(21.2)	396	(21.7)	-68	(14.8)	-65*	(21.5)	-70*	(21.5)	Ϋ́	(30.7)
Slovenia	507	(1.8)	457	(6.4)	471	(8.1)	439	(9.4)	-50	(6.7)	-36*	(8.2)	-68*	(8.6)	-31*	(12.0)
Spain	502	(2.0)	473	(6.3)	487	(12.1)	470	(6.5)	-29	(0.9)	-15	(12.1)	-32*	(6.2)	-18	(12.1)
Sweden	522	(3.1)	463	(6.9)	479	(0.6)	443	(8.4)	-59	(6.3)	-43*	(8.1)	-79*	(8.6)	-36*	(11.4)
Thailand	438	(3.5)	416	(15.7)	413	(16.0)	++	I	-23	(16.0)	-25	(16.2)	I	I	I	I
Tunisia	384	(1.9)	355	(2.6)	347	(8.2)	++	I	-29	(2.6)	-37*	(8.1)	I	I	I	I
Turkey	424	(3.4)	435	(15.6)	442	(17.5)	++	I	11	(15.4)	18	(17.2)	I	I	I	I
United Arab Emirates	404	(2.4)	464	(3.1)	451	(3.6)	472	(3.7)	60	(3.6)	47*	(4.1)	68*	(4.0)	21*	(3.9)
United Kingdom	524	(2.8)	511	(6.4)	519	(6.4)	503	(8.4)	-13	(9.9)	Ϋ́	(6.4)	-21*	(8.8)	-16	(8.4)
United States	528	(3.7)	508	(5.9)	515	(6.9)	493	(7.5)	-20	(0.9)	-13	(2.0)	-35*	(7.7)	-21*	(8.6)
Uruguay	444	(2.3)	463	(24.3)	++	I	++	I	19	(24.3)	T	I	I	I	I	T
OECD average	505	(0.5)	469	(1.9)	482	(2.0)	459	(2.2)	-36	(2.0)	-23*	(2.0)	-46*	(2.2)	-23*	(3.0)
 Uata not availab There are fewer \$ Statistically signite Mote: RSIG-China r 	e. than 30 obs Ticant differe	ervations (ences.	or there are	fewer than	30 observ מ	ations in th ha roverag	e referenco e of Malav	e/comparis eia is too sr	on group(s). Mall to ensure		ility See OFC	0 2017a for	a note regard	הפ רעמרווג		
	chi coci iro r		angnai, Jang	son, airu Or	auguoug. I					con parar	ווויץ. שבה טבעו		a nuce regard	116 Cypi up.		

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Estimated average index of economic, social, and cultural status (ESCS), by national and provincial quarters

	All st	tudents	Bottor	n quarter	Secon	d quarter	Third	quarter	Тор с	juarter
Country, economy, or province	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error
Canada	0.53	(0.02)	-0.58	(0.02)	0.34	(0.02)	0.91	(0.02)	1.46	(0.01)
Newfoundland and Labrador	0.34	(0.03)	-0.82	(0.04)	0.04	(0.06)	0.72	(0.04)	1.42	(0.03)
Prince Edward Island	0.53	(0.04)	-0.51	(0.06)	0.34	(0.06)	0.85	(0.06)	1.43	(0.05)
Nova Scotia	0.44	(0.04)	-0.70	(0.05)	0.20	(0.07)	0.85	(0.05)	1.43	(0.04)
New Brunswick	0.34	(0.03)	-0.78	(0.03)	0.09	(0.04)	0.70	(0.03)	1.35	(0.03)
Quebec	0.49	(0.04)	-0.66	(0.05)	0.34	(0.05)	0.89	(0.03)	1.38	(0.03)
Ontario	0.57	(0.04)	-0.50	(0.05)	0.37	(0.04)	0.92	(0.04)	1.48	(0.03)
Manitoba	0.35	(0.03)	-0.84	(0.05)	0.08	(0.04)	0.75	(0.03)	1.40	(0.02)
Saskatchewan	0.32	(0.03)	-0.80	(0.05)	0.07	(0.04)	0.68	(0.03)	1.35	(0.02)
Alberta	0.60	(0.04)	-0.50	(0.05)	0.39	(0.05)	0.97	(0.04)	1.55	(0.04)
British Columbia	0.61	(0.04)	-0.47	(0.05)	0.41	(0.05)	0.98	(0.03)	1.53	(0.03)
Australia	0.27	(0.01)	-0.81	(0.02)	0.06	(0.01)	0.65	(0.01)	1.18	(0.01)
Austria	0.09	(0.02)	-0.97	(0.03)	-0.24	(0.02)	0.37	(0.03)	1.21	(0.02)
Belgium	0.16	(0.02)	-1.05	(0.03)	-0.13	(0.03)	0.59	(0.03)	1.25	(0.02)
Brazil	-0.96	(0.03)	-2.43	(0.03)	-1.36	(0.03)	-0.61	(0.03)	0.57	(0.04)
BSJG–China	-1.07	(0.04)	-2.36	(0.03)	-1.57	(0.03)	-0.83	(0.06)	0.47	(0.07)
Bulgaria	-0.08	(0.03)	-1.37	(0.04)	-0.46	(0.04)	0.37	(0.04)	1.14	(0.02)
Chile	-0.49	(0.03)	-1.86	(0.04)	-0.92	(0.03)	-0.12	(0.04)	0.96	(0.03)
Chinese Taipei	-0.21	(0.02)	-1.28	(0.02)	-0.51	(0.02)	0.11	(0.03)	0.84	(0.02)
Colombia	-0.99	(0.04)	-2.41	(0.04)	-1.36	(0.03)	-0.62	(0.04)	0.44	(0.05)
Costa Rica	-0.80	(0.04)	-2.29	(0.03)	-1.23	(0.04)	-0.41	(0.05)	0.73	(0.03)
Croatia	-0.24	(0.02)	-1.22	(0.02)	-0.59	(0.01)	-0.03	(0.03)	0.89	(0.02)
Cyprus	0.20	(0.01)	-1.02	(0.01)	-0.15	(0.02)	0.62	(0.02)	1.33	(0.01)
Czech Republic	-0.21	(0.01)	-1.19	(0.02)	-0.53	(0.02)	0.04	(0.02)	0.85	(0.02)
Denmark	0.59	(0.02)	-0.64	(0.03)	0.41	(0.03)	1.07	(0.02)	1.53	(0.01)
Estonia	0.05	(0.01)	-0.96	(0.02)	-0.25	(0.02)	0.39	(0.02)	1.01	(0.01)
Finland	0.25	(0.02)	-0.73	(0.02)	-0.02	(0.03)	0.60	(0.03)	1.17	(0.02)
France	-0.14	(0.02)	-1.17	(0.02)	-0.42	(0.02)	0.19	(0.03)	0.85	(0.02)
Germany	0.12	(0.02)	-1.07	(0.02)	-0.24	(0.02)	0.43	(0.03)	1.36	(0.02)
Greece	-0.08	(0.03)	-1.31	(0.03)	-0.46	(0.04)	0.32	(0.04)	1.14	(0.02)
Hong Kong–China	-0.53	(0.03)	-1.73	(0.02)	-0.91	(0.03)	-0.18	(0.04)	0.69	(0.03)
Hungary	-0.23	(0.02)	-1.44	(0.02)	-0.62	(0.03)	0.13	(0.03)	1.02	(0.02)
Iceland	0.73	(0.01)	-0.28	(0.02)	0.57	(0.02)	1.10	(0.01)	1.55	(0.01)
Israel	0.16	(0.03)	-0.99	(0.05)	-0.01	(0.04)	0.55	(0.02)	1.10	(0.02)
Italy	-0.07	(0.02)	-1.31	(0.02)	-0.38	(0.02)	0.27	(0.02)	1.16	(0.02)
Japan	-0.18	(0.01)	-1.10	(0.02)	-0.44	(0.02)	0.08	(0.02)	0.72	(0.01)
Korea	-0.20	(0.02)	-1.06	(0.02)	-0.45	(0.03)	0.04	(0.03)	0.68	(0.03)

Table B.1.9 (cont'd)

Estimated average index of economic, social, and cultural status (ESCS), by national and provincial quarters

	All st	udents	Botton	n quarter	Secon	d quarter	Third	quarter	Тор с	luarter
Country, economy, or province	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Score	Standard error
Latvia	-0.44	(0.02)	-1.62	(0.02)	-0.82	(0.03)	-0.03	(0.03)	0.72	(0.02)
Lithuania	-0.06	(0.02)	-1.24	(0.02)	-0.37	(0.03)	0.38	(0.03)	0.97	(0.02)
Luxembourg	0.07	(0.01)	-1.42	(0.02)	-0.26	(0.02)	0.56	(0.02)	1.41	(0.01)
Macao–China	-0.54	(0.01)	-1.59	(0.02)	-0.87	(0.01)	-0.30	(0.01)	0.60	(0.01)
Malaysia	-0.47	(0.04)	-1.82	(0.04)	-0.91	(0.04)	-0.12	(0.05)	0.96	(0.04)
Mexico	-1.22	(0.04)	-2.72	(0.04)	-1.73	(0.04)	-0.86	(0.05)	0.42	(0.05)
Montenegro	-0.18	(0.01)	-1.23	(0.01)	-0.48	(0.01)	0.13	(0.01)	0.88	(0.01)
The Netherlands	0.16	(0.02)	-0.85	(0.03)	-0.07	(0.02)	0.50	(0.02)	1.07	(0.02)
New Zealand	0.17	(0.02)	-0.89	(0.02)	-0.06	(0.02)	0.52	(0.02)	1.09	(0.02)
Norway	0.48	(0.02)	-0.54	(0.03)	0.33	(0.02)	0.82	(0.02)	1.31	(0.01)
Peru	-1.08	(0.04)	-2.56	(0.03)	-1.58	(0.04)	-0.73	(0.05)	0.55	(0.05)
Portugal	-0.39	(0.03)	-1.83	(0.02)	-0.88	(0.03)	0.00	(0.05)	1.16	(0.03)
Russian Federation	0.05	(0.02)	-0.95	(0.03)	-0.20	(0.03)	0.40	(0.03)	0.95	(0.02)
Singapore	0.03	(0.01)	-1.22	(0.02)	-0.20	(0.02)	0.45	(0.02)	1.09	(0.01)
Slovak Republic	-0.11	(0.02)	-1.24	(0.04)	-0.47	(0.02)	0.18	(0.03)	1.10	(0.02)
Slovenia	0.03	(0.01)	-1.04	(0.01)	-0.30	(0.02)	0.40	(0.02)	1.07	(0.01)
Spain	-0.51	(0.04)	-2.05	(0.03)	-0.98	(0.04)	-0.04	(0.05)	1.03	(0.03)
Sweden	0.33	(0.02)	-0.78	(0.03)	0.12	(0.03)	0.72	(0.02)	1.27	(0.01)
Thailand	-1.23	(0.04)	-2.53	(0.02)	-1.70	(0.03)	-0.98	(0.04)	0.29	(0.07)
Tunisia	-0.83	(0.03)	-2.31	(0.04)	-1.24	(0.03)	-0.48	(0.04)	0.69	(0.04)
Turkey	-1.43	(0.05)	-2.87	(0.04)	-1.91	(0.05)	-1.06	(0.06)	0.14	(0.07)
United Arab Emirates	0.50	(0.01)	-0.49	(0.03)	0.37	(0.02)	0.79	(0.01)	1.32	(0.01)
United Kingdom	0.21	(0.02)	-0.92	(0.02)	-0.09	(0.03)	0.58	(0.03)	1.27	(0.02)
United States	0.10	(0.04)	-1.25	(0.06)	-0.18	(0.04)	0.55	(0.04)	1.29	(0.02)
Uruguay	-0.78	(0.02)	-2.12	(0.02)	-1.25	(0.02)	-0.46	(0.03)	0.71	(0.04)
OECD average	-0.04	(0.00)	-1.20	(0.01)	-0.34	(0.01)	0.33	0.01	1.08	(0.00)

