OECD Education Working Papers No. 168

Science teachers' satisfaction: Evidence from the PISA 2015 teacher survey

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https://dx.doi.org/10.1787/1ecdb4e3-en

OECD

Organisation for Economic Co-operation and Development

EDU/WKP(2018)4

Unclassified **English text only**

2 February 2018

DIRECTORATE FOR EDUCATION AND SKILLS

Science teachers' satisfaction: Evidence from the PISA 2015 teacher survey

OECD Education Working Paper No. 168

By Tarek Mostafa and Judit Pál

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

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ACKNOWLEDGEMENT

The authors would like to thank Andreas Schleicher, Yuri Belfali, Miyako Ikeda, Francesco Avvisati, Pablo Fraser, Noémie Le Donné, Jeffrey Mo and the country representatives for valuable feedback on earlier drafts of this paper.

This paper was prepared by Tarek Mostafa and Judit Pál from the OECD Directorate for Education and Skills, and edited by Marilyn Achiron. Editorial and statistical support was provided by Hélène Guillou.

ABSTRACT

In 2015, for the first time in its history, PISA (the Programme for International Student Assessment) asked teachers to describe the various aspects of their working environment and teaching practices. This paper examines how teacher, student and school characteristics are related to science teachers' satisfaction in 19 PISA-participating countries and economies.

The findings show that the most satisfied science teachers tend to be those who are initially motivated to become teachers. The results also highlight the positive relationship between science teachers' satisfaction and teacher collaboration, good disciplinary climate in science classes, availability of school resources, and the opportunity to participate in professional-development activities.

RÉSUMÉ

En 2015, et pour la première fois dans l'histoire du PISA (Programme international pour le suivi des acquis des élèves), les enseignants ont été invités à décrire les différents aspects de leur environnement de travail et de leurs pratiques pédagogiques. Le présent document est consacré à l'étude de la relation que les caractéristiques des enseignants, des élèves et des établissements scolaires entretiennent avec le degré de satisfaction des professeurs de sciences dans 19 pays et économies participant au programme.

Il apparaît que les professeurs de sciences les plus heureux sont généralement ceux qui ont embrassé l'enseignement par goût. L'étude révèle également que leur épanouissement est en relation directe avec la collaboration entre collègues, la discipline qui règne dans les classes scientifiques, les ressources scolaires à disposition et la possibilité de prendre part à des activités de perfectionnement professionnel.

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1. INTRODUCTION

Teachers play a vital role in the lives of their students. They impart knowledge, provide pastoral care, act as role models and, above all, create an effective learning environment. However, teaching is fraught with numerous challenges that could lead to dissatisfaction and to eventually leaving the profession (Maslach, Jackson and Leither, 1996).

Many countries around the world are struggling to attract and retain teachers. In particular, retention is deemed the most important factor contributing to the shortfall of qualified science teachers (Bozeman, Scoggin and Stuessy, 2013; Ingersoll and Perda, 2010; Ingersoll, 2003; Loeb, Darling-Hammond and Luczak, 2005; Liu et al., 2011). As a consequence, social commentators, policy makers and teachers themselves have highlighted the problems associated with teacher retention and shortages (Ingersoll and Strong 2011; Skaalvik and Skaalvik, 2011).

Traditionally, inadequate teacher supply was blamed for the shortage of qualified science teachers. This was translated into numerous initiatives designed to increase supply. For instance, in the United States, programmes like "Teach for America" were used to entice the brightest candidates into teaching careers. Some states have also loosened certification requirements, provided financial incentives to prospective teachers, or even started recruiting teachers from overseas (Feistritzer and Chester, 2003; Hirsch, Koppich and Knapp, 2001; Ingersoll and Perda, 2010; Liu et al., 2008; Rice et al., 2008).

However, in reality the problem lay elsewhere. Evidence from the United States suggests that turnover of science teachers is the main factor behind the demand for new hires. For example, 25% of young teachers in the United States quit their jobs within the first three years, and almost 40% quit within the first five years, triggering a demand for replacement teachers (Chang, 2009). Moreover, the supply of qualified science and mathematics teachers is 2.5 times the number of teachers retiring (Ingersoll and Perda, 2010). As such, the shortage of science teachers cannot be attributed to inadequate supply or to the loss of teachers due to retirement. Rather, the culprit is the continuous loss of teachers to other careers. In other words, too many science teachers quit the profession prematurely.

This phenomenon is observed in many other countries. In Norway, 8.8% of teachers left their positions in a period of one year between 1995 and 1996, and 4.6% left the profession altogether during that period (Schøne, 1999). Other countries, including Australia, the People's Republic of China (hereafter "China") and England (UK), have also experienced rising teacher attrition (Hong, 2010).[1]

Given the intensity and impact of teacher attrition on education systems worldwide, one can ask the question: why are science teachers quitting their jobs? Happy and satisfied teachers would be more likely to stay in the profession while dissatisfied teachers might be more likely to drop out. This paper, thus, focuses on teachers' satisfaction with the assumption that it is key to retaining teachers.

Teachers, like other service professionals, are exposed to stress (Stoeber and Rennert, 2008). Most of them cope well, through support from fellow teachers and principals, and through co-operation and understanding from parents and students. However, in

the absence of a supportive environment, teachers might fall victim to emotional exhaustion, a precursor to burnout (Jennett, Harris and Mesibov, 2003; Pines and Aronson, 1988; Schwarzer, Schmitz and Tang, 2000).

This paper examines the context of science teachers in 19 PISA-participating countries and economies while focusing on teachers' satisfaction as a key outcome. PISA 2015 provides a unique opportunity to address this research question as it offers detailed data on science teachers using a specifically designed questionnaire. The questionnaire covered different aspects of science teachers' working environment, teaching practices and satisfaction. In addition, PISA collected data on students and schools, including students' performance in science and students' attitudes towards science. In comparison with existing research on teachers' satisfaction, PISA 2015 has the distinct features of being comparative, focusing on science, and collecting data at the student, teacher and school levels.

The paper is organised as follows. Section 2 discusses the analytical framework and Section 3 presents the results on science teachers' satisfaction based on the data collected through the PISA 2015 teacher questionnaire. Section 4 explores the demographic profile of science teachers and how it relates to their satisfaction. Section 5 examines science teachers' satisfaction in relation to student characteristics. It also discusses the impact of teachers' satisfaction on students' cognitive and non-cognitive outcomes. Section 6 explores science teachers' satisfaction in relation to school characteristics. Section 7 presents the policy implications of the results.

2. THE PISA 2015 TEACHER SURVEY

2.1. What is PISA?

The Programme for International Student Assessment (PISA) is a triennial international survey that aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students.

The PISA 2015 survey focused on science, with reading, mathematics and collaborative problem solving as minor areas of assessment. PISA 2015 also included an assessment of young people's financial literacy, which was optional for countries and economies.

Approximately 540 000 students completed the assessment in 2015, representing about 29 million 15-year-olds in the schools of the 72 participating countries and economies.

Computer-based tests were used, with assessments lasting a total of two hours for each student. Test items were a mixture of multiple-choice questions and questions requiring students to construct their own responses. The items were organised in groups based on a passage setting out a real-life situation. About 810 minutes of test items for science, reading, mathematics and collaborative problem solving were covered, with different students taking different combinations of test items.

Students also answered a background questionnaire, which took 35 minutes to complete. The questionnaire sought information about the students themselves, their homes, and their school and learning experiences. Countries could choose two other optional questionnaires for students: one asked students about their familiarity with and use of information and communication technologies (ICT); and the second sought information about students' education to date, including any interruptions in their schooling, and whether and how they are preparing for a future career.

School principals completed a questionnaire that covered the school system and the learning environment. In some countries/economies, optional questionnaires were distributed to parents, who were asked to provide information on their perceptions of and involvement in their child's school, their support for learning in the home, and their child's career expectations, particularly in science.

2.2. The teacher sample in PISA 2015

In 2015, and for the first time, 19 countries and economies (9 OECD countries and 10 partner countries and economies) distributed an optional questionnaire to teachers. This questionnaire was intended to provide more contextual information on typical 15-year-old students eligible to participate in PISA. For this purpose, teachers were defined as "those whose primary or major activity in school is student instruction, whether it happens in a classroom, in a small group, on a one-to-one basis, or outside regular classrooms". In order to ensure adequate representation of teachers and to guarantee samples that are sufficiently large, sampling of teachers included teachers who were eligible to teach the modal grade of 15-year-old students – whether they were teaching it currently, had done so before, or will/could do so in the future.

In each country or economy, the questionnaire focused on the grade level that most 15-year-old students attend. If an adjacent grade level was attended by one-third or more of 15-year-old students, both grade levels were used as modal grades (OECD 2017b, Chapter 4). Teachers were listed and randomly sampled within each school as part of two distinct populations: science teachers and teachers who teach other subjects. The distinction was based on the meaning of school science, which includes various domains, such as physics, chemistry, biology, earth science, geology, space, astronomy, applied science, and technology. These are either taught as separate subjects or within an integrated science course. School science does not include such subjects as mathematics, psychology, economics, geography, language and literature. Teachers teaching these subjects were part of the non-science teacher population.

In each school, 10 science teachers were randomly sampled if the school had more than 10 science teachers. In smaller schools with fewer than 10 science teachers, all science teachers were selected. Similarly, 15 non-science teachers were randomly sampled if the school had more than 15 science teachers. If not, then all non-science teachers were included in the survey. Within each subpopulation (science and non-science), teachers had the same probability of being selected (i.e. random sampling).

There is no teacher-student link in PISA 2015. In other words, the teachers sampled to participate in the survey were all eligible to teach the modal grade of 15-year-old students, as described above, but they were not necessarily teaching the sampled students.

Figure 2.1 presents the number of sampled teachers for each country and economy. Non-responding teachers are teachers who were selected to participate but did not take part in the survey. In total, the 19 countries and economies provided data on 32 071 science teachers and 62 765 non-science teachers.

The proportion of non-responding teachers is the highest in Australia, Brazil, Germany and Italy, with about 30% of sampled teachers not answering the survey. For these countries, results should be interpreted with caution as they might be affected by possible non-response bias.

Figure 2.1. The PISA 2015 teacher sample

	Science teachers	Teachers of other subjects	Non-response	Total
	Frequency	Frequency	Frequency	Frequency
	N	N	N	N
OECD				
Australia	4,206	7,509	4,519	16,234
Chile	883	2,397	317	3,597
Czech Republic	2,184	3,782	393	6,359
Germany	2,047	3,596	2,804	8,447
Italy	2,455	4,550	2,733	9,738
Korea	924	2,130	49	3,103
Portugal	1,445	2,266	517	4,228
Spain	1,373	2,527	386	4,286
United States	1,119	2,122	439	3,680
Partners				
Brazil	2,730	5,557	3,535	11,822
B-S-J-G (China)	2,413	3,882	128	6,423
Colombia	1,371	3,372	929	5,672
Dominican Republic	455	1,059	313	1,827
Hong Kong (China)	1,042	1,841	315	3,198
Macao (China)	391	2,410	26	2,827
Malaysia	2,009	3,193	257	5,459
Peru	934	2,919	184	4,037
Chinese Taipei	1,549	3,132	65	4,746
United Arab Emirates	2,541	4,521	1,006	8,068
All countries and economies	32,071	62,765	18,915	113,751

Source: OECD, PISA 2015 Database.

The PISA technical standards were met in all countries and economies that distributed the PISA 2015 teacher questionnaire, except in Malaysia. In this country, the PISA assessment was conducted in accordance with the operational standards and guidelines of the OECD. However, the weighted response rate among the initially sampled Malaysian schools (51%) fell well short of the standard PISA response rate of 85%. Therefore, the results may not be comparable to those of other countries. In this paper, Malaysia was excluded from the all-country averages which were computed using data from the remaining 18 countries and it was excluded from all figures. Henceforth, the expression "18 participating countries and economies" is used to designate those which have distributed the teacher questionnaire.

2.3. The teacher questionnaire

The teacher questionnaire in PISA 2015 was developed with the objective of collecting detailed information on teacher demographics, instruction, teaching strategies, teacher well-being and school context (OECD 2017b, Chapter 4). Such data can be used to analyse differences between countries/economies and to explore how student outcomes are associated with teachers. Even though some of these dimensions were covered in the school and student questionnaires, surveying teachers directly was thought to be more valid in providing accurate information about them (e.g. teaching strategies). Items in the teacher questionnaire were developed in conjunction with the rest of the PISA instruments and covered similar policy topics.

Two versions of the teacher questionnaire were used for the two teacher populations (i.e. science teachers and teachers who teach other subjects). The questionnaires consisted of a main common core and some population-specific questions. These differences were introduced to gauge particular aspects about science (or non-science) teaching, given that science was the major domain of assessment in PISA 2015. The teacher questionnaire was distributed using a computer-based assessment platform in all 19 countries and economies.

The teacher questionnaire covered the following areas:

- *Teacher qualifications and professional knowledge*: The teacher questionnaire covered teacher background information, such as gender, age, qualification, experience, training, professional development, employment status, self-efficacy and satisfaction with the job and profession. These aspects of the questionnaire were partially taken from the OECD Teaching and Learning International Survey (TALIS).
- *Science teaching practices and school learning environment*: Teachers were asked to describe their teaching practices, including teacher-directed learning, enquiry-based strategies, collaborative learning, assessment, feedback and grading practices. Some of these dimensions were also covered in the student questionnaire, allowing for a student-teacher comparison. Such a comparison might reflect variations in what teachers implement and what students perceive from this implementation.
- *Learning time and curriculum*: As the stakeholders knowledgeable about the science curriculum, teachers were asked about whether there is a formal curriculum, which education goals are covered by the curriculum, and whether parents are informed about the curriculum.
- *Leadership and school management*: Even though these aspects were covered by the school questionnaire, the teacher questionnaire collected similar information from the teacher's perspective on the principal's leadership style.
- *School resources*: Teachers were asked to report on school human and physical resources and whether any shortages affect their ability to teach. This question complemented a similar question in the school questionnaire.

Questionnaires for science and non-science teachers differed in a number of ways. Science teachers were asked particular questions that were not asked of non-science teachers. These covered the proportion of education and training time dedicated to particular areas, whether there is a formal science curriculum in the school, science teaching strategies, parents' knowledge about the curriculum, co-operation in science courses among teachers, science activities and teacher self-efficacy related to teaching

science. In parallel, teachers who teach other subjects were also asked specific questions, covering: details about teacher training and education, teacher perception of school leadership, teacher co-operation in general, student appraisal and assessment, organisation of student collaborative activities and ability grouping.

2.4. The structure of the data

In this paper, analyses are based on data from the PISA 2015 student, school and teacher questionnaires. Science teachers are the main focus because science was the major domain in PISA 2015. In what follows, the word teacher is used to designate science teachers only, unless otherwise specified.

Students and science teachers are sampled randomly and independently within each school. Therefore, a student-teacher link does not exist (i.e. it is not possible to determine whether an individual teacher is teaching a particular student). However, all sampled teachers have taught, are or will be teaching the modal grade 15-year-old students are attending.

In order to analyse the teacher and student data jointly, either the student or teacher data have to be aggregated at the school level. For most of the analyses in the paper, the student data are aggregated at the school level because the outcome of interest (i.e. teachers' satisfaction) is reported at the teacher level. This was done in order to preserve, and subsequently exploit, the variations among teachers within schools. The data consist of multiple teachers nested within schools. At the teacher level, individual teacher data are used. At the school level, school data and aggregated student data are used. As such, this is a teacher database with each observation representing an individual teacher. The percentages presented in the analyses represent proportions of teachers who are eligible to teach 15-year-old students. All findings are weighted using a transformed version of the student weights. The construction of these weights is described in Annex A.

Analyses in subsection 5.4 are the only exceptions. The teacher data in that subsection were aggregated at the school level while keeping individual student data. This was done for the same reason mentioned above. Subsection 5.4 examines the relationship between teachers' satisfaction and student outcomes (e.g. performance, and enjoyment and interest in science).

3. TEACHERS' SATISFACTION

Job satisfaction is customarily defined as the positive judgement people make about their jobs (Weiss, 2002) or as a positive emotional state resulting from the appraisal of one's job (Locke, 1976). In the case of teachers, job satisfaction is defined as a sense of fulfilment and gratification resulting from being a teacher and from working in a particular teaching job.

In 1959, Fredrick Herzberg, a pioneer of motivation theory, identified various dimensions of employee satisfaction that can be grouped under two headings: intrinsic and extrinsic satisfiers (Herzberg, Mausner and Snyderman, 1959). In general, intrinsic factors create satisfaction when they are present; extrinsic satisfiers tend to reduce satisfaction when they are absent. The former group includes challenging work, responsibility, advancement, student achievement, working with students and seeing them develop; the latter group includes more tangible factors, like basic needs, status in society, job security, salary and benefits. Extrinsic factors are those lesser needs that cannot motivate employees in themselves, but can minimise dissatisfaction when present. Once the extrinsic factors have been addressed, intrinsic satisfiers, representing higher-order needs, can promote satisfaction, motivation and productivity.

Herzberg's work was successfully replicated using data on teachers (Sergiovanni, 1967; Dinham and Scott, 1998) found a clear distinction between two groups of mutually exclusive factors that fall neatly within Herzberg's framework. The two studies identified intrinsic factors, such as student performance and self-growth, which are uniformly satisfying, and extrinsic factors, such as a poor collegial environment, that are uniformly dissatisfying.

Further, Dinham and Scott (1998) extended Herzberg's framework by identifying a neutral domain between intrinsic and extrinsic factors. In line with Herzberg, the authors identified two groups of factors: a) intrinsic satisfiers, which relate to the core mission of teaching, such as student achievement, aspirations, behaviours and attitudes, teacher self-growth, mastery of professional skills, and a sense of belonging at school; and b) extrinsic dissatisfiers, such as the declining status of teachers in society, greater expectations on teachers to solve social problems, changing education policy over which teachers have little control, increased administrative workload, and being treated impersonally by employers. The third, more neutral, domain included mainly school-related factors, such as school leadership, climate, decision making and school reputation. These factors were found to fall between the satisfiers and dissatisfiers.

Box 3.1. Teachers' satisfaction in PISA 2015

PISA measures teachers' satisfaction using one question consisting of eight statements. Answers were provided on a four-point Likert scale ranging from "strongly agree", "agree", "disagree", to "strongly disagree". The question is:

We would like to know how you generally feel about your job. How strongly do you agree or disagree with the following statements?

1. The advantages of being a teacher clearly outweigh the disadvantages.
2. If I could decide again, I would still choose to work as a teacher.
3. I regret that I decided to become a teacher.
4. I wonder whether it would have been better to choose another profession.
5. I enjoy working at this school.
6. I would recommend my school as a good place to work.
7. I am satisfied with my performance in this school.
8. All in all, I am satisfied with my job.

Two indices were constructed based on answers to the statements using IRT scaling (see OECD, 2017c, Technical Report, Chapter 16). One focuses on satisfaction with the teaching profession; the other focuses on satisfaction with the current job. The former was constructed using statements 1 through 4 and the latter using statements 5 through 8. The two indices were standardised to have an average of 0 across OECD countries and a standard deviation of 1, meaning that two-thirds of the population fall between the values of -1 and 1 on each index.

As described in Box 3.1, PISA uses two indices of teachers' satisfaction: one focusing on satisfaction with the current job, and the other focusing on satisfaction with the teaching profession. Although the two are expected to be correlated, they might diverge. According to (Sahlberg, 2010), teaching is a profession driven by ethical values and personal motivation. In this sense, teachers could well be satisfied with the teaching profession because it fulfils their personal goals, but at the same time they could be dissatisfied with their current job and working conditions.

Figure 3.1 illustrates the analytical framework and describes the hypothetical relationships between teachers' satisfaction and student, school and teacher contexts. The association between teachers' satisfaction and some of the factors are examined in Chapter 7 of the *OECD Teaching and Learning International Survey (TALIS) 2013 Results* (OECD, 2014). In comparison with TALIS, PISA offers detailed information about students' achievement, socio-economic background, behaviours, and relationship with teachers, in addition to a wealth of information on their schools.

Figure 3.1. Analytical framework

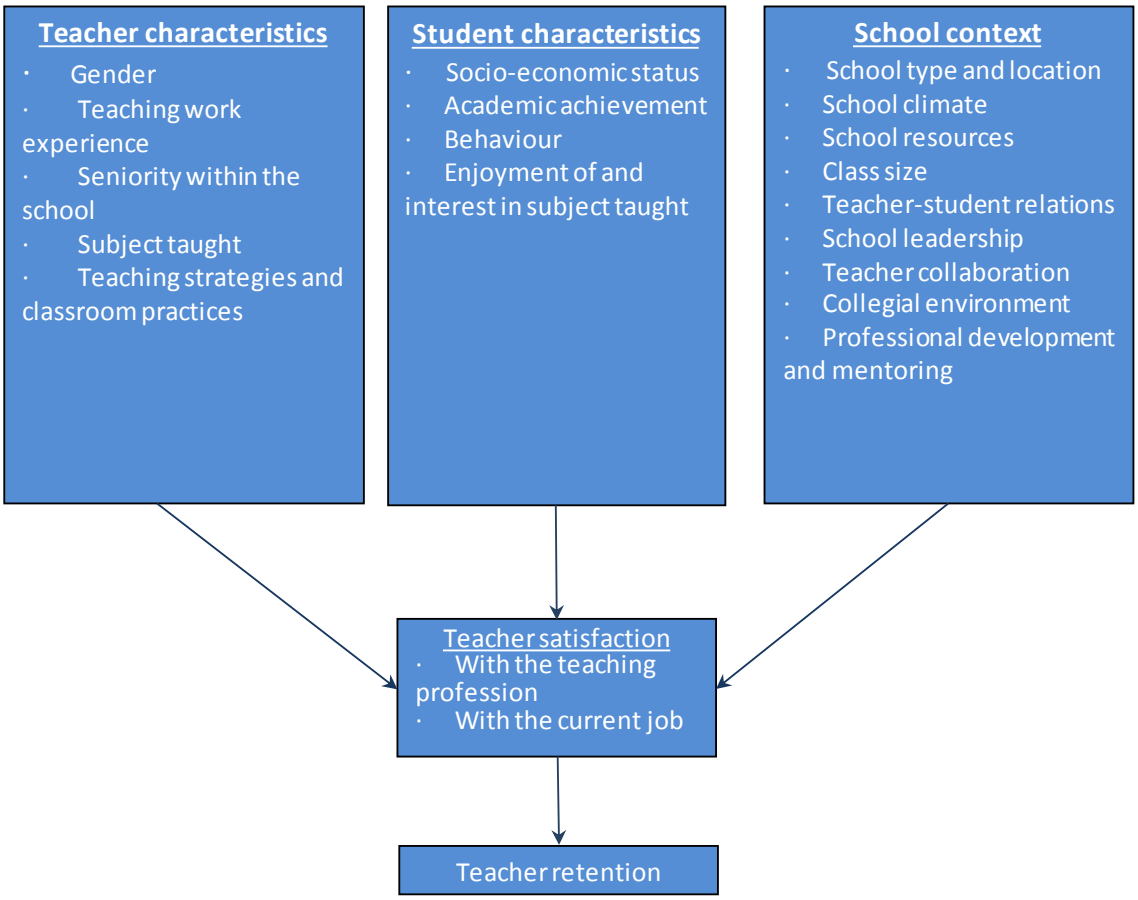


Figure 3.2 and Figure 3.3 present the proportion of teachers who agreed or strongly agreed with each of the statements related to the question about satisfaction. For satisfaction with the teaching profession, 79% of teachers, on average, across all 19 countries and economies agreed or strongly agreed with the statement that the advantages of being a teacher outweigh the disadvantages; only 10% regret that they have become teachers. Some 79% agreed or strongly agreed that if given the choice again they would still decide to become teachers, while 38% wonder whether it would have been better to choose another profession. The responses vary across countries and items. In Hong Kong (China), Macao (China) and Chinese Taipei, the low levels of satisfaction with the profession, measured by the standardised index, stem from the responses to one statement: whether it would have been better to choose another profession. In Italy and Portugal, the low levels of satisfaction reflect the responses to all four statements.

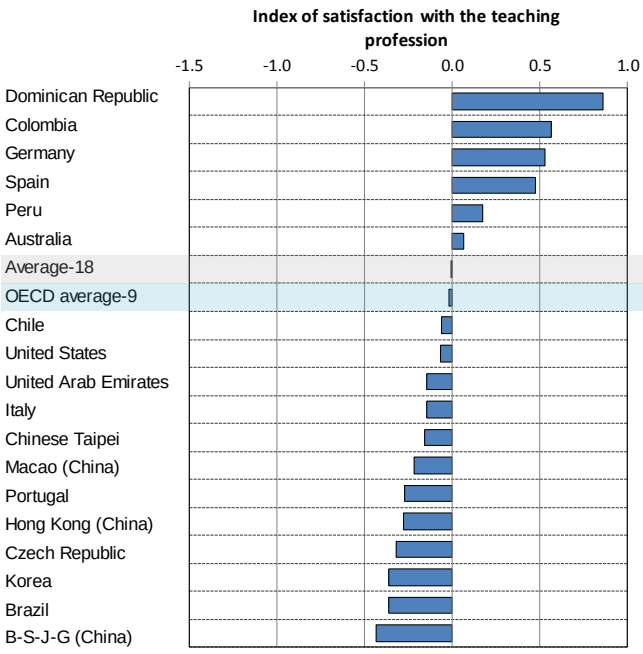
When it comes to satisfaction with the current job (Figure 3.3), 89% of teachers, on average across all countries and economies, enjoy working in their current school (based on responses "agree" and "strongly agree" with the corresponding statements). Some 83% of teachers would recommend their school as a good place to work, 93% are satisfied with the performance of their school, and 92% responded that, all in all,

they are satisfied with their job. All East Asian countries and economies are below the all-country average for almost all statements. Portugal is above average for all statements, even though it is below average when it comes to teachers' satisfaction with the profession.

Differences between countries in the level of teachers' satisfaction could be related to genuine contextual differences between education systems and teachers' working conditions, but they could also be masking cultural differences in how people express their satisfaction and happiness. Therefore, the findings should be interpreted with caution.

Figure 3.2. Satisfaction with the teaching profession

Results based on science teachers' reports and the index of satisfaction with the teaching profession

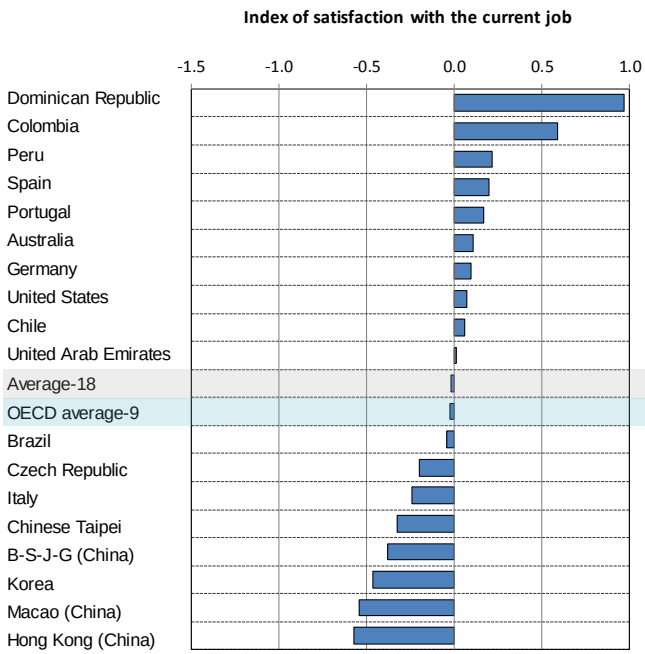


	Percentage of science teachers who agreed/strongly agreed with the following statements:			
	The advantages of being a teacher clearly outweigh the disadvantages	If I could decide again, I would still choose to work as a teacher	I regret that I decided to become a teacher	I wonder whether it would have been better to choose another profession
Dominican Republic	93.2	95.6	4.5	12.8
Colombia	86.6	91.3	7.0	18.3
Germany	86.3	82.0	4.6	12.5
Spain	85.7	91.9	5.2	17.2
Peru	76.0	87.0	6.7	22.7
Australia	88.1	80.6	6.7	38.2
Average-18	78.5	79.4	10.4	38.0
OECD average-9	75.7	77.1	10.3	35.9
Chile	68.8	72.7	12.7	38.4
United States	80.5	76.6	8.4	45.6
United Arab Emirates	79.8	74.9	17.1	38.9
Italy	54.5	81.2	14.1	26.7
Chinese Taipei	93.0	85.7	6.7	60.6
Macao (China)	82.2	78.5	8.9	44.5
Portugal	71.6	69.4	18.8	45.7
Hong Kong (China)	85.2	82.6	12.9	56.5
Czech Republic	55.1	73.0	8.2	32.5
Korea	90.4	66.7	13.8	66.4
Brazil	54.9	68.4	13.5	43.4
B-S-J-G (China)	81.0	71.8	17.7	62.6

Countries and economies are ranked in descending order of the index of satisfaction with the teaching profession.
Source: OECD, PISA 2015 Database.

Figure 3.3. Satisfaction with the current job

Results based on science teachers' reports and the index of satisfaction with the current job



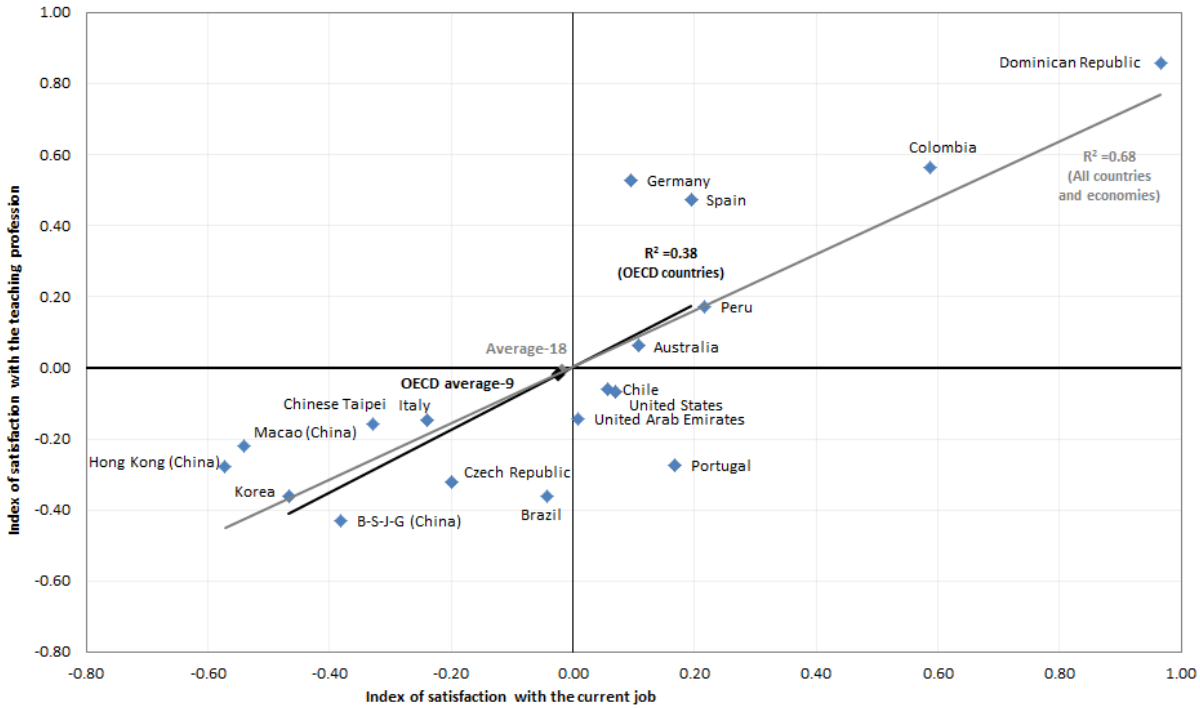
	Percentage of science teachers who agreed/strongly agreed with the following statements:			
	I enjoy working at this school	I would recommend my school as a good place to work	I am satisfied with my performance in this school	All in all, I am satisfied with my job
Dominican Republic	96.9	97.6	98.9	99.1
Colombia	95.2	94.2	96.8	97.3
Peru	95.1	89.0	96.8	97.2
Spain	91.0	87.1	96.6	97.3
Portugal	92.4	89.1	96.8	95.8
Australia	92.8	88.2	95.0	90.8
Germany	83.9	79.3	93.7	92.1
United States	92.4	86.8	93.7	90.6
Chile	89.8	78.3	93.1	92.8
United Arab Emirates	86.9	85.2	95.5	91.9
Average-18	89.0	82.8	92.6	92.2
OECD average-9	89.2	83.5	92.3	92.8
Brazil	94.1	90.9	89.5	76.5
Czech Republic	92.0	85.1	92.2	92.1
Italy	88.7	84.7	89.2	91.2
Chinese Taipei	87.8	79.2	89.1	90.9
B-S-J-G (China)	84.7	73.9	88.8	87.8
Korea	79.8	72.4	80.6	92.5
Macao (China)	78.4	64.8	89.4	92.7
Hong Kong (China)	80.9	65.1	90.2	90.4

Countries and economies are ranked in descending order of the index of satisfaction with the current job.
Source: OECD, PISA 2015 Database.

Figure 3.4 shows that, in most countries and economies, the two indices of teachers' satisfaction are correlated. This means that teachers who are satisfied with their profession tend to be satisfied with their current jobs as well. The four exceptions are Brazil, Germany, Portugal and Spain. Teachers in all East Asian countries and economies are less satisfied on both measures. This also coincides with poorer student well-being (OECD, 2017a) and greater pressure on both students and teachers (e.g. long studying hours). The countries with most satisfied teachers are the Dominican Republic and Colombia followed by Germany and Spain. In the latter two countries, teachers are more satisfied with their profession than with their current job, but both measures are above the OECD average.

The two measures diverge in Chile, Portugal, the United Arab Emirates and the United States. Teachers in these countries are dissatisfied with the profession (below the OECD average) but satisfied with their current job (above the average). This divergence might reflect pessimistic views about the prospects of the teaching profession in spite of satisfaction with current job circumstances.

Figure 3.4. Relationship between the indices of satisfaction with the teaching profession and with the current job



Source: OECD, PISA 2015 Database.

In most countries, variations in teachers' satisfaction fall close to the OECD average with a standard deviation of one on the two indices. Chile and Portugal show slightly larger variations among teachers on satisfaction with the teaching profession, while the Czech Republic, Hong Kong (China) and Chinese Taipei show slightly smaller variations. Similarly, Chile and Germany show larger variations on satisfaction with the current job, and the Dominican Republic shows smaller variations in that measure. When these variations are decomposed, the results show that the proportion of variation between schools is about 6.6% on average for satisfaction with the profession and 12% for satisfaction with the job. Countries with large between school variations on the index of satisfaction with the profession include Brazil, Colombia, the Dominican Republic, and the United Arab Emirates. For satisfaction with the job, the countries with the largest between school variations are Brazil, Chile, Colombia, and the United States (Tables 3.1 and 3.2).

4. SCIENCE TEACHERS' SATISFACTION AND TEACHER CHARACTERISTICS

The level of teachers' satisfaction is related, to a certain degree, to a teacher's background. Gender, education, years of experience, seniority in the current school, training and type of job contract can all be related to how satisfied teachers feel. This chapter examines the profile of science teachers and how their satisfaction varies according to individual characteristics.