Note: BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

	Bottom	nquarter	Second	lquarter	Third	quarter	Тор q	uarter	Diffe (top q minus qua	rence uarter bottom rter)	Change collabo problem score p (intege change ESCS i	e in the prative -solving er one r) unit in the ndex	Explained in stur perforr (r ² x 1	variance dent nance 100)
Country, economy, or province	Average	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Difference	Standard error	Difference	Standard error	%	Standard error
Canada	504	(3.3)	528	(2.9)	548	(3.5)	567	(3.1)	63 *	(4.1)	29*	(1.7)	5.3	(0.6)
Newfoundland and Labrador	496	(7.6)	517	(8.1)	534	(7.6)	542	(7.7)	46*	(10.2)	22*	(4.0)	3.9	(1.4)
Prince Edward Island	506	(11.0)	543	(13.6)	531	(12.3)	537	(15.5)	31	(19.0)	14	(7.5)	1.2	(1.3)
Nova Scotia	509	(5.6)	528	(9.2)	550	(8.0)	560	(8.4)	50 *	(9.8)	24*	(3.9)	3.8	(1.3)
New Brunswick	489	(9.7)	514	(8.6)	518	(7.3)	550	(10.2)	60 *	(13.5)	26*	(5.4)	4.6	(1.8)
Quebec	496	(7.5)	526	(6.4)	550	(7.0)	565	(7.3)	68 *	(10.9)	32*	(4.7)	6.9	(1.9)
Ontario	499	(6.3)	527	(5.4)	546	(6.3)	562	(6.4)	63 *	(7.2)	30*	(3.2)	4.9	(1.0)
Manitoba	490	(10.0)	515	(9.4)	525	(7.6)	550	(6.5)	60 *	(11.6)	26*	(5.0)	5.1	(1.9)
Saskatchewan	482	(7.3)	506	(6.6)	509	(7.0)	537	(7.0)	54 *	(8.8)	25*	(3.3)	4.4	(1.2)
Alberta	515	(7.4)	539	(7.1)	549	(8.1)	571	(8.3)	57*	(8.4)	27*	(3.7)	4.4	(1.2)
British Columbia	540	(8.2)	547	(8.0)	576	(8.9)	594	(8.4)	5 4*	(10.8)	2 6*	(4.6)	4.0	(1.3)
Australia	498	(2.8)	522	(3.0)	544	(3.0)	570	(3.4)	72*	(4.4)	35*	(1.9)	6.7	(0.8)
Austria	474	(3.9)	497	(4.0)	522	(3.2)	548	(4.4)	74*	(5.4)	35*	(2.1)	9.0	(1.1)
Belgium	458	(3.9)	486	(3.0)	517	(3.3)	548	(3.7)	89*	(5.2)	39*	(2.0)	12.8	(1.2)
Brazil	384	(2.6)	403	(2.5)	414	(3.3)	454	(4.7)	70*	(5.0)	23*	(1.4)	9.5	(1.1)
BSJG–China	447	(4.8)	485	(5.4)	504	(4.5)	549	(7.4)	101*	(8.6)	35*	(2.4)	15.9	(2.2)
Bulgaria	398	(5.5)	429	(4.9)	460	(4.9)	495	(4.4)	97*	(6.4)	37*	(2.1)	14.2	(1.4)
Chile	420	(3.6)	455	(4.1)	461	(3.8)	496	(4.0)	76*	(5.0)	26*	(1.5)	11.3	(1.3)
Chinese Taipei	495	(3.8)	517	(3.2)	535	(3.8)	560	(4.2)	65*	(5.8)	30*	(2.5)	7.5	(1.1)
Colombia	392	(3.2)	414	(3.2)	436	(3.2)	474	(4.8)	82*	(6.0)	29*	(1.7)	14.8	(1.8)
Costa Rica	416	(3.3)	427	(3.1)	444	(3.7)	478	(4.1)	63*	(5.1)	21*	(1.6)	10.0	(1.4)
Croatia	446	(3.6)	461	(3.7)	475	(3.5)	511	(4.2)	64*	(5.2)	31*	(2.1)	8.6	(1.0)
Cyprus	423	(3.4)	436	(3.3)	447	(3.3)	473	(3.9)	50*	(5.2)	20*	(2.1)	4.1	(0.8)
Czech Republic	461	(4.4)	488	(3.6)	509	(3.5)	539	(3.2)	78*	(6.1)	38*	(2.6)	11.2	(1.4)
Denmark	493	(3.5)	511	(3.6)	527	(4.1)	551	(3.8)	58*	(4.8)	25*	(2.0)	6.0	(0.9)
Estonia	508	(3.9)	529	(4.1)	542	(3.7)	565	(3.1)	56*	(4.6)	26*	(2.1)	5.0	(0.8)
Finland	504	(4.4)	522	(4.1)	544	(4.1)	566	(4.0)	62*	(5.9)	33*	(2.7)	5.8	(0.9)
France	454	(3.5)	480	(3.9)	508	(3.8)	543	(4.1)	90*	(5.0)	44*	(2.1)	12.3	(1.1)
Germany	497	(4.5)	524	(4.1)	539	(4.1)	571	(4.2)	74*	(5.6)	29*	(2.0)	7.6	(1.0)
Greece	427	(4.9)	448	(4.8)	465	(4.9)	497	(4.5)	71*	(5.6)	28*	(2.0)	8.3	(1.1)
Hong Kong–China	525	(3.9)	539	(4.0)	542	(4.2)	560	(4.7)	35*	(6.1)	14*	(2.2)	2.1	(0.6)
Hungary	425	(3.8)	462	(4.0)	479	(3.9)	524	(3.9)	99*	(5.4)	40*	(1.9)	15.9	(1.3)

Estimated average scores in collaborative problem solving by the index of economic, social, and cultural status (ESCS)

Table B.1.10 (cont'd)

	Bottom	quarter	Second	quarter	Third q	juarter	Тор qı	uarter	Differ (top q minus b quai	rence uarter pottom rter)	Change collabo problem score p (intege change ESCS i	in the orative -solving er one r) unit in the ndex	Explained in stu perforr (r² x :	variance dent nance 100)
Country, economy, or province	Average	Standard error	Score	Standard error	Score	Standard error	Score	Standard error	Difference	Standard error	Difference	Standard error	%	Standard error
Iceland	485	(4.4)	494	(4.4)	508	(4.1)	515	(4.1)	29*	(5.5)	17*	(2.9)	1.7	(0.6)
Israel	422	(5.4)	460	(4.8)	495	(5.5)	505	(4.5)	83*	(7.0)	38*	(2.9)	9.4	(1.4)
Italy	445	(4.3)	474	(3.5)	488	(3.5)	510	(3.7)	65*	(5.4)	26*	(1.9)	6.7	(1.0)
Japan	524	(3.5)	548	(3.7)	559	(3.7)	577	(3.1)	52*	(4.0)	27*	(2.0)	5.2	(0.7)
Korea	515	(3.5)	530	(3.4)	546	(3.9)	563	(4.2)	49*	(5.3)	28*	(2.6)	5.1	(1.0)
Latvia	458	(3.5)	476	(3.7)	494	(4.1)	513	(3.5)	55*	(5.0)	23*	(2.1)	5.6	(0.9)
Lithuania	434	(3.3)	455	(3.0)	479	(4.5)	505	(3.7)	71*	(4.9)	31*	(2.2)	8.5	(1.1)
Luxembourg	448	(3.3)	480	(3.3)	501	(3.1)	541	(3.1)	93*	(4.4)	30*	(1.4)	11.3	(0.9)
Macao–China	524	(3.0)	535	(2.6)	536	(3.2)	541	(3.0)	17*	(4.5)	8*	(1.9)	0.6	(0.3)
Malaysia	408	(4.2)	428	(3.6)	448	(5.0)	476	(5.4)	68*	(6.2)	24*	(1.9)	10.8	(1.5)
Mexico	400	(3.6)	423	(3.2)	443	(3.8)	468	(3.8)	68*	(5.1)	22*	(1.4)	11.1	(1.4)
Montenegro	395	(2.2)	412	(2.6)	420	(2.4)	438	(2.4)	43*	(3.5)	19*	(1.4)	4.1	(0.6)
The Netherlands	489	(3.5)	504	(3.7)	525	(3.7)	555	(4.5)	66*	(5.8)	33*	(2.7)	6.6	(1.1)
New Zealand	496	(4.8)	528	(4.8)	547	(4.0)	572	(4.2)	76*	(6.9)	37*	(3.2)	7.4	(1.2)
Norway	479	(3.5)	497	(3.7)	512	(4.2)	527	(3.5)	47*	(4.2)	25*	(2.1)	3.8	(0.6)
Peru	364	(2.7)	409	(3.8)	431	(3.7)	467	(4.7)	103*	(5.5)	32*	(1.6)	21.6	(1.8)
Portugal	465	(3.7)	489	(3.7)	502	(4.4)	538	(4.5)	73*	(5.5)	23*	(1.7)	8.8	(1.3)
Russian Federation	440	(4.4)	467	(4.9)	489	(5.2)	502	(4.2)	62*	(5.4)	31*	(2.7)	6.3	(1.0)
Singapore	519	(2.7)	552	(2.8)	575	(3.1)	600	(3.2)	81*	(4.2)	33*	(1.7)	9.8	(0.9)
Slovak Republic	427	(4.2)	455	(2.8)	470	(3.4)	503	(4.4)	76*	(5.9)	30*	(2.1)	9.7	(1.2)
Slovenia	472	(3.7)	487	(3.4)	512	(3.3)	538	(2.9)	67*	(5.0)	32*	(2.1)	8.0	(1.0)
Spain	469	(3.6)	486	(3.3)	506	(3.2)	528	(3.3)	59*	(4.5)	20*	(1.3)	7.1	(0.9)
Sweden	477	(3.5)	497	(4.0)	527	(4.3)	546	(5.9)	69*	(5.9)	33*	(2.5)	7.7	(1.1)
Thailand	414	(4.0)	419	(3.7)	436	(4.4)	477	(7.7)	64*	(8.7)	24*	(2.5)	9.7	(2.0)
Tunisia	363	(2.4)	372	(2.6)	381	(2.9)	412	(4.1)	48*	(4.5)	16*	(1.5)	9.2	(1.5)
Turkey	398	(4.8)	416	(4.1)	424	(4.0)	453	(6.4)	55*	(7.4)	19*	(2.0)	7.9	(1.7)
United Arab Emirates	402	(3.2)	430	(3.8)	453	(3.0)	459	(3.1)	58*	(3.7)	28*	(1.8)	4.9	(0.6)
United Kingdom	489	(3.6)	503	(4.7)	532	(3.7)	559	(4.2)	69*	(5.3)	30*	(2.2)	6.3	(0.9)
United States	486	(4.4)	503	(4.3)	533	(6.0)	565	(5.3)	79*	(6.5)	29*	(2.1)	7.5	(1.0)
Uruguay	407	(3.0)	428	(3.3)	449	(4.0)	489	(4.5)	82*	(5.4)	29*	(1.7)	12.4	(1.4)
OECD average	468	(0.7)	491	(0.7)	510	(0.7)	536	(0.7)	69*	(1.0)	30*	(0.4)	7.9	(0.2)

Estimated average scores in collaborative problem solving by the index of economic, social, and cultural status (ESCS)

* Statistically significant differences.

Note: BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Correlation of collaborative problem-solving performance with performance in mathematics, reading, and science

	Cor	rrelation be probler	tween per n solving ar	formance i nd perform	n collaborat nance in:	ive	For co	mparison	, correlation	betweer	n performano	e in:
	Mathe	ematics	Rea	ding	Scier	nce	Mather and rea	natics ading	Mather and sc	matics ience	Read and sc	ling ience
Country, economy, or province	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error
Canada	0.67	(0.01)	0.74	(0.01)	0.75	(0.01)	0.77	(0.01)	0.87	(0.01)	0.87	(0.01)
Newfoundland and Labrador	0.72	(0.02)	0.78	(0.02)	0.79	(0.02)	0.82	(0.01)	0.90	(0.01)	0.90	(0.01)
Prince Edward Island	0.67	(0.04)	0.77	(0.03)	0.75	(0.04)	0.78	(0.03)	0.88	(0.02)	0.88	(0.02)
Nova Scotia	0.69	(0.02)	0.77	(0.02)	0.77	(0.01)	0.80	(0.02)	0.88	(0.01)	0.88	(0.01)
New Brunswick	0.68	(0.02)	0.76	(0.02)	0.76	(0.02)	0.80	(0.02)	0.89	(0.01)	0.89	(0.01)
Quebec	0.66	(0.02)	0.71	(0.01)	0.73	(0.02)	0.75	(0.02)	0.88	(0.01)	0.86	(0.01)
Ontario	0.69	(0.02)	0.75	(0.01)	0.76	(0.01)	0.79	(0.01)	0.88	(0.01)	0.88	(0.01)
Manitoba	0.70	(0.02)	0.76	(0.02)	0.77	(0.02)	0.79	(0.02)	0.88	(0.01)	0.87	(0.01)
Saskatchewan	0.70	(0.02)	0.76	(0.02)	0.76	(0.01)	0.80	(0.02)	0.88	(0.01)	0.88	(0.01)
Alberta	0.67	(0.02)	0.73	(0.02)	0.75	(0.01)	0.76	(0.02)	0.86	(0.01)	0.85	(0.01)
British Columbia	0.63	(0.03)	0.72	(0.03)	0.74	(0.02)	0.74	(0.03)	0.85	(0.01)	0.85	(0.01)
Australia	0.68	(0.01)	0.75	(0.01)	0.76	(0.01)	0.79	(0.01)	0.88	(0.00)	0.87	(0.00)
Austria	0.71	(0.01)	0.77	(0.01)	0.78	(0.01)	0.80	(0.01)	0.89	(0.01)	0.88	(0.01)
Belgium	0.73	(0.01)	0.76	(0.01)	0.78	(0.01)	0.84	(0.01)	0.90	(0.00)	0.90	(0.00)
Brazil	0.65	(0.01)	0.73	(0.01)	0.75	(0.01)	0.75	(0.01)	0.84	(0.01)	0.86	(0.01)
BSJG-China	0.76	(0.01)	0.76	(0.01)	0.80	(0.01)	0.84	(0.01)	0.91	(0.01)	0.90	(0.01)
Bulgaria	0.74	(0.01)	0.80	(0.01)	0.83	(0.01)	0.80	(0.01)	0.89	(0.01)	0.89	(0.01)
Chile	0.70	(0.01)	0.74	(0.01)	0.77	(0.01)	0.80	(0.01)	0.88	(0.01)	0.87	(0.01)
Chinese Taipei	0.71	(0.01)	0.77	(0.01)	0.77	(0.01)	0.83	(0.01)	0.90	(0.01)	0.90	(0.01)
Colombia	0.74	(0.01)	0.74	(0.01)	0.80	(0.01)	0.83	(0.01)	0.90	(0.01)	0.90	(0.01)
Costa Rica	0.59	(0.02)	0.67	(0.01)	0.68	(0.01)	0.75	(0.01)	0.83	(0.01)	0.85	(0.01)
Croatia	0.69	(0.01)	0.75	(0.01)	0.76	(0.01)	0.80	(0.01)	0.89	(0.01)	0.87	(0.01)
Cyprus	0.65	(0.01)	0.71	(0.01)	0.74	(0.01)	0.74	(0.01)	0.85	(0.00)	0.83	(0.01)
Czech Republic	0.69	(0.01)	0.72	(0.01)	0.75	(0.01)	0.84	(0.01)	0.90	(0.01)	0.89	(0.01)
Denmark	0.69	(0.01)	0.72	(0.01)	0.77	(0.01)	0.77	(0.01)	0.87	(0.01)	0.86	(0.01)
Estonia	0.71	(0.01)	0.74	(0.01)	0.79	(0.01)	0.78	(0.01)	0.88	(0.01)	0.87	(0.01)
Finland	0.72	(0.01)	0.75	(0.01)	0.78	(0.01)	0.79	(0.01)	0.87	(0.01)	0.87	(0.01)
France	0.70	(0.01)	0.75	(0.01)	0.78	(0.01)	0.84	(0.01)	0.91	(0.01)	0.90	(0.00)
Germany	0.70	(0.01)	0.72	(0.01)	0.77	(0.01)	0.81	(0.01)	0.90	(0.00)	0.88	(0.01)
Greece	0.73	(0.01)	0.75	(0.01)	0.79	(0.01)	0.79	(0.01)	0.88	(0.01)	0.88	(0.01)
Hong Kong–China	0.64	(0.01)	0.73	(0.01)	0.74	(0.01)	0.77	(0.01)	0.88	(0.01)	0.86	(0.00)
Hungary	0.74	(0.01)	0.78	(0.01)	0.81	(0.01)	0.83	(0.01)	0.90	(0.01)	0.90	(0.00)
Iceland	0.70	(0.01)	0.74	(0.01)	0.76	(0.01)	0.78	(0.01)	0.86	(0.01)	0.84	(0.01)

Table B.1.11 (cont'd)

Correlation of collaborative problem-solving performance with performance in mathematics, reading, and science