4.1. Who are the science teachers in PISA 2015?

4.1.1. Science teachers' gender and age distribution

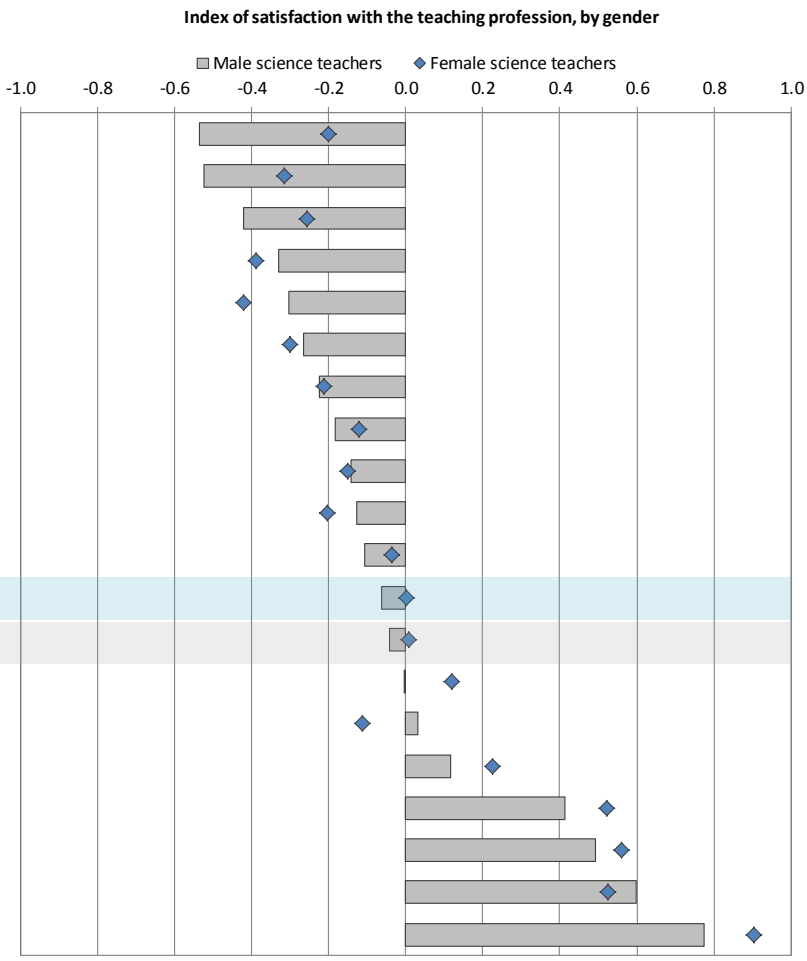
Gender imbalance in the teaching profession is relatively common across countries. In general, women are over-represented as fewer men are attracted to the profession (Drudy, 2008; OECD, 2009, 2005). This was found to be true in the 2013 OECD Teaching and Learning International Survey (TALIS) (OECD, 2014) and is confirmed by the PISA 2015 teacher questionnaire results. Figure 4.1 shows that the science teaching workforce in PISA-participating countries and economies is dominated by women. On average across OECD countries, 60% of science teachers are women; while across all 18 participating countries and economies, 55% are women. There are five exceptions to this pattern (in ascending order): Hong Kong (China), where 33% of science teachers are women, Macao (China), where 42% are women, Chinese Taipei (43%), Beijing-Shanghai-Jiangsu-Guangdong (China) (hereafter "B-S-J-G [China]), where 44% of science teachers are women, and Korea (49%). The country with the largest gender imbalance is Portugal, where almost 78% of science teachers are women.

In spite of the gender imbalance, there is little evidence to suggest that teachers' gender influences student performance (Antecol, Eren and Ozbeklik, 2012; Holmlund and Sund, 2008). PISA results also show that there is no consistent pattern in the relationship between teachers' gender and their level of satisfaction (Figures 4.1 and 4.2). Women in Australia, B-S-J-G (China), the Czech Republic and Portugal tend to be more satisfied with the profession than their male counterparts; while in Portugal, they are more satisfied with their current job than men are. In contrast, women in Hong Kong (China), Macao (China) and Chinese Taipei are less satisfied with their current job than men are.

Figure 4.1. Index of satisfaction with the teaching profession, by gender

Results based on science teachers' self-reports

Percentage of science teachers, by gender		
Male	Female	
21.9	78.1	Portugal*
56.3	43.7	B-S-J-G (China)*
39.3	60.7	Czech Republic*
42.2	57.8	Brazil
51.0	49.0	Korea
66.9	33.1	Hong Kong (China)
58.3	41.7	Macao (China)*
38.6	61.4	United Arab Emirates
32.7	67.3	Italy
57.5	42.5	Chinese Taipei
44.8	55.2	United States
40.2	59.8	OECD average-9*
45.2	54.8	Average-18*
47.1	52.9	Australia*
34.9	65.1	Chile
46.4	53.6	Peru
45.2	54.8	Spain
44.8	55.2	Germany
51.0	49.0	Colombia
35.4	64.6	Dominican Republic

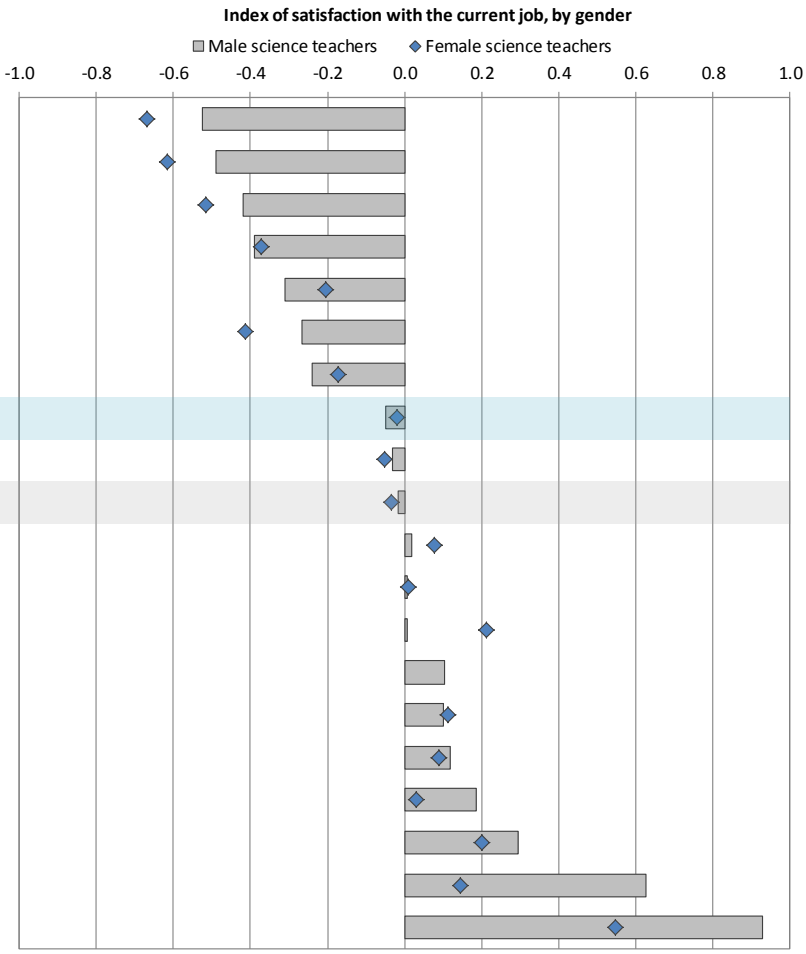


Note: Statistically significant differences between male and female science teachers are marked with an asterisk next to the county/economy name (see Annex A).
Countries and economies are ranked in ascending order of the index of satisfaction with the teaching profession among male science teachers.
Source: OECD, PISA 2015 Database.

Figure 4.2. Index of satisfaction with the current job, by gender

Results based on science teachers' self-reports

Percentage of science teachers, by gender		
Male	Female	
66.9	33.1	Hong Kong (China)*
58.3	41.7	Macao (China)*
51.0	49.0	Korea
56.3	43.7	B-S-J-G (China)
32.7	67.3	Italy
57.5	42.5	Chinese Taipei*
39.3	60.7	Czech Republic
40.2	59.8	OECD average-9
42.2	57.8	Brazil
45.2	54.8	Average-18
34.9	65.1	Chile
38.6	61.4	United Arab Emirates
21.9	78.1	Portugal*
47.1	52.9	Australia
44.8	55.2	Germany
44.8	55.2	United States
45.2	54.8	Spain
46.4	53.6	Peru*
51.0	49.0	Colombia
35.4	64.6	Dominican Republic



Note: Statistically significant differences between male and female science teachers are marked with an asterisk next to the county/economy name (see Annex A).
Countries and economies are ranked in ascending order of the index of satisfaction with the current job among male science teachers.
Source: OECD, PISA 2015 Database.

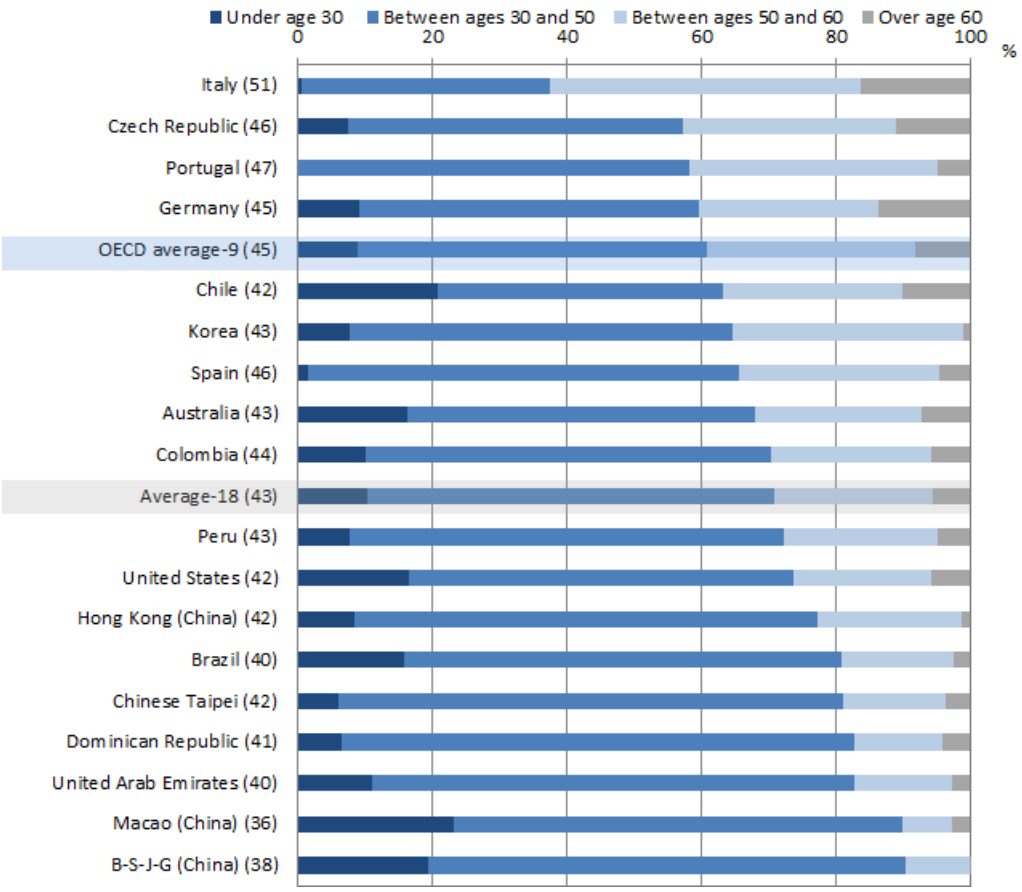
The age distribution of the science-teacher workforce is also of importance as it reflects the dynamics of hiring and the challenges resulting from the ageing teacher population (OECD, 2014, 2009). Age was also found to be related to teacher retention, because attrition is affecting younger teachers in the beginning of their teaching careers (OECD, 2005; Ingersoll, 2001). In most countries, the majority of teachers are between 30 and 50 years old (52% across OECD countries, and 60% across all countries and economies); few teachers are younger than 30 (Figure 4.3).

Some countries seem to be severely affected by the ageing problem. For instance, in Italy, 63% of teachers are older than 50, with 16% nearing retirement (over 60). In the Czech Republic, 11% of teachers are over 60, as are 14% of teachers in Germany. The

countries and economies with the youngest science-teacher workforce are Brazil, B-S-J-G (China), the Dominican Republic, Macao (China) and the United Arab Emirates, with the average age of science teachers ranging from 36 in Macao (China) to 41 in the Dominican Republic. A large proportion of teachers younger than 30 (observed in Australia, Brazil, B-S-J-G [China], Chile, Macao [China], and the United States) could be symptomatic of either a recent wave of teacher hiring or low rates of retention, as teachers do not last in the profession beyond the first 5 to 7 years. Neither measure of teachers' satisfaction is significantly correlated with age.

Figure 4.3. Science teachers' age

Results based on science teachers' self-reports



Note: Science teachers' average age is shown next to the country/economy name.
Countries and economies are ranked in descending order of the percentage of science teachers of age 50 or more.
Source: OECD, PISA 2015 Database.

4.1.2. Science teachers' teaching experience

Teacher experience is a recurrent theme in education research. Policy makers and researchers alike are interested in how experience shapes teachers' skills, competencies, pedagogical strategies and, ultimately, how it affects their students' achievement (Clotfelter, Ladd and Vigdor, 2010, 2007; Croninger et al., 2007; Leigh, 2010) However, little is known about how teachers' satisfaction evolves with experience. Existing evidence suggests that less-experienced teachers might not be familiar with their job environment and might be exposed to higher job insecurity,

resulting in lower satisfaction (Elchardus et al., 2009). This might explain why younger teachers leave the profession (Guarino, Santibanez and Daley, 2006; Hancock and Scherff, 2010; Weiss, 2002).

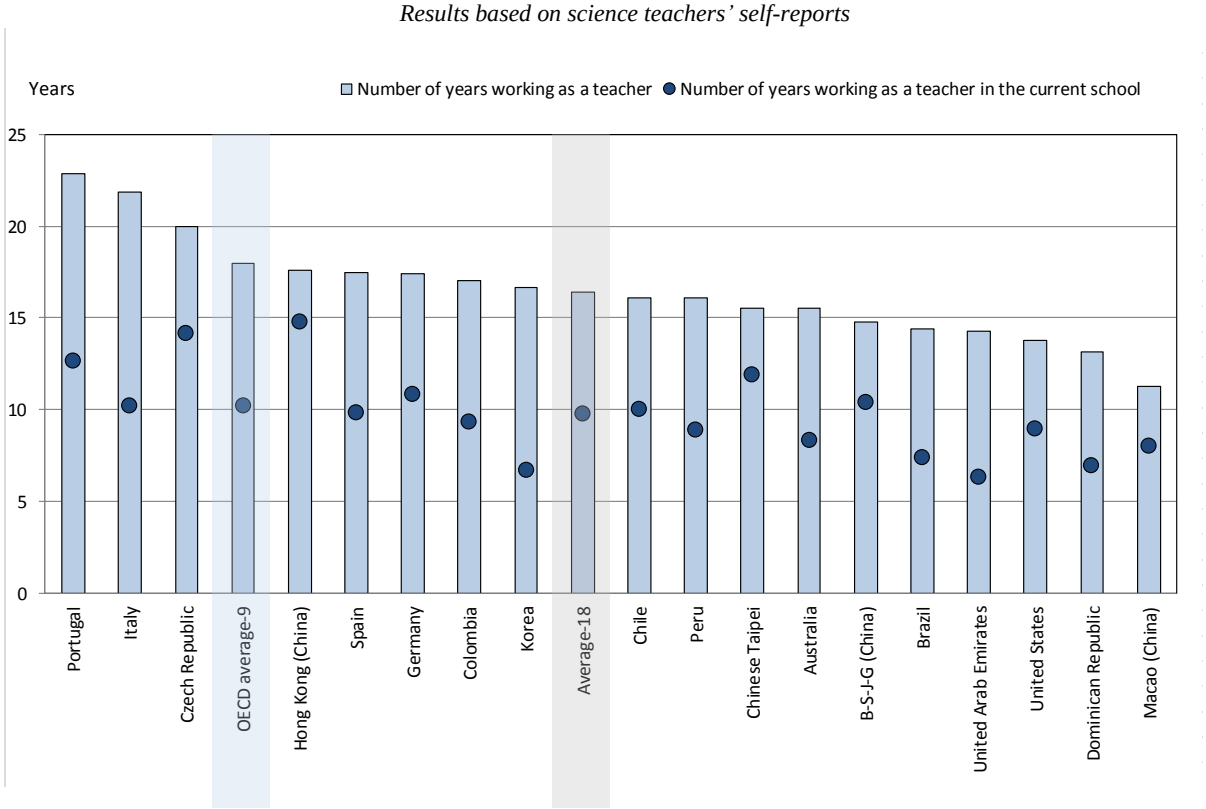
In PISA 2015, teacher experience was measured using two questions. The first measures the number of years of experience in the current school; the second measures the number of years of experience in the profession. Figure 4.4 shows that on average across all 18 countries and economies, teachers have around 10 years of experience in their current school and 16 years in total. The numbers vary across countries. Italy and Portugal stand out as the countries with the longest average experience, while the Dominican Republic and Macao (China) show the shortest experience. However, total experience could be influenced by national or regional hiring policies. If the hiring of teachers was suspended for a period of time (e.g. Italy in the 2000s), this will result in an ageing population of teachers.

The difference between total experience and experience in the current school could also reflect the extent of teacher mobility and retention. For instance, longer total experience and less experience in the current school reflect high retention and high mobility (i.e. teachers tend to remain in the profession while moving between schools). This is the case in Italy. In Brazil, the Dominican Republic, Macao (China) and the United States, both school experience and total experience are relatively short in duration, indicating high mobility and limited retention (i.e. teachers move between schools before leaving the profession at a relatively early stage in their careers). In the Czech Republic, Hong Kong (China) and Portugal, both total and current school experience are long in duration, indicating that teachers enter the profession and remain in the same school for an extended period of time.

As for teachers' satisfaction, results show that both total experience and experience in the current school are significantly related to teachers' satisfaction in few countries.[2] Teachers with more than five years of experience in the current school in Colombia, Korea and Portugal are more satisfied with the profession, while teachers with similar experience in Macao (China) are less satisfied (Table 4.1). In B-S-J-G (China), Spain, Chinese Taipei and the United Arab Emirates, this group of teachers is more satisfied with their current job, while in Macao (China) teachers with the same level of experience in the school are less satisfied with their current job (Table 4.2). By contrast, in B-S-J-G (China), Hong Kong (China) and Korea, teachers with more than five years total experience are less satisfied with the profession, while in Colombia and Peru, teachers with similar total experience are more satisfied. In B-S-J-G (China), Macao (China) and Chinese Taipei, these teachers are more satisfied with their current job (Table 4.1).

Figure 4.4. Years of teaching experience

Results based on science teachers' self-reports



Countries and economies are ranked in descending order of the number of years working as a teacher.
Source: OECD, PISA 2015 Database.

Almost all science teachers (95% in all countries and economies) work in one school (Table 4.3). The exceptions are Brazil, where 35% of teachers work in more than one school, Chile (15%) and the Dominican Republic (10%). On average across all 18 countries and economies, teachers have worked in slightly more than four different schools over their teaching career. Teachers in Italy, Portugal and Spain have worked in the largest number of schools, on average, while those in B-S-J-G (China), the Czech Republic, Hong Kong (China), Macao (China) and Chinese Taipei have worked in the least number of schools over their career (Table 4.4)

The findings also show that in the Czech Republic, teachers are less mobile between schools (long total experience and experience in the current school combined with a limited number of schools over their teaching career), while in Portugal teachers tend to show greater mobility early in their careers (long total experience and experience in current school combined with a large number of schools over their teaching career) (Tables 4.2 4.3).

In Australia, Hong Kong (China), Korea, Portugal and Spain, teachers who worked in more than five schools over their careers are less satisfied with the profession, and in Spain and the United Arab Emirates, these teachers are less satisfied with their current job (Table 4.5). This suggests that teachers do not necessarily move to different schools under favourable circumstances (e.g. better salaries). Teacher mobility could sometimes be associated with adversity or could reflect low job security. In some

countries, the non-significant association could also be masking the fact that the most dissatisfied teachers would have left the profession instead of changing schools. Consequently, these teachers do not show up in the data.

Moreover, the length of experience in the profession and in the current school, and the patterns of teacher mobility (i.e. number of schools over the teaching career) are inter-related as they reflect the age structure of the teacher population, the dynamics of the labour market and selection into the teaching profession. For instance, in some countries teachers are older (i.e. Italy, Portugal) and hence had more time to move between schools, or are younger with less mobility (B-S-J-G (China) and Macao (China). Labour market dynamics also affect teacher mobility, retention and experience. Teachers are likely to change schools for higher salaries or better working conditions; they might also leave the profession for better jobs. This is particularly common among science teachers who have alternative and possibly better job prospects outside the teaching profession (but this largely depends on the local economy). PISA 2015 results (OECD, 2016b) show that the ratio of typically-trained teachers' salaries to per capita GDP is relatively low in the Czech Republic, Italy and Macao (China).

4.1.3. Science teachers' employment status

The possibility of having secure but flexible employment is seen as a likely determinant of job satisfaction (Dinham and Scott, 1998). In PISA, teachers were asked to report whether they have permanent or fixed contracts and whether they are working full or part time. The former indicator is a good measure of job security, while the latter suggests the possibility of flexible employment.

There are large variations between countries in the type of contracts under which science teachers work (Table 4.5). Most science teachers in Germany (94%), the Dominican Republic (93%), Portugal (89%), Chinese Taipei (87%), the Czech Republic (86%), Australia (86%), Korea (86%) and Italy (83%) are employed on permanent contracts; fewer teachers in Macao (China) (20%), B-S-J-G (China) (35%), Peru (51%), the United Arab Emirates (53%), the United States (64%) and Chile (67%) work under such contracts.

In spite of such large variations, teachers' satisfaction with the profession is not significantly correlated with the type of contract under which teachers work. However, in Chile, Macao (China), Chinese Taipei and the United Arab Emirates, teachers with permanent contracts seem to be more satisfied with their current jobs than those with fixed-term contracts. The reverse is true in Brazil, the Czech Republic and Korea, where teachers with fixed-term contracts are more satisfied with their jobs. This counterintuitive result could be related to the profile of teachers with fixed-term contracts in these three countries and would merit an in-depth investigation.

In general it is possible to say that satisfaction with the profession is more likely to be related to teachers' intrinsic motivation and to whether the profession fulfils their personal goals, rather than with their current working situation (e.g. type of contract).

Across OECD and partner countries and economies, most teachers (86% for OECD and 87% for all-countries averages) work full time (Table 4.6). The countries with the smallest share of full-time teachers are Brazil (37%), Chile (64%), the Dominican Republic (76%) and Germany (74%). The countries and economies with the largest share of full-time teachers are B-S-J-G (China), Hong Kong (China), Korea, Macao

(China), Chinese Taipei and the United States. All East Asian countries have more male than female teachers which could explain some of these results.

Teachers' satisfaction with the profession does not significantly vary between full- and part-time teachers. However, teachers with full-time jobs in Australia, Brazil and Chile tend to be more satisfied with their current job; full-time teachers in Spain are less satisfied with their current job.

4.1.4. Science teachers' initial education and training

Teacher education and training constitute the first steps towards becoming a teacher. As noted in *TALIS 2013 Results*, initial teacher education and training can be highly predictive of teachers' future learning and development needs (OECD, 2014). Existing studies focused mostly on the impact of initial teacher education and training on student achievement. Some studies found a positive impact (Clotfelter, Ladd, and Vigdor, 2010, 2007; Darling-Hammond et al., 2005; Ronfeldt and Reininger, 2012), while others provided no evidence of such a relationship (Buddin and Zamarro, 2009; Larsen, 2010; Harris and Sass, 2011). However, the association between teacher education and training, and teachers' satisfaction has largely gone unexplored, even in the literature focusing on satisfaction. One can imagine that teachers who are better educated and trained might show greater self-efficacy and confidence, and might be better prepared to manage classrooms. This could result in greater satisfaction.

PISA measured various aspects of initial education and training for science teachers. These include the level of formal education attained, whether teachers completed initial teacher education and training, whether they were trained to teach a particular subject (and whether they are teaching this subject), and how they received their teacher qualification.

Across all countries and economies, the majority of teachers have a bachelor's or a master's degree or higher (equivalent to ISCED 5) as their main formal qualification (Table 4.7). The country and economy with the largest share of teachers who earned less than a bachelor's degree are B-S-J-G (China) (15%) and Peru (19%). Countries with the largest proportion of teachers with a master's degree or higher are the Czech Republic, Germany, Chinese Taipei and the United States.[3]

Most teachers (77% across all countries and economies) received their initial teacher education through a standard teacher education or training programme; few received it though in-service teacher education (13%), and fewer still through work-based teacher education (3%) (Table 4.8). In no country or economy is either measure of teachers' satisfaction significantly associated with formal education levels.

On average across the 18 participating countries and economies, 91% of teachers have completed teacher education and training programmes (Table 4.9). Italy has the largest proportion of teachers (35%) who did not complete a programme, followed by Chile (14%), the United Arab Emirates (13%), the Czech Republic (11%), Macao (China) (11%) and Peru (11%). Teachers in Colombia, Korea and the United Arab Emirates who have completed teacher education and training are more satisfied with the profession, and teachers with similar training in Colombia and Korea are more satisfied with their current job.

4.1.5. Science teachers' professional development

Most education systems offer professional development opportunities for their teachers with the objective of allowing them to improve and extend their skills (see Box 4.1). Such activities help teachers remain up-to-date with new developments in their subjects and in pedagogical practices (Hill, Beisiegel and Jacob, 2013; Panizzon, 2016; Yoon et al., 2007). There are many definitions of teacher professional development in the literature. All share a common understanding that professional development is about teachers learning procedures, learning to learn, and transforming their knowledge into practices that benefit their students. Specifically, professional development aims to improve a teacher's skills, knowledge, expertise and other characteristics (OECD, 2014). As teacher professional development is expected to improve teachers' skills, it could contribute to their self-confidence, self-efficacy and, ultimately, to their satisfaction as teachers (European Commission, 2012). Across all participating countries and economies, about 70% of teachers are required to participate in professional development activities. The proportions vary substantially between countries. For instance, in Spain, only 42% of teachers are required to participate in such activities while 95% of teachers in the United States are required to do so (Figure 4.5).

Box 4.1. Teacher professional development

PISA 2015 asked science teachers and teachers who teach other subjects whether they are required to take part in professional development activities and to report on the activities they undertook in the previous 12 months. The activities were:

1. Participating in a qualification programme
2. Participating in a network of teachers formed specifically for the professional development of teachers
3. Conducting individual or collaborative research on a topic of professional interest
4. Mentoring and/or coaching or observing peers, as part of a formal school arrangement
5. Reading professional literature (e.g. journals, evidence-based papers, thesis papers)

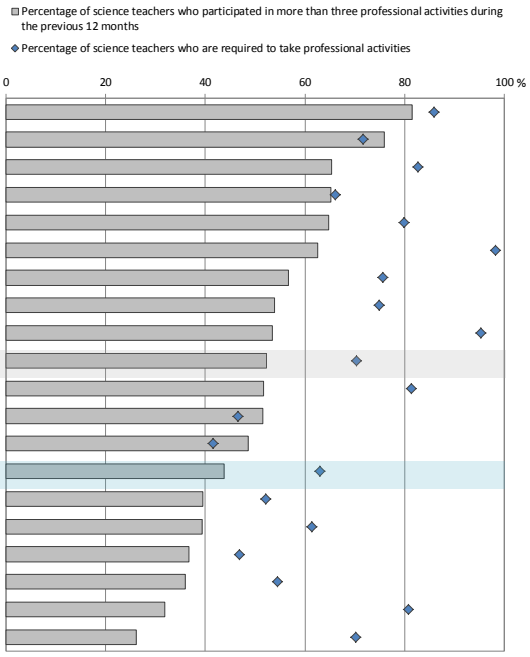
Engaging in informal dialogue with colleagues on how to improve teaching

The results also show that the most common activity teachers engage in is informal dialogue with colleagues on how to improve teaching (Figure 4.5). On average across all countries and economies, 95% of teachers engage in this activity, followed by reading professional literature (71%), mentoring, observing peers and coaching (61%), conducting individual or collaborative research on a topic of interest (57%), and participating in a network of teachers formed for the professional development of teachers (56%). The least common professional development activity is participating in a qualification programme (28%).

Figure 4.5. Professional qualification activities

Results based on science teachers' self-reports

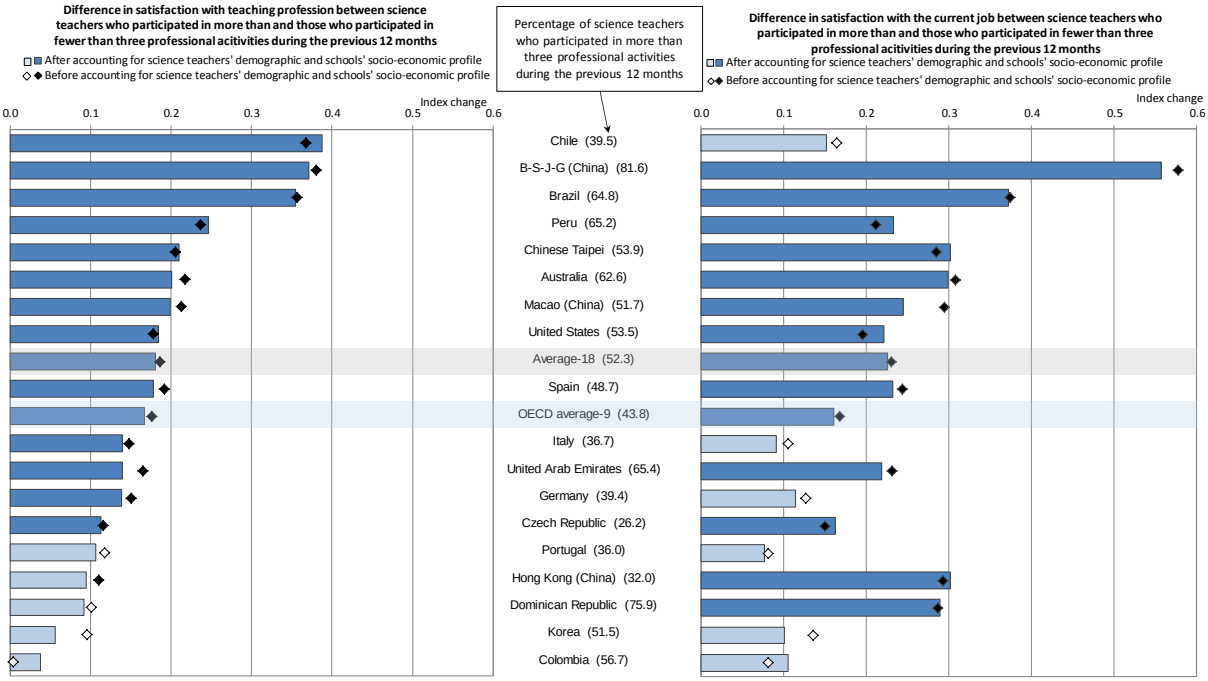
Percentage of science teachers who participated in any of the following activities during the previous 12 months:						
Qualification programme (e.g. a <degree programme>)	Participation in a network of teachers formed specifically for the professional development of teachers	Individual or collaborative research on a topic of interest to [them] professionally	Mentoring and/or peer observation and coaching, as part of a formal school arrangement	Reading professional literature (e.g. journals, evidence-based papers, thesis papers)	Engaging in informal dialogue with [their] colleagues on how to improve [their] teaching	
41.2	70.6	67.2	98.5	86.0	98.5	B-S-J-G (China)
59.3	62.7	81.9	73.2	75.3	97.9	Dominican Republic
16.5	80.2	54.3	87.6	68.1	95.2	United Arab Emirates
56.7	68.8	69.9	63.4	57.9	95.6	Peru
66.4	62.9	52.3	65.1	73.7	90.0	Brazil
10.8	75.3	47.4	74.3	78.1	97.7	Australia
56.9	57.1	65.5	44.7	57.6	95.9	Colombia
10.5	60.0	72.2	66.9	60.8	95.8	Chinese Taipei
17.5	77.3	48.7	53.1	70.7	96.9	United States
28.5	55.7	57.3	60.8	70.6	95.5	Average-18
30.8	41.9	47.9	90.8	62.8	97.0	Macao (China)
23.8	57.3	51.3	76.5	62.3	91.9	Korea
33.2	53.7	59.7	45.5	71.8	95.8	Spain
17.7	50.4	55.3	46.7	76.2	95.5	OECD average-9
32.4	41.6	53.3	38.3	70.5	91.0	Chile
7.6	27.8	83.2	32.4	88.0	95.0	Germany
15.1	46.5	77.0	21.6	65.8	96.0	Italy
7.2	33.2	52.9	39.6	86.2	99.0	Portugal
15.1	45.4	22.6	83.1	43.4	93.3	Hong Kong (China)
11.8	41.0	24.0	39.2	92.5	96.0	Czech Republic



Countries and economies are ranked in descending order of the percentage of science teachers who participated in more than three professional activities during the previous 12 months.
Source: OECD, PISA 2015 Database.

Science teachers who had engaged in more than three activities during that 12-month period tend to be more satisfied with the teaching profession and with their current job (Figure 4.6). The impact is moderate in magnitude across the two measures of satisfaction, with a difference of approximately 0.2 point in favour of those who undertook more than three activities in the previous 12 months, even after accounting for science teachers' demographic and schools' socio-economic profile. Compared with levels of formal education, which were found to be uncorrelated with teachers' satisfaction, participating in professional development activities is related to teachers' satisfaction (and possibly teachers' knowledge and performance). This finding resonates with the existing literature highlighting the importance of self-growth as a major source of teachers' satisfaction (Dinham and Scott, 1998). Please see Annex A for an explanation of how the magnitudes of associations are interpreted.

Figure 4.6. Science teachers' satisfaction, by participation in professional activities



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the difference in satisfaction with the teaching profession between science teachers who participated in more than and those who participated in fewer than three professional activities during the previous 12 months, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

4.2. Science teachers' perceptions about their own teaching attitudes

4.2.1. Teacher self-efficacy and motivation to become a teacher

Self-efficacy as defined by (Bandura, 1986) social cognitive theory refers to individuals' beliefs about their capacity to successfully accomplish a particular task. For teachers, self-efficacy consists of their efficacy in instruction and in their mastery of their subject content.

Teacher self-efficacy has been shown to be associated with higher student achievement and motivation, and with teacher enthusiasm, commitment and job satisfaction (Caprara et al., 2006; Skaalvik and Skaalvik, 2007; Tschannen-Moran and Barr, 2004; Tschannen-Moran and Hoy, 2001). In contrast, less teacher self-efficacy is found to be linked to teachers' inability to manage student misbehaviour, teachers' pessimism about student learning, higher levels of job-related stress and dissatisfaction (Caprara et al., 2006, 2003; Collie, Shapka, and Perry, 2012; Klassen and Chiu, 2010).

Box 4.2. Teacher self-efficacy

PISA asked two questions to gauge teachers' self-efficacy. The questions enquired about teachers' ability to do certain tasks relating to two separate domains: pedagogy and content. Teachers were asked to rate the extent to which they perform the given task. Responses were constructed on a four-point Likert scale with the following options: "Not at all", "very little", "to some extent", and "to a large extent".

Teacher self-efficacy in teaching science pedagogy. The tasks were:

1. Design experiments and hands-on activities for enquiry-based learning.
2. Assign tailored tasks to the weakest as well as to the best students.
3. Use a variety of assessment strategies.
4. Facilitate a discussion among students on how to interpret experimental findings.

Teacher self-efficacy related to the mastery of science content. The tasks were:

1. Explain a complex scientific concept to a fellow teacher.
2. State and defend an informed position on ethical problems relating to broad science.
3. Read state-of-the art papers in my scientific discipline.
4. Explain the links between biology, physics and chemistry.

The questions were used to construct two indices measuring self-efficacy in the two domains. These indices were standardised to have an OECD average of zero and an OECD standard deviation of one. As noted by (Klassen et al., 2009) and in OECD (2009), self-efficacy appears to be a valid construct across countries differing in their language and culture. This is supported by evidence suggesting that self-efficacy is positively related to job satisfaction across different cultural settings.

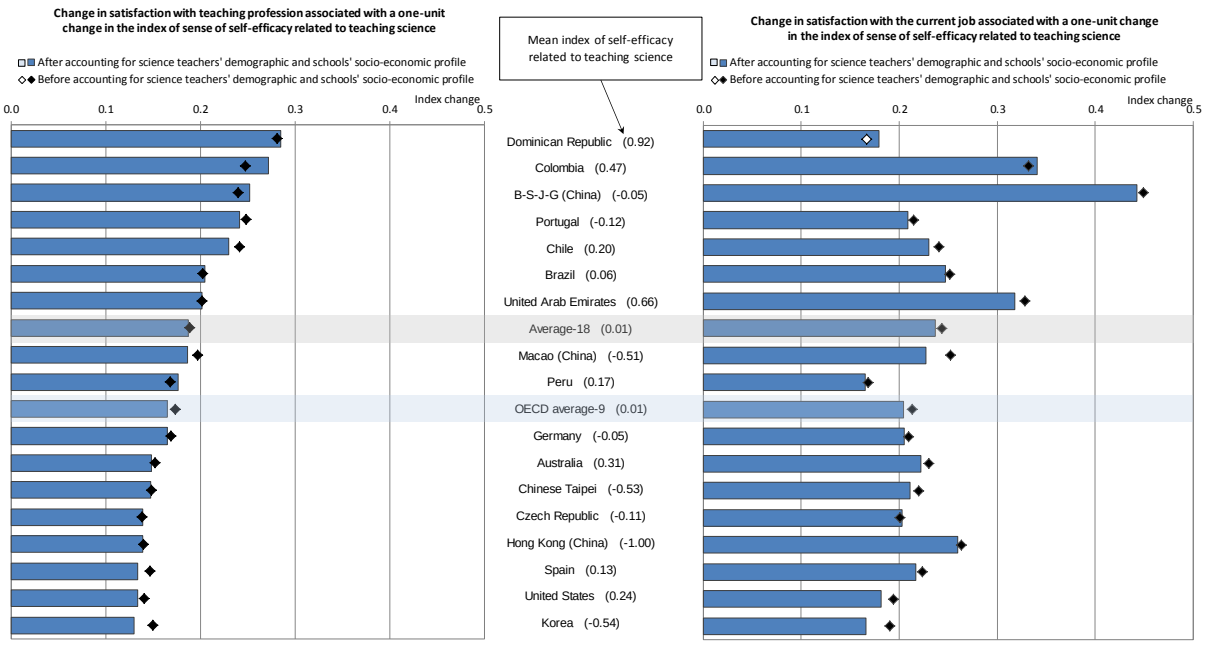
In addition to these two questions, PISA asked teachers whether their goal was to pursue a career in the teaching profession after finishing their initial education. This question can be used as a proxy of teachers' intrinsic motivation to pursue a career in teaching.