	Cor	relation bet problem	tween per n solving ar	formance in nd perform	n collaborat ance in:	ive	For co	mparison,	correlation	between	performanc	e in:
	Mathe	matics	Read	ding	Scier	nce	Mather and rea	natics ading	Mather and sc	natics ience	Read and sci	ling ience
Country, economy, or province	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error	Correlation	Standard error
Israel	0.75	(0.01)	0.78	(0.01)	0.80	(0.01)	0.83	(0.01)	0.89	(0.01)	0.89	(0.01)
Italy	0.65	(0.02)	0.68	(0.01)	0.73	(0.01)	0.75	(0.01)	0.85	(0.01)	0.84	(0.01)
Japan	0.66	(0.01)	0.73	(0.01)	0.72	(0.01)	0.79	(0.01)	0.87	(0.01)	0.86	(0.01)
Korea	0.72	(0.01)	0.76	(0.01)	0.77	(0.01)	0.78	(0.01)	0.87	(0.01)	0.85	(0.01)
Latvia	0.66	(0.01)	0.73	(0.01)	0.75	(0.01)	0.77	(0.01)	0.87	(0.01)	0.87	(0.01)
Lithuania	0.72	(0.01)	0.74	(0.01)	0.79	(0.01)	0.79	(0.01)	0.90	(0.01)	0.87	(0.00)
Luxembourg	0.73	(0.01)	0.78	(0.01)	0.78	(0.01)	0.83	(0.01)	0.91	(0.00)	0.90	(0.00)
Macao–China	0.65	(0.02)	0.78	(0.01)	0.78	(0.01)	0.75	(0.01)	0.84	(0.01)	0.89	(0.00)
Malaysia	0.72	(0.01)	0.74	(0.01)	0.79	(0.01)	0.78	(0.02)	0.87	(0.01)	0.88	(0.01)
Mexico	0.67	(0.02)	0.73	(0.01)	0.76	(0.01)	0.77	(0.01)	0.84	(0.01)	0.86	(0.01)
Montenegro	0.66	(0.01)	0.70	(0.01)	0.74	(0.01)	0.76	(0.01)	0.83	(0.01)	0.84	(0.01)
The Netherlands	0.75	(0.01)	0.78	(0.01)	0.77	(0.01)	0.87	(0.01)	0.91	(0.00)	0.89	(0.00)
New Zealand	0.70	(0.01)	0.75	(0.01)	0.78	(0.01)	0.79	(0.01)	0.89	(0.00)	0.87	(0.00)
Norway	0.68	(0.01)	0.72	(0.01)	0.74	(0.01)	0.78	(0.01)	0.89	(0.01)	0.84	(0.01)
Peru	0.73	(0.01)	0.78	(0.01)	0.79	(0.01)	0.81	(0.01)	0.86	(0.01)	0.88	(0.01)
Portugal	0.70	(0.01)	0.74	(0.01)	0.76	(0.01)	0.79	(0.01)	0.89	(0.01)	0.86	(0.01)
Russian Federation	0.55	(0.02)	0.68	(0.01)	0.70	(0.01)	0.66	(0.01)	0.82	(0.01)	0.81	(0.01)
Singapore	0.73	(0.01)	0.78	(0.01)	0.80	(0.01)	0.82	(0.01)	0.89	(0.00)	0.90	(0.01)
Slovak Republic	0.69	(0.01)	0.74	(0.01)	0.74	(0.01)	0.83	(0.01)	0.88	(0.01)	0.87	(0.01)
Slovenia	0.68	(0.01)	0.73	(0.01)	0.74	(0.01)	0.79	(0.01)	0.89	(0.00)	0.87	(0.01)
Spain	0.66	(0.01)	0.71	(0.01)	0.74	(0.01)	0.76	(0.01)	0.88	(0.01)	0.86	(0.00)
Sweden	0.71	(0.01)	0.78	(0.01)	0.77	(0.01)	0.78	(0.01)	0.89	(0.00)	0.85	(0.01)
Thailand	0.65	(0.02)	0.76	(0.02)	0.78	(0.01)	0.75	(0.01)	0.83	(0.01)	0.87	(0.01)
Tunisia	0.59	(0.02)	0.58	(0.02)	0.65	(0.02)	0.72	(0.02)	0.81	(0.01)	0.83	(0.01)
Turkey	0.68	(0.02)	0.71	(0.01)	0.76	(0.01)	0.76	(0.01)	0.86	(0.01)	0.85	(0.01)
United Arab Emirates	0.74	(0.01)	0.80	(0.01)	0.81	(0.01)	0.81	(0.01)	0.88	(0.01)	0.89	(0.00)
United Kingdom	0.68	(0.01)	0.74	(0.01)	0.76	(0.01)	0.77	(0.01)	0.87	(0.01)	0.86	(0.01)
United States	0.76	(0.01)	0.79	(0.01)	0.82	(0.01)	0.83	(0.01)	0.90	(0.00)	0.90	(0.00)
Uruguay	0.71	(0.01)	0.73	(0.01)	0.77	(0.01)	0.79	(0.01)	0.88	(0.01)	0.87	(0.01)
OECD average	0.70	(0.00)	0.74	(0.00)	0.77	(0.00)	0.80	(0.00)	0.88	(0.00)	0.87	(0.00)

Note: BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Estimated average scores in individual problem solving (PISA 2012) and in collaborative problem solving (PISA 2015)

	PISA 2012 individ	dual problem solving	PISA 2015 collaborati	ve problem solving
Country, economy, or province	Average	Standard error	Average	Standard error
Singapore	562	(1.2)	561	(1.2)
British Columbia	535	(3.5)	561	(5.8)
Japan	552	(3.1)	552	(2.7)
Alberta	531	(5.1)	543	(5.8)
Hong Kong–China	540	(3.9)	541	(2.9)
Korea	561	(4.3)	538	(2.5)
Canada	526	(2.4)	535	(2.3)
Estonia	515	(2.5)	535	(2.5)
Finland	523	(2.3)	534	(2.6)
Macao–China	540	(1.0)	534	(1.2)
Quebec	525	(4.5)	534	(4.7)
Nova Scotia	512	(5.7)	533	(4.6)
Ontario	528	(5.7)	532	(4.4)
Australia	523	(1.9)	531	(1.9)
Prince Edward Island	493	(2.6)	529	(5.9)
Chinese Taipei	534	(2.9)	527	(2.5)
Germany	509	(3.6)	525	(2.8)
Newfoundland and Labrador	504	(7.3)	521	(4.4)
United States	508	(3.9)	520	(3.6)
Denmark	497	(2.9)	520	(2.5)
United Kingdom	517	(4.2)	519	(2.7)
Manitoba	504	(3.6)	519	(5.5)
The Netherlands	511	(4.4)	518	(2.4)
New Brunswick	515	(3.1)	517	(5.5)
Sweden	491	(2.9)	510	(3.4)
Austria	506	(3.6)	509	(2.6)
Saskatchewan	515	(2.8)	508	(3.7)
Norway	503	(3.3)	502	(2.5)
Slovenia	476	(1.5)	502	(1.8)
Belgium	508	(2.5)	501	(2.4)
Czech Republic	509	(3.1)	499	(2.2)
Portugal	494	(3.6)	498	(2.6)
Spain	477	(4.1)	496	(2.1)
France	511	(3.4)	494	(2.4)
Italy	510	(4.0)	478	(2.5)
Russian Federation	489	(3.4)	473	(3.4)
Croatia	466	(3.9)	473	(2.5)
Hungary	459	(4.0)	472	(2.4)

Table B.1.12 (cont'd)

Estimated average scores in individual problem solving (PISA 2012) and in collaborative problem solving (PISA 2015)

	PISA 2012 individ	lual problem solving	PISA 2015 collaborative problem solving			
Country, economy, or province	Average	Standard error	Average	Standard error		
Israel	454	(5.5)	469	(3.6)		
Slovak Republic	483	(3.6)	463	(2.4)		
Chile	448	(3.7)	457	(2.7)		
Cyprus	445	(1.4)	444	(1.7)		
Bulgaria	402	(5.1)	444	(3.9)		
Uruguay	403	(3.5)	443	(2.3)		
Malaysia	422	(3.5)	440	(3.3)		
United Arab Emirates	411	(2.8)	435	(2.4)		
Colombia	399	(3.5)	429	(2.3)		
Turkey	454	(4.0)	422	(3.4)		
Montenegro	407	(1.2)	416	(1.3)		
Brazil	425	(4.7)	412	(2.3)		
OECD average	500	(0.7)	500	(0.5)		

Note: Countries, economies, and provinces have been sorted in descending order by average score in PISA 2015 collaborative problem solving. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Table B.2.1

Estimated average index of valuing teamwork and proportion of students who agreed or strongly agreed with each statement about valuing teamwork

	Index of valuing teamwork		Percentage of students who agreed/strongly agreed with the following statements							
			I prefer working as part of a team to working alone		I find that teams make better decisions than individuals		I find that teamwork raises my own efficiency		l enjoy cooperating with peers	
Country, economy, or province	Score	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Canada	0.00	(0.01)	66.6	(0.4)	71.9	(0.5)	69.8	(0.4)	87.3	(0.3)
Newfoundland and Labrador	0.00	(0.03)	69.0	(1.7)	72.8	(1.3)	69.9	(1.5)	88.9	(1.2)
Prince Edward Island	0.13	(0.06)	68.3	(3.0)	79.2	(2.3)	76.0	(2.4)	91.7	(1.8)
Nova Scotia	0.01	(0.03)	67.2	(1.4)	70.7	(1.2)	67.5	(1.4)	89.4	(0.8)
New Brunswick	0.02	(0.03)	67.3	(1.5)	71.1	(1.3)	68.7	(1.2)	84.5	(1.1)
Quebec	0.11	(0.03)	70.7	(1.0)	70.9	(1.1)	70.0	(1.0)	87.3	(0.9)
Ontario	-0.01	(0.02)	65.3	(0.9)	72.2	(0.8)	70.7	(0.9)	87.1	(0.5)
Manitoba	-0.03	(0.04)	66.1	(1.4)	74.5	(1.1)	71.5	(1.3)	86.4	(1.0)
Saskatchewan	-0.08	(0.03)	66.6	(1.4)	72.9	(1.1)	71.3	(1.2)	87.3	(0.9)
Alberta	-0.01	(0.03)	67.1	(1.1)	73.9	(1.0)	69.2	(1.3)	87.2	(0.6)
British Columbia	-0.09	(0.02)	63.1	(1.3)	69.4	(1.3)	66.5	(1.1)	87.7	(0.7)
Australia	0.01	(0.01)	66.1	(0.5)	73.7	(0.5)	72.4	(0.4)	89.0	(0.3)
Austria	0.19	(0.01)	69.1	(0.7)	75.1	(0.6)	67.2	(0.6)	87.4	(0.5)
Belgium	-0.11	(0.01)	66.2	(0.6)	71.1	(0.5)	63.0	(0.5)	84.9	(0.5)
Brazil	0.20	(0.01)	70.6	(0.5)	79.5	(0.4)	83.1	(0.4)	93.7	(0.3)
BSJG–China	0.39	(0.01)	87.1	(0.5)	86.5	(0.4)	89.2	(0.5)	92.6	(0.4)
Bulgaria	-0.07	(0.02)	66.7	(0.8)	73.0	(0.7)	74.1	(0.8)	82.0	(0.7)
Chile	0.21	(0.02)	71.8	(0.6)	74.7	(0.7)	81.1	(0.6)	93.1	(0.3)
Chinese Taipei	0.37	(0.02)	84.8	(0.5)	84.1	(0.5)	85.2	(0.5)	90.5	(0.3)
Colombia	0.23	(0.01)	68.1	(0.6)	83.5	(0.5)	76.7	(0.5)	93.9	(0.3)
Costa Rica	0.34	(0.02)	70.8	(0.6)	82.3	(0.6)	77.8	(0.6)	92.7	(0.3)
Croatia	0.21	(0.02)	76.2	(0.6)	80.9	(0.6)	79.3	(0.7)	90.2	(0.5)
Cyprus	0.10	(0.01)	67.8	(0.6)	77.8	(0.5)	76.1	(0.6)	86.8	(0.5)
Czech Republic	0.00	(0.02)	72.2	(0.7)	76.4	(0.7)	66.5	(0.7)	89.3	(0.5)
Denmark	-0.12	(0.01)	64.5	(0.8)	66.8	(0.8)	60.8	(0.8)	90.1	(0.5)
Estonia	-0.10	(0.02)	61.6	(0.8)	72.5	(0.7)	70.8	(0.7)	80.8	(0.6)
Finland	-0.22	(0.02)	62.9	(0.7)	71.7	(0.6)	59.5	(0.8)	82.9	(0.6)
France	0.11	(0.02)	70.6	(0.7)	72.1	(0.6)	76.4	(0.5)	85.2	(0.5)
Germany	0.14	(0.02)	65.8	(0.7)	71.7	(0.6)	65.3	(0.6)	91.7	(0.4)
Greece	0.18	(0.01)	71.9	(0.6)	82.7	(0.6)	75.7	(0.6)	88.5	(0.4)
Hong Kong–China	0.05	(0.02)	71.0	(0.7)	80.2	(0.6)	76.9	(0.6)	84.5	(0.5)
Hungary	-0.02	(0.02)	74.0	(0.7)	77.0	(0.7)	66.8	(0.7)	85.7	(0.6)
Iceland	-0.20	(0.02)	58.2	(0.8)	62.6	(0.8)	64.9	(0.9)	86.7	(0.7)
Israel	-0.03	(0.02)	63.7	(0.8)	73.4	(0.6)	63.9	(0.8)	87.9	(0.4)

Table B.2.1 (cont'd)

Estimated average index of valuing teamwork and proportion of students who agreed or strongly agreed with each statement about valuing teamwork

		Index of valuing teamwork		Percentage of students who agreed/strongly agreed with the following statements							
	Index o tear			I prefer working as part of a team to working alone		I find that teams make better decisions than individuals		l find that teamwork raises my own efficiency		l enjoy cooperating with peers	
Country, economy, or province	Score	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	
Italy	0.02	(0.02)	71.5	(0.6)	73.6	(0.6)	70.9	(0.6)	87.7	(0.5)	
Japan	-0.03	(0.02)	65.6	(0.7)	80.5	(0.6)	53.6	(0.7)	89.2	(0.4)	
Korea	0.14	(0.01)	75.5	(0.7)	83.0	(0.5)	84.4	(0.5)	86.8	(0.5)	
Latvia	-0.14	(0.02)	69.0	(0.7)	70.6	(0.8)	65.6	(0.8)	81.8	(0.6)	
Lithuania	0.33	(0.02)	73.3	(0.6)	78.6	(0.6)	79.5	(0.6)	85.7	(0.5)	
Luxembourg	0.00	(0.01)	67.8	(0.7)	71.1	(0.7)	66.8	(0.6)	85.3	(0.5)	
Macao-China	0.01	(0.01)	69.0	(0.7)	74.2	(0.6)	79.8	(0.6)	84.0	(0.5)	
Malaysia	0.59	(0.02)	87.5	(0.6)	91.0	(0.4)	92.3	(0.4)	95.7	(0.3)	
Mexico	0.23	(0.01)	70.2	(0.6)	82.3	(0.6)	83.0	(0.5)	90.2	(0.4)	
Montenegro	-0.09	(0.01)	43.7	(0.7)	76.0	(0.6)	74.4	(0.7)	89.5	(0.4)	
The Netherlands	-0.26	(0.01)	63.9	(0.7)	62.8	(0.7)	68.1	(0.8)	84.1	(0.5)	
New Zealand	0.07	(0.02)	69.6	(0.7)	75.9	(0.7)	73.0	(0.7)	89.7	(0.5)	
Norway	-0.23	(0.02)	60.3	(0.8)	66.4	(0.8)	56.0	(0.8)	83.8	(0.6)	
Peru	0.09	(0.01)	67.8	(0.7)	79.3	(0.6)	76.5	(0.6)	90.5	(0.4)	
Portugal	0.32	(0.02)	71.8	(0.7)	83.0	(0.6)	81.0	(0.5)	94.9	(0.3)	
Russian Federation	-0.18	(0.02)	71.7	(0.8)	67.7	(0.8)	70.4	(0.8)	80.3	(0.9)	
Singapore	0.27	(0.01)	72.6	(0.6)	82.3	(0.6)	80.1	(0.6)	92.1	(0.4)	
Slovak Republic	-0.12	(0.02)	71.8	(0.6)	74.3	(0.7)	69.6	(0.6)	80.5	(0.6)	
Slovenia	0.02	(0.01)	69.4	(0.7)	75.2	(0.7)	71.2	(0.7)	89.0	(0.5)	
Spain	0.15	(0.02)	66.8	(0.7)	75.4	(0.7)	72.2	(0.6)	92.6	(0.3)	
Sweden	-0.19	(0.02)	58.2	(0.8)	63.3	(0.7)	66.9	(0.7)	83.0	(0.6)	
Thailand	0.37	(0.02)	83.0	(0.5)	90.5	(0.4)	87.2	(0.5)	96.4	(0.3)	
Tunisia	0.43	(0.02)	78.1	(0.7)	84.3	(0.6)	85.7	(0.6)	92.3	(0.4)	
Turkey	-0.04	(0.01)	47.9	(0.7)	71.0	(0.7)	78.9	(0.7)	80.7	(0.6)	
United Arab Emirates	0.45	(0.02)	68.8	(0.5)	86.5	(0.4)	85.5	(0.4)	91.5	(0.3)	
United Kingdom	-0.04	(0.01)	68.4	(0.7)	73.9	(0.6)	71.6	(0.6)	85.6	(0.6)	
United States	0.06	(0.02)	69.0	(0.7)	75.0	(0.7)	74.2	(0.6)	87.0	(0.4)	
Uruguay	0.20	(0.01)	70.3	(0.6)	80.0	(0.5)	75.2	(0.7)	92.9	(0.4)	
OECD average	0.00	(0.00)	66.9	(0.1)	73.5	(0.1)	69.7	(0.1)	86.9	(0.1)	

Note: "Strongly agree" and "agree" responses were combined. BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.
Estimated average index of valuing relationships and proportion of students who agreed or strongly agreed with each statement about valuing relationships

			Percentage of students who agreed/strongly agreed with the following statements									
	Index of valuing relationships		I am a good listener		l enjoy seeing my classmates be successful		I take accoun other interes	into t what s are sted in	l en consid diffe perspe	joy lering rent ectives		
Country, economy, or province	Score	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error		
Canada	0.11	(0.01)	89.2	(0.3)	90.5	(0.3)	89.5	(0.3)	90.3	(0.4)		
Newfoundland and Labrador	0.03	(0.04)	87.5	(1.3)	91.9	(1.0)	88.2	(1.2)	88.9	(0.9)		
Prince Edward Island	0.13	(0.06)	89.6	(2.1)	93.7	(1.3)	91.9	(1.6)	92.0	(1.7)		
Nova Scotia	0.09	(0.03)	88.8	(0.9)	91.9	(0.8)	90.6	(0.8)	91.1	(1.0)		
New Brunswick	0.06	(0.03)	86.7	(0.9)	89.4	(0.9)	86.7	(0.9)	88.3	(1.0)		
Quebec	0.22	(0.03)	86.9	(1.0)	91.8	(0.7)	89.1	(0.9)	92.0	(0.6)		
Ontario	0.09	(0.02)	90.2	(0.5)	89.6	(0.6)	89.7	(0.6)	89.4	(0.7)		
Manitoba	0.00	(0.03)	89.7	(0.9)	89.5	(0.8)	87.1	(0.9)	90.2	(0.9)		
Saskatchewan	-0.03	(0.03)	89.9	(0.7)	91.3	(0.9)	88.8	(0.9)	88.9	(0.9)		
Alberta	0.09	(0.03)	89.8	(0.7)	89.9	(0.7)	90.4	(0.7)	90.8	(0.7)		
British Columbia	0.10	(0.03)	89.7	(0.8)	91.7	(0.7)	89.8	(0.8)	90.5	(0.8)		
Australia	0.09	(0.01)	87.5	(0.3)	91.6	(0.3)	91.1	(0.3)	90.7	(0.3)		
Austria	0.24	(0.01)	88.6	(0.4)	82.8	(0.6)	88.2	(0.4)	81.5	(0.5)		
Belgium	-0.06	(0.01)	84.9	(0.4)	90.6	(0.4)	85.7	(0.5)	88.9	(0.4)		
Brazil	-0.04	(0.01)	84.2	(0.3)	94.1	(0.2)	83.6	(0.4)	87.4	(0.3)		
BSJG–China	0.01	(0.02)	87.1	(0.6)	88.9	(0.5)	88.9	(0.5)	90.8	(0.4)		
Bulgaria	-0.03	(0.02)	88.1	(0.5)	86.6	(0.6)	79.9	(0.7)	89.2	(0.5)		
Chile	0.08	(0.02)	86.5	(0.6)	90.5	(0.4)	79.9	(0.6)	90.2	(0.5)		
Chinese Taipei	0.22	(0.02)	92.4	(0.4)	90.6	(0.4)	92.4	(0.3)	92.8	(0.3)		
Colombia	0.05	(0.01)	90.0	(0.4)	93.2	(0.3)	78.8	(0.6)	83.8	(0.6)		
Costa Rica	0.35	(0.02)	89.5	(0.5)	94.6	(0.3)	83.7	(0.5)	93.8	(0.4)		
Croatia	0.01	(0.02)	92.8	(0.4)	92.3	(0.4)	77.5	(0.7)	87.2	(0.5)		
Cyprus	0.07	(0.01)	84.2	(0.5)	90.0	(0.4)	84.4	(0.5)	89.1	(0.4)		
Czech Republic	-0.20	(0.01)	91.8	(0.4)	77.6	(0.6)	86.0	(0.6)	85.8	(0.6)		
Denmark	0.01	(0.01)	91.2	(0.4)	91.1	(0.4)	86.5	(0.5)	89.4	(0.4)		
Estonia	0.03	(0.02)	88.0	(0.5)	89.0	(0.5)	91.7	(0.4)	87.1	(0.6)		
Finland	-0.08	(0.01)	90.6	(0.5)	86.4	(0.6)	92.3	(0.4)	79.2	(0.7)		
France	-0.07	(0.01)	86.3	(0.5)	86.8	(0.5)	82.7	(0.5)	88.3	(0.4)		
Germany	0.15	(0.02)	89.8	(0.4)	82.3	(0.5)	89.4	(0.4)	81.5	(0.5)		
Greece	0.03	(0.02)	85.2	(0.6)	90.0	(0.5)	86.8	(0.5)	90.9	(0.5)		
Hong Kong–China	-0.04	(0.02)	89.8	(0.5)	84.8	(0.6)	89.7	(0.5)	91.7	(0.5)		
Hungary	-0.03	(0.02)	84.1	(0.6)	87.2	(0.5)	84.9	(0.5)	87.9	(0.5)		
Iceland	-0.09	(0.02)	81.6	(0.7)	87.1	(0.5)	79.3	(0.6)	88.8	(0.6)		
Israel	0.24	(0.02)	92.3	(0.5)	91.2	(0.5)	88.3	(0.5)	83.4	(0.6)		