Figure 4.7 shows that teachers in Australia, Chile, Colombia, the Dominican Republic, Peru, Spain, the United Arab Emirates and the United States reported higher-than-average self-efficacy in teaching science. In contrast, teachers in Hong Kong (China), Korea, Macao (China) and Chinese Taipei reported lower-than-average levels.

Figure 4.7 also shows that self-efficacy accounts for significant variations in science teachers' satisfaction. For instance, across all countries and economies, an increase of one unit in self-efficacy in teaching science is associated with an increase of 0.19 point on the index of satisfaction with the teaching profession and an increase of 0.24 point on satisfaction with the current job. The countries and economies with the strongest associations with both measures of teachers' satisfaction are B-S-J-G (China) and Colombia, and the weakest effects are observed in Korea and the United States.

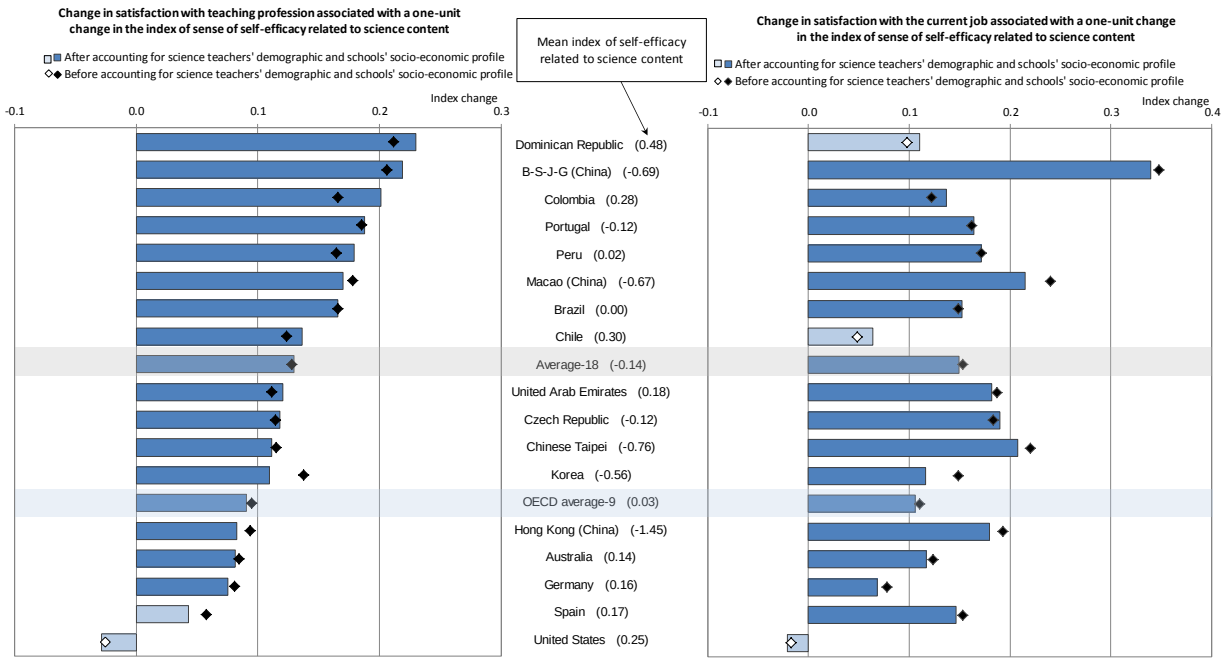
The findings are similar when it comes to self-efficacy in teaching science content (Figure 4.8). Science teachers in Australia, Chile, Colombia, the Dominican Republic, Germany, Spain, the United Arab Emirates and the United States reported higher-than-average values, while science teachers in Hong Kong (China), Korea, Macao (China) and Chinese Taipei reported lower-than-average values. Self-efficacy in teaching science content is also significantly and positively related to teachers' satisfaction. On average across all countries and economies, an increase of one unit on the index of self-efficacy in science content is associated with an increase of 0.13 point on satisfaction with the profession and an increase of 0.15 point on satisfaction with the current job. The strongest associations are observed in B-S-J-G (China), Macao (China) and Portugal, while the weakest are observed in Germany and Spain.

Figure 4.7. Satisfaction, by self-efficacy related to teaching science



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Only countries and economies with available values are shown.
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in the index of self-efficacy related to teaching science, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

Figure 4.8. Satisfaction, by self-efficacy related to science content

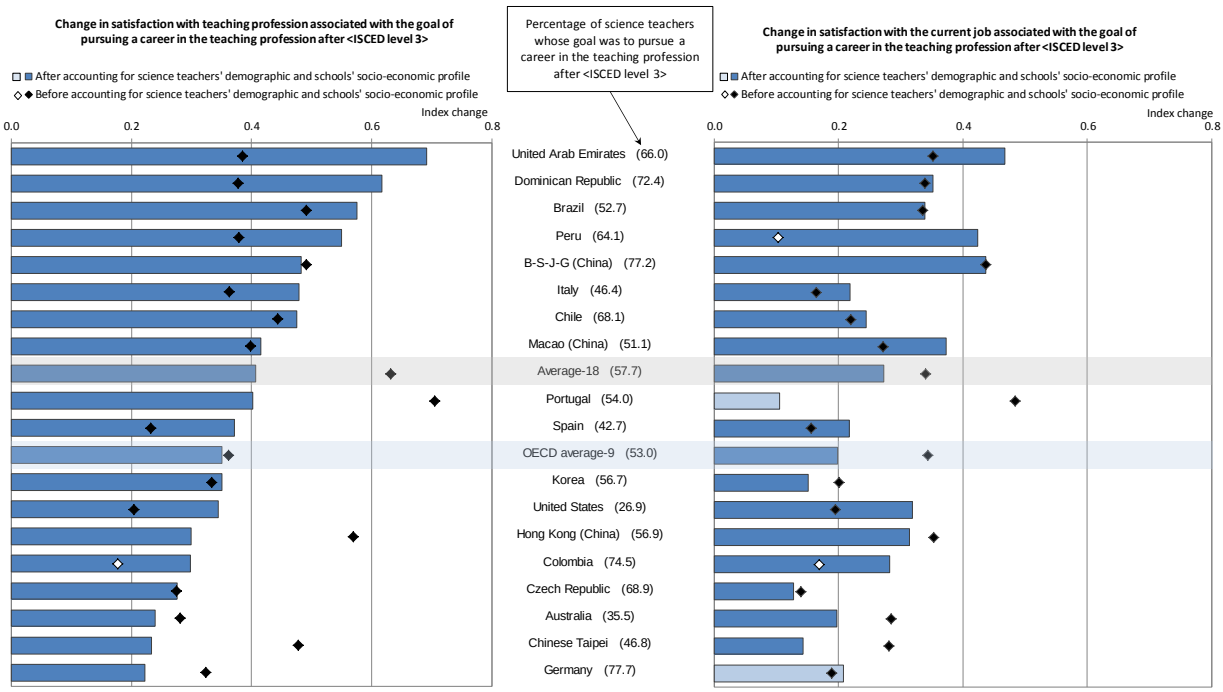


Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Only countries and economies with available values are shown.
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in the index of self-efficacy related to science content, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

On average across all countries and economies, 58% of science teachers reported that their goal was to become a teacher (Figure 4.10). The largest proportions are in Germany (78%), B-S-J-G (China) (77%), Colombia (75%), and the Dominican Republic (72%); the smallest proportions are in Spain (43%), Australia (35%) and the Unites States (27%).

Teachers who reported that teaching was their goal are expected to be more satisfied in that becoming a teacher was not an accident but rather a reflection of their ambitions. This expectation is confirmed by the results, which hold true across all countries and economies, even though the effect varies in magnitude (Figure 4.10). On average across all countries and economies, teachers who reported that teaching was their goal tend to be 0.41 point more satisfied with the teaching profession and 0.27 point more satisfied with their current job, after accounting for science teachers' demographic and schools' socio-economic profile. The relationship is strong across most countries and economies, and particularly in B-S-J-G (China), Brazil, the Dominican Republic and Peru and the United Arab Emirates.

Figure 4.9. Pursuing a career in the teaching profession and satisfaction



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the difference in satisfaction with teaching profession between science teachers whose goal was and was not pursuing a career in the teaching profession after <ISCED level 3>, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

The impact of this variable is more pronounced on satisfaction with the profession than with the current job. This reflects the fact that satisfaction with the profession is likely to be related to a teacher's intrinsic motivation while satisfaction with the job is associated with the environment surrounding the teacher (Dinham and Scott, 2000; Novacek and Lazarus, 1990).

5. SCIENCE TEACHERS' SATISFACTION AND STUDENT CHARACTERISTICS

There is a perception that teachers in socio-economically disadvantaged schools might be less satisfied with the profession and with their job because of the concentration of challenges they face. For instance, due to residential stratification, disadvantaged families tend to live in poorer communities, where schools are understaffed and lack adequate resources. In some countries, socio-economic disadvantage overlaps with having an immigrant background. This implies that disadvantaged students with an immigrant background who may not speak the language of their host country might be sorted into the same schools (Brunner, Cho, and Reback, 2012; Iceland and Scopilliti, 2008; Mostafa, 2010).

For teachers, the concentration of socio-economic disadvantage translates into various challenges related to school resources, working conditions, school disciplinary climate, and the ability of teachers to manage student heterogeneity and promote learning (Houck, 2010; OECD, 2016b). It is also expected that socio-economic stratification could result in students' clustering according to their motivation, aspirations, confidence, self-efficacy, enjoyment and engagement with learning, and even the quality of the relationships they have with their teachers and peers.

The first three subsections explore how teachers' satisfaction is related to students characteristics based on data collected through the student questionnaire. These student-level data are averaged at the school level and represent aggregate characteristics of the school student population. In the last subsection (5.4) the reverse relationship is examined as the effect of teacher satisfaction on student cognitive and non-cognitive outcomes is investigated.

5.1. Students' immigrant background and the language spoken at home

As PISA results have shown, student background is highly predictive of students' cognitive and non-cognitive outcomes (OECD, 2016b), which, in turn, are associated with teachers' satisfaction (Dinham and Scott, 2000). This sub-section examines how students' socio-economic status affects teachers' satisfaction. In particular, the focus is on the school's socio-economic profile, on the proportion of immigrants in the school, and on the proportion of students who speak a language at home that is different from the language of the PISA test.[4]

5.1.1. The proportion of students with an immigrant background in the school

In recent years, many OECD countries have seen a rise in the number of immigrants entering their territories, including an unprecedented number of refugees and asylum seekers (OECD and EU, 2015). This recent wave of immigration has reinforced a rising trend in the share of immigrants in OECD countries. PISA 2015 results show that immigrant students score lower than non-immigrant students in science in most countries and economies except Macao (China), Qatar and the United Arab Emirates, where they score higher (OECD, 2016b, pp. 252).

Moreover, countries with large immigrant populations also have large concentrations of immigrant students in schools. Among OECD countries, Australia, Canada, and the

United States have some of the largest concentrations of immigrants in school (OECD, 2016b, pp. 257). But the size of this concentration is mostly uncorrelated with students' performance in science (OECD, 2016b, pp. 258).

Despite this evidence, little is known about how the concentration of immigrant students affects teachers' satisfaction. In fact, most studies on teachers' satisfaction rely on teacher surveys, which do not offer detailed data on students. This is not the case here. PISA 2015 asked students about the countries in which they and their parents were born. Based on the answers to this question, first- and second-generation immigrant students and non-immigrant students were identified. For this analysis, an indicator was created for schools where more than 30% of the student population is made up of students with an immigrant background (first- and second-generation immigrants combined).

In the United Arab Emirates, about 69% of teachers teach in schools where more than 30% of students have an immigrant background. In Hong Kong (China), the proportion stands at 55% followed by Australia (33%), the United States (27%), Germany (20%), Spain (7%) and Italy (3%) (Table 5.1). In Macao (China), all schools have more than 30% of students who reported having an immigrant background. In all other countries and economies, the proportions are almost negligible.

The association between teachers' satisfaction and a school where more than 30% of students have an immigrant background is weak and non-significant in all countries except the United Arab Emirates. After accounting for science teachers' demographic and schools' socio-economic profile, teachers in the United Arab Emirates tend to be more satisfied with the profession and with their current job when they teach in schools where more than 30% of students are immigrants. This significant effect could be attributed to the socio-economic characteristics of immigrant students in the United Arab Emirates: these students are mainly children of professional expatriates who are socio-economically advantaged.

5.1.2. The proportion of students who speak at home a language different from that of the assessment

In PISA 2015, students were asked to report what language they speak at home most of the time. On average across OECD countries, among 45% of second-generation immigrant students and 67% of first-generation immigrant students, the language spoken at home is different from the language of the assessment. In other words, immigrant background overlaps to some degree with language spoken at home, and the concentration of immigrant students in schools could translate into a concentration of speakers of other languages (OECD, 2016b, pp. 256).

Using students' responses to the aforementioned question, a binary indicator was constructed for schools where more than 30% of students speak a different language at home than the language of the assessment. Table 5.2 shows that in the United Arab Emirates, 45% of teachers teach in these schools. In Macao (China) 23% of teachers teach in these schools, followed by Spain (23% of teachers), the United States (21%), Italy (17%), Australia (11%), Germany (11%), and Peru (7%).

Teachers in Spain and the United Arab Emirates who teach in these schools tend to be more satisfied with the profession; those in Australia and the United Arab Emirates tend to be more satisfied with their current job.

These associations do not imply causation because schools where more than 30% of students are immigrants or members of linguistic minorities could differ from other schools in significant ways (e.g. socio-economic profile and resources). However, in no country or economy is the relationship negative and significant. In other words, there is no evidence to suggest that teachers in schools with more immigrant students or members of linguistic minorities are less satisfied.

5.2. Students' science performance and socio-economic profile

According to (Dinham and Scott 1998, 2000), improving student achievement is the core objective of teaching and is a major teacher satisfier. Teachers join the profession with the ambition of making a difference in the lives of their students by improving their academic attainment and their school experience. However, since academic achievement is highly correlated with students' socio-economic status, it is unclear whether teachers derive their satisfaction from their students' performance or from teaching socio-economically advantaged students. PISA is particularly well-placed to answer this question.

PISA 2015 assessed students' science performance and also derived their socio-economic status from three different components: parents' profession, parents' education and home possessions. Figure 5.1 and Figure 5.2 compare the relationship between average school performance and schools' socio-economic profile with teachers' satisfaction.[5]

The bar chart on the left side of the figure is based on analyses that account for average school science performance and the school's socio-economic profile separately (univariate regressions). The right side presents analyses that account for the two variables simultaneously (multivariate regressions). In the multivariate regressions, other covariates were not included because the focus of the analysis is on the gross effects of the two variables without accounting for other factors.

The univariate regressions show that the effects of school performance and the schools' socio-economic profile on teachers' satisfaction with the profession are positive and significant in Brazil, Chile, the Czech Republic, Spain, Chinese Taipei and the United Arab Emirates (Figure 5.1). The only exception is Colombia, where both variables have a negative and significant impact. In all countries and economies where results are statistically significant, the effect of average school performance in science is larger in magnitude than the effect of the schools' socio-economic profile (except the Czech Republic and Chinese Taipei). When both variables are included in the same model (right side of the figure) the effects are mostly non-significant, except in Chile, Macao (China), Spain and the United Arab Emirates. Apart from Macao (China), the effect of school performance remains positive and stronger than the effect of the school's socio-economic profile.

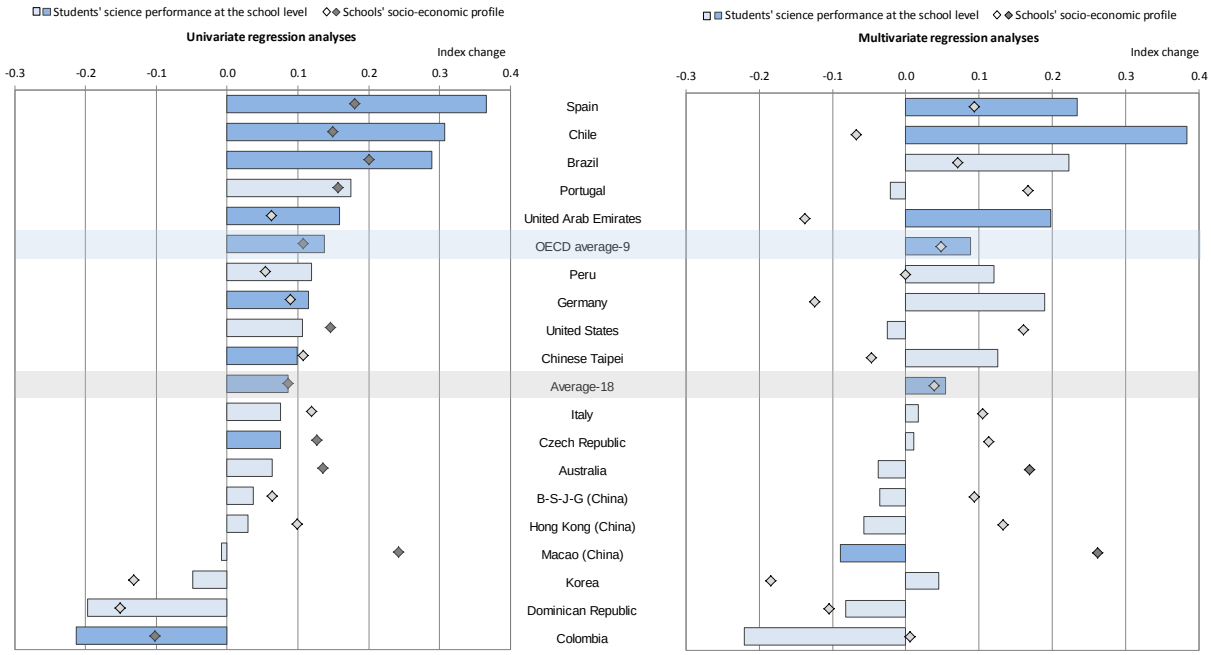
The results for teachers' satisfaction with their current job are similar (Figure 5.2). For both variables, the relationship in the univariate regressions are positive and significant in Australia, Brazil, Chile, Germany, Hong Kong (China), Portugal, Spain, Chinese Taipei and the United States. When school performance and socio-economic profile are accounted for in the same regression (right side of the figure), the relationships remain significant in Brazil, Chile, Portugal, Spain, Chinese Taipei and the United States. In all of these countries except the United States, the relationship between school performance and teachers' satisfaction with their job is stronger than

the relationship between the school's socio-economic profile and teachers' satisfaction with the job.

The results imply that in countries where the associations are strong and significant, a school's performance has a stronger relationship with teachers' satisfaction than the school's socio-economic profile (based on multivariate regressions). This implies that teachers' care more about their students' achievements than their socio-economic background. In addition, the relationships are more consistent and stronger with satisfaction with the job rather than with the profession. This is in line with the analyses in the previous chapters, which confirmed that satisfaction with the job tends to be related to the teacher's surrounding environment while satisfaction with the profession is related to personal motivation (i.e. the goal to become a teacher).

Figure 5.1. Satisfaction with the teaching profession, by students' science performance and socio-economic status

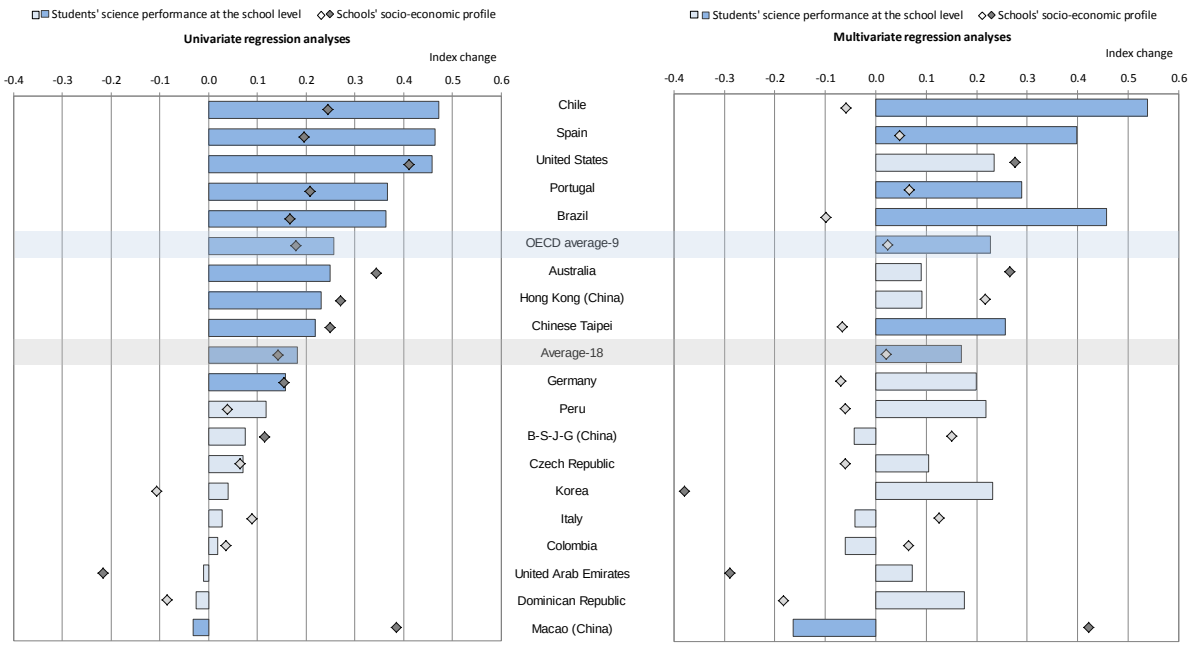
Change in satisfaction with the teaching profession associated with a 100-unit change in average school science performance or a one-unit change in school socio-economic profile[1]



1. The school socio-economic profile is measured by the PISA index of economic, social and cultural status (ESCS).
Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession using univariate regression analysis for students' science performance at the school level.
Source: OECD, PISA 2015 Database.

Figure 5.2. Satisfaction with the current job, by students' science performance and socio-economic status

Change in satisfaction with the current job associated with a 100-unit change in average school science performance or a one-unit change in the school socio-economic profile[1]



1. The school socio-economic profile is measured by the PISA index of economic, social and cultural status (ESCS).
Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the current job using univariate regression analysis for students' science performance at the school level.
Source: OECD, PISA 2015 Database.

5.3. Students' experiences at school

Teachers have a key role in promoting students' learning and overall school experience. They are well-placed to nurture students' academic achievement, and their socio-emotional and physical development (Borgonovi and Pál, 2016). Research over the past decades has examined teacher-student relationships, especially teachers' roles in preparing students for adult life (Muller, 2001). Motivated and satisfied teachers enhance students' physical and mental health, their happiness and satisfaction with different aspects of their lives, their sense of being connected to others, and their aspirations for their studies and future (Roorda et al., 2011). Students' positive experiences in school and in life, however, could also affect teachers' motivation, professional aspirations and levels of satisfaction.

5.3.1. Students' enjoyment of science and interest in broad science topics

One of the biggest challenges science teachers face is to be able to motivate their students to learn science. Students are motivated when they find learning science enjoyable (Ryan and Deci, 2009), and when they show a general interest in science topics (OECD, 2016b). Students' enjoyment of science and interest in science topics might affect teachers' self-image, willingness to spend time on preparation for classes, and aspiration to update their teaching materials and strategies.

PISA 2015 used two questions to assess students' intrinsic motivation to learn science. The questions related to students' enjoyment of science and interest in broad science topics were scaled to create two standardised indices with an OECD average of zero and a standard deviation of one. In this section, these two indices were averaged at the school level with the aim of describing the context in which teachers work.

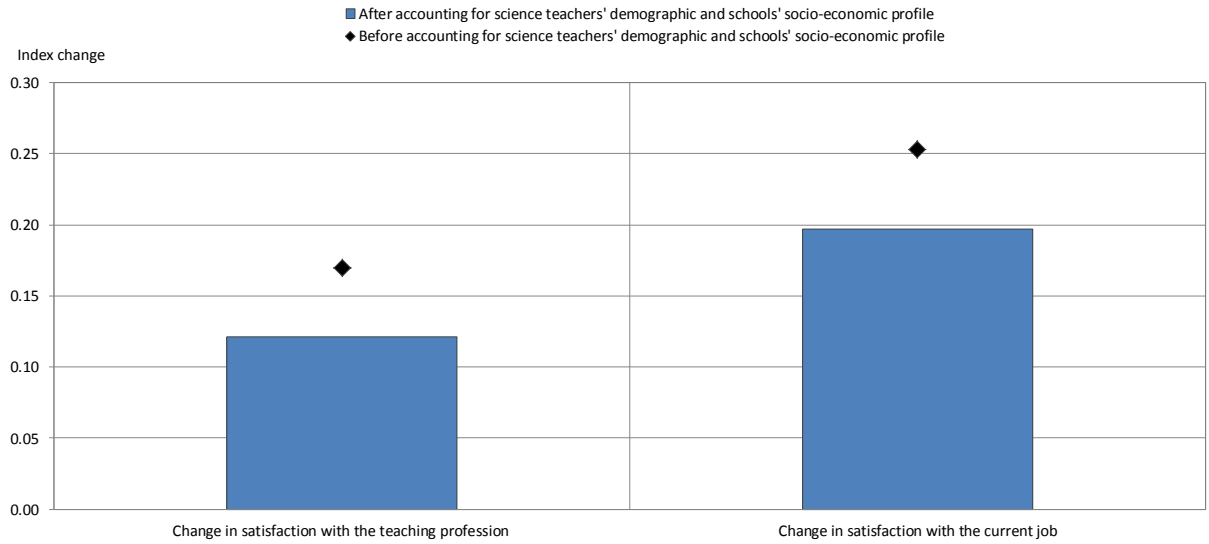
After accounting for science teachers' demographic and schools' socio-economic profile, in Chile and Macao (China), teachers' satisfaction with the teaching profession is positively associated with the average of students' enjoyment of learning science at the school level (Table 5.3).

In contrast, the relationship between students' enjoyment of science and teachers' satisfaction with their current job is positive and significant in 11 out of 18 countries and economies. The relationship weakens after accounting for teachers' demographic profile, but is still observed in B-S-J-G (China), Brazil, the Dominican Republic, Korea, Macao (China), Portugal and the United States. This weakening of the relationship is due to the positive association between students' enjoyment of science and schools' socio-economic profile. On average across all participating countries and economies, teachers are more satisfied with the profession and with their job in schools where students reported greater enjoyment of learning science, even after accounting for science teachers' demographic and schools' socio-economic profile (Figure 5.3).

The association between teachers' satisfaction with the teaching profession and students' interest in broad science topics at the school level is positive in Macao (China) and the United Arab Emirates, after accounting for science teachers' demographic and schools' socio-economic profile. Similarly, the association between students' interest in broad science topics (at the school level) and teachers' satisfaction with their current job is positive in Macao (China) and Portugal, after accounting for science teachers' demographic and schools' socio-economic profile. On average across all countries, students' interest in broad science topics has a positive but weak effect on teachers' satisfaction with their current job (Figure 5.4).

Figure 5.3. Students' enjoyment of science and science teachers' satisfaction

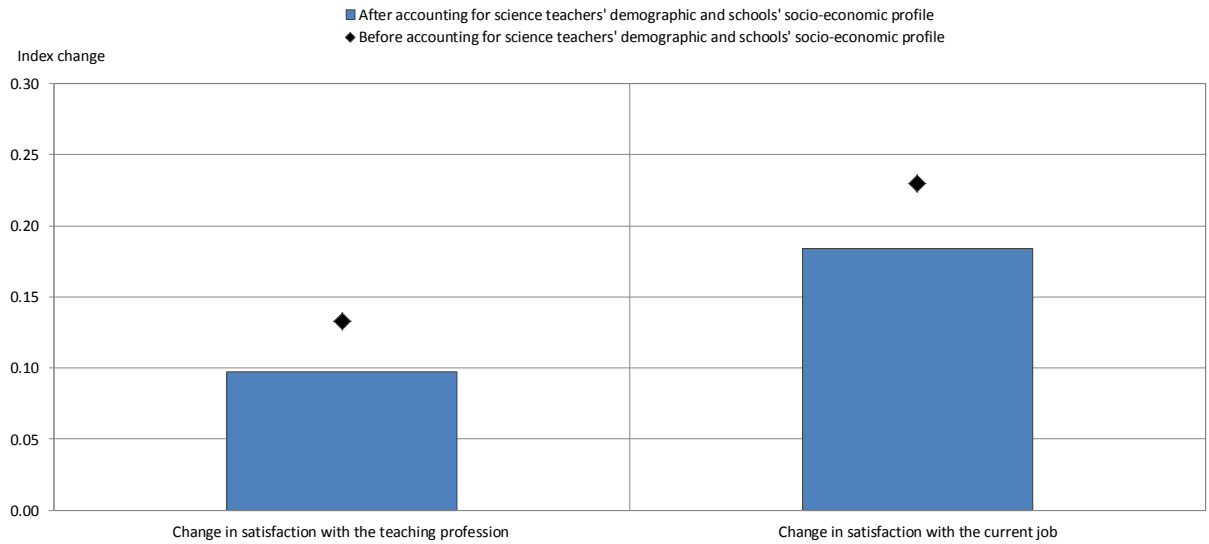
Change in satisfaction associated with a one-unit change in students' index of enjoyment of science at the school level (Average-18)



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
All values are statistically significant (see Annex A).
Source: OECD, PISA 2015 Database.

Figure 5.4. Students' interest in broad science topics and science teachers' satisfaction

Change in satisfaction associated with a one-unit change in students' interest in broad science topics (Average-18)



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
All values are statistically significant (see Annex A).
Source: OECD, PISA 2015 Database.

5.3.2. Students' achievement motivation and schoolwork-related anxiety

Motivation and schoolwork-related anxiety are two fundamental psychological factors affecting student performance. Students' disposition to work hard to master a task or to perform well academically could positively affect teachers' satisfaction and overall professional self-esteem. In addition, teachers who work with motivated students are likely to enjoy their job more and be better prepared for their classes.

In contrast, schoolwork-related anxiety can create barriers to learning and performance because when "students are anxious about tests, they cannot focus on solving tasks but, rather, are occupied worrying about such tasks" (Borgonovi and Pál 2016, pp. 22).

Teachers have an essential role to play in reducing schoolwork-related anxiety, e.g. by asking students where their fears are coming from. But if teachers' strategies to mitigate their students' schoolwork-related stress fail, teachers are more likely to feel professionally unsuccessful, which can lead to greater job dissatisfaction.

PISA 2015 asked students five questions, using a 4-point Likert scale, to monitor their level of achievement motivation and schoolwork-related anxiety. Students were asked about themselves and their ambitions (e.g. wanting to be the best in their class or to attend top universities). Similar to achievement motivation, schoolwork-related

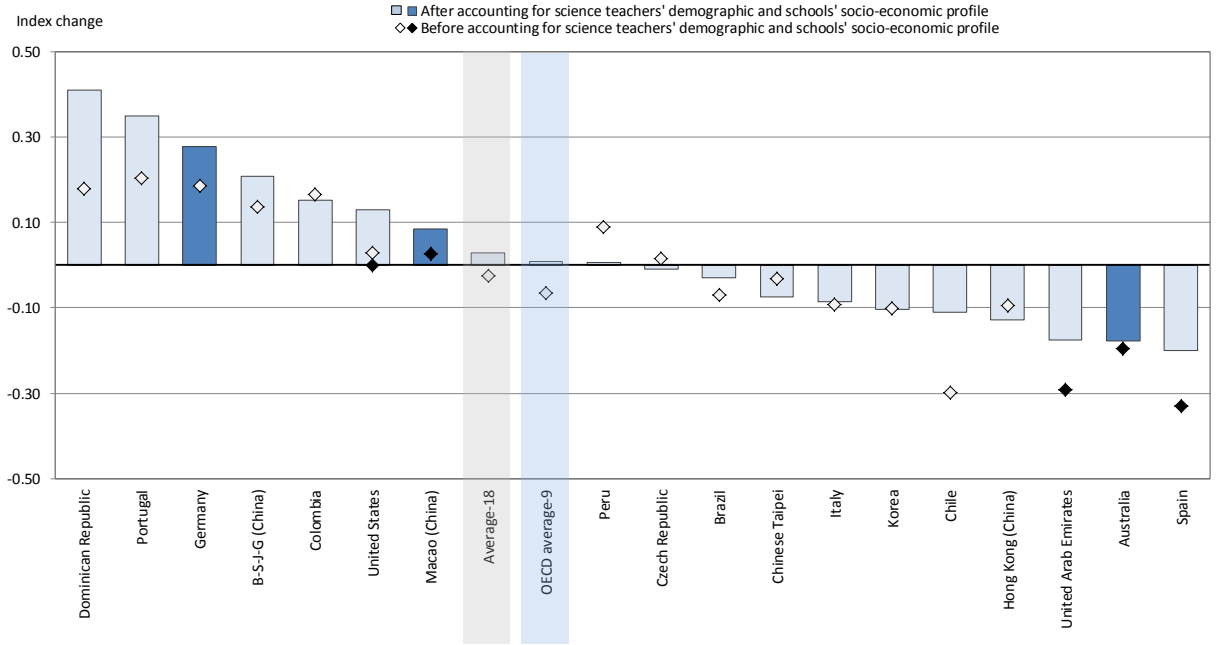
anxiety was measured through students' responses to five statements, mapped on a 4-point Likert scale, about their experience of anxiety when preparing for or sitting tests. Based on these questions, two indices were derived that were averaged at the school level.

After accounting for science teachers' demographic and schools' socio-economic profile, the average index of students' achievement motivation at the school level is positively associated with teachers' satisfaction with the teaching profession in Macao (China), Portugal and Spain (Table 5.4). In B-S-J-G (China), Korea, Macao (China), Portugal and Spain, a one-unit change in the index of students' achievement motivation at the school level is also associated with a positive increase of between 0.37 and 0.69 in the index of teacher satisfaction with their current job.

Students in most countries and economies reported some degree of schoolwork-related anxiety (Table 5.5). In Australia, Spain and the United Arab Emirates, teachers' satisfaction with the profession is negatively associated with students' schoolwork-related anxiety at the school level before accounting for science teachers' demographic and schools' socio-economic profile (Figure 5.5). In contrast, a positive relationship is observed in Colombia and Macao (China), where teachers tend to be more satisfied with their current job in schools where students expressed higher levels of schoolwork-related anxiety (Figure 5.6). This result could reflect a selection bias since schoolwork-related anxiety seems to be more prevalent in top-achieving than in low-achieving schools (OECD, 2017a). In other words, in top-performing schools, students might be more anxious due to the demanding performance requirements that, at the same time, make teachers more satisfied (high performance is also associated with better school climate).

Figure 5.5. Schoolwork-related anxiety and science teachers' satisfaction with the teaching profession

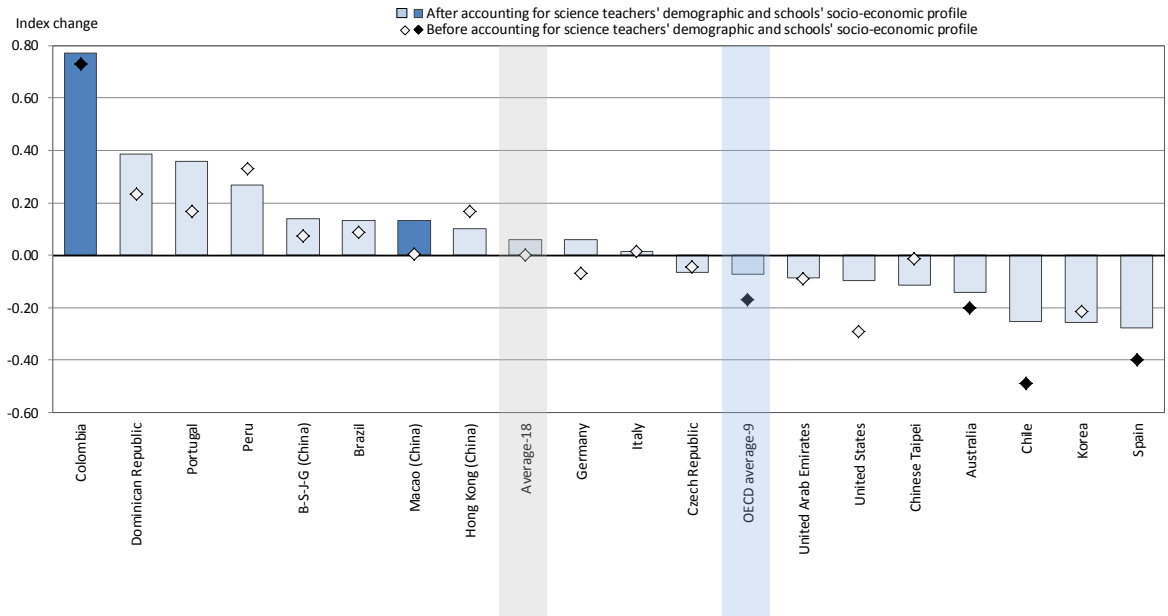
Change in satisfaction with the teaching profession associated with a one-unit change in students' index of schoolwork-related anxiety at the school level



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

Figure 5.6. Schoolwork-related anxiety and science teachers' satisfaction with the current job

Change in satisfaction with the current job associated with a one-unit change in students' index of schoolwork-related anxiety at the school level



Notes: The school socio-economic profile is measured by the PISA index of economic, social and cultural status (ESCS).
Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the current job, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

5.3.3. Students' perception of disciplinary climate in science lessons

In classroom environments where there is limited disruptive noise and disorder, students can listen to what the teacher and other students say and can focus on academic tasks (OECD, 2016b). From the teacher's perspective, better disciplinary climates can foster learning and facilitate instruction, something that could translate into greater teachers' satisfaction and confidence. While meaningful learning is more likely to happen in such environments (Willms and Ma, 2004), creating a good disciplinary climate is another challenge for teachers. As PISA 2015 shows, across OECD countries, the most common disciplinary problems in science lessons occur when students do not pay attention to what the teacher says, and when there is noise and disorder in the classroom (OECD, 2016b, Table II.3.10).