Table B.2.2 (cont'd)

Estimated average index of valuing relationships and proportion of students who agreed or strongly agreed with each statement about valuing relationships

			Percentage of students who agreed/strongly agreed with the following statements									
	Index o relati	Index of valuing relationships		l am a good listener		l enjoy seeing my classmates be successful		ke into Int what ers are ested in	l enjoy considering different perspectives			
Country, economy, or province	Score	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error		
Italy	-0.14	(0.01)	85.5	(0.5)	85.2	(0.5)	77.6	(0.5)	91.0	(0.4)		
Japan	-0.22	(0.02)	76.8	(0.6)	86.0	(0.5)	78.0	(0.5)	67.5	(0.7)		
Korea	-0.02	(0.02)	95.0	(0.3)	82.2	(0.6)	89.2	(0.5)	91.2	(0.4)		
Latvia	-0.30	(0.02)	80.7	(0.7)	83.8	(0.6)	81.5	(0.7)	82.0	(0.5)		
Lithuania	0.16	(0.02)	85.7	(0.5)	85.1	(0.7)	77.3	(0.6)	88.4	(0.5)		
Luxembourg	0.03	(0.01)	86.0	(0.5)	83.7	(0.5)	84.2	(0.5)	82.8	(0.5)		
Macao–China	-0.15	(0.01)	84.1	(0.5)	84.9	(0.5)	85.7	(0.6)	89.5	(0.5)		
Malaysia	-0.02	(0.02)	87.4	(0.5)	94.1	(0.3)	75.4	(0.6)	90.1	(0.5)		
Mexico	0.16	(0.02)	88.7	(0.4)	92.7	(0.4)	84.3	(0.5)	92.7	(0.4)		
Montenegro	-0.05	(0.01)	82.6	(0.5)	94.7	(0.3)	80.9	(0.6)	84.2	(0.6)		
The Netherlands	-0.18	(0.01)	89.0	(0.5)	91.3	(0.4)	94.0	(0.3)	80.7	(0.5)		
New Zealand	0.01	(0.02)	82.9	(0.7)	91.2	(0.5)	89.2	(0.5)	89.6	(0.4)		
Norway	0.11	(0.02)	87.7	(0.5)	88.0	(0.5)	92.5	(0.4)	88.6	(0.5)		
Peru	-0.08	(0.01)	90.2	(0.4)	84.5	(0.5)	78.1	(0.6)	90.8	(0.4)		
Portugal	0.37	(0.02)	93.2	(0.4)	96.1	(0.3)	93.0	(0.3)	93.7	(0.4)		
Russian Federation	-0.25	(0.02)	91.5	(0.5)	78.0	(0.8)	84.4	(0.6)	81.7	(0.6)		
Singapore	0.32	(0.01)	91.8	(0.4)	91.4	(0.3)	91.5	(0.5)	95.4	(0.2)		
Slovak Republic	-0.34	(0.01)	77.8	(0.6)	78.5	(0.6)	83.7	(0.6)	82.8	(0.6)		
Slovenia	-0.04	(0.01)	82.1	(0.7)	92.3	(0.4)	89.8	(0.5)	83.6	(0.6)		
Spain	0.19	(0.02)	93.3	(0.4)	90.2	(0.5)	85.5	(0.6)	92.0	(0.4)		
Sweden	0.05	(0.02)	87.0	(0.5)	87.0	(0.5)	89.6	(0.4)	86.0	(0.5)		
Thailand	0.10	(0.02)	90.4	(0.6)	97.8	(0.2)	92.7	(0.4)	88.9	(0.4)		
Tunisia	0.12	(0.02)	89.1	(0.5)	94.1	(0.4)	73.7	(0.7)	87.0	(0.6)		
Turkey	0.00	(0.02)	86.4	(0.6)	83.3	(0.7)	75.6	(0.6)	88.3	(0.5)		
United Arab Emirates	0.32	(0.01)	88.3	(0.4)	92.6	(0.3)	86.2	(0.4)	91.1	(0.3)		
United Kingdom	-0.04	(0.02)	86.9	(0.5)	89.2	(0.5)	88.2	(0.5)	87.3	(0.5)		
United States	0.13	(0.02)	89.8	(0.4)	93.0	(0.4)	86.3	(0.5)	90.8	(0.5)		
Uruguay	0.11	(0.02)	83.6	(0.5)	95.5	(0.3)	81.8	(0.6)	90.4	(0.4)		
OECD average	0.01	(0.00)	87.1	(0.1)	87.8	(0.1)	86.4	(0.1)	86.7	(0.1)		

Note: "Strongly agree" and "agree" responses were combined. BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Estimated average index of valuing teamwork by gender

	Females			Males	Difference (Difference (females-males)		
country, economy, or province	Score	Standard error	Score	Standard error	Difference	Standard error		
Canada	-0.11	(0.01)	0.12	(0.02)	-0.23*	(0.02)		
Newfoundland and Labrador	-0.06	(0.04)	0.06	(0.05)	-0.13*	(0.06)		
Prince Edward Island	0.06	(0.09)	0.19	(0.10)	-0.14	(0.15)		
Nova Scotia	-0.13	(0.04)	0.15	(0.05)	-0.28*	(0.06)		
New Brunswick	-0.10	(0.04)	0.14	(0.05)	-0.25*	(0.07)		
Quebec	-0.04	(0.04)	0.26	(0.04)	-0.30*	(0.05)		
Ontario	-0.13	(0.02)	0.10	(0.03)	-0.23*	(0.04)		
Manitoba	-0.15	(0.04)	0.08	(0.04)	-0.22*	(0.04)		
Saskatchewan	-0.23	(0.04)	0.06	(0.04)	-0.28*	(0.05)		
Alberta	-0.09	(0.03)	0.06	(0.04)	-0.14*	(0.05)		
British Columbia	-0.17	(0.03)	-0.01	(0.03)	-0.16*	(0.04)		
Australia	-0.08	(0.01)	0.09	(0.01)	-0.17*	(0.02)		
Austria	0.16	(0.02)	0.22	(0.02)	-0.06	(0.03)		
Belgium	-0.17	(0.02)	-0.04	(0.02)	-0.13*	(0.03)		
Brazil	0.17	(0.01)	0.25	(0.01)	-0.08*	(0.01)		
BSJG–China	0.38	(0.01)	0.40	(0.02)	-0.02	(0.02)		
Bulgaria	-0.13	(0.02)	-0.02	(0.03)	-0.11*	(0.03)		
Chile	0.15	(0.02)	0.26	(0.02)	-0.11*	(0.03)		
Chinese Taipei	0.31	(0.02)	0.42	(0.02)	-0.11*	(0.02)		
Colombia	0.21	(0.02)	0.26	(0.02)	-0.04	(0.02)		
Costa Rica	0.29	(0.03)	0.39	(0.02)	-0.10*	(0.03)		
Croatia	0.17	(0.02)	0.26	(0.02)	-0.09*	(0.02)		
Cyprus	0.09	(0.02)	0.11	(0.02)	-0.02	(0.03)		
Czech Republic	-0.03	(0.02)	0.03	(0.02)	-0.06*	(0.03)		
Denmark	-0.20	(0.02)	-0.04	(0.02)	-0.17*	(0.03)		
Estonia	-0.15	(0.02)	-0.05	(0.02)	-0.10*	(0.03)		
Finland	-0.31	(0.02)	-0.13	(0.02)	-0.18*	(0.03)		
France	0.08	(0.02)	0.14	(0.02)	-0.07*	(0.03)		
Germany	0.11	(0.02)	0.18	(0.02)	-0.06*	(0.03)		
Greece	0.14	(0.02)	0.21	(0.02)	-0.07*	(0.03)		
Hong Kong–China	0.03	(0.02)	0.08	(0.02)	-0.05	(0.03)		
Hungary	-0.06	(0.02)	0.03	(0.02)	-0.09*	(0.03)		
Iceland	-0.29	(0.02)	-0.10	(0.03)	-0.19*	(0.04)		
Israel	-0.02	(0.02)	-0.04	(0.02)	0.02	(0.03)		
Italy	-0.04	(0.02)	0.09	(0.02)	-0.13*	(0.03)		
Japan	0.00	(0.02)	-0.06	(0.02)	0.06*	(0.03)		
Korea	0.06	(0.02)	0.22	(0.02)	-0.17*	(0.03)		
Latvia	-0.19	(0.02)	-0.08	(0.02)	-0.11*	(0.03)		

Table B.2.3 (cont'd)

Lotinated average index of valuing teanswork by genue

	Females		l	Males	Difference (f	Difference (females-males)		
Country, economy, or province	Score	Standard error	Score	Standard error	Difference	Standard error		
Lithuania	0.28	(0.02)	0.38	(0.03)	-0.10*	(0.04)		
Luxembourg	-0.04	(0.02)	0.05	(0.02)	-0.09*	(0.03)		
Macao–China	-0.01	(0.02)	0.02	(0.02)	-0.02	(0.03)		
Malaysia	0.59	(0.02)	0.58	(0.02)	0.01	(0.03)		
Mexico	0.19	(0.02)	0.27	(0.02)	-0.07*	(0.03)		
Montenegro	-0.09	(0.02)	-0.09	(0.02)	0.00	(0.03)		
The Netherlands	-0.34	(0.02)	-0.17	(0.02)	-0.17*	(0.02)		
New Zealand	-0.01	(0.02)	0.14	(0.02)	-0.15*	(0.02)		
Norway	-0.30	(0.02)	-0.15	(0.02)	-0.15*	(0.03)		
Peru	0.04	(0.02)	0.14	(0.02)	-0.10*	(0.02)		
Portugal	0.27	(0.02)	0.36	(0.02)	-0.09*	(0.03)		
Russian Federation	-0.24	(0.02)	-0.12	(0.02)	-0.12*	(0.03)		
Singapore	0.20	(0.02)	0.34	(0.02)	-0.15*	(0.03)		
Slovak Republic	-0.16	(0.02)	-0.09	(0.02)	-0.07*	(0.03)		
Slovenia	-0.01	(0.02)	0.05	(0.02)	-0.05*	(0.03)		
Spain	0.13	(0.02)	0.17	(0.02)	-0.04	(0.03)		
Sweden	-0.32	(0.02)	-0.06	(0.02)	-0.26*	(0.03)		
Thailand	0.33	(0.02)	0.42	(0.02)	-0.09*	(0.03)		
Tunisia	0.42	(0.02)	0.44	(0.02)	-0.01	(0.03)		
Turkey	-0.07	(0.02)	-0.02	(0.02)	-0.05	(0.03)		
United Arab Emirates	0.45	(0.02)	0.44	(0.02)	0.01	(0.02)		
United Kingdom	-0.10	(0.02)	0.01	(0.02)	-0.12*	(0.03)		
United States	-0.05	(0.02)	0.17	(0.02)	-0.22*	(0.03)		
Uruguay	0.16	(0.02)	0.25	(0.02)	-0.08*	(0.03)		
OECD average	-0.06	(0.00)	0.06	(0.00)	-0.11*	(0.00)		

* Statistically significant differences. *Note*: BSJG–China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Estimated average index of valuing relationships by gender

	Females			Males	Difference (i	Difference (females-males)		
Country, economy, or province	Score	Standard error	Score	Standard error	Difference	Standard error		
Canada	0.19	(0.02)	0.02	(0.02)	0.17*	(0.02)		
Newfoundland and Labrador	0.09	(0.06)	-0.04	(0.05)	0.13	(0.08)		
Prince Edward Island	0.19	(0.08)	0.08	(0.09)	0.12	(0.12)		
Nova Scotia	0.17	(0.03)	0.00	(0.04)	0.17*	(0.05)		
New Brunswick	0.09	(0.04)	0.03	(0.05)	0.06	(0.07)		
Quebec	0.32	(0.04)	0.11	(0.04)	0.21*	(0.05)		
Ontario	0.18	(0.03)	0.00	(0.03)	0.18*	(0.04)		
Manitoba	0.06	(0.04)	-0.05	(0.04)	0.11*	(0.04)		
Saskatchewan	0.02	(0.04)	-0.07	(0.04)	0.10	(0.06)		
Alberta	0.15	(0.04)	0.04	(0.05)	0.11	(0.06)		
British Columbia	0.16	(0.03)	0.03	(0.04)	0.14*	(0.04)		
Australia	0.17	(0.01)	0.00	(0.01)	0.17*	(0.02)		
Austria	0.45	(0.02)	0.04	(0.02)	0.42*	(0.03)		
Belgium	0.03	(0.02)	-0.16	(0.02)	0.19*	(0.03)		
Brazil	-0.05	(0.01)	-0.04	(0.02)	-0.01	(0.02)		
BSJG–China	0.03	(0.02)	-0.01	(0.02)	0.04	(0.02)		
Bulgaria	0.07	(0.02)	-0.13	(0.02)	0.20*	(0.03)		
Chile	0.18	(0.02)	-0.02	(0.02)	0.19*	(0.03)		
Chinese Taipei	0.28	(0.02)	0.16	(0.02)	0.12*	(0.02)		
Colombia	0.16	(0.02)	-0.06	(0.02)	0.22*	(0.02)		
Costa Rica	0.41	(0.02)	0.28	(0.02)	0.13*	(0.03)		
Croatia	0.16	(0.02)	-0.16	(0.02)	0.32*	(0.03)		
Cyprus	0.22	(0.02)	-0.09	(0.02)	0.31*	(0.03)		
Czech Republic	-0.06	(0.02)	-0.33	(0.02)	0.27*	(0.03)		
Denmark	0.10	(0.02)	-0.08	(0.02)	0.17*	(0.03)		
Estonia	0.17	(0.02)	-0.11	(0.02)	0.29*	(0.03)		
Finland	0.06	(0.02)	-0.22	(0.02)	0.28*	(0.03)		
France	0.00	(0.02)	-0.14	(0.02)	0.15*	(0.03)		
Germany	0.30	(0.02)	0.01	(0.02)	0.29*	(0.03)		
Greece	0.13	(0.02)	-0.06	(0.02)	0.20*	(0.03)		
Hong Kong–China	-0.02	(0.02)	-0.06	(0.03)	0.04	(0.03)		
Hungary	0.07	(0.02)	-0.13	(0.02)	0.19*	(0.03)		
Iceland	-0.06	(0.02)	-0.11	(0.03)	0.05	(0.04)		
Israel	0.38	(0.02)	0.09	(0.03)	0.29*	(0.03)		
Italy	-0.02	(0.02)	-0.25	(0.02)	0.23*	(0.03)		
Japan	-0.13	(0.02)	-0.32	(0.02)	0.19*	(0.03)		
Korea	-0.01	(0.02)	-0.02	(0.02)	0.02	(0.03)		
Latvia	-0.17	(0.02)	-0.43	(0.02)	0.26*	(0.03)		

Table B.2.4 (cont'd)

Estimated average index of valuing relationships by gender

	Fer	males	N	1 ales	Difference (fe	Difference (females-males)		
Country, economy, or province	Score	Standard error	Score	Standard error	Difference	Standard error		
Lithuania	0.30	(0.03)	0.02	(0.03)	0.28*	(0.04)		
Luxembourg	0.16	(0.02)	-0.10	(0.02)	0.26*	(0.03)		
Macao–China	-0.17	(0.02)	-0.13	(0.02)	-0.04	(0.02)		
Malaysia	0.04	(0.02)	-0.09	(0.02)	0.13*	(0.03)		
Mexico	0.27	(0.02)	0.06	(0.02)	0.22*	(0.02)		
Montenegro	0.07	(0.02)	-0.17	(0.02)	0.25*	(0.03)		
The Netherlands	-0.13	(0.02)	-0.24	(0.02)	0.11*	(0.02)		
New Zealand	0.13	(0.02)	-0.11	(0.02)	0.24*	(0.03)		
Norway	0.28	(0.02)	-0.06	(0.02)	0.34*	(0.03)		
Peru	-0.01	(0.02)	-0.15	(0.02)	0.14*	(0.02)		
Portugal	0.52	(0.02)	0.23	(0.02)	0.30*	(0.03)		
Russian Federation	-0.21	(0.02)	-0.29	(0.02)	0.08*	(0.03)		
Singapore	0.33	(0.02)	0.30	(0.02)	0.03	(0.03)		
Slovak Republic	-0.27	(0.02)	-0.41	(0.02)	0.14*	(0.03)		
Slovenia	0.10	(0.02)	-0.17	(0.02)	0.27*	(0.02)		
Spain	0.28	(0.02)	0.09	(0.02)	0.19*	(0.02)		
Sweden	0.13	(0.02)	-0.03	(0.03)	0.17*	(0.03)		
Thailand	0.12	(0.02)	0.07	(0.02)	0.05*	(0.03)		
Tunisia	0.18	(0.02)	0.04	(0.02)	0.14*	(0.03)		
Turkey	0.10	(0.03)	-0.11	(0.03)	0.21*	(0.04)		
United Arab Emirates	0.41	(0.03)	0.22	(0.02)	0.18*	(0.03)		
United Kingdom	0.07	(0.02)	-0.14	(0.02)	0.21*	(0.02)		
United States	0.17	(0.02)	0.08	(0.03)	0.09*	(0.03)		
Uruguay	0.17	(0.02)	0.05	(0.02)	0.11*	(0.03)		
OECD average	0.11	(0.00)	-0.10	(0.00)	0.21*	(0.01)		

* Statistically significant differences.

Note: BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Malaysia is too small to ensure comparability. See OECD 2017a for a note regarding Cyprus.