Since science was the major subject assessed in PISA 2015, students were asked how they perceive the disciplinary climate in their science lessons. The questions covered disruptive behaviour, noise and disorder, and were answered on a 4-point Likert scale. A standardised index based on these answers was constructed. Higher values indicate

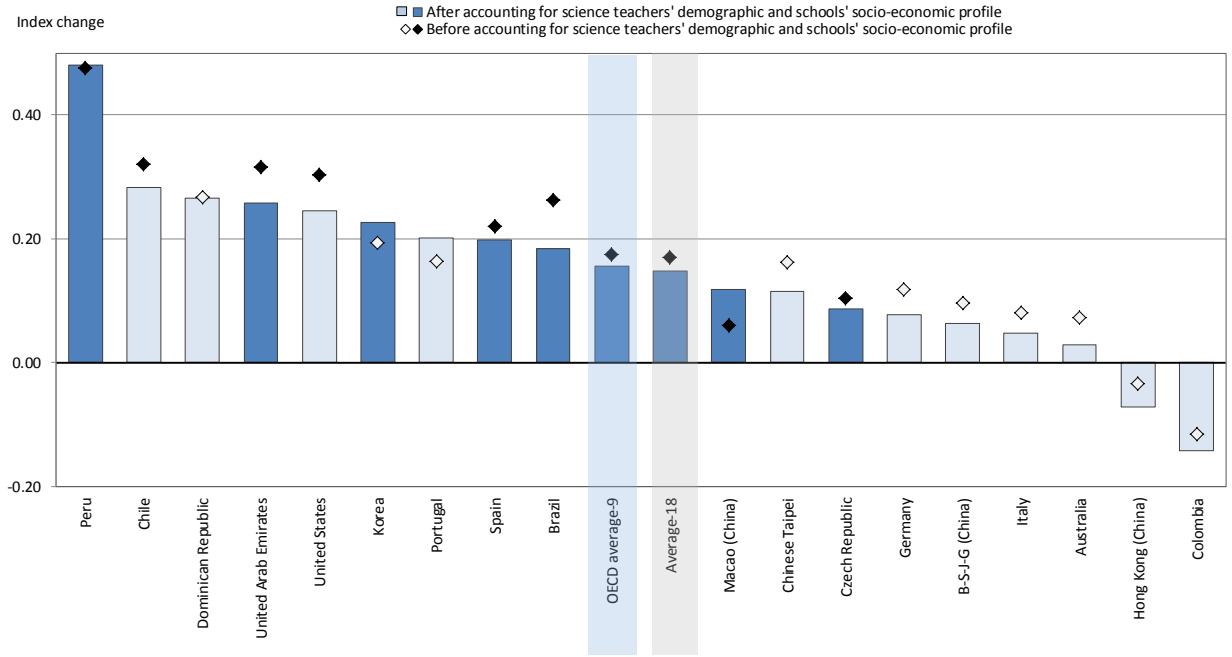
perceptions of better disciplinary climate in science lessons. The index was averaged at the school level in order to describe the school climate in which teachers work.

Teachers' satisfaction with the teaching profession is positively associated with disciplinary climate in seven countries (Figure 5.7). A one-unit increase in the index of disciplinary climate in science lessons at the school level is associated with a 0.15 increase in the index of teacher satisfaction with the teaching profession. The increase is largest in Peru and smallest in the Czech Republic.

In 10 out of 18 countries and economies, teachers' satisfaction with their current job is positively associated with the disciplinary climate in science lessons at the school level, even after accounting for science teachers' demographic and schools' socio-economic profile (Figure 5.8). Across all participating countries and economies, an increase of one unit in the index of disciplinary climate in science lessons at the school level is associated with an increase of 0.24 point on the index of teacher satisfaction with their current job. The increases range between 0.47 point in Brazil and 0.18 point in the Czech Republic and Italy.

Figure 5.7. Disciplinary climate and science teachers' satisfaction with the teaching profession

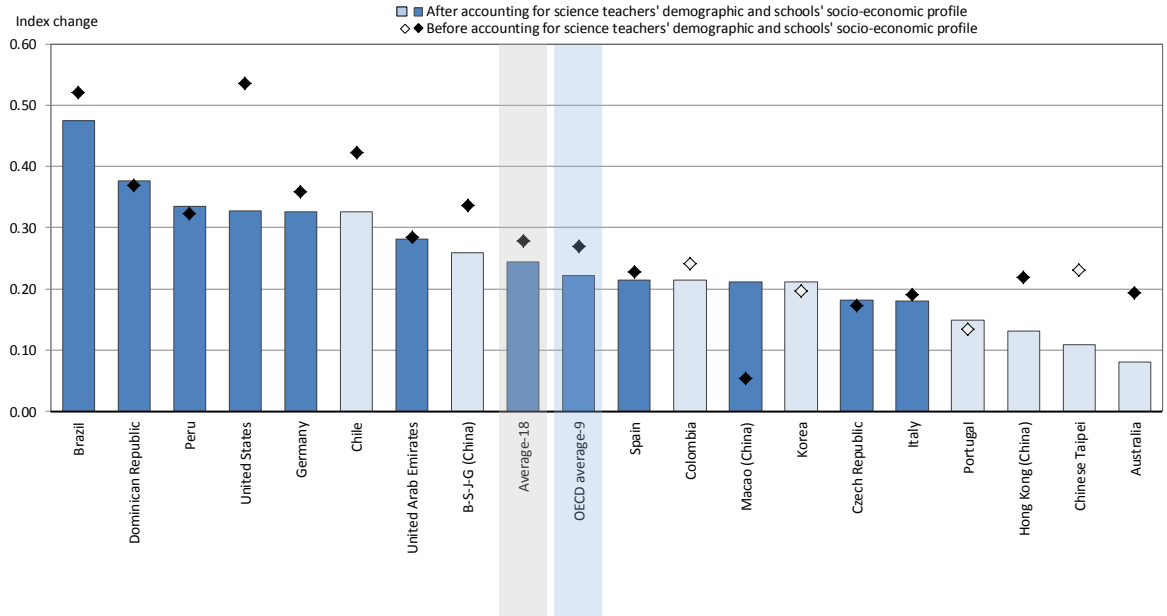
Change in satisfaction with the teaching profession associated with a one-unit change in student-reported index of disciplinary climate in science class at the school level



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

Figure 5.8. Disciplinary climate and science teachers' satisfaction with the current job

Change in satisfaction with the current job associated with a one-unit change in student-reported index of disciplinary climate in science class at the school level



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the current job, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

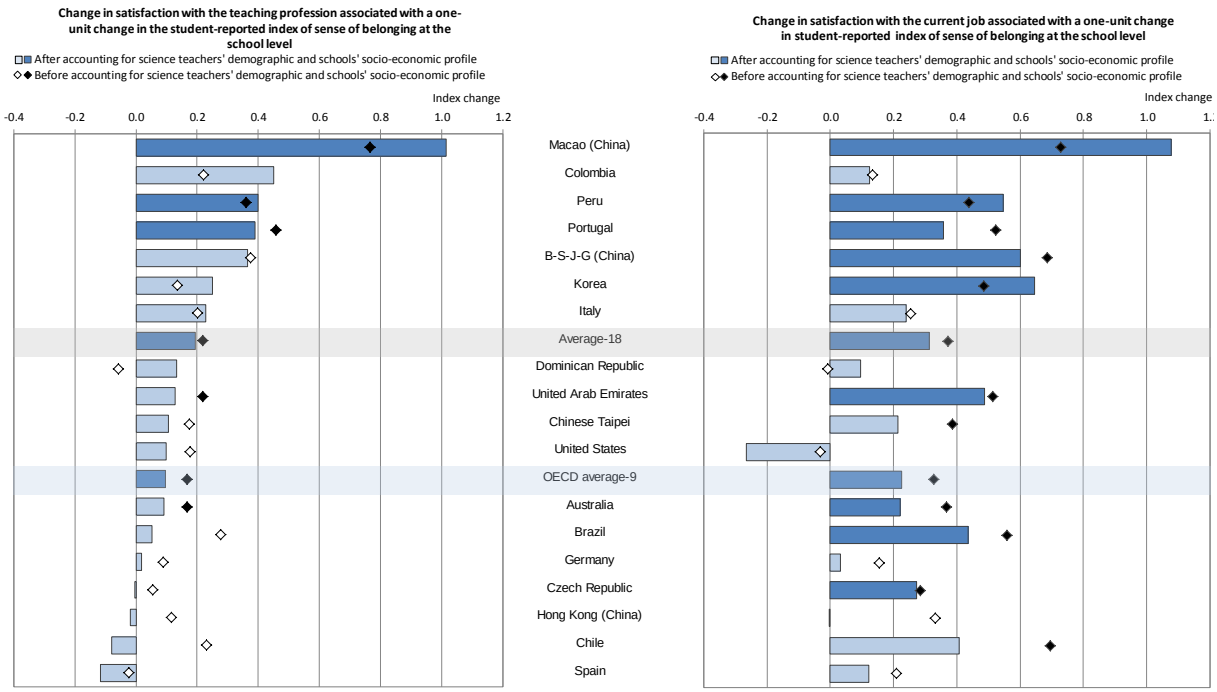
5.3.4. Students' sense of belonging at school and satisfaction with life

Teachers spend a considerable amount of time with their students at school. Thus, how their students feel about their own life and their school affects not only students' academic achievement and motivation, but also their teachers' perception about their own professional life. Teachers whose students have a strong sense of belonging at the school are more likely to be productive, to engage with their workplace and to be satisfied with their job. Students' dissatisfaction with their life and social exclusion, in turn, are likely to undermine teachers' professional motivation and job satisfaction.

PISA 2015 asked students to report their feelings about social bonding, isolation, how they are regarded by others, and belonging at school on a 4-point Likert scale ranging from 1 "strongly agree" to 4 "strongly disagree". Positive social bonding refers to students' perception that they connect with others; social isolation refers to students' feelings of loneliness at being separated from their social group; regard refers to peer perceptions; and belonging (or lack thereof) refers to students' general sense of engagement (or lack thereof) in their school community (Borgonovi and Pál, 2016). Based on six measures of students' sense of belonging, a standardised index was constructed with higher values indicating a stronger sense of belonging. The index was then averaged at the school level.

Figure 5.9 shows that teachers' satisfaction with the teaching profession is weakly associated with students' sense of belonging at the school level. The association is positive only in Macao (China), Peru and Portugal. In contrast, the association between teachers' satisfaction with their current job and students' sense of belonging at the school level is strong and positive in 9 of 18 countries and economies. The values range from 0.22 in Australia to 1.08 in Macao (China) with an average of 0.31 across all 18 countries and economies. The results imply that when students have positive and strong ties to their school, their teachers feel more satisfied with the teaching profession and with their current job.

Figure 5.9. Science teachers' satisfaction, by students' sense of belonging at school



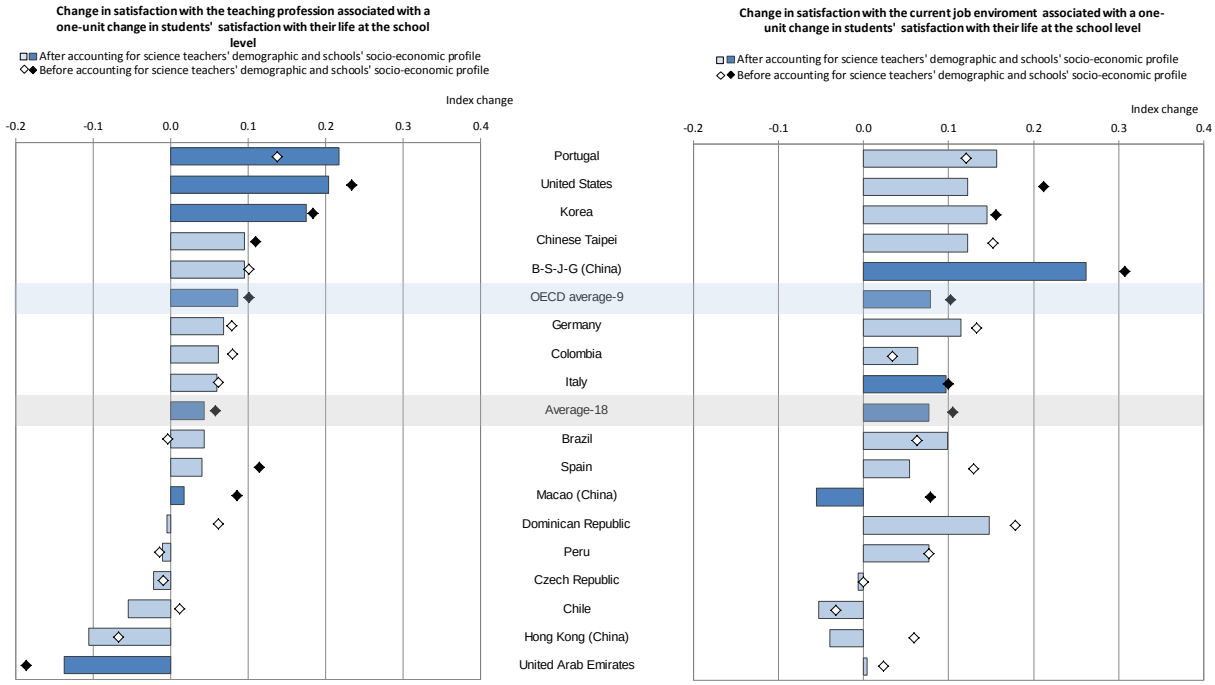
Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in student-reported index of sense of belonging at the school level, after accounting for science teachers' demographic profile.
Source: OECD, PISA 2015 Database.

PISA 2015 asked students to report on how satisfied they are with their lives overall on a scale ranging from 0 (not at all satisfied) to 10 (completely satisfied). Higher values on the scale indicate greater satisfaction with life.

Teachers' satisfaction with the teaching profession and with their current job is weakly associated with students' satisfaction with their own lives at the school level (Figure 5.10). The association with teachers' satisfaction with the teaching profession

is positive in Korea, Portugal and the United States, while the association with satisfaction with teachers' current job is moderately positive only in B-S-J-G (China) and Italy.

Figure 5.10. Science teachers' satisfaction, by students' satisfaction with their life



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Student variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in students' satisfaction with their life at the school level, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

5.3.5. Students' exposure to bullying and perceptions of teacher unfairness

People, in general, desire strong social ties and positive relationships – the threads that binds communities together. In schools, social ties connect teachers with students and students with their peers. Positive, trustworthy, good-quality relationships protect students from loneliness, low academic performance, and mental and physical health problems (Borgonovi and Pál, 2016). By contrast, negative and poor-quality relationships and experiences at school, such as bullying, can result in students skipping classes, performing poorly and even dropping out of school entirely (Konishi et al., 2010; Townsend, 2008).

The quality of teacher-student relations not only influences student outcomes, but also affects teachers' professional engagement. For teachers, good-quality relations with their students could lead to greater job satisfaction, professional motivation and engagement with their students. When bullying is widespread and teacher-student

relations are poor, teachers' attitudes towards the profession and towards their current job could suffer.

PISA 2015 asked students about their relations with their peers and teachers. Views on teachers' unfairness were measured through six questions. Students' self-reports were also used to measure three forms of bullying – verbal, physical and relational – from the victim's perspective. Two summative indices – of teacher unfairness and of bullying – were constructed for each student, as described in Volume III of the *PISA 2015 Initial Report* (OECD, 2017a), and then averaged at the school level.

Table 5.6 shows that students' perceptions of teacher unfairness at the school level are not particularly related to teachers' satisfaction with teaching profession or to their satisfaction with their current job.

The association between students' exposure to bullying and teachers' satisfaction with teaching profession and with their current job are negative, moderate in magnitude, and significant only in few countries. One possible explanation is that bullying at school might indicate a challenging school environment that could adversely affect teachers (Table 5.7).

The school average of students' exposure to bullying is negatively and significantly associated with teachers' satisfaction with the profession in the Dominican Republic, Macao (China), and Peru even after accounting for science teachers' demographic and schools' socio-economic profile. The values range between -0.13 and -0.31 point.

Similarly, in Australia, the Dominican Republic, Germany, and Macao (China), the relationship between the school average of students' exposure to bullying and teachers' satisfaction with their current job is negative, with values ranging between -0.22 and -0.30 point. A possible explanation of the moderate relationship (or the absence of a relationship in some countries) between bullying and teachers' satisfaction with the teaching profession and with their current job is that teachers may not recognise when their students are being bullied. Victims often do not report incidents of bullying to their teachers, so teachers' own satisfaction with their job remains unaffected.

5.4. Science teachers' satisfaction and students' schooling outcomes

Good-quality teaching and learning has a big impact on students' schooling outcomes (Kett, 2015). Among other factors, teachers constitute one of the most important pillars of high-quality education services. In this sense, teachers who are satisfied with their profession and jobs are able to provide high-quality instruction and good learning environments (Kett, 2015).

There is an assumption that there might be an association between teachers' satisfaction and students' academic performance, motivation and school engagement. But limited evidence is available about the direction and the nature of the relationship.

The previous sections examined how students and school characteristics influence teachers' satisfaction in PISA 2015. This sub-section studies the reverse relationship. It explores how teachers' satisfaction influences students' cognitive and non-cognitive outcomes. It discusses how teachers' satisfaction is related to students' science performance, science-related career expectations, school climate and student absenteeism.

In order to analyse the impact of teachers' satisfaction on students' outcomes, the teacher data were aggregated at the school level. Therefore, these can be seen as aggregate characteristics of the school's population of teachers. At the student level, individual student data are used.

5.4.1. Teachers' satisfaction and students' academic performance

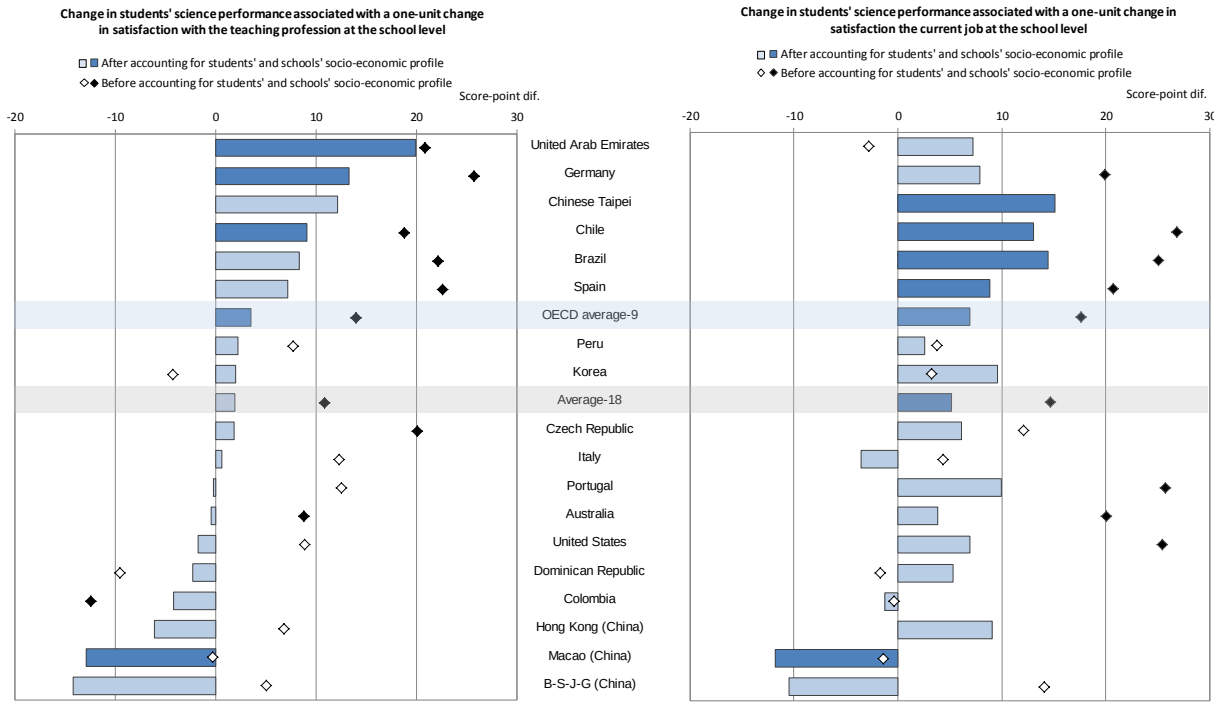
Teachers have a huge impact on students' proficiency in academic subjects. Evidence suggests that teachers who are satisfied with their jobs tend to be more effective in promoting better learning, which could lead to better student performance (OECD, 2014). Along with the moderate effect of teacher collaboration, teachers' satisfaction can positively influence the quality and the stability of instruction, which, in turn, might translate into better learning outcomes for students (Ashton and Webb, 1986; Banerjee et al., 2016).

PISA 2015 data reveal that in eight countries and economies, students in schools with more-satisfied science teachers perform better in science than students in schools with less-satisfied science teachers. After accounting for students' and schools' socio-economic profile, in Chile, Germany and the United Arab Emirates, students score at least 9 points higher in science when they attend schools with teachers who reported greater satisfaction with the teaching profession.

The results for science teachers' satisfaction with their current job are similar, and even stronger (Figure 5.11). Results show that, across all participating countries and economies, students in schools with teachers who are satisfied with their current job score 15 points higher in science, on average, than students with less-satisfied teachers. This difference in performance persists (around five score points) even after accounting for students' and schools' socio-economic profile. In Brazil, Chile, Spain and Chinese Taipei, students score 9 to 15 points higher when they attend schools with teachers who reported greater satisfaction with their current job.

The results imply that even after accounting for students' and schools' socio-economic profile, when teachers feel more satisfied with the teaching profession and their current job, on average within schools, students seem to perform better in science.

Figure 5.11. Science teachers' satisfaction and students' science performance



Notes: Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.
Teacher variables are aggregated at the school level.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the students' science performance associated with a one-unit change in satisfaction with the teaching profession at the school level, after accounting for students' and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

5.4.2. Teachers' satisfaction and students' expectations of a science career

Children who expect, at an early age, to have a science-related career are more likely to graduate from college or university with a science degree (Tai et al., 2006). As there is growing concern that the number of students who choose careers in science is insufficient, career education, role models and positive teacher attitudes are necessary to foster students' motivation and interest in science (OECD, 2016a).

Science teachers are not professional career educators, but they are in a good position to support career-related learning (Hutchinson, 2012). In the lives of 15-year-old students, teachers are among those few adults who can help these students understand the relationship between learning and earning. They are able to influence students' choice of occupation by helping students visualise their future role in society. Relying on the support of inspired, well-prepared and enthusiastic teachers, students can understand what their full potential is and, in turn, develop the skills needed to realise their aspirations.

Teachers' satisfaction could influence students' career expectations. If teachers are more satisfied with their jobs and more enthusiastic about their profession, it is more

likely that they will be able to motivate their students to pursue careers in science-related fields.

PISA 2015 asked students what occupation they expect to be working in when they are 30 years old. Students could enter any job title or description in an open-entry field; their answers were then classified according to the International Standard Classification of Occupations, 2008 edition (ISCO-8). These coded answers were used to create an indicator of science-related career expectations, defined as those career expectations whose realisation requires the study of science beyond compulsory education, typically in formal tertiary education (see OECD, 2016a, Volume I, pp. 111 and Annex A for details).

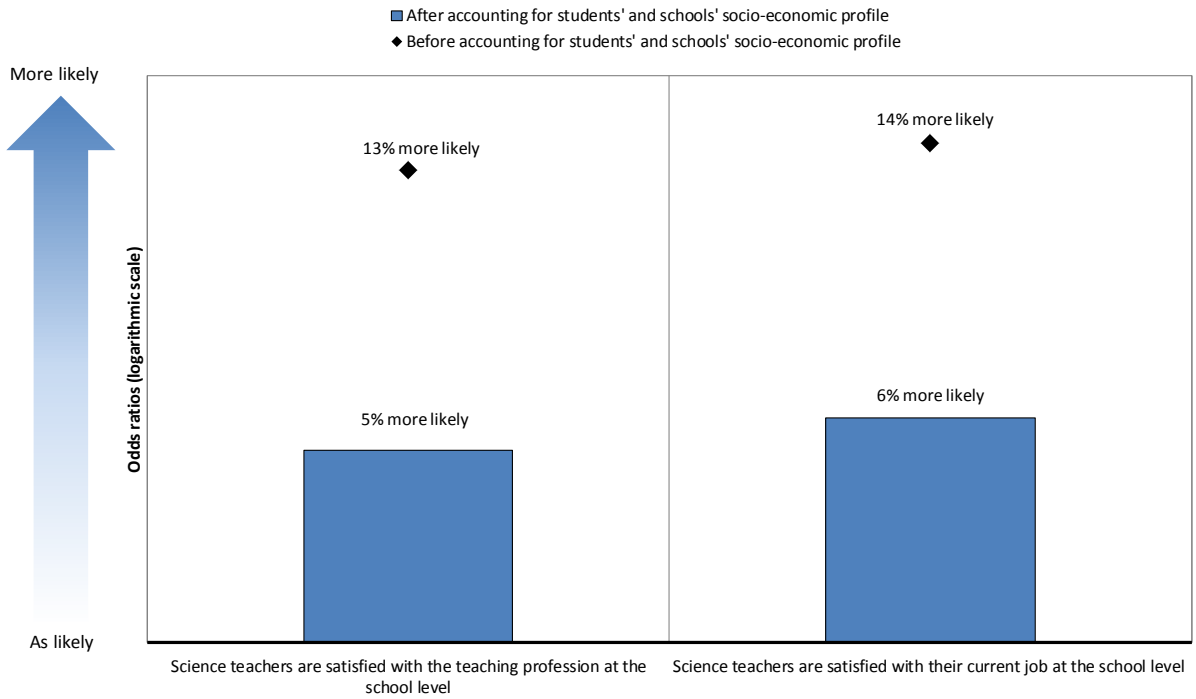
Data collected from students participating in the PISA 2015 assessment show that, across all 18 participating countries and economies, 30% of students reported that they expect to work in science-related occupations at age 30 (Table 5.8). However, the share of students who expect to work in science-related careers varies widely across countries and economies. For example, at least 40% of students in Brazil, Chile, Colombia, the Dominican Republic and the United Arab Emirates reported that they plan to have a science-related career at the age of 30. By contrast, in B-S-J-G (China), the Czech Republic, Germany and Korea, less than 20% of students visualise themselves in a science-related occupation.

Figure 5.12 shows that teachers' satisfaction is significantly related to students' expectations of pursuing a science career. On average across all 18 countries and economies, students in schools with teachers who are satisfied with the teaching profession or with their current job are more likely to expect to work in science-related occupations than students whose teachers are not satisfied, even after accounting for students' and schools' socio-economic profile.

This association suggests that promoting teachers' job satisfaction at school can affect how adolescents see their future as adults, and consequently the level of effort they invest in science-related activities.

Figure 5.12. Science teachers' satisfaction and students' science-related career expectations

Likelihood that students expect to work in science-related occupations at age 30[1] if their science teachers are satisfied with the teaching profession or their current job, at the school level (Average-18)



1. See Annex A for the list of science-related occupations.
Notes: A logarithmic transformation of the odd ratios is plotted to make the values comparable in the graph. The interpretation of the odd ratios (in terms of percentage change in the likelihood of the outcome) is indicated above each bar/plot.
Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.
Teacher variables are aggregated at the school level.
All values are statistically significant (see Annex A).
Source: OECD, PISA 2015 Database.

5.4.3. Teachers' satisfaction and school climate

Teachers' perceptions of the academic climate in their school, teacher collaboration, teacher-student relationships, and teacher participation in school decisions are strong predictors of teachers' satisfaction (OECD, 2014). However, teachers' satisfaction, among other factors, can also shape the school climate.

After accounting for students' and schools' socio-economic profile, in the Czech Republic, Korea, Peru, Spain and the United Arab Emirates, teachers' satisfaction with the teaching profession at the school level is positively associated with the index of disciplinary climate (Table 5.9).

Moreover, the associations between teachers' satisfaction with their current job and the index of disciplinary climate are similar and slightly stronger. Figure 5.13 shows, that across all countries and economies, a one-unit change in the index of teacher satisfaction with their current job, at the school level, is associated with a 0.09 point

increase in the student-report index of disciplinary climate, after accounting for students' and schools' socio-economic profile. The effects vary between 0.06 and 0.16 point and are slightly stronger in Brazil, and the Czech Republic.

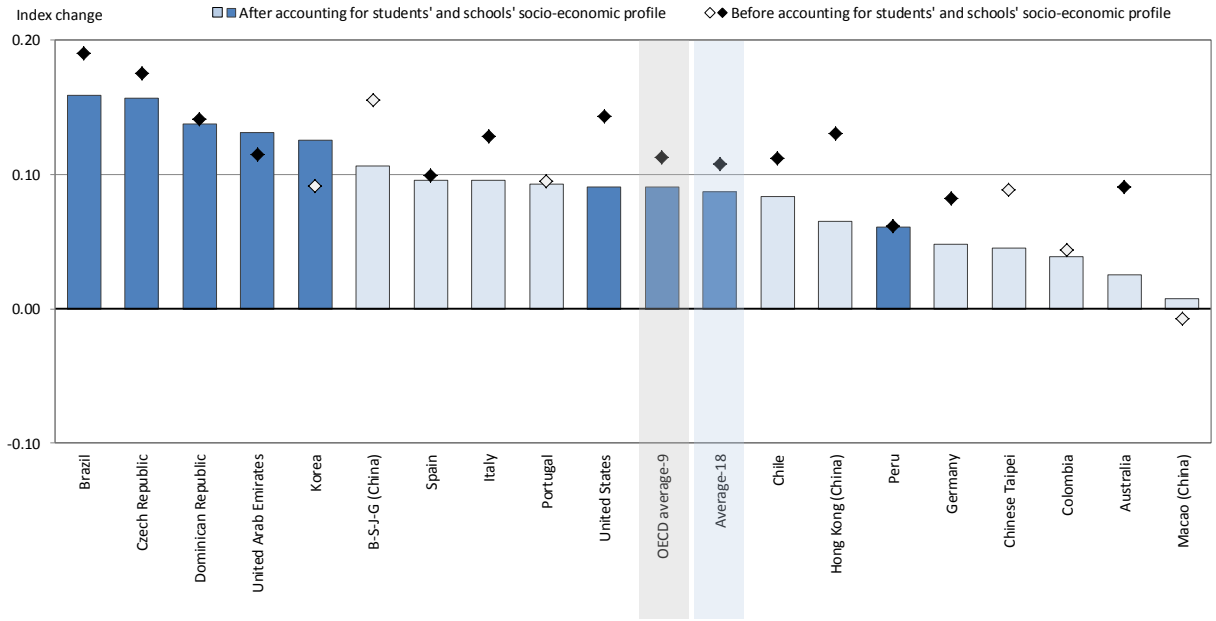
Figure 5.14 shows that teachers' satisfaction with the teaching profession at the school level is negatively and moderately to strongly associated with student factors affecting school climate (based on principals' reports, with higher values indicating unfavourable school climate) in Australia, Brazil, Chile, Germany, Peru, Spain and the United Arab Emirates, even after accounting for students' and schools' socio-economic profile.

When it comes to teachers' satisfaction with their current job, the association with student factors affecting school climate is negative in Brazil, Chile, the Czech Republic, Germany, Spain and the United Arab Emirates, even after accounting for students' and schools' socio-economic profile (Figure 5.14). The association is particularly strong in Brazil (-0.45), Chile (-0.5), and Spain (-0.47).

These findings, together with the results presented in the previous subsection, imply that there is an interplay between teachers and school climate. Various aspects of school climate are related to how teachers feel, but teachers might play an active role in shaping the school atmosphere as well.

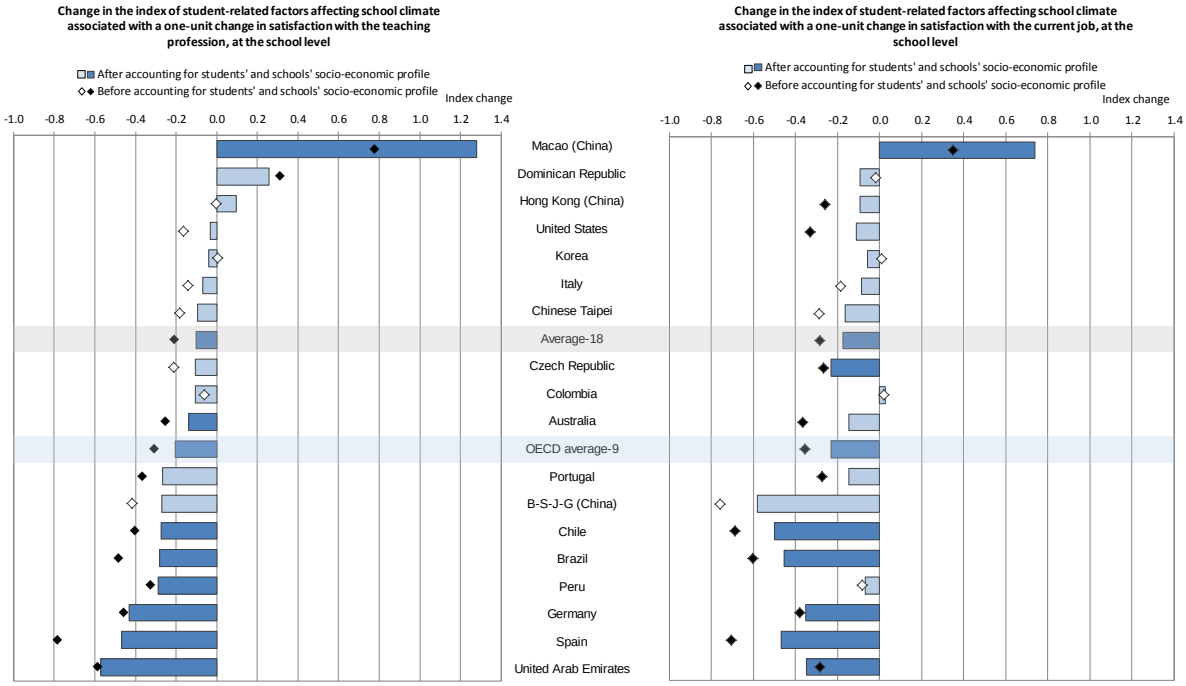
Figure 5.13. Science teachers' satisfaction and disciplinary climate

Change in student-reported index of disciplinary climate in science class associated with a one-unit change in teachers' satisfaction with the current job, at the school level



1. See Annex A for the list of science-related occupations.
Notes: Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the current job, after accounting for students' and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

Figure 5.14. Science teachers' satisfaction and student-related factors affecting school climate



Notes: Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the index of student-related factors affecting school climate associated with a one-unit change in satisfaction with the teaching profession, at the school level, after accounting for students' and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

5.4.4. Teachers' satisfaction and student absenteeism

Students need to make an effort to learn (Christenson, Reschly and Wylie, 2012; Wigfield et al., 2007). They lose out on learning opportunities by skipping classes, arriving late or by being inattentive during lessons. Students who are disengaged from school might be particularly at risk of developing behavioural problems and associated negative outcomes (Barber, Stone and Eccles, 2010; Fredricks and Eccles, 2006; Griffiths et al., 2012; Juvonen, Espinoza and Knifsend 2012), such as poor academic performance, low levels of emotional well-being, dropping out of school or delinquency (Baker, Sigmon, and Nugent, 2001; Lee and Burkam, 2003; McCluskey, Bynum and Patchin, 2004; Valeski and Stipek, 2001).

Some students miss classes or are late for school because of reasons beyond their control, while others are absent of their own choice. Despite students' acceptable or unacceptable excuses to come late to class, teachers play a crucial role in reducing student absenteeism. Motivated and satisfied teachers could eliminate boredom, disinterest and disengagement as causes of absenteeism by, for example, establishing a supportive learning environment.

Students who took part in PISA 2015 were asked to report how many times they skipped school days without authorisation in the two weeks prior to the PISA

assessment. They were also asked how many times they arrived late for school during that period.

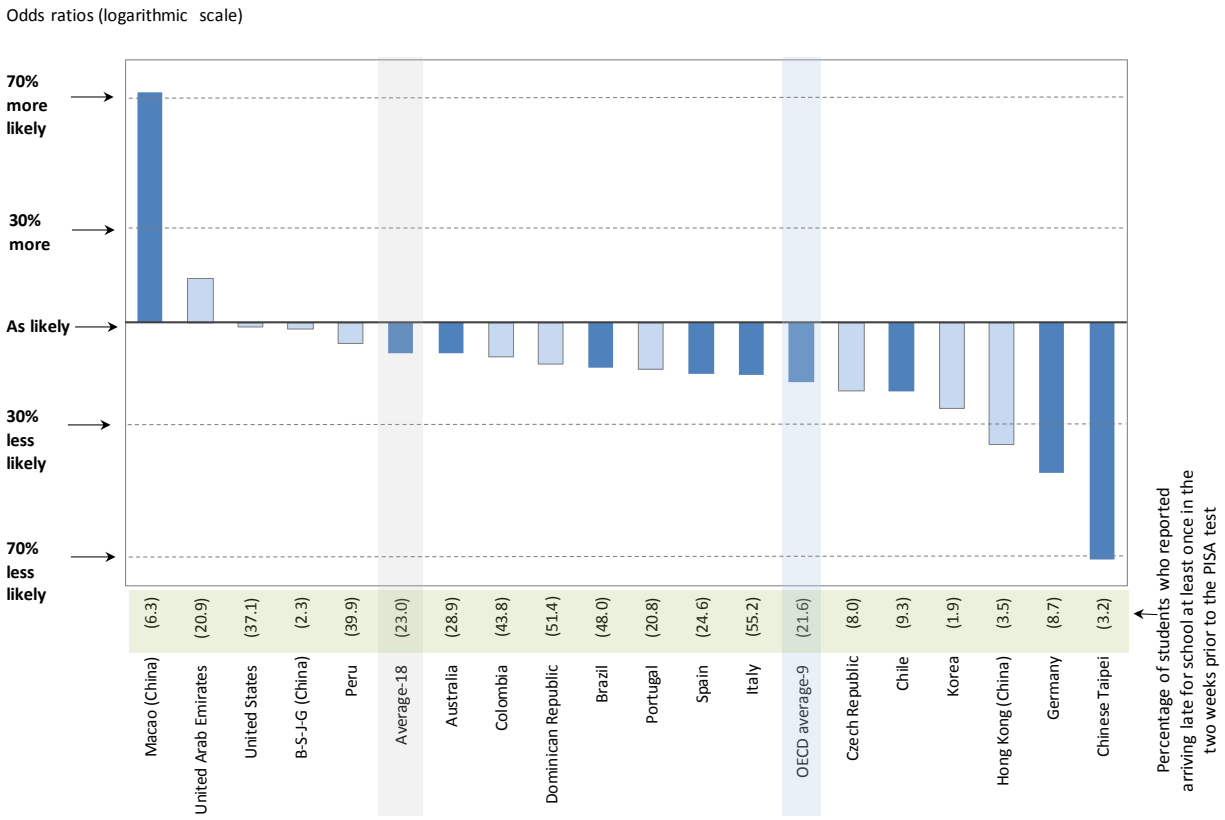
According to PISA results, student absenteeism varies a lot across participating countries and economies. In Chile, the Czech Republic and Peru, at least one in two students reported that they had skipped a whole school day at least once in the two weeks prior to the PISA test. By contrast, in Hong Kong (China), Korea and Macao (China), fewer than one in three students were absent from school at least once in the previous two weeks (Table 5.10). Among all participating countries and economies, Italy has the largest share of students (55%) who had arrived late for school in the two weeks prior to the PISA test, followed by the Dominican Republic (51%) and Brazil (48%). In contrast, in B-S-J-G (China), the Czech Republic, Chile, Hong Kong (China), Germany, Macao (China) and Chinese Taipei, less than 10% of students reported that they had arrived late for school (Table 5.11).

Teachers' satisfaction might reduce students' truancy, particularly late arrival for school (Figure 5.15). In Brazil, Chile, Germany, Italy, Spain and Chinese Taipei, students in schools with science teachers who are more satisfied with their current job were at least 9% less likely to arrive late for school. After accounting for students' and schools' socio-economic profile, the association between teachers' satisfaction with their current job and students' late arrival for school remains significant in Brazil, Germany and the Dominican Republic (Table 5.11). The relationship between teachers' satisfaction with the teaching profession and students' late arrival for school is much less clear.

These results suggest that teachers' satisfaction with their current job might have a role in improving school attendance; however more analysis is needed to understand how teachers' satisfaction affects student absenteeism, given the different reasons for being late or absent from school.

Figure 5.15. Science teachers' satisfaction with the current job and students arriving late for school

Likelihood that students arrived late for school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with their current job, at the school level, before accounting for students' and schools' socio-economic profile[1]



1. Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.

Notes: A logarithmic transformation of the odd ratios is plotted to make the values below one and above one comparable in the graph. The interpretation of the odd ratios (in terms of percentage change in the likelihood of the outcome) is indicated above each bar/plot.

Teacher variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

Countries and economies are ranked in descending order of the likelihood that students had arrived late for school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with their current job, at the school level.

Source: OECD, PISA 2015 Database.

6. SCIENCE TEACHERS' SATISFACTION AND SCHOOL CHARACTERISTICS

Teachers' satisfaction is influenced by teachers' working conditions and the characteristics of their schools. Teachers were asked about different aspects that affect their ability to do their work, such as collaboration among teachers and shortages of educational and human resources. In addition, school principals were asked to fill out a school questionnaire covering different aspects of the school context, such as school type, location, resources, leadership and school management. This section focuses on science teachers' satisfaction in relation to these factors.

6.1. Science teachers' perceptions about their schools

6.1.1. Science teachers' collaboration

According to earlier studies, one of the major factors influencing teachers' satisfaction is a collegial and supportive working environment, especially since teachers are dependent on other school staff members in achieving their goals (van Maele and van Houtte, 2012). For instance, teachers need to co-operate in developing teaching materials and assessment frameworks, and sometimes, they need to share expertise and knowledge about specific subject matter or classroom practices (Bryk and Schneider, 2002; Lortie, 2002). Therefore, involvement in the school as a social system is inherent to the teaching profession. As such, functioning and supportive social relations among colleagues are essential to ensure the transfer of knowledge, pedagogical innovation and excellence in teaching, and could well mitigate feelings of isolation and dissatisfaction (Lee, Dedrick and Smith, 1991; Lortie, 2002; Nias, 1981). Box 6.1 describes how collaboration among science teachers was measured in PISA 2015.

Box 6.1. Teacher collaboration

PISA measured teacher collaboration using one question consisting of eight statements. Teachers were asked to comment on the statements along a four-point Likert scale ranging from "strongly agree", "agree", "disagree", to "strongly disagree". The question is:

To what extent do you disagree or agree with the following statements about regular co-operation among your fellow school science teachers and yourself?

1. We discuss the achievement requirements for school science when setting tests.
2. It is natural for us to co-operate on what homework to give to our students.
3. We discuss the criteria we use to grade written tests.
4. We exchange tasks for lessons and homework that cover a range of different levels of difficulty.
5. I prepare a selection of teaching units with my fellow school science teachers.
6. We discuss ways to teach learning strategies and techniques to our students.
7. My fellow school science teachers benefit from my specific skills and interests.
8. We discuss ways to better identify students' individual strengths and weaknesses.

Based on teacher's responses to these statements, a teacher collaboration index was developed. The index was standardised to have an average of 0 across OECD countries and a standard deviation of 1, meaning that two-thirds of the population fall between the values of -1 and 1 on each index.

Figure 6.1 shows that teacher collaborative activities tend to be more common in Australia, B-S-J-G (China), Colombia, the Dominican Republic, Korea, Macao (China), Peru, Portugal and the United Arab Emirates, and less common in Brazil, Chile, the Czech Republic, Germany, Italy and the United States.

The most common activities across all countries, used by about 87% of science teachers, are: discussing the achievement requirements when setting tests; discussing the criteria to grade written tests; and discussing ways to teach learning strategies and techniques. The least common activity is co-operation on what homework to give, with only 72% of science teachers reporting that they co-operate in this way.

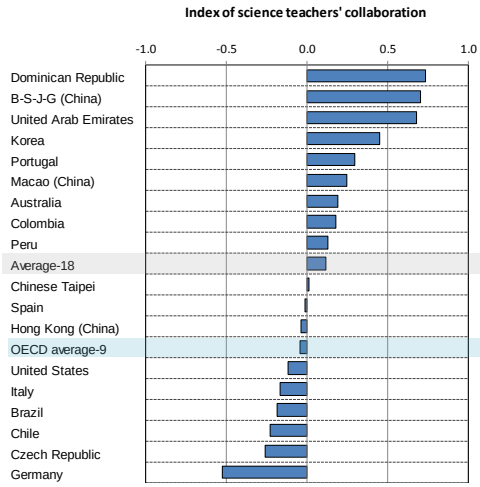
Teacher collaboration is positively and significantly associated with both measures of teachers' satisfaction in all countries and economies, even after accounting for teachers' demographic characteristics (Table 6.1). This finding confirms the importance of a collegial and supportive atmosphere among teachers. The effects are moderate to strong and similar across countries. On average, a rise of one unit on the index of teacher collaboration is associated with a rise of 0.22 point on satisfaction with their profession and an increase of 0.35 point on satisfaction with their current job. Associations are slightly stronger in B-S-J-G (China) and Macao (China) and weaker in Chile, Korea, Spain and the United States. It is not surprising that teacher collaboration has a stronger effect on satisfaction with the current job, as it reflects the quality of the work environment.

Figure 6.2 shows that in the Dominican Republic, Macao (China) and the United Arab Emirates, teachers in the top quarter of the index of teacher collaboration are at least 0.7 of a standard deviation more satisfied with their profession than teachers in the bottom quarter. The smallest difference between the two quarters is in the United States (about 0.28 of a standard deviation) (see Annex A for an explanation of how the quarters were computed).

The figure also shows that in Brazil, B-S-J-G (China), Chile, Colombia and the United Arab Emirates, there are very large differences between teachers in the top and bottom quarters of the index of teacher collaboration on the index of satisfaction with the current job. The differences are smallest in Korea.

Figure 6.1. Science teachers' collaboration

Results based on science teachers' reports and index of science teachers' collaboration

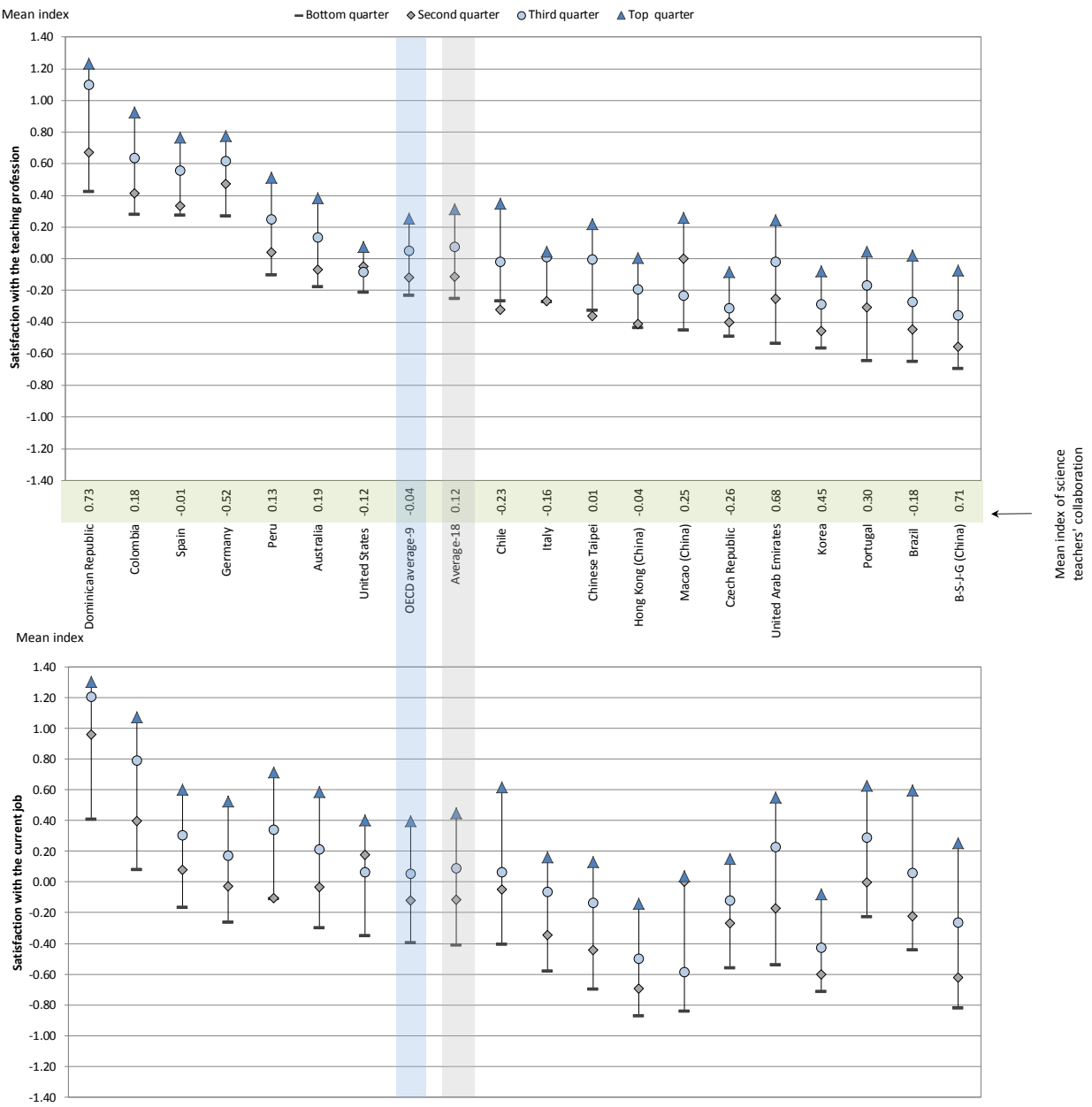


	Percentage of science teachers who agreed/strongly agreed with the following statements:							
	We discuss the achievement requirements for <school science> when setting tests	It is natural for us to co-operate on what homework to give to our students	We discuss the criteria we use to grade written tests	We exchange tasks for lessons and homework that cover a range of different levels of difficulty	I prepare a selection of teaching units with my fellow <school science> teachers	We discuss ways to teach learning strategies and techniques to our students	My fellow <school science> teachers benefit from my specific skills and interests	We discuss ways to better identify students' individual strengths and weaknesses
Dominican Republic	92.2	94.1	92.4	81.7	84.7	94.8	85.0	92.9
B-S-J-G (China)	98.0	96.2	97.3	91.7	96.3	98.3	95.4	95.6
United Arab Emirates	95.8	84.9	94.7	89.1	90.8	94.8	96.1	93.8
Korea	96.0	92.0	97.0	91.7	92.4	87.7	92.0	89.1
Portugal	89.6	55.4	91.8	89.9	84.7	90.1	89.0	87.9
Macao (China)	94.6	90.1	94.2	86.4	88.1	94.4	87.3	90.2
Australia	91.2	56.5	91.6	85.3	83.7	87.5	89.3	78.7
Colombia	86.1	83.3	81.4	74.7	77.9	85.2	85.9	86.9
Peru	87.1	89.7	84.3	79.6	79.1	87.5	74.2	91.9
Average-18	87.1	72.0	87.1	78.2	76.3	87.2	82.5	84.3
Chinese Taipei	92.2	72.9	92.3	81.8	76.7	93.7	90.3	87.2
Spain	80.2	68.1	84.5	78.8	62.7	83.1	76.1	76.5
Hong Kong (China)	87.4	79.7	93.7	75.5	76.2	91.2	82.8	84.4
OECD average-9	84.3	59.3	84.0	75.5	70.7	82.7	79.9	78.6
United States	82.7	54.9	72.1	75.2	63.2	84.2	84.0	76.3
Italy	86.8	58.2	87.4	58.7	89.2	87.8	80.7	78.3
Brazil	75.1	70.8	81.4	67.6	67.5	84.6	67.9	86.7
Chile	73.3	76.2	73.6	61.4	54.7	72.9	68.8	73.7
Czech Republic	82.6	50.0	85.5	71.2	62.1	85.6	70.2	86.7
Germany	76.5	22.5	72.4	67.1	43.4	65.6	69.3	60.2

Countries and economies are ranked in descending order of the index of science teachers' collaboration.
Source: OECD, PISA 2015 Database.

Figure 6.2. Science teachers' collaboration and satisfaction

Satisfaction, by quarter of the index of science teacher's collaboration



Countries and economies are ranked in descending order of satisfaction with the teaching profession at the bottom quarter of the index of science teachers' collaboration.
Source: OECD, PISA 2015 Database.

6.1.2. Science teachers' views on shortages of staff and educational material

The availability of qualified teaching staff and physical resources is essential for successful instruction. This is even more apparent in the case of science because, compared with other subjects, science requires expensive and sophisticated

equipment, especially if students need to participate in hands-on activities. Teachers often mention lack of resources and inadequate teaching staff as a major hindrance to effective instruction and as a barrier to incorporating enquiry-based learning in their lessons (Cheung, 2008; Hofstein and Lunetta, 2004; Lawson, Costenson and Cisneros, 1986). PISA also showed that schools whose principals reported that their science department is well-equipped and well-staffed tend to perform better in science in general (OECD, 2016b).

When it comes to teachers' satisfaction, Dinham and Scott (2000) showed that the availability of resources is important. Even though resources do not generate satisfaction by themselves, a lack of resources could cause dissatisfaction. In other words, they are a necessary but insufficient condition to maintain teachers' satisfaction.

Box 6.2. Shortages of physical and human resources

PISA measured teachers' perception of staff and resource shortages using one question in the science teacher questionnaire. The question consists of eight statements requiring responses constructed on a four-point Likert scale consisting of "Not at all", "very little", "to some extent", and "a lot". The question is:

Is your school's capacity to provide instruction hindered by any of the following issues?

1. A lack of teaching staff.
2. Inadequate or poorly qualified teaching staff.
3. A lack of assisting staff.
4. Inadequate or poorly qualified assisting staff.
5. A lack of educational material (e.g. textbooks, IT equipment, library or laboratory material).
6. Inadequate or poor quality educational material (e.g. textbooks, IT equipment, library or laboratory material).
7. A lack of physical infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems).
8. Inadequate or poor quality physical infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems).

Two indices were constructed based on the responses to these statements. The indices have an OECD average of zero and a standard deviation of one. The first index is based on the first four statements and measures the lack of teaching staff; the second uses the last four statements and measures the lack or inadequacy of resources.

The findings (Figure 6.3) show that teachers in B-S-J-G (China), Germany, Korea, Macao (China), Peru, Portugal Spain and the United Arab Emirates perceive staff shortages as a greater hindrance to instruction, while teachers in Australia, the Czech Republic and the Dominican Republic perceive staff shortages as less of a hindrance. Teachers who perceive more staff shortages tend to be less satisfied with their profession and with their current job, even after accounting for teachers' demographic characteristics (Table 6.2). The associations are moderate, on average across all countries and economies. An increase of one point on the index of staff shortage is

associated with a decrease of 0.17 point on satisfaction with the profession and a decrease of 0.27 point on satisfaction with the current job. The effects are stronger in Australia, Chile and Macao (China) and weaker in B-S-J-G (China), Colombia and Italy.

Figure 6.3 shows that there are large differences in the level of satisfaction between teachers in the top and bottom quarters of the index of staff shortage. Differences in satisfaction with the profession between the top and bottom quarters of the index are largest in Macao (China) and the United Arab Emirates (more than 0.8 of a standard deviation on the satisfaction index) and smallest in Peru. Differences in satisfaction with the current job between the two quarters of the index are largest in Chile, Macao (China) and the United States, and smallest in the Dominican Republic.

The results are similar when considering teachers' perceptions of a lack of educational resources. Teachers in Brazil, B-S-J-G (China), Colombia, Germany, Italy, Korea, Peru, Portugal and Spain perceive that shortages of resources frequently hinder instruction, while teachers in Australia, the Czech Republic, Hong Kong (China) and the United States were less likely to report such shortages (Figure 6.4).

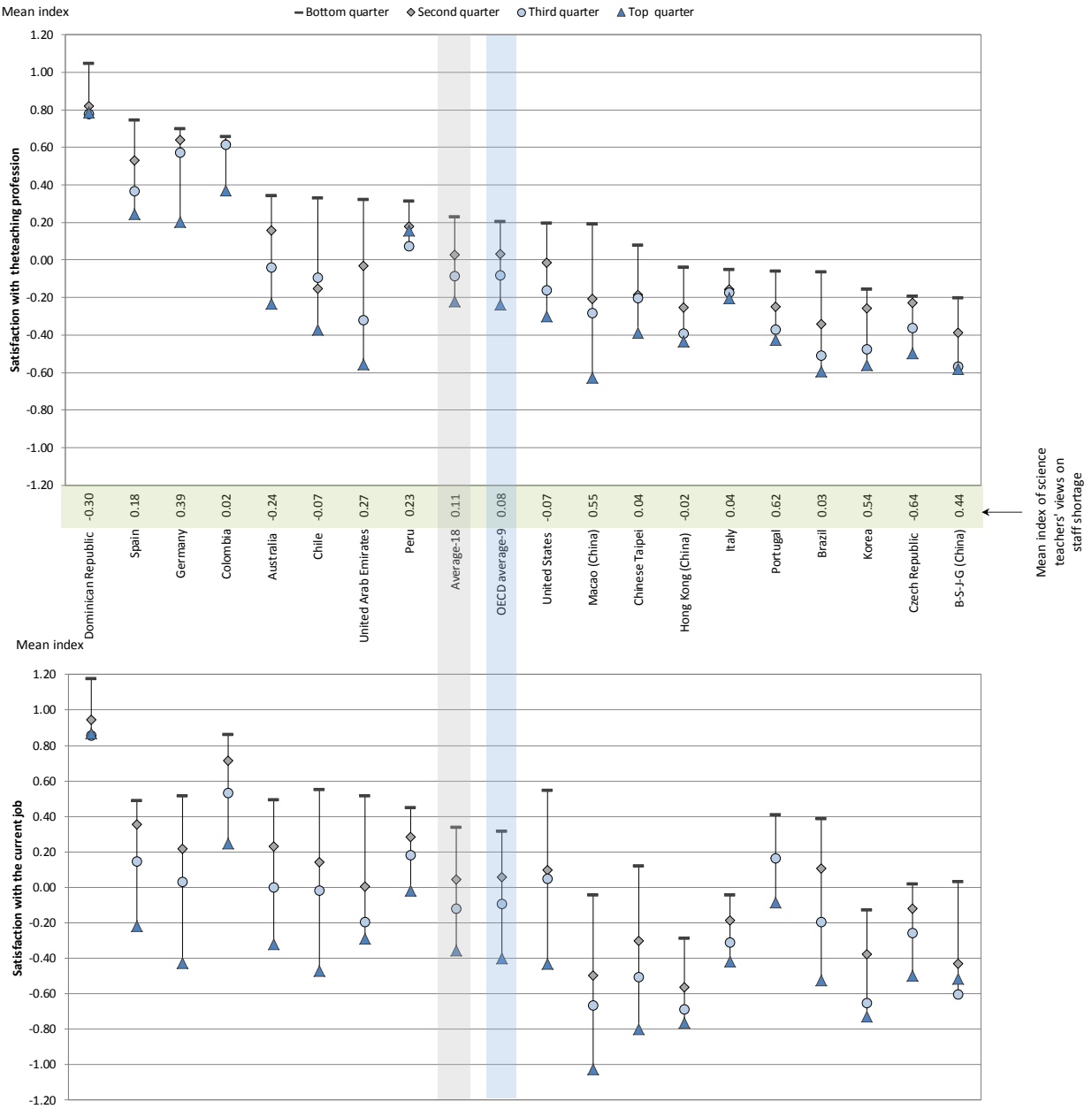
Across most countries and economies, perceptions of lack of resources are associated with less satisfaction on both indices (Table 6.3). The associations are weak to moderate. On average across all countries and economies, an increase of one point on the index of resource shortages is associated with a decrease of 0.15 point on satisfaction with the teaching profession and a decrease of 0.22 point on satisfaction with the current job. The associations are close to the all-country average for almost all countries. The exceptions are Chile, Germany, Chinese Taipei and the United States, where the effect is much larger than the average for satisfaction with the current job.

Figure 6.4 also shows large differences between quarters of the index of resource shortages. Science teachers in the bottom quarter are the most satisfied, since they face limited shortages. Between-quarter differences related to satisfaction with the profession are largest in Australia, Brazil, Germany, Spain and the United Arab Emirates and smallest in Colombia and the Dominican Republic. Between-quarter differences related to satisfaction with the job are largest in Chile and Germany, and smallest in the Dominican Republic.

As with collaboration among teachers, perceptions of staff and resource shortages reflect the characteristics of the environment surrounding teachers. Therefore, it is not surprising to find that the effect of these two indices is stronger on satisfaction with the current job than on satisfaction with the teaching profession.

Figure 6.3. Views on staff shortage and satisfaction

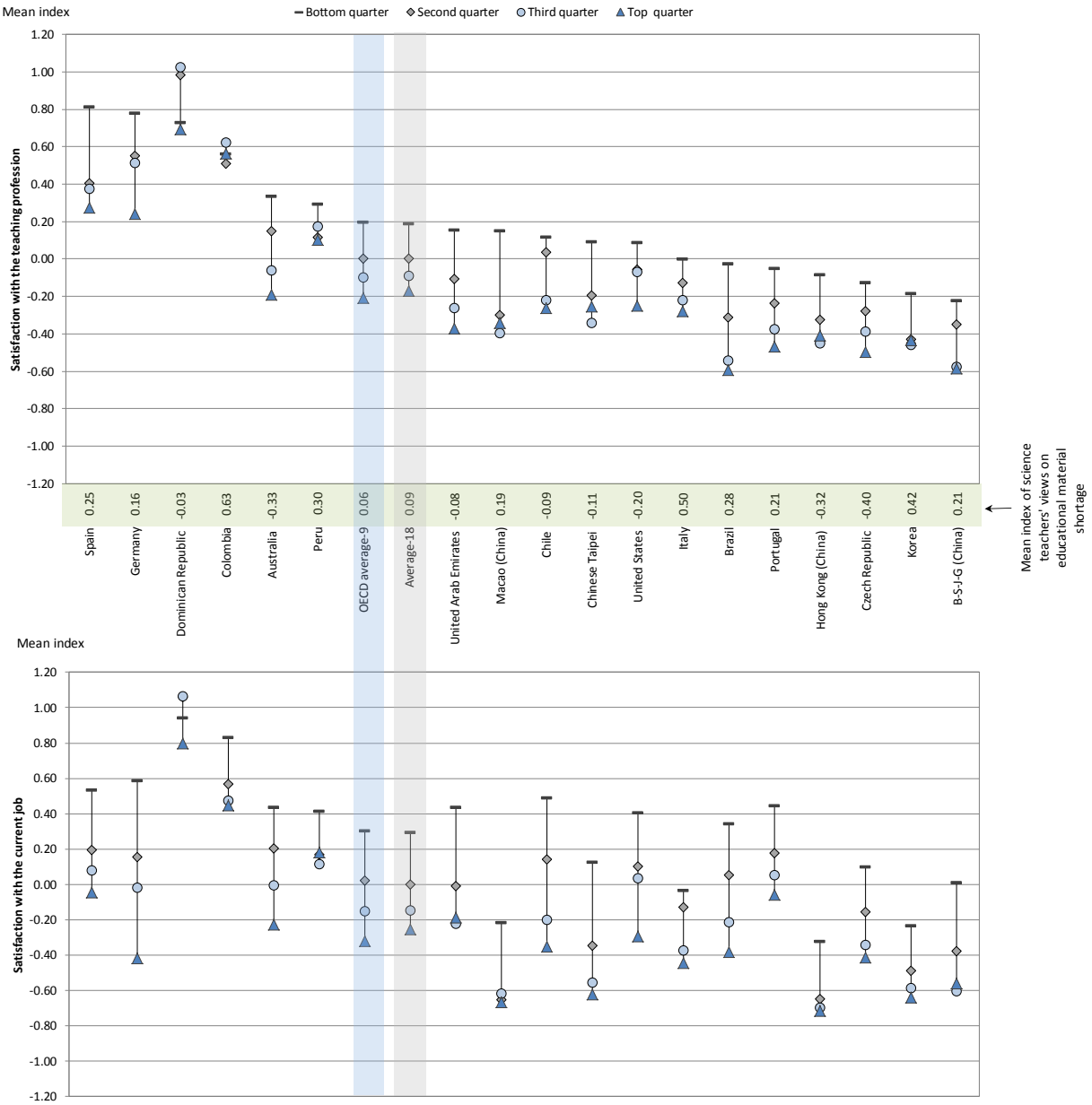
Satisfaction, by quarter of the index of science teachers' views on staff shortage



Countries and economies are ranked in descending order of satisfaction with the teaching profession at the bottom quarter of the index of science teachers' views on staff shortage.
Source: OECD, PISA 2015 Database.

Figure 6.4. Views on shortage of educational material and satisfaction

Satisfaction, by quarter of the index of science teachers' views on educational material shortage



Countries and economies are ranked in descending order of satisfaction with the teaching profession at the bottom quarter of the index of science teachers' views on educational material shortage.
Source: OECD, PISA 2015 Database.

6.1.3. Student- and teacher-related factors hindering instruction

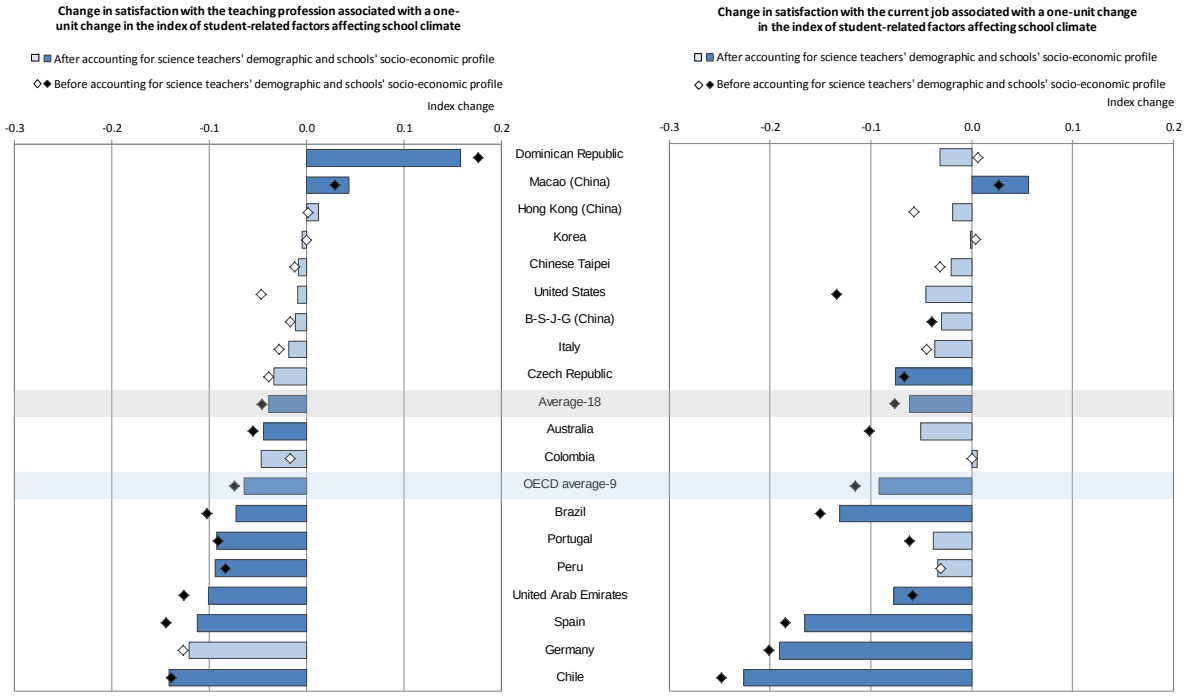
The learning environment influences student performance and engagement with learning, in addition to teachers' satisfaction (Engeström, 2009; Thapa et al., 2013). It encompasses what happens in the classroom, from instruction, to disciplinary climate and truancy (Fraser, 2015). Research into what makes schools effective finds that learning requires an orderly, supportive and positive environment both in and outside the classroom (Jennings and Greenberg, 2009). In effective schools, students engage in learning activities, rarely miss class and have few disciplinary problems (Taylor, Pressley and Pearson, 2002). From the teacher's perspective, this means an environment that is conducive to instruction and that facilitates classroom management.

PISA 2015 asked school principals to evaluate the factors affecting school climate. The question had 10 statements describing different phenomena taking place in school. Principals' responses to the statements were used to construct two indices about student- and teacher-related factors hindering learning. The student-related index focused on student truancy, absenteeism, lack of respect for teachers, use of drugs and alcohol, and exposure to bullying. The teacher-related index focused on teachers not meeting students' needs, teacher absenteeism, staff resisting change, teachers being too strict with students, and teachers not being prepared for classes.

After accounting for science teachers' demographic and schools' socio-economic profile, student factors affecting school climate are negatively, but weakly, associated with teachers' satisfaction with the teaching profession in Australia, Brazil, Chile, Peru, Portugal Spain and the United Arab Emirates, and negatively, but weakly, associated with teachers' satisfaction with their current job in Brazil, Chile, the Czech Republic, Germany, Spain, and the United Arab Emirates (Figure 6.5). School disciplinary climate, as reported by students (Figures 5.7 and 5.8), is more strongly associated with teachers' satisfaction than the principals' perception of student-related factors hindering learning. The reason could be that students have a better perception of their school environment than the principal does, since they experience it daily.

Principals' perception of teacher-related factors hindering learning is weakly related to teachers' satisfaction with the teaching profession, after accounting for teachers' demographic and schools' socio-economic profile. In fact, in all countries and economies, the associations are weaker than 0.1 of a standard deviation on the satisfaction index. The effects are significant in Brazil, the Czech Republic, Peru and Spain. In contrast, the associations with teachers' satisfaction with their current job are stronger and significant in more countries. The effects are significant and moderate in Brazil, Chile, the Czech Republic, Germany, Spain and the United States, and significant but weak in B-S-J-G (China), Colombia, Hong Kong (China), Portugal and the United Arab Emirates (Figure 6.6).

Figure 6.5. Science teachers' satisfaction, and student-related factors affecting school climate



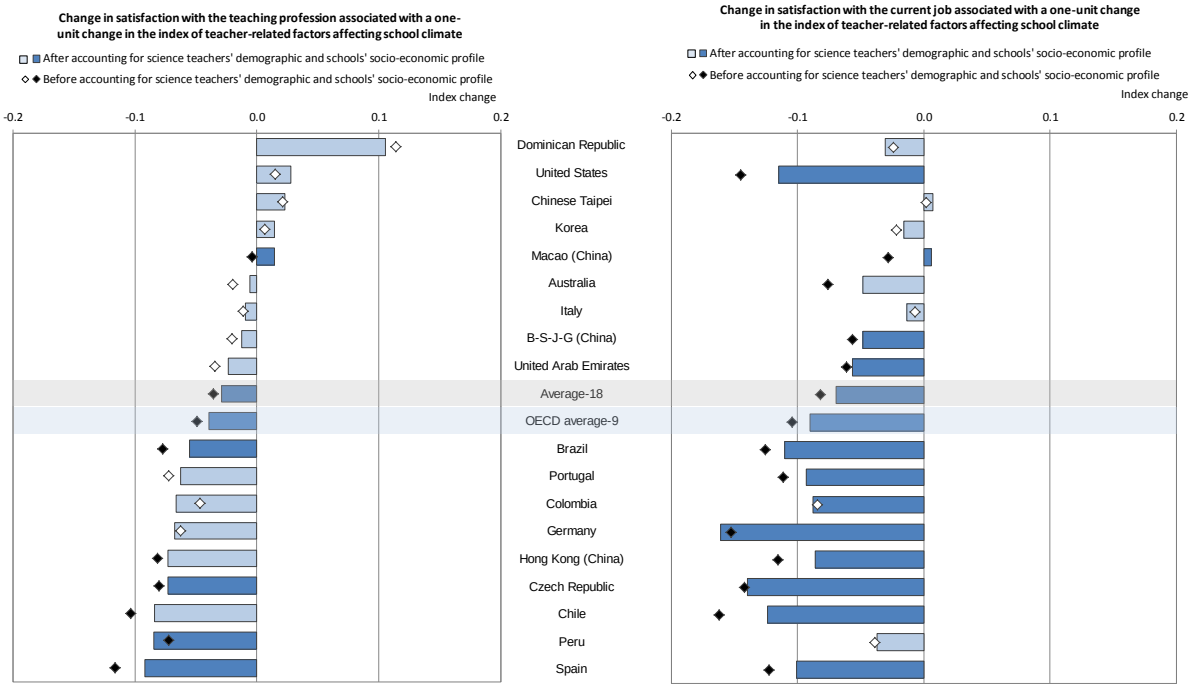
Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

The index of student-related factors affecting school climate is based on school principals' reports. Statistically significant values are marked in a darker tone (see Annex A).

Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in the index of student-related factors affecting school climate, after accounting for science teachers' demographic and schools' socio-economic profile.

Source: OECD, PISA 2015 Database.

Figure 6.6. Science teachers' satisfaction, and teacher-related factors affecting school climate



Notes: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
The index of teacher-related factors affecting school climate is based on school principals' reports.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in descending order of the change in satisfaction with the teaching profession associated with a one-unit change in the index of teacher-related factors affecting school climate, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

6.2. School context

6.2.1. School type

Evidence from PISA (OECD 2016b, pp. 126) shows that students in private schools out-perform students in public school in science on average across OECD countries and in 32 education systems. However, this difference in performance is mostly attributed to differences in the socio-economic status of students. Put differently, private schools perform better because they attract students from more advantaged backgrounds. Social advantage also translates into better school climate and resources, and better working conditions for teachers, which, in turn, could lead to higher teacher satisfaction.

In PISA 2015, school principals reported whether their school is private or public, depending on who manages the school. The data show that the proportion of teachers working in private schools is relatively large. For instance, in Hong Kong (China) and Macao (China), more than 90% of teachers work in private schools. The two economies are followed by Chile, with 66% of teachers working in private schools, the United Arab Emirates (60%), Australia (44%), Korea (36%), Chinese Taipei

(33%), Spain (31%), Peru (31%), the Dominican Republic (28%), Colombia (22%), Brazil (14%) and B-S-J-G (China) (11%). In all other countries and economies, less than 10% teachers work in private schools (Figure 6.7).

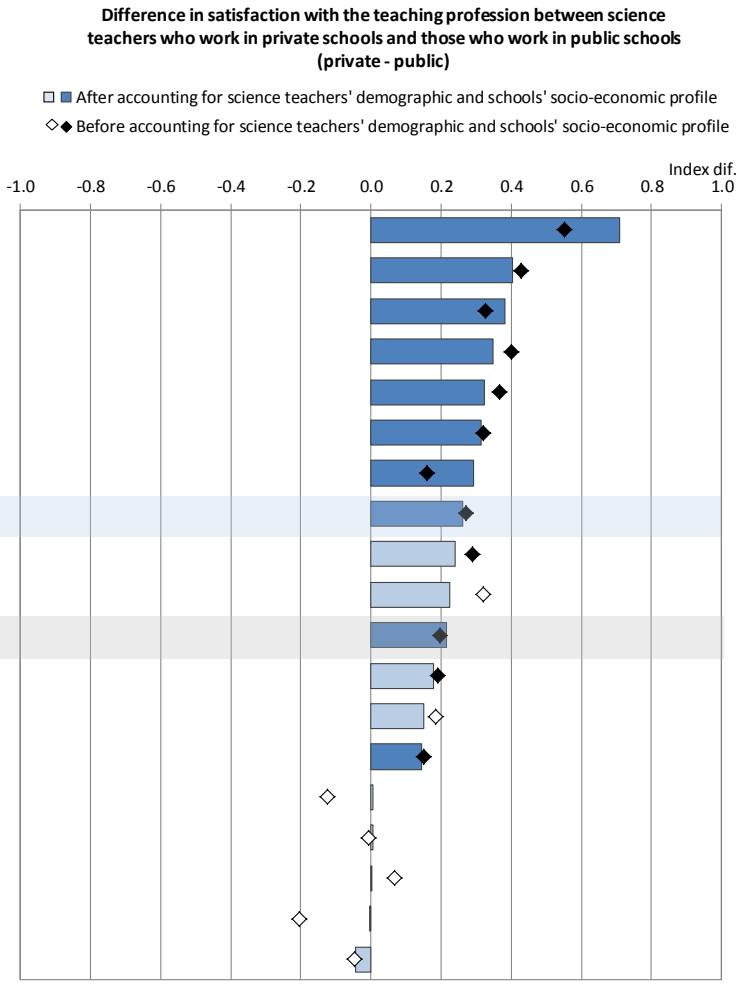
Figure 6.7 shows that science teachers in private schools in Australia, Brazil, Hong Kong (China), Korea, Peru, Portugal, Spain, the United Arab Emirates and the United States are more satisfied with the teaching profession. The association with teaching in a private school remains positive and significant in all countries except Chile and the United States after accounting for science teachers' demographic and schools' socio-economic profile. In general, the effects are strong in most countries and exceed 0.3 of a standard deviation on the teacher satisfaction index.

Teachers working in private schools in Australia, Brazil, Chile, Italy, Korea, Portugal, and Spain are also more satisfied with their current job. However, these effects become non-significant (except in Italy) after accounting for science teachers' demographic and schools' socio-economic profile (Figure 6.7).

These findings imply that teaching in a private school is positively associated with satisfaction with the profession but not with satisfaction with the current job. Satisfaction with the current job is more related to teachers' context as discussed in section 4, while satisfaction with the profession is related to teachers' intrinsic motivation and goals. This result suggests that, after accounting for science teachers' demographic and schools' socio-economic profile, satisfaction with the current job does not differ by much between public and private schools. However, private schools seem to be more successful in fulfilling teachers' personal goals, which leaves them more satisfied with the profession.

Figure 6.7. School type and science teachers' satisfaction with the teaching profession

Percentage of science teachers who work in:		
Public schools	Private schools	
94.9	5.1	Portugal
39.8	60.2	United Arab Emirates
64.1	35.9	Korea
85.7	14.3	Brazil
68.6	31.4	Spain
6.5	93.5	Hong Kong (China)
69.1	30.9	Peru
76.6	23.4	OECD average-9
92.1	7.9	United States
95.7	4.3	Italy
70.4	33.3	Average-18
33.7	66.3	Chile
92.5	7.5	Germany
55.9	44.1	Australia
72.0	28.0	Dominican Republic
89.4	10.6	B-S-J-G (China)
91.9	8.1	Czech Republic
77.9	22.1	Colombia
67.3	32.7	Chinese Taipei



Note: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Countries and economies are ranked in descending order of the difference in satisfaction with the teaching profession between science teachers who work in private schools and those who work in public schools, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

6.2.2. Principals' and teachers' perception of staff and resource shortages

Despite the widely accepted idea that more resources improve students' performance, previous research suggests that beyond a certain level, additional resources will not contribute to better learning outcomes due to diminishing returns on education spending (Nicoletti and Rabe, 2012; Suryadarma, 2012; Wei, Clifton and Roberts, 2011). The previous subsection also shows that a lack of educational and human resources could be a source of dissatisfaction for teachers. In PISA 2015, teachers and school principals were asked to report whether instruction in their school is hindered by a lack of staff or educational resources. These data were used to construct two new indices measuring the difference, in absolute value, between what teachers and school

principals reported about staff and resources shortages. Large differences indicate divergence in perceptions and possibly miscommunication about school needs.

Table 6.4 shows that there are larger differences in what teachers and principals reported about the lack of adequate staff in Brazil, B-S-J-G (China), Colombia, Italy, Korea, Macao (China), Spain, and the United Arab Emirates and smaller differences in Australia, Chile, the Czech Republic, the Dominican Republic, Germany, Hong Kong (China), Germany, Portugal, Chinese Taipei and the United States.

These differences between teachers' and schools principals' perceptions about staff shortages are negatively associated with teachers' satisfaction with the teaching profession in Australia, Brazil and the United Arab Emirates, and with teachers' satisfaction with their job in Brazil, Chile, Italy, Peru, the United Arab Emirates and the United States, both after accounting for teachers' demographic profile (Figure 6.8).

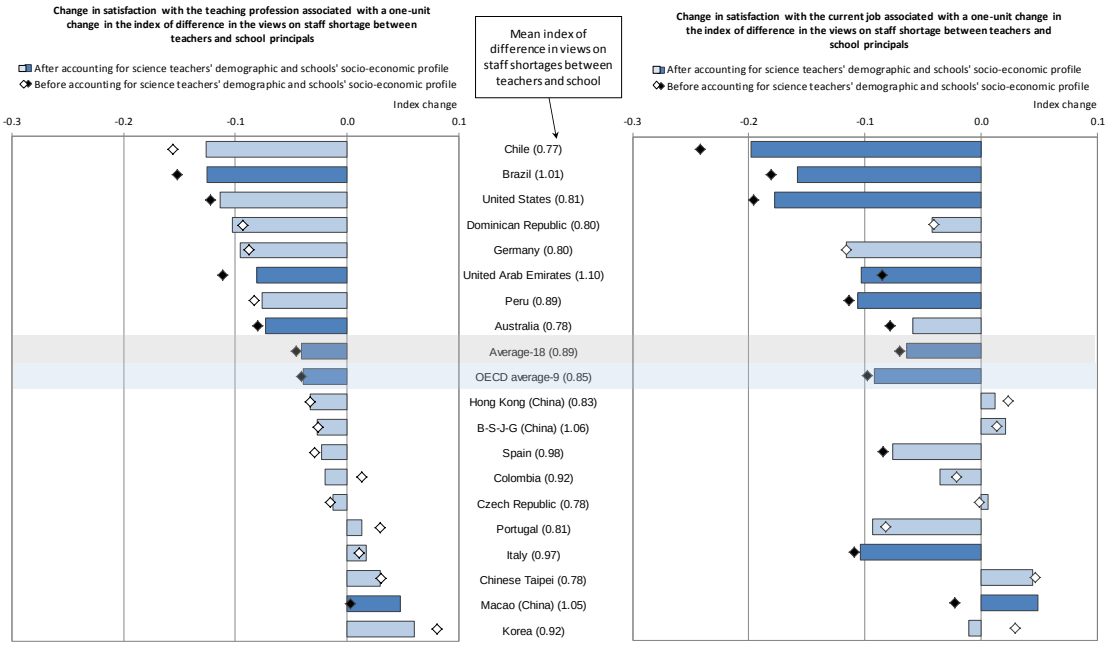
When it comes to shortages of educational resources, results show that there are larger differences between what teachers and school principals reported in Brazil, B-S-J-G (China), Colombia, Hong Kong (China), Italy, Macao (China), and the United Arab Emirates, and smaller differences in Chile, the Czech Republic, Germany, Korea, Portugal and Chinese Taipei (Table 6.5).

Differences between teachers' and school principals' perceptions of resource shortages are negatively associated with teachers' satisfaction with the profession in the Czech Republic, the Dominican Republic, Macao (China) and the United Arab Emirates, and with satisfaction with their job in the Dominican Republic, Macao (China) and the United Arab Emirates, after accounting for teachers' demographic and schools' socio-economic profile.

In general, the results indicate that differences in perceptions between teachers and principals about resource and staff shortages, resulting from miscommunication, can be a source of teacher dissatisfaction, especially with the teaching profession. However, these associations are much weaker than the direct effect of teachers' perception of a lack of staff or educational resources, as discussed in the previous subsection.

Figure 6.8. Science teachers' satisfaction, by differences in perception of staff shortages

Differences between teachers' and school principals' views on staff shortages



Note: Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Statistically significant values are marked in a darker tone (see Annex A).
Countries and economies are ranked in ascending order of the change in satisfaction with the teaching profession associated with a one-unit change in the index of difference in the views on staff shortage between teachers and school principals, after accounting for science teachers' demographic and schools' socio-economic profile.
Source: OECD, PISA 2015 Database.

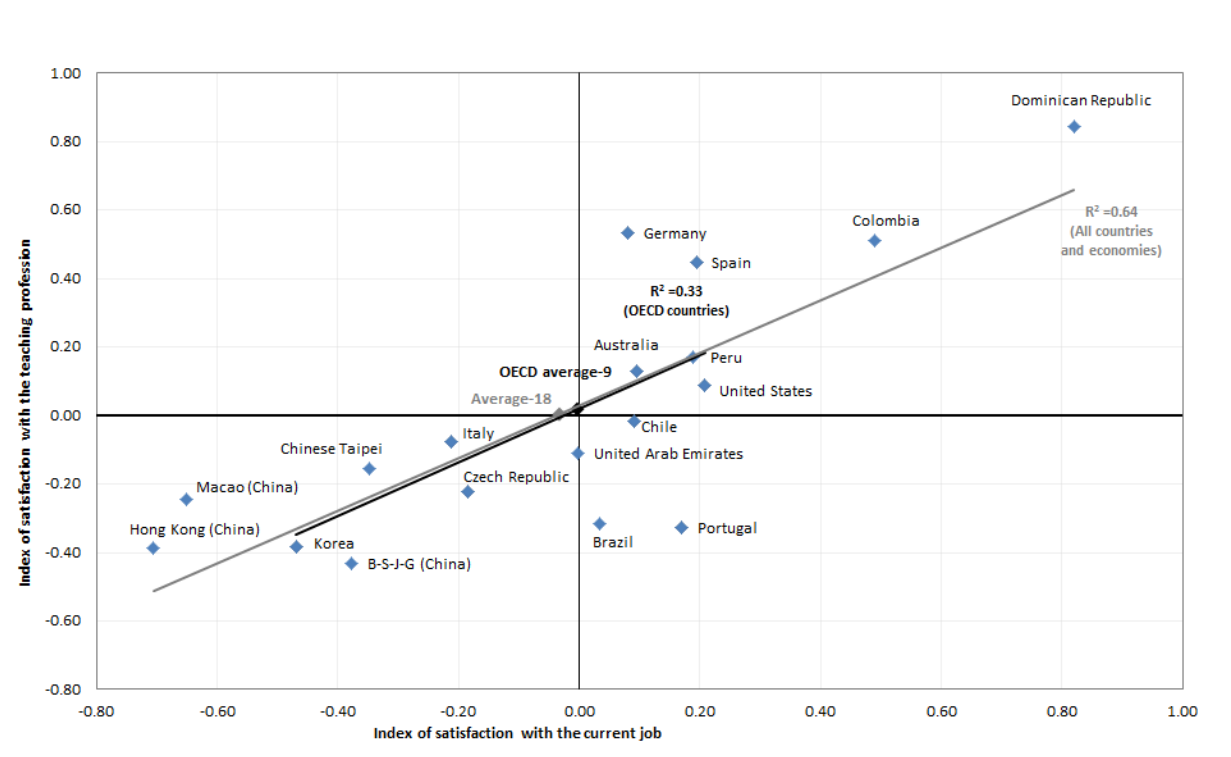
No evidence was found of an association between teachers' satisfaction and a number of other principal-reported factors, including school location (urban vs. rural), school and teacher responsibility over school resources and curriculum (this could be seen as a proxy for school and teacher autonomy), class size, student-teacher ratio and school leadership.

Box 6.3. A comparison between science and non-science teachers

As described in Section 2, science and non-science teachers were surveyed in PISA 2015 as two independently sampled populations in each school. This box compares the two teacher populations along the lines of teacher satisfaction and teacher demographics.

Non-science teachers reported almost identical levels of satisfaction as science teachers. This indicates that teachers' satisfaction with the teaching profession and with their current job do not vary according to the subject taught (Figure 6.9).

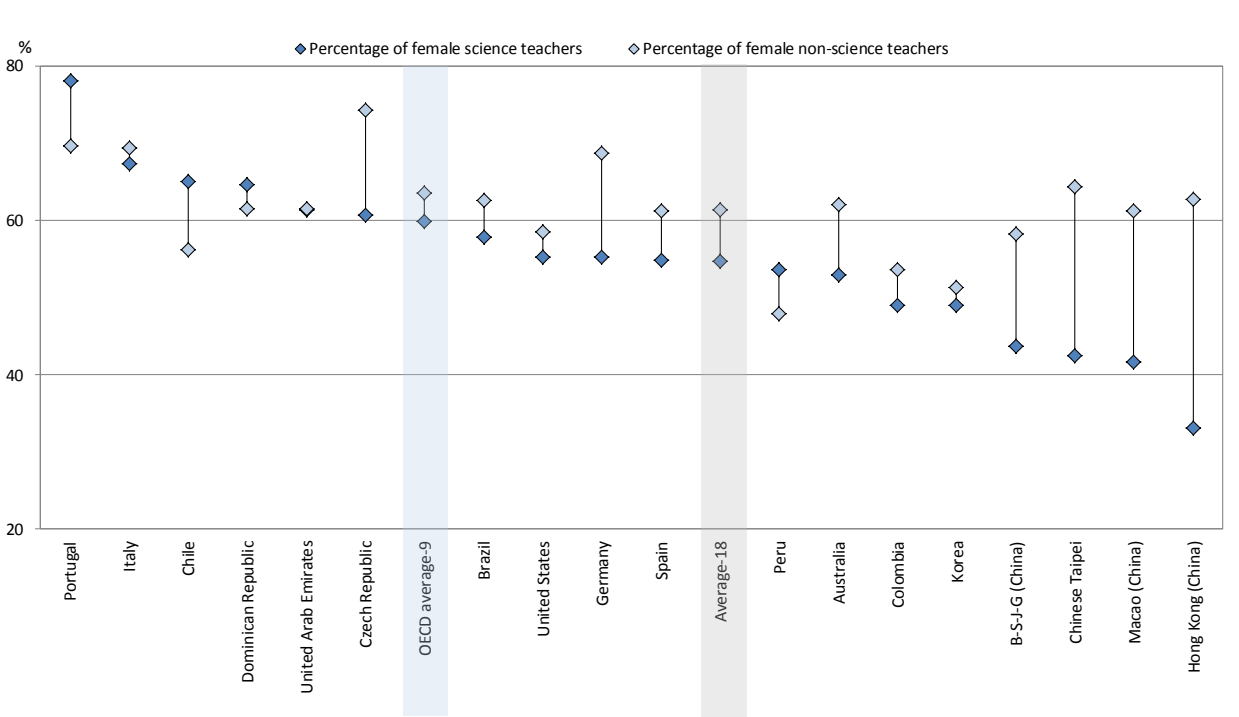
Figure 6.9. Satisfaction with the teaching profession and with the current job (non-science teachers)



Source: OECD, PISA 2015 Database.

The proportion of women is larger among non-science teachers than among science teachers. This is particularly true in Beijing-Shanghai-Jiangsu-Guangdong (China) (hereafter "B-S-J-G [China]"), the Czech Republic, Germany, Hong Kong (China), Macao (China) and Chinese Taipei. In contrast, differences in favour of women are larger among science teachers only in Chile, the Dominican Republic, Peru and Portugal. The United Arab Emirates is the only country where the gender difference is the same regardless of the type of teacher; and Peru is the only country where the proportion of male non-science teachers exceeds that of females (Figure 6.10). These results are not surprising since, in general, women are more represented in the teaching profession and in non-STEM fields than men (i.e. non-science, technology, engineering and mathematics fields like languages and humanities).

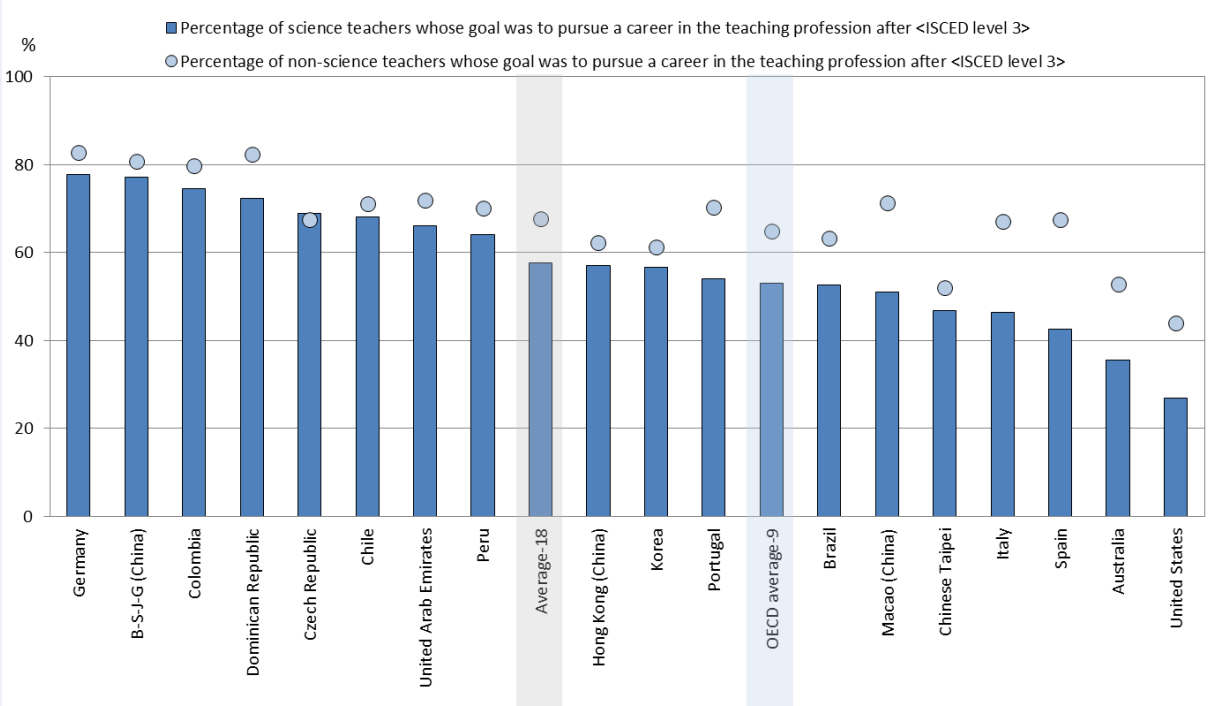
Figure 6.10. Female science and non-science teachers



Countries and economies are ranked in descending order of the percentage of female science teachers. Source: OECD, PISA 2015 Database.

In almost all countries and economies except the Czech Republic, a larger proportion of non-science teachers than science teachers reported that their goal was to pursue a career in the teaching profession after finishing their ISCED 3 degree (Figure 6.11). The difference exceeds 10 percentage points in Australia, Brazil, the Dominican Republic, Italy, Macao (China), Portugal, Spain and the United States. In the Czech Republic, the proportions are almost identical. A possible explanation, although speculative, is that science graduates need to be more motivated to become teachers because they have good job prospects outside the teaching profession.

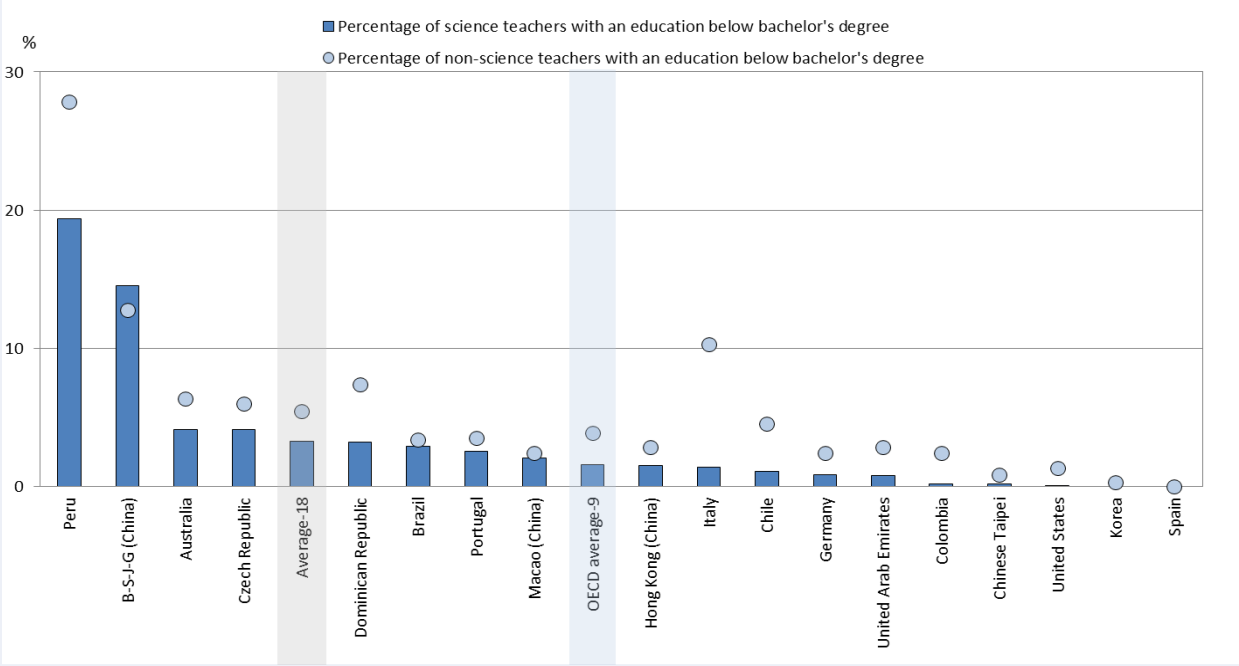
Figure 6.11. Pursuing a career in the teaching profession, by subject taught



Countries and economies are ranked in descending order of the percentage of science teachers whose goal was to pursue a career in the teaching profession after <ISCED level 3>.
Source: OECD, PISA 2015 Database.

The proportion of non-science teachers who have less than a bachelor's degree exceeds that of science teachers in Australia, Chile, Colombia, the Czech Republic, the Dominican Republic, Germany, Italy, Peru, Portugal, the United Arab Emirates and the United States (Figure 6.12). The differences are mostly small except in Italy and Peru, where 9 percentage points more non-science teachers than science teachers do not have a bachelor's degree. These differences could indicate that teachers are required to have higher qualifications in order to teach science.

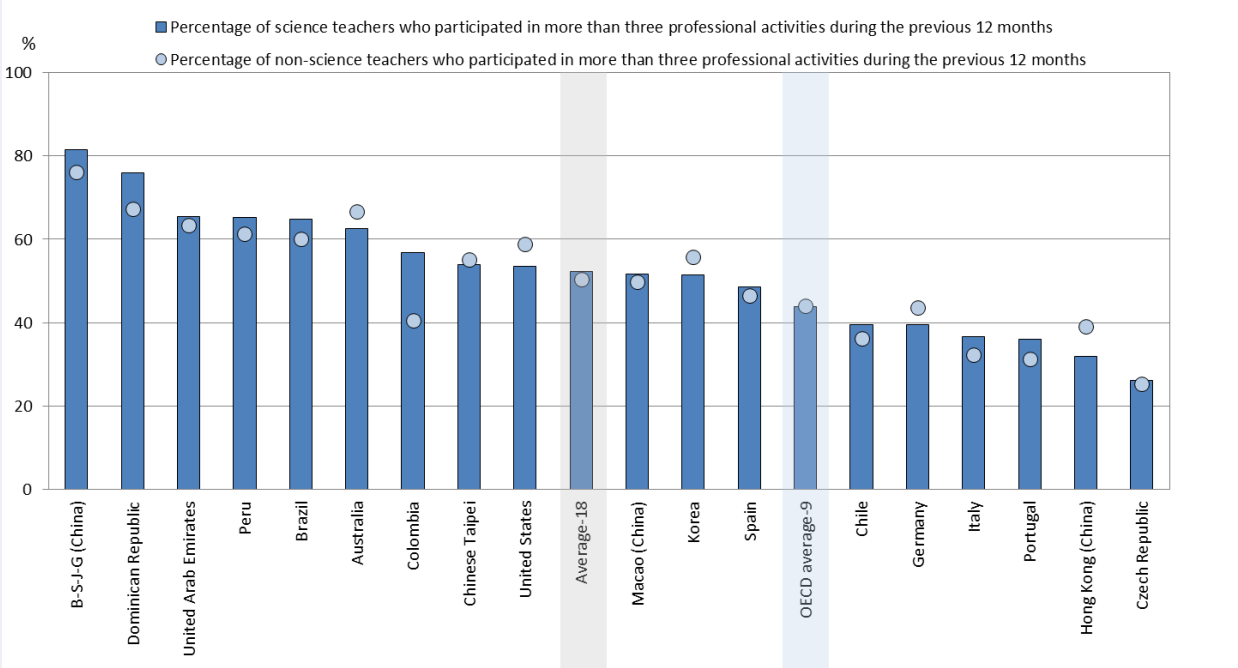
Figure 6.12. Percentage of science and non-science teachers without a bachelor's degree



Notes: Below bachelor's degree includes any level of formal education below <ISCED Level 5> or equal to <ISCED Level 5>.
In Italy, the national questionnaire combined bachelor's and master's degrees. Above bachelor's includes doctoral degrees only.
Countries and economies are ranked in descending order of the percentage of science teachers with an education below bachelor's degree.
Source: OECD, PISA 2015 Database.

The proportion of teachers who participate in more than three professional development activities per year is almost the same across the two populations of teachers. Some differences are observed in Australia, Germany, Hong Kong (China), Korea and the United States, where a greater proportion of non-science teachers engages in these activities, while the reverse is true in Brazil, B-S-J-G (China), Colombia, the Dominican Republic, Peru and Portugal (Figure 6.13). The similarity between the two groups of teachers could be due to the fact that professional development activities are offered by national or local authorities to teachers regardless of the subject they teach.

Figure 6.13. Percentage of science and non-science teachers who participated in professional activities



Countries and economies are ranked in descending order of the percentage of science teachers who participated in more than three professional activities during the previous 12 months.
Source: OECD, PISA 2015 Database.

7. WHAT PISA 2015 RESULTS ON SCIENCE TEACHERS' SATISFACTION IMPLY FOR POLICY

Teachers' satisfaction is never far from the headlines as education systems struggle to attract and retain qualified teachers. Teachers, like other service professionals, are subject to occupational stress. In under-resourced and struggling schools, teachers face numerous challenges compounded by the need to adapt to continuously changing demands. Science teachers, in particular, are more vulnerable to career changes due to better opportunities outside the teaching profession.

For the first time in its history, PISA 2015 distributed an optional teacher questionnaire that was circulated in 19 participating countries and economies. The questionnaire provides contextual information on science teachers, including their satisfaction with the teaching profession and with their current job. In this paper, data from the teacher questionnaire were examined with the aim of determining how teachers' environment and working conditions affect their satisfaction. The teacher environment was defined as broadly as possible. It included the characteristics of the school's student population, students' academic achievements, future aspirations and engagement with learning, school resources, school disciplinary climate, teacher collaboration and demographic characteristics.

The strength of PISA lies in its coverage of student, school and teacher contexts and in the comparative nature of the data. However, in non-experimental, cross-sectional data such as those gathered through PISA, even sophisticated statistical methods cannot identify cause-and-effect relationships between teachers' satisfaction and the surrounding environment. In particular, the inability to identify causal effects arises from the non-random selection of teachers into particular schools and from reverse causation.

Since teachers are not randomly assigned to schools, relationships between school context and teachers' satisfaction could be confounded by other factors not accounted for in the analyses. For instance, the relationship between the school's disciplinary climate and teachers' satisfaction could be confounded by unobserved personal attitudes and predispositions of teachers that affect teachers' satisfaction and school climate at the same time.

The second challenge arises from reverse causation if teachers' satisfaction has an effect on students' outcomes and the school environment. In this paper, both challenges are likely to be present and associations should be interpreted with caution.

This section examines the findings in the light of the wider literature on the subject. In general, the results show that the goal of becoming a teacher, working in a co-operative environment, the availability of adequate human and physical resources, and of professional development opportunities, and students' achievements and attitudes are strongly related to teachers' satisfaction. In contrast, teachers' socio-demographic background, the school's student composition, and even the type of contract under which teachers work are not associated with teachers' satisfaction.

7.1. Hire motivated science teachers

Science teachers who reported that becoming a teacher was their goal after finishing their education and training programmes are more likely to be satisfied with their jobs and with the profession as a whole. For them, becoming a science teacher is a realisation of their ambitions rather than an accident of the labour market. In fact, among the different factors analysed in this paper, the goal to become a teacher bears one of the strongest associations with teacher satisfaction. This association also holds across all countries and economies with almost no exceptions.

This finding is also supported by evidence that psychological factors, like career motivation, could encourage teachers to improve their teaching (Runhaar, 2008; Spillane, Reiser, and Reimer, 2002; Van Veen, Sleegers, and Van de Ven, 2005) and ultimately foster learning among their students. These by-products will, in turn, contribute to even greater teacher satisfaction.

Moreover, the analyses show that teachers' satisfaction could contribute to students' achievement motivation in science and to their aspirations to pursue a science-related career. This result may imply a virtuous circle across science teachers' generations. While science teachers who have been motivated students are more likely to become satisfied with the teaching profession; students in schools with satisfied science teachers tend to have higher aspiration for science-related careers and could become science teachers in the future.

7.2. Provide sufficient educational resources for teaching science and improve school climate

Career motivation, in itself, is not sufficient if other contextual factors are absent or if they operate to the detriment of the teaching and learning process. For instance, the lack of educational or physical resources, the presence of student behavioural problems or the absence of a disciplinary climate that is conducive to learning could undermine teachers' satisfaction.

For instance, shortages of human and educational resources as reported by teachers are found to be negatively associated with teachers' satisfaction. The association is the strongest with satisfaction with the current job compared with satisfaction with the profession. Similarly, the presence of student-related factors hindering instruction, such as truancy and disrespect for teachers (as reported by school principals), is also negatively and strongly associated with both teacher-satisfaction measures (in 6 out of 18 countries and economies), even after accounting for science teachers' demographic and schools' socio-economic profile. In contrast, better disciplinary climate at school, as perceived by students, is positively associated with teachers' satisfaction in about six countries and economies.

Some of these variables were also found to be associated with student outcomes. For instance, truancy and the lack of discipline are associated with low achievement, school dropout, and engagement in risky behaviours (Barber, Stone, and Eccles, 2010; Henry and Huizinga, 2007). They could also lead to pervasive problems at school if other students start imitating truants (Juvonen, Espinoza and Knifsend, 2012; Wilson et al., 2008).

7.3. Encourage science teachers' collaboration and self-growth

Other factors that contribute to improving science teachers' satisfaction are teacher self-efficacy, teacher collaboration, the availability of professional development opportunities, and positive student cognitive and non-cognitive outcomes, such as achievement in science, enjoyment of science and feeling a sense of belonging at school.

Two of the most important correlates of teachers' satisfaction are teacher self-efficacy with science content and with science teaching. Both variables are positively and significantly associated with both measures of teachers' satisfaction in nearly every participating country and economy. These findings are in line with existing literature showing that self-efficacy, in addition to student achievement, is closely related to teacher commitment and satisfaction (Caprara et al., 2006; Skaalvik and Skaalvik, 2007; Tschannen-Moran and Barr, 2004; Tschannen-Moran and Hoy, 2001)

Collaboration among science teachers is also of great importance. The association between teacher collaboration and teachers' satisfaction is positive and strong in all countries. The effect is much stronger when it comes to satisfaction with the current job compared with satisfaction with the profession. This is not surprising since schools are essentially social systems where teachers have to collaborate to insure knowledge transfer, pedagogical innovation and excellence in teaching. Collaboration could also mitigate feelings of isolation and dissatisfaction (Lee, Dedrick and Smith, 1991; Lortie, 2002; Nias, 1981), and could contribute to student achievement through its positive effect on teachers and their working environment.

Self-growth was also identified as a key teacher satisfier in the literature (Dinham and Scott, 1998). A major source of self-growth is the availability of professional development activities that would allow teachers to improve their skills, knowledge and know-how. The results of this paper show that teachers who undertook more than three professional development activities in the year preceding the survey were significantly more satisfied with the profession and with their current job. The association is positive and significant across most countries, even after accounting for teachers' demographic profile.

Students' achievement in science is found to be positively associated with science teachers' satisfaction with the profession (in seven countries) and with teachers' satisfaction with their current job (in nine countries), before accounting for schools' socio-economic profile. In addition, students' enjoyment of science (in seven countries), and students' sense of belonging at school (in nine countries) are positively and strongly associated with teachers' satisfaction with their current job, even after accounting for teachers' demographic profile.

7.4. Factors that are not associated with science teachers' satisfaction

Some factors that are usually associated with challenging learning environments, such as the presence of large proportions of immigrant students in the school or students who do not speak the language of the host country, do not represent sources of dissatisfaction for teachers. This finding is particularly interesting because it shows that teachers do not necessarily mind teaching in schools with more demanding student populations as long as the environment is conducive to learning, the school climate is positive, and adequate resources are available.

In addition, teachers' socio-demographic characteristics, such as gender, age, general experience as a teacher, seniority in the current school, initial teacher education and even employment stability, were found not to be associated with teachers' satisfaction.