Index of valuing teamwork and performance in collaborative problem solving

-	Index of v teamw	valuing vork	Score in c	ollaborative p quarters	problem solving, b s of this index	y national	Difference in collaborative problem-solving performance between students in the top quarter		
	All students		Bottom	Bottom quarter		Top quarter		and students in the bottom quarter of this index	
Canada, provinces, and OECD average	Score	Standard error	Average	Standard error	Average	Standard error	Difference	Standard error	
Canada	0.00	(0.01)	568	(3.2)	520	(3.0)	-48*	(4.0)	
Newfoundland and Labrador	0.00	(0.03)	552	(8.2)	512	(9.4)	-40*	(12.2)	
Prince Edward Island	0.13	(0.06)	561	(12.2)	512	(13.6)	-48*	(18.5)	
Nova Scotia	0.01	(0.03)	571	(6.8)	521	(10.0)	-50*	(10.4)	
New Brunswick	0.02	(0.03)	550	(8.6)	497	(8.5)	-54*	(10.0)	
Quebec	0.11	(0.03)	552	(5.5)	507	(7.1)	-45*	(8.4)	
Ontario	-0.01	(0.02)	569	(6.1)	520	(5.7)	-49*	(6.8)	
Manitoba	-0.03	(0.04)	551	(9.1)	513	(10.3)	-37*	(13.0)	
Saskatchewan	-0.08	(0.03)	542	(7.2)	493	(7.8)	-49*	(10.8)	
Alberta	-0.01	(0.03)	575	(7.8)	523	(8.4)	-52*	(8.6)	
British Columbia	-0.09	(0.02)	591	(6.4)	554	(7.5)	-37*	(8.8)	
OECD average	0.00	(0.00)	516	(0.7)	496	(0.7)	-19*	(0.8)	

Before accounting for gender and student socioeconomic profile

	Change in col problem- performanc (integer) un in the index teamw	hange in collaborative problem-solving performance per one (integer) unit change in the index of valuing teamwork		Explained variance in student performance (r ² x 100)		Change in relative collaborative problem- solving performance per one (integer) unit change in the index of valuing teamwork		l variance t relative ce (r² x 100)
Canada, provinces, and OECD average	Difference	Standard error	%	Standard error	Difference	Standard error	%	Standard error
Canada	-15*	(1.3)	2.4	(0.4)	-4*	(1.3)	59.1	(1.0)
Newfoundland and Labrador	-12*	(3.9)	1.8	(1.1)	-2	(2.4)	64.5	(2.6)
Prince Edward Island	-13*	(6.1)	1.9	(1.7)	-1	(5.5)	61.2	(4.8)
Nova Scotia	-15*	(3.3)	2.3	(1.0)	-3	(2.1)	62.7	(2.3)
New Brunswick	-15*	(3.1)	3.2	(1.2)	-1	(2.2)	61.5	(2.6)
Quebec	-14*	(2.8)	2.5	(0.9)	-5	(2.9)	57.0	(2.1)
Ontario	-16*	(2.3)	2.5	(0.7)	-3	(2.1)	60.0	(2.0)
Manitoba	-11*	(4.1)	1.3	(0.9)	-2	(2.9)	62.3	(2.8)
Saskatchewan	-16*	(3.7)	2.4	(1.1)	-2	(2.4)	61.7	(2.3)
Alberta	-19*	(2.9)	3.5	(1.0)	-5	(2.4)	59.4	(2.1)
British Columbia	-12*	(3.4)	1.4	(0.8)	-2	(2.0)	56.8	(2.8)
OECD average	-7*	(0.3)	0.8	(0.1)	1*	(0.2)	61.0	(0.2)

Table B.2.5 (cont'd)

Index of valuing teamwork and performance in collaborative problem solving

After accounting for gender and student socioeconomic profile

	Change in col problem performance (integer) un in the index o teamw	laborative solving e per one it change of valuing vork	Explained v student pe (r² x	Explained variance in student performance (r ² x 100) Change in relative collaborative problem- solving performance per one (integer) unit change in the index of valuing teamwork		Explained variance in student performance (r ² x 100)		Explained v in student performance	variance relative e (r² x 100)
Canada, provinces, and OECD average	Difference	Standard error	%	Standard error	Difference	Standard error	%	Standard error	
Canada	-14*	(1.3)	10.2	(0.8)	-2	(1.3)	61.3	(1.0)	
Newfoundland and Labrador	-12*	(3.8)	8.0	(1.8)	-1	(2.5)	66.9	(2.4)	
Prince Edward Island	-12*	(5.9)	12.2	(3.8)	0	(5.2)	65.3	(4.9)	
Nova Scotia	-14*	(3.3)	10.4	(1.8)	-1	(2.2)	65.1	(2.2)	
New Brunswick	-15*	(3.0)	11.3	(2.4)	0	(2.0)	63.4	(2.5)	
Quebec	-13*	(2.8)	10.3	(2.0)	-3	(2.8)	58.4	(2.0)	
Ontario	-14*	(2.2)	10.4	(1.4)	-1	(2.1)	62.5	(2.0)	
Manitoba	-11*	(3.6)	9.9	(2.5)	0	(2.8)	64.8	(2.6)	
Saskatchewan	-14*	(3.5)	9.9	(1.7)	0	(2.4)	64.8	(2.2)	
Alberta	-18*	(2.7)	11.6	(1.5)	-4	(2.4)	62.5	(2.0)	
British Columbia	-10*	(3.3)	8.2	(1.7)	-1	(2.0)	59.4	(2.5)	
OECD average	-5*	(0.3)	10.8	(0.2)	2*	(0.2)	62.7	(0.2)	

* Statistically significant differences. *Note: Relative performance* refers to the residual performance, attributable to purely "collaborative problem-solving" competencies, after accounting for performance in science, reading, and mathematics in a regression performed across students at the national level.

Index of valuing relationships and performance in collaborative problem solving

-	Index of v relation	valuing ships	Score in c	Score in collaborative problem solving, by national quarters of this index				Difference in collaborative problem-solving performance between students in the top quarter	
	All stud	lents	Bottom	Bottom quarter		Top quarter		and students in the bottom quarter of this index	
Canada, provinces, and OECD average	Score	Standard error	Average	Standard error	Average	Standard error	Difference	Standard error	
Canada	0.11	(0.01)	528	(2.5)	551	(3.3)	23*	(3.3)	
Newfoundland and Labrador	0.03	(0.04)	497	(15.4)	540	(7.1)	43*	(16.9)	
Prince Edward Island	0.13	(0.06)	517	(7.0)	543	(15.7)	26	(17.1)	
Nova Scotia	0.09	(0.03)	524	(5.3)	558	(9.5)	35*	(10.6)	
New Brunswick	0.06	(0.03)	493	(8.7)	527	(7.5)	34*	(9.9)	
Quebec	0.22	(0.03)	526	(8.9)	536	(6.7)	10	(9.3)	
Ontario	0.09	(0.02)	525	(5.0)	549	(5.6)	24*	(5.9)	
Manitoba	0.00	(0.03)	493	(21.2)	541	(9.7)	48*	(22.4)	
Saskatchewan	-0.03	(0.03)	501	(17.7)	521	(7.1)	20	(18.4)	
Alberta	0.09	(0.03)	536	(6.2)	556	(8.6)	20*	(8.5)	
British Columbia	0.10	(0.03)	553	(5.3)	585	(7.3)	32*	(6.9)	
OECD average	0.01	(0.00)	481	(0.8)	520	(0.7)	39*	(0.9)	

Before accounting for gender and student socioeconomic profile

	Change in col problem- performanc (integer) un in the index relation	llaborative solving e per one it change of valuing ships	Explained student pe (r ² x	variance in erformance 100)	Change in collaborativ solving pe per one (in change in t valuing rel	n relative re problem- rformance teger) unit he index of ationships	Explained in studen performand	l variance tt relative ce (r² x 100)
Canada, provinces, and OECD average	Difference	Standard error	%	Standard error	Difference	Standard error	%	Standard error
Canada	12*	(1.4)	1.4	(0.3)	2	(1.1)	59.0	(1.1)
Newfoundland and Labrador	16*	(3.9)	2.7	(1.3)	3	(3.2)	64.7	(2.6)
Prince Edward Island	12	(6.1)	1.4	(1.4)	1	(4.2)	61.2	(4.8)
Nova Scotia	19*	(3.9)	3.3	(1.3)	3	(2.8)	62.8	(2.3)
New Brunswick	9*	(3.1)	1.1	(0.7)	2	(2.2)	61.5	(2.6)
Quebec	8*	(2.7)	0.8	(0.5)	2	(2.3)	56.8	(2.2)
Ontario	12*	(2.7)	1.4	(0.6)	2	(2.1)	60.0	(2.1)
Manitoba	17*	(4.0)	2.4	(1.1)	3	(2.6)	62.3	(2.9)
Saskatchewan	13*	(4.1)	1.6	(0.9)	5	(2.5)	61.8	(2.3)
Alberta	10*	(3.5)	1.0	(0.6)	1	(2.6)	59.2	(2.2)
British Columbia	16*	(3.2)	2.3	(0.9)	3	(2.5)	56.9	(2.8)
OECD average	16*	(0.3)	2.8	(0.1)	4*	(0.2)	61.2	(0.2)

Table B.2.6 (cont'd)

Index of valuing relationships and performance in collaborative problem solving

After accounting for gender and student socioeconomic profile

	Change in collaborative problem-solving performance per one (integer) unit change in the index of valuing relationships		Explained variance in student performance (r ² x 100)		Change in relative collaborative problem- solving performance per one (integer) unit change in the index of valuing relationships		Explained variance in student relative performance (r ² x 100)	
Canada, provinces, and OECD average	Difference	Standard error	%	Standard error	Difference	Standard error	%	Standard error
Canada	8*	(1.3)	8.9	(0.8)	1	(1.1)	61.2	(1.0)
Newfoundland and Labrador	12*	(3.9)	7.8	(1.9)	2	(3.1)	67.0	(2.3)
Prince Edward Island	10	(6.6)	11.7	(3.4)	0	(4.3)	65.2	(4.9)
Nova Scotia	14*	(3.8)	10.2	(2.1)	2	(2.8)	65.2	(2.2)
New Brunswick	6	(3.1)	8.9	(2.4)	2	(2.2)	63.4	(2.5)
Quebec	6*	(2.6)	8.8	(1.9)	1	(2.3)	58.2	(2.0)
Ontario	8*	(2.7)	9.0	(1.3)	1	(2.1)	62.5	(2.0)
Manitoba	12*	(4.0)	10.1	(2.2)	2	(2.6)	64.9	(2.6)
Saskatchewan	10*	(3.8)	9.1	(1.8)	4	(2.4)	64.9	(2.2)
Alberta	6	(3.3)	8.6	(1.5)	0	(2.4)	62.3	(2.0)
British Columbia	13*	(3.2)	8.6	(1.7)	2	(2.5)	59.4	(2.5)
OECD average	12*	(0.3)	11.8	(0.2)	3*	(0.2)	62.8	(0.2)

* Statistically significant differences.

Note: Relative performance refers to the residual performance, attributable to purely "collaborative problem-solving" competencies, after accounting for performance in science, reading, and mathematics in a regression performed across students at the national level.