The findings in this paper are mostly in line with the existing literature on teachers' satisfaction. They show that intrinsic factors, such as career motivation, are more strongly associated with satisfaction with the profession compared with satisfaction with the current job. In contrast, extrinsic factors, such as school climate, collaboration among teachers, school resources, professional development opportunities and students' science performance, are more strongly associated with satisfaction with teachers' current job. A third group of factors that are not correlated with teachers' satisfaction includes: school location, school and teacher responsibility over school resources and curriculum, class size, student-teacher ratio, and school leadership. Some of these factors were also found to have no effect on teachers' satisfaction by Dinham and Scott (1998).

7.5. A rising tide lifts all boats

The aphorism of a rising tide was used by the American president John F. Kennedy to describe how policy designed to improve the general economy could benefit everyone. This saying holds true particularly when it comes to schools, student achievement and teacher satisfaction. By improving schools' disciplinary climate, teacher collaboration and self-efficacy, and by providing teachers with professional development opportunities, it is possible to improve student performance and teachers' satisfaction at the same time. In other words, by pursuing policies that are conducive to higher educational attainment and better learning outcomes, policy makers will be able to improve teachers' satisfaction at no extra cost. Such win-win policies are hard to come by; but as the findings of this paper show, teachers' satisfaction is a positive by-product of a better school environment. In this sense, teachers' satisfaction should be monitored, but not necessarily be treated as an independent policy area. What policy makers should focus on is providing better learning experiences for all of their students; all other boats will be set afloat with that rising tide.

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NOTES

[1] Given that Australia is a federated Commonwealth, it would be useful to note that these findings are at the national level and may be variable across states. For example, in NSW there has been a steady decrease in teacher attrition rates since 2007.

[2] The possible non-linear association between teachers' satisfaction and teachers' age and experience was examined by including quadratic terms for age and experience in the regressions. However, none of the associations were significant.

[3] In the Italian version of the teacher questionnaire, teachers were not given the 'ISCED Level 5A master's degree' option because teacher education in Italy consists of a consolidated five-year programme. Moreover, education systems might differ in the way they define a master's degree. For instance, in Australia a master's of teaching is a postgraduate degree not a research degree, whereas a master's in education might be a research degree in other countries.

[4] The construction of these indicators is described in the appendix.

[5] School performance is measured as the school average of student science performance and school socio-economic profile is measured as the school average of student ESCS.

ANNEX A

Weights for the analyses

PISA provides a set of student weights to be used in data analyses. These weights account for sample design and non-response among schools and students. In this paper, the weights were adapted to be used with teacher data. A new science-teacher weight was constructed by summing student weights within a school and then dividing the sum by the number of responding science teachers within the same school. These weights are used in all sections where teacher satisfaction is the outcome of interest (i.e. all sections except 5.4).

The weights:

- Take into account sample design and response for schools and students.
- Do not account for teacher non-response because the characteristics of non-responding teachers are unknown. In other words, we do not know how teacher non-response affects the representativeness of the data.
- Are equal for all teachers within the same school regardless of their characteristics or their workload (whether they teach one or five classes, work full or part time, etc.).

In section 5.4 the outcomes are at the student level and the PISA student weights are used without any transformation.

Missing data

PISA 2015, like any other survey, suffers from missing data resulting from non-response to particular questions in the student, school or teacher questionnaires. Missing values were discarded from the statistical computations. This is referred to in statistical literature as casewise deletion. Note that all analyses involving the same variables (i.e. regressions, cross-tabulations and descriptive statistics) are based on the same samples.

Quality assurance

The results of adjudication and subsequent further examinations showed that the PISA technical standards were met in all countries and economies that distributed the PISA 2015 teacher questionnaire, except Malaysia.

In Malaysia, the PISA assessment was conducted in accordance with the operational standards and guidelines of the OECD. However, the weighted response rate among the initially sampled Malaysian schools (51%) falls well short of the standard PISA response rate of 85%. Therefore, the results may not be comparable to those of other countries or to results for Malaysia from previous years.

The sample for Macao (China) represents a census of all 15-year old students and, as a consequence, of all schools attended by 15-year olds. Allowing for very limited non-response among the sampled students, the sampling error for this partner economy is minimal since the entire population of eligible students and schools are part of the surveyed sample. This, in turn, results in very small standard errors on the statistics presented in this paper.

Quartiles

In order to simplify the analyses, teachers, students and schools were classified into quartiles on some of the PISA standardised indices and other continuous variables. Quartiles are the three values (of a variable) that divide the data into four equal groups with each containing 25% of the observations.

For instance, in order to classify students on a scale of school socio-economic affluence, the student index of economic, social and cultural status (ESCS) is averaged at the school level and then the quartiles of the school average ESCS are computed. By doing so, students are divided into four groups depending on the socio-economic status of their school. The bottom quartile contains the 25% of students attending the most disadvantaged schools, while the top quartile contains the quarter attending the most advantaged ones.

Regression analyses

In this paper, a number of statistics, such as means, proportions and regression coefficients, are used. Means and proportions are used to describe the level of an index or the proportion of teachers within a group (e.g. gender, education levels, etc.). Regressions, on the other hand, are used to measure the relationship between two variables.

Two types of regression analyses are used: univariate and multivariate. In univariate analyses, the association of a variable of interest with the outcome variable is measured without accounting for any other factors. In multivariate analyses, other factors are accounted for. These are:

- In the analyses where teacher satisfaction is the outcome variable: the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school. These are referred to as teachers' demographic profile for simplicity.
- In the analyses where teacher satisfaction is an input and the outcomes are students' achievement, attitudes and school experiences: students' index of economic, social and cultural status (ESCS), students' gender, and schools' index of economic, social and cultural status. These are referred to as students' and schools' socio-economic profile.

To facilitate the interpretation of regression coefficients, a convention is adopted where effects are classified as weak, moderate or strong, depending on their magnitude. The cut-off points for the three categories are 0.2 and 0.3 of a unit change on the indices of teacher satisfaction, where less than 0.2 is weak, 0.2 to 0.3 is moderate and 0.3 or higher is strong.

Odds ratio

The odds ratio is a measure of the relative likelihood of a particular outcome across two groups. The odds ratio for observing the outcome when an antecedent is present is simply

$$OR = \frac{(p_{11}/p_{12})}{(p_{21}/p_{22})}$$

where p_{11}/p_{12} represents the "odds" of observing the outcome when the antecedent is present, and p_{21}/p_{22} represents the "odds" of observing the outcome when the antecedent is not present. Logistic regression can be used to estimate the log ratio: the exponentiated logit coefficient for a binary variable is equivalent to the odds ratio. A "generalised" odds ratio, after accounting for other differences across groups, can be estimated by introducing control variables in the logistic regression.

Standard errors and significance tests

The statistics in this report represent estimates of national performance based on samples of students, rather than values that could be calculated if every student in every country had answered every question. Consequently, it is important to measure the degree of uncertainty of the estimates. In PISA, each estimate has an associated degree of uncertainty, which is expressed through a standard error. The use of confidence intervals provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. From an observed sample statistic and assuming a normal distribution, it can be inferred that the corresponding population result would lie within the confidence interval in 95 out of 100 replications of the measurement on different samples drawn from the same population.

In many cases, readers are primarily interested in whether a given value in a particular country is different from a second value in the same or another country, e.g. whether girls in a country perform better than boys in the same country. In the tables and charts used in this report, differences are labelled as statistically significant if the probability of reporting a difference when there is actually no such difference in corresponding population values is lower than 5%. Similarly, the risk of reporting a correlation as significant if there is, in fact, no correlation between two measures, is contained at 5%.

Throughout the report, significance tests were undertaken to assess the statistical significance of the comparisons made.

Differences between subgroup means

Differences between groups of students (e.g. students who have skipped a day of school and students who have not skipped a day of school) or between groups of schools (e.g. teachers who are working less than 5 years in their current school or teachers who are working more than 5 years in their current school were tested for statistical significance. The definitions of the subgroups can, in general, be found in the tables and the text accompanying the analysis. All differences marked in bold in the tables presented in Annex B of this report are statistically significant at the 95% level.

Change in the performance per unit of an index

For many tables, the difference in student performance per unit of an index was calculated. Figures in bold indicate that the differences are statistically significantly different from zero at the 95% confidence level.

Odds ratio

Figures in bold in the data tables presented in Annex B of this report indicate that the relative risk/odds ratio is statistically significantly different from 1 at the 95% confidence level. To compute statistical significance around the value of 1 (the null hypothesis), the relative-risk/odds-ratio statistic is assumed to follow a log-normal distribution, rather than a normal distribution, under the null hypothesis.

Explanation of the indices

This section explains the indices derived from the PISA 2015 student and school context questionnaires used in this paper.

Several PISA measures reflect indices that summarise responses from students, their parents, teachers or school representatives (typically principals) to a series of related questions. The questions were selected from a larger pool of questions on the basis of theoretical considerations and previous research. The *PISA 2015 Assessment and Analytical Framework* (OECD, 2017b) provides an in-depth description of this conceptual framework. Structural equation modelling was used to confirm the theoretically expected behaviour of the indices and to validate their comparability across countries. For this purpose, a model was estimated separately for each country and collectively for all OECD countries. For a detailed description of other PISA indices and details on the methods, see the PISA 2015 *Technical Report* (OECD, 2017c).

There are three types of indices: simple indices, new scale indices and trend scale indices.

1. **Simple indices** are the variables that are constructed through the arithmetic transformation or recoding of one or more items in exactly the same way across assessments. Here, item responses are used to calculate meaningful variables, such as the recoding of the four-digit ISCO-08 codes into "highest parents' socio-economic index (HISEI)" or teacher-student ratio based on information from the school questionnaire.

2. Sequential codes were assigned to the different response categories of the questions in the sequence in which the latter appeared in the student, school or parent questionnaires. Where indicated in this section, these codes were inverted for the purpose of constructing indices or scales. Negative values for an index do not necessarily imply that students responded negatively to the underlying questions. A negative value merely indicates that the respondents answered less positively than all respondents did on average across OECD countries. Likewise, a positive value on an index indicates that the respondents answered more favourably, or more positively, on average, than respondents in OECD countries did. In addition to simple and scaled indices described in this annex, there are a number of variables from the questionnaires that were used in this volume and correspond to single items not used to construct indices. These non-recoded

variables have prefix of "ST" for the questionnaire items in the student questionnaire and "SC" for the items in the school questionnaire. All the context questionnaires, and the PISA international database, including all variables, are available through www.oecd.org/pisa.

Student-level simple indices

Immigrant background

The PISA database contains three country-specific variables relating to the country of birth of the students, their mother and their father (COBN_S, COBN_M, and COBN_F). The items ST019Q01TA, ST019Q01TB and ST019Q01TC were recoded into the following categories: (1) country of birth is the same as country of assessment and (2) other. The index of immigrant background (IMMIG) was calculated from these variables with the following categories: (1) non-immigrant students (those students who had at least one parent born in the country); (2) second-generation immigrant students (those born in the country of assessment but whose parent[s] were born in another country); and (3) first-generation immigrant students (those students born outside the country of assessment and whose parents were also born in another country). Students with missing responses for either themselves or for both parents were assigned missing values for this variable.

Science-related career expectations

In PISA 2015, students were asked "what kind of job [they] expect to have when [they] are about 30 years old" (ST114). Answers to this open-ended question were coded to four-digit ISCO codes (ILO, 2007), in variable OCOD3. This variable was used to derive the index of science-related career expectations.

Science-related career expectations are defined as those career expectations whose realisation requires further engagement with the study of science beyond compulsory education, typically in formal tertiary education settings. The classification of careers into science-related and non-science-related is based on the four-digit ISCO-08 classification of occupations.

Only professionals (major ISCO group 2) and technicians/associate professionals (major ISCO group 3) were considered to fit the definition of science-related career expectations. In a broad sense, several managerial occupations (major ISCO group 1) are clearly science-related: these include research and development managers, hospital managers, construction managers, and other occupations classified under production and specialised services managers (submajor group 13). However, it was considered that when science-related experience and training is an important requirement of a managerial occupation, these are not entry-level jobs, and 15-year-old students with science-related career expectations would not expect to be in such a position by age 30.

Several skilled agriculture, forestry and fishery workers (major ISCO group 6) could also be considered to work in science-related occupations. The United States O*NET OnLine (2016) classification of science, technology, engineering and mathematics (STEM) occupations indeed include these occupations. These, however, do not typically require formal science-related training or study after compulsory education. On these grounds, only major occupation groups that require ISCO skill levels 3 and 4 were included among science-related occupational expectations.

Among professionals and technicians/associate professionals, the boundary between science-related and non-science related occupations is sometimes blurred, and different classifications draw different lines.

The classification used in this paper includes four groups of jobs: [6]

1. *Science and engineering professionals*: All science and engineering professionals (submajor group 21), except product and garment designers (2163), graphic and multimedia designers (2166).
2. *Health professionals*: All health professionals in submajor group 22 (e.g. doctors, nurses, veterinarians), with the exception of traditional and complementary medicine professionals (minor group 223).
3. *ICT professionals*: All information and communications technology professionals (submajor group 25).
4. *Science technicians and associate professionals*, including:
    - physical and engineering science technicians (minor group 311)
    - life science technicians and related associate professionals (minor group 314)
    - air traffic safety electronic technicians (3155)
    - medical and pharmaceutical technicians (minor group 321), except medical and dental prosthetic technicians (3214)
    - telecommunications engineering technicians (3522).

Student-level scale indices

Schoolwork-related anxiety

The index of schoolwork-related anxiety (ANXTEST) was constructed using student responses to a question (ST118) about the extent to which they strongly agreed, agreed, disagreed or strongly disagreed with the following statements when asked to think about him or herself: I often worry that it will be difficult for me taking a test; I worry that I will get poor <grades> at school; Even if I am well prepared for a test I feel very anxious; I get very tense when I study; I get nervous when I don't know how to solve a task at school.

Teacher fairness

The index of teacher fairness (UNFAIR) was constructed using student responses to a question (ST039) about the frequency (never or almost never; a few times in a year; a few times a month; once a week or more), during the previous 12 months, they had experienced the following in school: Teachers called on me less often than they called on other students; Teachers graded me harder than they graded other students; Teachers gave me the impression that they think I am less smart than I really am; Teachers disciplined me more harshly than other students; Teachers ridiculed me in front of others.

Enjoyment of science

The index of enjoyment of science (JOYSCIE) was constructed based on a trend question (ST094) from PISA 2006 (ID in 2006: ST16), asking students, on a four-point Likert scale with the categories "strongly agree", "agree", "disagree", and "strongly disagree", about their agreement with the following statements: I generally have fun when I am learning <broad science> topics; I like reading about

<broad science>; I am happy working on <broad science> topics; I enjoy acquiring new knowledge in <broad science>; and I am interested in learning about <broad science>. The derived variable JOYSCIE was equated to the corresponding scale in the PISA 2006 database, thus allowing for a trend comparison between PISA 2006 and PISA 2015. Higher values on the index reflect greater levels of agreement with these statements.

Sense of belonging

The index of sense of belonging (BELONG) was constructed using students' responses to a trend question about their sense of belonging at school. Students reported, on a four-point Likert scale with the answering categories "strongly agree", "agree", "disagree", and "strongly disagree", their agreement with the following statements (ST034): I feel like an outsider (or left out of things) at school; I make friends easily at school; I feel like I belong at school; I feel awkward and out of place in my school; Other students seem to like me; I feel lonely at school. The answers to three items were reversed-coded so that higher values in the index indicate a greater sense of belonging.

Index of exposure to bullying

PISA 2015 includes eight items on students' exposure to bullying or bullying victimisation. A scale for exposure to bullying is not included in the international database, but a summative index was derived for this report.

Disciplinary climate

The index of disciplinary climate (DISCLISCI) was constructed from students' reports on how often ("every lesson", "most lessons", "some lessons", "never or hardly ever") the following happened in their science lessons (ST097): The teacher shows an interest in every student's learning; The teacher gives extra help when students need it; The teacher helps students with their learning; The teacher continues teaching until students understand the material; The teacher gives students an opportunity to express their opinions.

Achievement motivation

The index of achievement motivation (MOTIVAT) was constructed using students' responses to a new question developed for PISA 2015 (ST119). Students reported, on a four-point Likert scale with the answering categories "strongly disagree", "disagree", "agree", and "strongly agree", their agreement with the following statements: I want top grades in most or all of my courses; I want to be able to select from among the best opportunities available when I graduate; I want to be the best, whatever I do; I see myself as an ambitious person; I want to be one of the best students in my class. Higher values indicate that students have greater achievement motivation.

Scaling of indices related to the PISA index of economic social and cultural status

The PISA index of economic, social and cultural status (ESCS) was derived, as in previous cycles, from three variables related to family background: parents' highest level of education (PARED), parents' highest occupation status (HISEI), and home

possessions (HOMEPOS), including books in the home. PARED and HISEI are simple indices, and HOMEPOS is a proxy measure for family wealth.

For the purpose of computing the PISA index of economic, social and cultural status (ESCS), values for students with missing PARED, HISEI or HOMEPOS were imputed with predicted values plus a random component based on a regression on the other two variables. If there were missing data on more than one of the three variables, ESCS was not computed and a missing value was assigned for ESCS.

The PISA index of economic, social and cultural status was derived from a principal component analysis of standardised variables (each variable has an OECD mean of zero and a standard deviation of one), taking the factor scores for the first principal component as measures of the PISA index of economic, social and cultural status. All countries and economies (both OECD and partner countries/economies) contributed equally to the principal component analysis, while in previous cycles, the principal component analysis was based on OECD countries only. However, for the purpose of reporting the ESCS scale has been transformed with zero being the score of an average OECD student and one being the standard deviation across equally weighted OECD countries.

Principal component analysis was also performed for each participating country or economy separately, to determine to what extent the components of the index operate in similar ways across countries or economy.

School-level simple indices

School type

Schools are classified as either public or private according to whether a private entity or a public agency has the ultimate power for decision making concerning its affairs (SC013). As in previous PISA surveys, the index on school type (SCHLTYPE) has three categories, based on two questions: SC013, which asks if the school is a public or a private school, and SC016, which asks about the sources of funding. This index was calculated in 2015 and in all previous cycles.

School-level scale indices

School resources

PISA 2015 included a question with eight items about school resources, measuring the school principals' perceptions of potential factors hindering the provision of instruction at school ("Is your school's capacity to provide instruction hindered by any of the following issues?"). The four response categories were "not at all", "very little", "to some extent", and "a lot". A similar question was used in previous cycles, but items were reduced and reworded for 2015 focusing on two derived variables. The index on staff shortage (STAFFSHORT) was derived from the four items: a lack of teaching staff; inadequate or poorly qualified teaching staff; a lack of assisting staff; inadequate or poorly qualified assisting staff. The index of shortage of educational material (EDUSHORT) was scaled using the following four items: a lack of educational material (e.g. textbooks, IT equipment, library or laboratory material); inadequate or poor quality educational material (e.g. textbooks, IT equipment, library or laboratory material); a lack of physical infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems); inadequate or poor quality physical

infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems). Positive values on these indices mean that school principals view the amount and/or quality of resources in their schools as an obstacle to providing instruction to a greater extent than the OECD average.

Educational leadership

A question on school leadership was developed for PISA 2012 and partially taken up again for PISA 2015. Question SC009 with 13 items asks about school leadership. The results provided data for five scaled indices. Principals were asked to indicate the frequency of the listed activities and behaviours in their school during the previous academic year. The six response categories were "did not occur", "1-2 times during the year", "3-4 times during the year", "once a month", "once a week", and "more than once a week". Higher values on these indices indicate that these activities and behaviours occur more frequently.

The overall scale for leadership (LEAD) consists of all 13 items.

The index LEADCOM reflects how a school's goals and curricular development are framed and communicated, and is based on four items: I use student performance results to develop the school's educational goals; I make sure that the professional development activities of teachers are in accordance with the teaching goals of the school; I ensure that teachers work according to the school's educational goals; I discuss the school's academic goals with teachers at faculty meetings.

The index reflecting instructional leadership (LEADINST) is based on three items: I promote teaching practices based on recent educational research; I praise teachers whose students are actively participating in learning; I draw teachers' attention to the importance of pupils' development of critical and social capacities.

The index on how instructional improvements and professional development are promoted by the principal (LEADPD) is based on three items: When a teacher has problems in his/her classroom, I take the initiative to discuss matters; I pay attention to disruptive behaviour in classrooms; When a teacher brings up a classroom problem, we solve the problem together.

The index of teacher participation in leadership (LEADTCH) is based on three items: I provide staff with opportunities to participate in school decision-making; I engage teachers to help build a school culture of continuous improvement; I ask teachers to participate in reviewing management practices.

School climate

The school questionnaire included a trend question on school climate (SC061) that had been used in previous cycles with a larger set of items. It measured the school principal's perceptions of the school climate, in particular his or her perceptions of teacher and student behaviour that might hinder student learning. The four response categories were "not at all", "very little", "to some extent" and "a lot". For PISA 2015, the items were rearranged to reflect student behaviour (STUBEHA) and teacher behaviour (TEACHBEHA) hindering learning. The index of student behaviour hindering learning is based on five items: student truancy; students skipping classes; students lacking respect for teachers; students using alcohol or illegal drugs; students intimidating or bullying other students. The index of teacher behaviour hindering learning is based on five items:

teachers not meeting individual students' needs; teacher absenteeism; staff resisting change; teachers being too strict with students; teachers not being well-prepared for classes.

ANNEX B

List of Tables

All tables in Annex B together with other results are available online at:
http://www.oecd.org/pisa/sitedocument/PISA-2015-Working-Paper-Teacher-Satisfaction-Data.xlsx

Notes:

- c: There are too few observations or no observation to provide reliable estimates (i.e. there are fewer than 30 students or fewer than 5 schools with valid data).
- m: Data are not available. These data were not submitted by the country or were collected but subsequently removed from the publication for technical reasons

Note regarding the averages:
OECD average-9 includes all OECD countries that distributed the optional teacher questionnaire. Average-18 includes all countries that distributed the optional teacher questionnaire. The average does not contain Malaysia where the coverage is too small to ensure comparability (see Annex).

Note regarding B-S-J-G (China):
B-S-J-G (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, Guangdong.

Table 3.1. Satisfaction with the teaching profession

Results based on science teachers' self-reports

	Index of satisfaction with the teaching profession				Variation in the index of sense of belonging with the teaching profession							Percentage of science teachers who agreed/strongly agreed with the following statements:							
	Mean index		Variation in the index		Total variation[1]		Variation between schools[2]		Variation within schools[3]		Proportion of variation that lies between schools[4]	The advantages of being a teacher clearly outweigh the disadvantages		If I could decide again, I would still choose to work as a teacher		I regret that I decided to become a teacher		I wonder whether it would have been better to choose another profession	
	Mean index	S.E.	S.D.	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	%	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD																			
Australia	0.06	(0.02)	0.99	(0.01)	0.98	(0.03)	0.05	(0.01)	0.93	(0.02)	4.8	88.1	(0.6)	80.6	(0.8)	6.7	(0.4)	38.2	(1.0)
Chile	-0.06	(0.05)	1.07	(0.02)	1.12	(0.09)	0.07	(0.04)	1.05	(0.05)	6.2	68.8	(2.4)	72.7	(2.1)	12.7	(1.5)	38.4	(2.2)
Czech Republic	-0.32	(0.03)	0.78	(0.01)	0.59	(0.04)	0.03	(0.01)	0.56	(0.03)	5.9	55.1	(1.5)	73.0	(1.4)	8.2	(0.8)	32.5	(1.5)
Germany	0.53	(0.03)	1.01	(0.02)	0.97	(0.04)	0.02	(0.02)	0.95	(0.03)	1.9	86.3	(1.0)	82.0	(1.2)	4.6	(0.5)	12.5	(1.0)
Italy	-0.15	(0.03)	0.93	(0.02)	0.86	(0.04)	0.03	(0.01)	0.82	(0.03)	4.1	54.5	(1.6)	81.2	(1.3)	14.1	(1.4)	26.7	(1.3)
Korea	-0.36	(0.03)	0.86	(0.02)	0.71	(0.05)	0.05	(0.02)	0.65	(0.03)	7.4	90.4	(1.2)	66.7	(1.8)	13.8	(1.3)	66.4	(1.9)
Portugal	-0.27	(0.03)	1.07	(0.02)	1.13	(0.07)	0.07	(0.02)	1.06	(0.05)	6.2	71.6	(1.5)	69.4	(1.5)	18.8	(1.1)	45.7	(1.5)
Spain	0.47	(0.03)	0.95	(0.02)	0.90	(0.06)	0.04	(0.02)	0.86	(0.04)	4.7	85.7	(1.0)	91.9	(0.8)	5.2	(0.6)	17.2	(1.3)
United States	-0.07	(0.04)	1.00	(0.02)	0.97	(0.06)	0.05	(0.02)	0.92	(0.04)	5.0	80.5	(1.3)	76.6	(1.3)	8.4	(0.9)	45.6	(1.6)
OECD average-9	-0.02	(0.01)	0.96	(0.01)	0.91	(0.02)	0.05	(0.01)	0.87	(0.01)	5.1	75.7	(0.5)	77.1	(0.5)	10.3	(0.3)	35.9	(0.5)
Partners																			
Brazil	-0.36	(0.03)	0.95	(0.02)	0.89	(0.06)	0.11	(0.03)	0.78	(0.04)	11.9	54.9	(1.4)	68.4	(1.6)	13.5	(0.9)	43.4	(1.7)
B-S-J-G (China)	-0.43	(0.03)	0.81	(0.02)	0.65	(0.05)	0.05	(0.02)	0.60	(0.04)	7.1	81.0	(1.2)	71.8	(1.2)	17.7	(1.2)	62.6	(1.3)
Colombia	0.56	(0.04)	0.97	(0.02)	0.92	(0.07)	0.10	(0.03)	0.83	(0.04)	10.6	86.6	(1.3)	91.3	(1.1)	7.0	(1.3)	18.3	(1.5)
Dominican Republic	0.86	(0.06)	0.86	(0.03)	0.75	(0.09)	0.09	(0.04)	0.66	(0.05)	12.1	93.2	(1.7)	95.6	(1.2)	4.5	(1.2)	12.8	(2.1)
Hong Kong (China)	-0.28	(0.03)	0.76	(0.02)	0.58	(0.05)	0.02	(0.01)	0.55	(0.03)	4.1	85.2	(1.4)	82.6	(1.5)	12.9	(1.3)	56.5	(1.9)
Macao (China)	-0.22	(0.00)	0.85	(0.00)	0.65	(0.10)	0.03	(0.02)	0.62	(0.08)	4.8	82.2	(0.0)	78.5	(0.0)	8.9	(0.0)	44.5	(0.0)
Peru	0.17	(0.04)	0.90	(0.02)	0.81	(0.06)	0.05	(0.02)	0.76	(0.04)	5.8	76.0	(1.6)	87.0	(1.3)	6.7	(1.0)	22.7	(1.7)
Chinese Taipei	-0.16	(0.02)	0.77	(0.01)	0.62	(0.03)	0.01	(0.01)	0.61	(0.03)	1.6	93.0	(0.9)	85.7	(1.1)	6.7	(0.8)	60.6	(1.8)
United Arab Emirates	-0.14	(0.03)	1.03	(0.02)	1.05	(0.06)	0.15	(0.03)	0.90	(0.03)	14.3	79.8	(1.1)	74.9	(1.0)	17.1	(1.0)	38.9	(1.3)
Average-18	-0.01	(0.01)	0.92	(0.00)	0.84	(0.01)	0.06	(0.01)	0.78	(0.01)	6.6	78.5	(0.3)	79.4	(0.3)	10.4	(0.2)	38.0	(0.4)
Malaysia*	0.45	(0.04)	0.93	(0.01)	0.88	(0.05)	0.08	(0.02)	0.81	(0.03)	8.6	97.1	(0.4)	91.2	(0.8)	6.6	(0.7)	22.2	(1.3)

1. The total variation in student performance is equal to the square of the standard deviation.
2. In some countries/economies, sub-units within schools were sampled instead of schools; this may affect the estimation of between-school variation components (see Annex A).
3. Due to the unbalanced clustered nature of the data, the sum of the between- and within-school variation components, as an estimate from a sample, does not necessarily add up to the total.
4. This measure corresponds to the intra-class correlation (rho), multiplied by 100.
*Coverage is too small to ensure comparability (see Annex A).

Table 3.2. Satisfaction with the current job

Results based on science teachers' self-reports

	Index of satisfaction with the current job				Variation in the index of satisfaction with the current job							Percentage of science teachers who agreed/strongly agreed with the following statements:							
	Mean index		Variation in the index		Total variation[1]		Variation between schools[2]		Variation within schools[3]		Proportion of variation that lies between schools[4]	I enjoy working at this school		I would recommend my school as a good place to work		I am satisfied with my performance in this school		All in all, I am satisfied with my job	
	Mean index	S.E.	S.D.	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	%	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Australia	0.11	(0.02)	0.99	(0.01)	0.98	(0.04)	0.13	(0.02)	0.84	(0.02)	13.4	92.8	(0.5)	88.2	(0.8)	95.0	(0.4)	90.8	(0.7)
Chile	0.06	(0.06)	1.06	(0.03)	1.14	(0.13)	0.20	(0.06)	0.95	(0.07)	17.4	89.8	(1.7)	78.3	(2.5)	93.1	(1.4)	92.8	(1.5)
Czech Republic	-0.20	(0.03)	0.89	(0.02)	0.78	(0.05)	0.09	(0.02)	0.69	(0.03)	11.0	92.0	(1.0)	85.1	(1.1)	92.2	(0.8)	92.1	(0.8)
Germany	0.09	(0.04)	1.06	(0.02)	1.08	(0.06)	0.15	(0.03)	0.93	(0.03)	14.0	83.9	(1.3)	79.3	(1.5)	93.7	(0.9)	92.1	(0.9)
Italy	-0.24	(0.03)	0.91	(0.02)	0.82	(0.04)	0.04	(0.01)	0.78	(0.03)	5.3	88.7	(1.1)	84.7	(1.2)	89.2	(0.9)	91.2	(0.8)
Korea	-0.47	(0.04)	0.97	(0.03)	0.92	(0.07)	0.06	(0.03)	0.86	(0.04)	6.7	79.8	(1.5)	72.4	(1.8)	80.6	(1.6)	92.5	(0.9)
Portugal	0.17	(0.03)	0.94	(0.02)	0.89	(0.05)	0.11	(0.02)	0.78	(0.03)	12.1	92.4	(0.8)	89.1	(1.1)	96.8	(0.5)	95.8	(0.6)
Spain	0.19	(0.04)	0.99	(0.02)	1.00	(0.06)	0.13	(0.03)	0.86	(0.04)	13.4	91.0	(1.0)	87.1	(1.2)	96.6	(0.5)	97.3	(0.5)
United States	0.07	(0.05)	1.00	(0.02)	1.02	(0.07)	0.20	(0.04)	0.81	(0.03)	20.0	92.4	(1.2)	86.8	(1.6)	93.7	(0.8)	90.6	(1.1)
OECD average-9	-0.02	(0.01)	0.98	(0.01)	0.96	(0.02)	0.12	(0.01)	0.83	(0.01)	12.6	89.2	(0.4)	83.5	(0.5)	92.3	(0.3)	92.8	(0.3)
Partners																			
Brazil	-0.04	(0.03)	0.97	(0.02)	0.95	(0.06)	0.19	(0.03)	0.77	(0.03)	19.5	94.1	(0.7)	90.9	(1.1)	89.5	(0.9)	76.5	(1.3)
B-S-J-G (China)	-0.38	(0.03)	0.99	(0.02)	0.98	(0.06)	0.08	(0.03)	0.90	(0.04)	7.9	84.7	(1.3)	73.9	(1.4)	88.8	(1.0)	87.8	(0.9)
Colombia	0.59	(0.05)	0.93	(0.04)	0.80	(0.08)	0.14	(0.03)	0.66	(0.05)	17.5	95.2	(0.9)	94.2	(1.1)	96.8	(0.8)	97.3	(0.7)
Dominican Republic	0.97	(0.05)	0.75	(0.05)	0.54	(0.09)	0.05	(0.02)	0.49	(0.07)	9.4	96.9	(1.4)	97.6	(0.9)	98.9	(0.5)	99.1	(0.5)
Hong Kong (China)	-0.57	(0.04)	0.89	(0.02)	0.77	(0.05)	0.06	(0.02)	0.71	(0.04)	7.3	80.9	(1.4)	65.1	(1.8)	90.2	(1.0)	90.4	(1.1)
Macao (China)	-0.54	(0.00)	0.91	(0.00)	0.74	(0.07)	0.07	(0.03)	0.66	(0.04)	10.0	78.4	(0.0)	64.8	(0.0)	89.4	(0.0)	92.7	(0.0)
Peru	0.22	(0.04)	0.90	(0.02)	0.79	(0.06)	0.09	(0.03)	0.70	(0.03)	11.4	95.1	(1.0)	89.0	(1.4)	96.8	(0.6)	97.2	(0.6)
Chinese Taipei	-0.33	(0.03)	0.93	(0.02)	0.86	(0.05)	0.05	(0.02)	0.80	(0.03)	6.1	87.8	(1.2)	79.2	(1.5)	89.1	(1.1)	90.9	(1.1)
United Arab Emirates	0.01	(0.03)	1.00	(0.01)	1.01	(0.06)	0.14	(0.02)	0.87	(0.04)	14.1	86.9	(0.9)	85.2	(1.0)	95.5	(0.5)	91.9	(0.8)
Average-18	-0.02	(0.01)	0.95	(0.01)	0.89	(0.02)	0.11	(0.01)	0.78	(0.01)	12.0	89.0	(0.3)	82.8	(0.3)	92.6	(0.2)	92.2	(0.2)
Malaysia*	-0.03	(0.04)	0.96	(0.02)	0.93	(0.05)	0.14	(0.02)	0.78	(0.03)	15.5	91.5	(0.9)	83.9	(1.5)	89.0	(1.0)	95.9	(0.5)

1. The total variation in student performance is equal to the square of the standard deviation.
2. In some countries/economies, sub-units within schools were sampled instead of schools; this may affect the estimation of between-school variation components (see Annex A).
3. Due to the unbalanced clustered nature of the data, the sum of the between- and within-school variation components, as an estimate from a sample, does not necessarily add up to the total.
4. This measure corresponds to the intra-class correlation (rho), multiplied by 100.
*Coverage is too small to ensure comparability (see Annex A).

Table 4.1. Total number of years working as a teacher, and satisfaction

Results based on science teachers' self-reports

	Number of years working as a teacher		Percentage of science teachers who reported the following:				Average satisfaction with the teaching profession, by number of years working as a teacher						Average satisfaction with the current job, by number of years working as a teacher					
			Working less than 5 years as a teacher		Working more than 5 years as a teacher		Working less than 5 years as a teacher		Working more than 5 years as a teacher		Difference between working more than and less than 5 years as a teacher		Working less than 5 years as a teacher		Working more than 5 years as a teacher		Difference between working more than and less than 5 years as a teacher	
	Mean	S.E.	%	S.E.	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD																		
Australia	16	(0.2)	17.5	(0.8)	82.5	(0.8)	0.13	(0.04)	0.05	(0.02)	-0.08	(0.05)	0.08	(0.05)	0.11	(0.02)	0.03	(0.05)
Chile	16	(0.6)	19.8	(2.0)	80.2	(2.0)	-0.03	(0.10)	-0.07	(0.05)	-0.03	(0.12)	-0.08	(0.11)	0.09	(0.07)	0.17	(0.11)
Czech Republic	20	(0.3)	8.2	(0.8)	91.8	(0.8)	-0.22	(0.07)	-0.33	(0.03)	-0.11	(0.07)	-0.14	(0.07)	-0.20	(0.03)	-0.06	(0.08)
Germany	17	(0.4)	13.9	(1.1)	86.1	(1.1)	0.60	(0.08)	0.52	(0.04)	-0.09	(0.09)	0.17	(0.10)	0.08	(0.04)	-0.09	(0.10)
Italy	22	(0.3)	3.7	(0.5)	96.3	(0.5)	0.01	(0.15)	-0.15	(0.03)	-0.16	(0.16)	-0.28	(0.12)	-0.24	(0.03)	0.05	(0.12)
Korea	17	(0.4)	16.2	(1.6)	83.8	(1.6)	-0.19	(0.09)	-0.39	(0.04)	**-0.20**	(0.09)	-0.32	(0.09)	-0.50	(0.05)	-0.18	(0.09)
Portugal	23	(0.3)	0.5	(0.6)	99.5	(0.6)	c	c	-0.28	(0.04)	c	c	c	c	0.17	(0.03)	c	c
Spain	17	(0.3)	6.8	(0.8)	93.2	(0.8)	0.55	(0.09)	0.47	(0.03)	-0.08	(0.09)	0.26	(0.13)	0.19	(0.04)	-0.07	(0.12)
United States	14	(0.3)	17.9	(1.3)	82.1	(1.3)	0.04	(0.08)	-0.09	(0.04)	-0.13	(0.09)	0.03	(0.08)	0.08	(0.05)	0.05	(0.08)
OECD average-9	18	(0.1)	11.6	(0.4)	88.4	(0.4)	0.11	(0.03)	-0.03	(0.01)	**-0.11**	(0.04)	-0.03	(0.03)	-0.02	(0.01)	-0.01	(0.03)
Partners																		
Brazil	14	(0.3)	14.0	(1.1)	86.0	(1.1)	-0.36	(0.10)	-0.36	(0.03)	-0.01	(0.10)	-0.02	(0.11)	-0.05	(0.03)	-0.03	(0.11)
B-S-J-G (China)	15	(0.3)	13.8	(1.3)	86.2	(1.3)	-0.29	(0.05)	-0.45	(0.03)	**-0.17**	(0.06)	-0.60	(0.08)	-0.35	(0.03)	**0.25**	(0.09)
Colombia	17	(0.4)	7.9	(1.1)	92.1	(1.1)	0.18	(0.16)	0.60	(0.04)	**0.41**	(0.16)	0.47	(0.17)	0.60	(0.05)	0.13	(0.17)
Dominican Republic	13	(0.6)	14.4	(2.4)	85.6	(2.4)	1.01	(0.15)	0.83	(0.06)	-0.18	(0.15)	1.09	(0.11)	0.95	(0.05)	-0.14	(0.12)
Hong Kong (China)	18	(0.4)	6.9	(0.8)	93.1	(0.8)	-0.07	(0.10)	-0.29	(0.03)	**-0.22**	(0.10)	-0.58	(0.14)	-0.57	(0.04)	0.01	(0.14)
Macao (China)	11	(0.0)	20.2	(0.0)	79.8	(0.0)	-0.23	(0.00)	-0.21	(0.00)	**0.01**	(0.00)	-0.66	(0.00)	-0.51	(0.00)	**0.14**	(0.00)
Peru	16	(0.4)	8.8	(1.2)	91.2	(1.2)	-0.15	(0.11)	0.20	(0.04)	**0.35**	(0.11)	-0.01	(0.15)	0.24	(0.04)	0.25	(0.14)
Chinese Taipei	16	(0.3)	9.3	(1.0)	90.7	(1.0)	-0.22	(0.06)	-0.15	(0.03)	0.07	(0.07)	-0.59	(0.09)	-0.30	(0.03)	**0.28**	(0.10)
United Arab Emirates	14	(0.3)	10.7	(1.1)	89.3	(1.1)	-0.11	(0.08)	-0.15	(0.03)	-0.03	(0.08)	-0.04	(0.05)	0.01	(0.03)	0.06	(0.06)
Average-18	16	(0.1)	11.7	(0.3)	88.3	(0.3)	0.04	(0.02)	-0.02	(0.01)	-0.04	(0.02)	-0.07	(0.03)	-0.01	(0.01)	0.05	(0.03)
Malaysia*	14	(0.3)	6.6	(0.8)	93.4	(0.8)	0.42	(0.13)	0.45	(0.04)	0.03	(0.12)	-0.15	(0.11)	-0.02	(0.04)	0.12	(0.11)

Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.2. Number of years working as a teacher in the current school, and satisfaction

Results based on science teachers' self-reports

	Number of years working as a teacher		Percentage of science teachers who reported the following:				Average satisfaction with the teaching profession, by number of years working as a teacher						Average satisfaction with the current job, by number of years working as a teacher					
			Working less than 5 years as a teacher		Working more than 5 years as a teacher		Working less than 5 years as a teacher		Working more than 5 years as a teacher		Difference between working more than and less than 5 years as a teacher		Working less than 5 years as a teacher		Working more than 5 years as a teacher		Difference between working more than and less than 5 years as a teacher	
	Mean	S.E.	%	S.E.	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD																		
Australia	16	(0.2)	17.5	(0.8)	82.5	(0.8)	0.13	(0.04)	0.05	(0.02)	-0.08	(0.05)	0.08	(0.05)	0.11	(0.02)	0.03	(0.05)
Chile	16	(0.6)	19.8	(2.0)	80.2	(2.0)	-0.03	(0.10)	-0.07	(0.05)	-0.03	(0.12)	-0.08	(0.11)	0.09	(0.07)	0.17	(0.11)
Czech Republic	20	(0.3)	8.2	(0.8)	91.8	(0.8)	-0.22	(0.07)	-0.33	(0.03)	-0.11	(0.07)	-0.14	(0.07)	-0.20	(0.03)	-0.06	(0.08)
Germany	17	(0.4)	13.9	(1.1)	86.1	(1.1)	0.60	(0.08)	0.52	(0.04)	-0.09	(0.09)	0.17	(0.10)	0.08	(0.04)	-0.09	(0.10)
Italy	22	(0.3)	3.7	(0.5)	96.3	(0.5)	0.01	(0.15)	-0.15	(0.03)	-0.16	(0.16)	-0.28	(0.12)	-0.24	(0.03)	0.05	(0.12)
Korea	17	(0.4)	16.2	(1.6)	83.8	(1.6)	-0.19	(0.09)	-0.39	(0.04)	**-0.20**	(0.09)	-0.32	(0.09)	-0.50	(0.05)	-0.18	(0.09)
Portugal	23	(0.3)	0.5	(0.6)	99.5	(0.6)	c	c	-0.28	(0.04)	c	c	c	c	0.17	(0.03)	c	c
Spain	17	(0.3)	6.8	(0.8)	93.2	(0.8)	0.55	(0.09)	0.47	(0.03)	-0.08	(0.09)	0.26	(0.13)	0.19	(0.04)	-0.07	(0.12)
United States	14	(0.3)	17.9	(1.3)	82.1	(1.3)	0.04	(0.08)	-0.09	(0.04)	-0.13	(0.09)	0.03	(0.08)	0.08	(0.05)	0.05	(0.08)
OECD average-9	18	(0.1)	11.6	(0.4)	88.4	(0.4)	0.11	(0.03)	-0.03	(0.01)	**-0.11**	(0.04)	-0.03	(0.03)	-0.02	(0.01)	-0.01	(0.03)
Partners																		
Brazil	14	(0.3)	14.0	(1.1)	86.0	(1.1)	-0.36	(0.10)	-0.36	(0.03)	-0.01	(0.10)	-0.02	(0.11)	-0.05	(0.03)	-0.03	(0.11)
B-S-J-G (China)	15	(0.3)	13.8	(1.3)	86.2	(1.3)	-0.29	(0.05)	-0.45	(0.03)	**-0.17**	(0.06)	-0.60	(0.08)	-0.35	(0.03)	**0.25**	(0.09)
Colombia	17	(0.4)	7.9	(1.1)	92.1	(1.1)	0.18	(0.16)	0.60	(0.04)	**0.41**	(0.16)	0.47	(0.17)	0.60	(0.05)	0.13	(0.17)
Dominican Republic	13	(0.6)	14.4	(2.4)	85.6	(2.4)	1.01	(0.15)	0.83	(0.06)	-0.18	(0.15)	1.09	(0.11)	0.95	(0.05)	-0.14	(0.12)
Hong Kong (China)	18	(0.4)	6.9	(0.8)	93.1	(0.8)	-0.07	(0.10)	-0.29	(0.03)	**-0.22**	(0.10)	-0.58	(0.14)	-0.57	(0.04)	0.01	(0.14)
Macao (China)	11	(0.0)	20.2	(0.0)	79.8	(0.0)	-0.23	(0.00)	-0.21	(0.00)	**0.01**	(0.00)	-0.66	(0.00)	-0.51	(0.00)	**0.14**	(0.00)
Peru	16	(0.4)	8.8	(1.2)	91.2	(1.2)	-0.15	(0.11)	0.20	(0.04)	**0.35**	(0.11)	-0.01	(0.15)	0.24	(0.04)	0.25	(0.14)
Chinese Taipei	16	(0.3)	9.3	(1.0)	90.7	(1.0)	-0.22	(0.06)	-0.15	(0.03)	0.07	(0.07)	-0.59	(0.09)	-0.30	(0.03)	**0.28**	(0.10)
United Arab Emirates	14	(0.3)	10.7	(1.1)	89.3	(1.1)	-0.11	(0.08)	-0.15	(0.03)	-0.03	(0.08)	-0.04	(0.05)	0.01	(0.03)	0.06	(0.06)
Average-18	16	(0.1)	11.7	(0.3)	88.3	(0.3)	0.04	(0.02)	-0.02	(0.01)	-0.04	(0.02)	-0.07	(0.03)	-0.01	(0.01)	0.05	(0.03)
Malaysia*	14	(0.3)	6.6	(0.8)	93.4	(0.8)	0.42	(0.13)	0.45	(0.04)	0.03	(0.12)	-0.15	(0.11)	-0.02	(0.04)	0.12	(0.11)

Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.3. Number of schools in which science teachers work, and satisfaction

Results based on science teachers' self-reports.

	Percentage of science teachers who reported the following:			
	Employed by one school		Employed by more than one school	
	%	S.E.	%	S.E.
OECD				
Australia	96.7	(0.4)	3.3	(0.4)
Chile	85.0	(1.7)	15.0	(1.7)
Czech Republic	97.8	(0.5)	2.2	(0.5)
Germany	96.1	(0.4)	3.9	(0.4)
Italy	93.2	(0.8)	6.8	(0.8)
Korea	99.9	(0.1)	0.1	(0.1)
Portugal	98.6	(0.4)	1.4	(0.4)
Spain	96.8	(0.5)	3.2	(0.5)
United States	99.3	(0.3)	0.7	(0.3)
OECD average-9	95.9	(0.2)	4.1	(0.2)
Partners				
Brazil	64.9	(1.6)	35.1	(1.6)
B-S-J-G (China)	99.9	(0.1)	0.1	(0.1)
Colombia	97.2	(0.9)	2.8	(0.9)
Dominican Republic	89.6	(2.5)	10.4	(2.5)
Hong Kong (China)	99.7	(0.2)	0.3	(0.2)
Macao (China)	100.0	c	0.0	c
Peru	93.5	(1.3)	6.5	(1.3)
Chinese Taipei	100.0	c	0.0	c
United Arab Emirates	99.2	(0.2)	0.8	(0.2)
Average-18	94.9	(0.2)	5.1	(0.2)
Malaysia*	98.9	(0.3)	1.1	(0.3)

*Coverage is too small to ensure comparability (see Annex A).

Table 4.4. Number of schools over the course of teaching career, and satisfaction

Results based on science teachers' self-reports

	Number of schools over the course of teaching career		Percentage of science teachers who reported the following:				Average satisfaction with the teaching profession, by the number of schools over the course of teaching career						Average satisfaction with the current job, by the number of schools over the course of teaching career					
			Working in fewer than 5 schools over the course of their teaching career		Working in more than 5 schools over the course of their teaching career		Fewer than five schools		More than five schools		Difference between working in more than and fewer than 5 schools		Fewer than five schools		More than five schools		Difference between working in more than and fewer than 5 schools	
	Mean	S.E.	%	S.E.	Mean	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD																		
Australia	4.2	(0.1)	66.6	(0.9)	33.4	(0.9)	0.11	(0.03)	-0.05	(0.03)	**-0.15**	(0.04)	0.10	(0.03)	0.11	(0.03)	0.01	(0.04)
Chile	4.1	(0.1)	63.9	(2.1)	36.1	(2.1)	-0.08	(0.06)	-0.05	(0.08)	0.03	(0.10)	0.02	(0.08)	0.12	(0.07)	0.10	(0.09)
Czech Republic	2.5	(0.0)	91.4	(0.8)	8.6	(0.8)	-0.32	(0.03)	-0.24	(0.08)	0.08	(0.09)	-0.20	(0.03)	-0.17	(0.08)	0.04	(0.08)
Germany	3.4	(0.1)	77.4	(1.3)	22.6	(1.3)	0.55	(0.03)	0.47	(0.07)	-0.08	(0.07)	0.13	(0.04)	0.00	(0.08)	-0.14	(0.08)
Italy	8.5	(0.2)	20.8	(1.4)	79.2	(1.4)	-0.19	(0.08)	-0.13	(0.03)	0.06	(0.08)	-0.20	(0.04)	-0.25	(0.04)	-0.05	(0.05)
Korea	4.0	(0.1)	63.0	(2.3)	37.0	(2.3)	-0.27	(0.04)	-0.54	(0.05)	**-0.27**	(0.06)	-0.43	(0.05)	-0.56	(0.06)	-0.14	(0.08)
Portugal	6.8	(0.1)	27.5	(1.2)	72.5	(1.2)	-0.16	(0.08)	-0.32	(0.03)	**-0.16**	(0.08)	0.19	(0.06)	0.16	(0.04)	-0.03	(0.07)
Spain	5.8	(0.1)	46.8	(1.1)	53.2	(1.1)	0.61	(0.05)	0.36	(0.04)	**-0.25**	(0.06)	0.31	(0.05)	0.11	(0.05)	**-0.19**	(0.07)
United States	3.3	(0.1)	82.3	(1.4)	17.7	(1.4)	-0.07	(0.04)	-0.09	(0.10)	-0.02	(0.12)	0.05	(0.05)	0.14	(0.11)	0.09	(0.12)
OECD average-9	4.7	(0.0)	60.0	(0.5)	40.0	(0.5)	0.02	(0.02)	-0.07	(0.02)	**-0.09**	(0.03)	0.00	(0.02)	-0.04	(0.02)	-0.04	(0.03)
Partners																		
Brazil	6.1	(0.1)	40.5	(1.6)	59.5	(1.6)	-0.37	(0.05)	-0.37	(0.04)	0.00	(0.05)	0.02	(0.05)	-0.09	(0.04)	-0.11	(0.06)
B-S-J-G (China)	2.1	(0.1)	96.5	(0.5)	3.5	(0.5)	-0.42	(0.03)	-0.58	(0.11)	-0.16	(0.12)	-0.35	(0.03)	-0.48	(0.13)	-0.13	(0.14)
Colombia	4.5	(0.1)	59.2	(2.0)	40.8	(2.0)	0.53	(0.06)	0.60	(0.05)	0.07	(0.08)	0.58	(0.07)	0.59	(0.06)	0.01	(0.08)
Dominican Republic	3.7	(0.2)	73.8	(2.6)	26.2	(2.6)	0.87	(0.07)	0.85	(0.12)	-0.02	(0.14)	1.02	(0.05)	0.87	(0.12)	-0.15	(0.14)
Hong Kong (China)	2.5	(0.1)	92.5	(1.1)	7.5	(1.1)	-0.26	(0.04)	-0.50	(0.09)	**-0.24**	(0.09)	-0.57	(0.04)	-0.64	(0.13)	-0.07	(0.13)
Macao (China)	2.2	(0.0)	92.0	(0.0)	8.0	(0.0)	-0.24	(0.00)	c	c	c	c	-0.57	(0.00)	c	c	c	c
Peru	4.9	(0.1)	52.5	(2.1)	47.5	(2.1)	0.21	(0.05)	0.13	(0.06)	-0.08	(0.08)	0.28	(0.05)	0.14	(0.06)	-0.14	(0.07)
Chinese Taipei	2.6	(0.1)	89.4	(1.1)	10.6	(1.1)	-0.16	(0.03)	-0.09	(0.08)	0.06	(0.08)	-0.33	(0.04)	-0.35	(0.10)	-0.02	(0.10)
United Arab Emirates	3.8	(0.1)	71.5	(1.3)	28.5	(1.3)	-0.12	(0.04)	-0.16	(0.04)	-0.04	(0.05)	0.04	(0.03)	-0.07	(0.04)	**-0.11**	(0.05)
Average-18	4.2	(0.0)	67.1	(0.4)	32.9	(0.4)	0.01	(0.01)	-0.04	(0.02)	**-0.07**	(0.02)	0.01	(0.01)	-0.02	(0.02)	**-0.06**	(0.02)
Malaysia*	2.8	(0.1)	89.0	(0.9)	11.0	(0.9)	0.47	(0.03)	0.54	(0.08)	0.07	(0.08)	-0.04	(0.04)	0.11	(0.09)	0.14	(0.08)

Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.5. Employment type at the current school, and satisfaction

Results based on science teachers' self-reports

	Percentage of science teachers, by employment type at the current school						Average satisfaction with the teaching profession, by employment type at the current school						Average satisfaction with the current job, by employment type at the current school					
	Permanent employment (an on-going contract with no fixed end-point before the age of retirement)		Fixed-term contract for a period of more than 1 school year		Fixed-term contract for a period of 1 school year or less		Permanent employment (an on-going contract with no fixed end-point before the age of retirement)		Fixed-term contract[1]		Difference between permanent and fixed-term contract		Permanent employment (an on-going contract with no fixed end-point before the age of retirement)		Fixed-term contract		Difference between permanent and fixed-term contract	
	%	S.E.	%	S.E.	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD																		
Australia	86.0	(0.7)	2.9	(0.3)	11.1	(0.7)	0.05	(0.02)	0.13	(0.05)	-0.08	(0.05)	0.10	(0.02)	0.18	(0.05)	-0.09	(0.06)
Chile	67.0	(2.5)	13.2	(1.5)	19.8	(1.8)	-0.04	(0.05)	-0.10	(0.10)	0.05	(0.12)	0.14	(0.06)	-0.12	(0.10)	**0.26**	(0.09)
Czech Republic	86.4	(1.3)	4.4	(0.6)	9.2	(1.1)	-0.34	(0.03)	-0.20	(0.08)	-0.14	(0.07)	-0.22	(0.03)	-0.04	(0.07)	**-0.19**	(0.07)
Germany	94.3	(0.6)	3.1	(0.3)	2.6	(0.5)	0.52	(0.03)	0.67	(0.12)	-0.15	(0.12)	0.09	(0.04)	0.19	(0.14)	-0.10	(0.14)
Italy	82.5	(1.3)	0.0	c	17.5	(1.3)	-0.16	(0.04)	-0.07	(0.05)	-0.09	(0.07)	-0.26	(0.04)	-0.15	(0.08)	-0.10	(0.09)
Korea	86.0	(1.2)	10.4	(1.2)	3.6	(0.6)	-0.38	(0.04)	-0.24	(0.08)	-0.14	(0.09)	-0.52	(0.04)	-0.12	(0.11)	**-0.40**	(0.12)
Portugal	88.6	(1.0)	2.0	(0.4)	9.4	(0.8)	-0.26	(0.04)	-0.39	(0.09)	0.13	(0.10)	0.16	(0.03)	0.21	(0.07)	-0.05	(0.07)
Spain	79.8	(1.2)	2.8	(0.4)	17.4	(1.1)	0.47	(0.04)	0.49	(0.05)	-0.01	(0.07)	0.19	(0.04)	0.22	(0.07)	-0.04	(0.07)
United States	63.9	(2.4)	7.3	(1.0)	28.8	(2.3)	-0.05	(0.05)	-0.10	(0.06)	0.06	(0.08)	0.08	(0.06)	0.05	(0.07)	0.03	(0.08)
OECD average-9	81.6	(0.5)	5.1	(0.3)	13.3	(0.4)	-0.02	(0.01)	0.02	(0.03)	-0.04	(0.03)	-0.03	(0.01)	0.05	(0.03)	**-0.08**	(0.03)
Partners																		
Brazil	75.4	(1.3)	12.8	(1.0)	11.8	(0.8)	-0.36	(0.04)	-0.36	(0.05)	0.00	(0.06)	-0.08	(0.04)	0.08	(0.07)	**-0.17**	(0.08)
B-S-J-G (China)	35.3	(2.6)	60.3	(2.6)	4.4	(0.8)	-0.44	(0.03)	-0.43	(0.04)	-0.01	(0.04)	-0.34	(0.04)	-0.41	(0.04)	0.07	(0.06)
Colombia	69.6	(1.8)	11.7	(1.7)	18.7	(1.4)	0.61	(0.05)	0.45	(0.08)	0.17	(0.10)	0.59	(0.05)	0.59	(0.10)	0.00	(0.11)
Dominican Republic	92.7	(1.9)	4.1	(1.2)	3.2	(1.3)	0.86	(0.06)	c	c	c	c	0.98	(0.05)	c	c	c	c
Hong Kong (China)	77.1	(1.3)	9.6	(1.1)	13.3	(1.2)	-0.29	(0.04)	-0.23	(0.05)	-0.06	(0.05)	-0.57	(0.04)	-0.57	(0.06)	0.00	(0.07)
Macao (China)	19.6	(0.0)	23.2	(0.0)	57.2	(0.0)	-0.16	(0.00)	-0.23	(0.00)	**0.07**	(0.00)	-0.43	(0.00)	-0.57	(0.00)	**0.14**	(0.00)
Peru	50.9	(2.1)	6.8	(0.9)	42.3	(2.3)	0.19	(0.04)	0.15	(0.05)	0.04	(0.06)	0.25	(0.05)	0.18	(0.06)	0.07	(0.08)
Chinese Taipei	87.3	(1.2)	8.1	(1.1)	4.7	(0.6)	-0.14	(0.03)	-0.27	(0.06)	0.13	(0.06)	-0.29	(0.03)	-0.61	(0.09)	**0.33**	(0.10)
United Arab Emirates	53.2	(1.5)	28.4	(1.3)	18.4	(0.8)	-0.14	(0.05)	-0.15	(0.03)	0.01	(0.06)	0.09	(0.03)	-0.09	(0.04)	**0.18**	(0.05)
Average-18	72.0	(0.4)	11.7	(0.3)	16.3	(0.3)	0.00	(0.01)	-0.05	(0.02)	0.00	(0.02)	0.00	(0.01)	-0.06	(0.02)	0.00	(0.02)
Malaysia*	98.6	(0.4)	1.2	(0.2)	0.2	(0.2)	0.46	(0.04)	c	c	c	c	-0.03	(0.04)	c	c	c	c

1. Fixed-term contract include the categories "fixed-term contract for a period of more than 1 school year" and "fixed-term contract for a period of 1 school year or less".
Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.6. Employment status as a teacher at the current school, and satisfaction

Results based on science teachers' self-reports

	Percentage of science teachers, by employment status as a teacher at the current school								Average satisfaction with the teaching profession, by employment status as a teacher at the current school						Average satisfaction with the current job, by employment status as a teacher at the current school					
	Full-time (more than 90% of full-time hours)		Part-time (71-90% full-time hours)		Part-time (51-70% full-time hours)		Part-time (less than 50% of full-time hours)		Full-time (more than 90% of full-time hours)		Part-time[1]		Difference between full-time and part-time		Full-time (more than 90% of full-time hours)		Part-time		Difference between full-time and part-time	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD																				
Australia	86.6	(0.7)	7.3	(0.5)	4.5	(0.5)	1.6	(0.2)	0.07	(0.02)	0.02	(0.05)	0.05	(0.05)	0.12	(0.02)	-0.02	(0.05)	**0.14**	(0.06)
Chile	64.1	(2.3)	17.7	(1.6)	8.8	(1.2)	9.4	(1.5)	-0.02	(0.05)	-0.14	(0.09)	0.12	(0.11)	0.15	(0.08)	-0.12	(0.10)	**0.27**	(0.12)
Czech Republic	87.2	(1.0)	4.8	(0.6)	3.6	(0.4)	4.3	(0.6)	-0.33	(0.03)	-0.26	(0.06)	-0.07	(0.06)	-0.19	(0.03)	-0.25	(0.07)	0.06	(0.07)
Germany	74.4	(1.3)	11.9	(1.1)	10.1	(0.9)	3.6	(0.4)	0.55	(0.04)	0.48	(0.06)	0.06	(0.06)	0.12	(0.04)	0.02	(0.06)	0.10	(0.06)
Italy	82.3	(1.3)	4.9	(0.6)	7.1	(0.9)	5.8	(0.8)	-0.15	(0.04)	-0.16	(0.06)	0.02	(0.07)	-0.27	(0.04)	-0.14	(0.07)	-0.13	(0.08)
Korea	99.4	(0.3)	0.3	(0.2)	0.3	(0.2)	0.0	c	-0.35	(0.04)	c	c	c	c	-0.46	(0.04)	c	c	c	c
Portugal	95.3	(0.5)	2.0	(0.4)	1.3	(0.3)	1.4	(0.3)	-0.27	(0.04)	-0.30	(0.13)	0.03	(0.14)	0.16	(0.03)	0.18	(0.17)	-0.02	(0.18)
Spain	88.0	(1.1)	5.0	(0.8)	4.5	(0.7)	2.5	(0.5)	0.45	(0.03)	0.65	(0.11)	-0.21	(0.11)	0.17	(0.04)	0.40	(0.11)	**-0.23**	(0.11)
United States	98.7	(0.4)	0.1	(0.1)	0.8	(0.3)	0.4	(0.2)	-0.06	(0.04)	c	c	c	c	0.07	(0.05)	c	c	c	c
OECD average-9	86.2	(0.4)	6.0	(0.3)	4.5	(0.2)	3.2	(0.2)	-0.01	(0.01)	0.04	(0.03)	0.00	(0.03)	-0.01	(0.01)	0.01	(0.04)	0.03	(0.04)
Partners																				
Brazil	37.0	(1.6)	15.4	(1.2)	25.7	(1.4)	21.9	(1.5)	-0.36	(0.06)	-0.37	(0.04)	0.00	(0.07)	0.05	(0.05)	-0.10	(0.04)	**0.15**	(0.07)
B-S-J-G (China)	99.5	(0.2)	0.2	(0.1)	0.3	(0.1)	0.1	(0.1)	-0.43	(0.03)	c	c	c	c	-0.38	(0.03)	c	c	c	c
Colombia	91.5	(1.2)	5.9	(1.0)	2.1	(0.6)	0.6	(0.3)	0.58	(0.04)	0.26	(0.21)	0.33	(0.21)	0.62	(0.05)	0.14	(0.29)	0.48	(0.29)
Dominican Republic	76.3	(3.1)	11.6	(2.5)	9.4	(2.0)	2.8	(1.1)	0.96	(0.06)	0.58	(0.12)	**0.38**	(0.12)	1.03	(0.05)	0.84	(0.11)	0.19	(0.12)
Hong Kong (China)	98.4	(0.4)	0.2	(0.1)	1.3	(0.4)	0.1	(0.1)	-0.27	(0.03)	c	c	c	c	-0.57	(0.04)	c	c	c	c
Macao (China)	98.8	(0.0)	0.7	(0.0)	0.5	(0.0)	0.0	c	-0.22	(0.00)	c	c	c	c	-0.55	(0.00)	c	c	c	c
Peru	84.8	(1.7)	7.5	(1.1)	4.9	(1.1)	2.8	(0.8)	0.16	(0.04)	0.25	(0.09)	-0.09	(0.09)	0.20	(0.04)	0.28	(0.09)	-0.08	(0.10)
Chinese Taipei	99.2	(0.3)	0.3	(0.2)	0.4	(0.3)	0.1	(0.1)	-0.16	(0.02)	c	c	c	c	-0.33	(0.03)	c	c	c	c
United Arab Emirates	97.3	(0.4)	1.7	(0.4)	0.9	(0.1)	0.2	(0.1)	-0.14	(0.03)	-0.45	(0.12)	**0.30**	(0.12)	0.01	(0.03)	-0.07	(0.15)	0.09	(0.15)
Average-18	86.6	(0.3)	5.4	(0.2)	4.8	(0.2)	3.2	(0.2)	0.00	(0.01)	0.05	(0.03)	**0.08**	(0.03)	0.00	(0.01)	0.10	(0.04)	**0.08**	(0.04)
Malaysia*	93.9	(0.7)	4.2	(0.7)	1.4	(0.4)	0.5	(0.2)	0.46	(0.04)	0.27	(0.11)	0.19	(0.12)	-0.02	(0.04)	-0.21	(0.11)	0.19	(0.11)

1. Part-time employment status includes the categories "part-time (71-90% full-time hours)", "part-time (51-70% full-time hours)" and "part-time (less than 50% of full-time hours)".

Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.7. Level of formal education completed, and satisfaction

Results based on science teachers' self-reports

	Percentage of science teachers with the highest level of completed formal education						Average satisfaction with the teaching profession, by level of formal education completed						Average satisfaction with the current job, by level of formal education completed					
	Below bachelor's degree[1]		Bachelor's degree		Above bachelor's degree		Below bachelor's degree		Bachelor's degree		Above bachelor's degree		Below bachelor's degree		Bachelor's degree		Above bachelor's degree	
	%	S.E.	%	S.E.	%	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.
OECD																		
Australia	4.1	(0.3)	74.4	(0.8)	21.5	(0.8)	0.03	(0.07)	0.03	(0.02)	0.18	(0.04)	0.07	(0.07)	0.09	(0.02)	0.16	(0.04)
Chile	1.1	(0.5)	81.3	(1.7)	17.6	(1.7)	c	c	-0.12	(0.05)	0.14	(0.11)	c	c	0.02	(0.07)	0.21	(0.10)
Czech Republic	4.1	(0.6)	2.7	(0.4)	93.2	(0.6)	-0.16	(0.09)	-0.26	(0.14)	-0.33	(0.03)	0.00	(0.12)	-0.19	(0.19)	-0.21	(0.03)
Germany	0.8	(0.3)	2.7	(0.4)	96.5	(0.4)	c	c	0.13	(0.14)	0.54	(0.03)	c	c	0.04	(0.18)	0.09	(0.04)
Italy[2]	1.4	(0.3)	92.2	(0.9)	6.4	(0.8)	-0.19	(0.17)	-0.15	(0.03)	-0.12	(0.09)	0.02	(0.16)	-0.25	(0.03)	-0.22	(0.11)
Korea	0.0	c	56.7	(1.8)	43.3	(1.8)	m	m	-0.37	(0.05)	-0.35	(0.05)	m	m	-0.47	(0.05)	-0.47	(0.05)
Portugal	2.5	(0.9)	72.3	(1.6)	25.2	(1.5)	c	c	-0.27	(0.04)	-0.31	(0.08)	c	c	0.17	(0.03)	0.13	(0.06)
Spain	0.0	c	71.4	(1.3)	28.6	(1.3)	m	m	0.44	(0.03)	0.56	(0.06)	m	m	0.17	(0.04)	0.26	(0.07)
United States	0.1	(0.1)	34.7	(1.9)	65.2	(1.9)	c	c	-0.09	(0.07)	-0.06	(0.05)	c	c	0.00	(0.07)	0.11	(0.06)
OECD average-9	1.6	(0.1)	54.3	(0.4)	44.2	(0.4)	-0.11	(0.07)	-0.07	(0.03)	0.03	(0.02)	0.03	(0.07)	-0.05	(0.03)	0.01	(0.02)
Partners																		
Brazil	2.9	(0.5)	85.0	(1.3)	12.1	(1.2)	-0.06	(0.12)	-0.38	(0.04)	-0.29	(0.09)	0.13	(0.20)	-0.05	(0.03)	-0.07	(0.08)
B-S-J-G (China)	14.5	(1.4)	79.6	(1.6)	5.9	(0.8)	-0.52	(0.07)	-0.42	(0.03)	-0.31	(0.11)	-0.52	(0.09)	-0.35	(0.03)	-0.40	(0.16)
Colombia	0.2	(0.1)	41.6	(2.3)	58.2	(2.3)	c	c	0.53	(0.05)	0.58	(0.06)	c	c	0.58	(0.06)	0.59	(0.07)
Dominican Republic	3.2	(1.1)	83.3	(1.9)	13.5	(1.7)	c	c	0.90	(0.06)	0.69	(0.13)	c	c	0.99	(0.05)	0.88	(0.13)
Hong Kong (China)	1.5	(0.4)	48.6	(1.6)	49.9	(1.6)	c	c	-0.28	(0.04)	-0.26	(0.04)	c	c	-0.63	(0.05)	-0.51	(0.05)
Macao (China)	2.1	(0.0)	71.3	(0.0)	26.7	(0.0)	c	c	-0.23	(0.00)	-0.22	(0.00)	c	c	-0.53	(0.00)	-0.61	(0.00)
Peru	19.4	(1.5)	62.2	(1.8)	18.4	(1.4)	0.22	(0.11)	0.17	(0.04)	0.13	(0.08)	0.20	(0.09)	0.22	(0.05)	0.23	(0.07)
Chinese Taipei	0.2	(0.1)	30.8	(1.4)	69.1	(1.4)	c	c	-0.15	(0.04)	-0.16	(0.03)	c	c	-0.34	(0.05)	-0.32	(0.04)
United Arab Emirates	0.8	(0.2)	62.5	(1.3)	36.7	(1.3)	c	c	-0.27	(0.03)	0.07	(0.05)	c	c	0.01	(0.03)	0.01	(0.05)
Average-18	3.3	(0.2)	58.5	(0.3)	38.2	(0.3)	-0.11	(0.05)	-0.04	(0.01)	0.03	(0.02)	-0.02	(0.05)	-0.03	(0.02)	-0.01	(0.02)
Malaysia*	1.9	(0.5)	89.8	(0.9)	8.3	(0.8)	0.18	(0.18)	0.48	(0.04)	0.23	(0.08)	0.09	(0.23)	-0.02	(0.04)	-0.19	(0.09)

1. Below bachelor's degree includes any level of formal education below ISCED Level 5 or equal to ISCED Level 5B; Bachelor's degree is defined as ISCED Level 5A Bachelor; above bachelor's degree includes Level 5A Master degree and ISCED Level 6.
2. In Italy, the national questionnaire combined bachelor's and master's degrees. Above bachelor's includes doctoral degrees only.
*Coverage is too small to ensure comparability (see Annex A).

Table 4.8. Teaching qualifications and satisfaction

Results based on science teachers' self-reports

	Percentage of science teachers who earned the following teaching qualifications:									
	A standard teacher education or training programme at an <educational institute which is eligible to educate or train teachers>		An in-service teacher education or training programme		A work-based teacher education or training programme		Training in another pedagogical profession		Other	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD										
Australia	98.1	(0.3)	0.5	(0.1)	0.5	(0.1)	0.2	(0.1)	0.6	(0.1)
Chile	86.0	(1.5)	3.2	(0.9)	1.5	(0.5)	1.1	(0.5)	8.2	(1.4)
Czech Republic	75.0	(1.5)	18.5	(1.2)	2.8	(0.4)	1.6	(0.4)	2.0	(0.4)
Germany	91.2	(0.9)	3.8	(0.5)	0.6	(0.2)	0.3	(0.2)	4.1	(0.6)
Italy	23.4	(1.1)	28.6	(1.4)	2.3	(0.4)	0.4	(0.2)	45.4	(1.6)
Korea	99.7	(0.2)	0.3	(0.2)	0.0	c	0.0	c	0.0	c
Portugal	67.3	(1.3)	31.6	(1.3)	0.6	(0.2)	0.0	c	0.4	(0.2)
Spain	72.9	(1.4)	7.2	(0.7)	5.0	(0.6)	1.2	(0.3)	13.7	(1.0)
United States	81.0	(1.7)	4.5	(0.7)	7.7	(1.0)	1.1	(0.4)	5.7	(0.9)
OECD average-9	77.2	(0.4)	10.9	(0.3)	2.3	(0.2)	0.7	(0.1)	8.9	(0.3)
Partners										
Brazil	95.2	(0.6)	0.6	(0.2)	0.8	(0.3)	0.5	(0.2)	2.9	(0.6)
B-S-J-G (China)	84.4	(1.3)	13.5	(1.2)	0.0	(0.0)	0.4	(0.1)	1.6	(0.4)
Colombia	85.8	(1.6)	0.9	(0.4)	1.5	(0.5)	4.0	(0.7)	7.8	(1.1)
Dominican Republic	86.3	(2.2)	3.3	(0.9)	2.8	(1.1)	3.5	(1.2)	4.1	(1.1)
Hong Kong (China)	56.0	(1.8)	40.5	(1.7)	2.5	(0.4)	0.0	c	1.0	(0.3)
Macao (China)	58.9	(0.0)	30.2	(0.0)	3.4	(0.0)	1.0	(0.0)	6.6	(0.0)
Peru	83.8	(1.5)	6.6	(1.1)	5.2	(0.8)	0.0	c	4.4	(1.0)
Chinese Taipei	73.0	(1.6)	15.7	(1.7)	2.1	(0.4)	3.5	(0.6)	5.7	(1.1)
United Arab Emirates	63.4	(1.5)	22.2	(1.3)	5.7	(0.7)	1.8	(0.4)	6.9	(0.7)
Average-18	76.7	(0.3)	12.9	(0.2)	2.5	(0.1)	1.1	(0.1)	6.7	(0.2)
Malaysia*	93.0	(0.5)	3.4	(0.5)	1.7	(0.5)	1.3	(0.5)	0.6	(0.3)

1. Below bachelor's degree includes any level of formal education below ISCED Level 5 or equal to ISCED Level 5B; Bachelor's degree is defined as ISCED Level 5A Bachelor; above bachelor's degree includes Level 5A Master degree and ISCED Level 6.
2. In Italy, the national questionnaire combined bachelor's and master's degrees. Above bachelor's includes doctoral degrees only.
*Coverage is too small to ensure comparability (see Annex A).

Table 4.9. Initial education and satisfaction

Results based on science teachers' self-reports

	Percentage of science teachers who completed education or training programme		Average satisfaction with the teaching profession, by initial teacher education and training						Average satisfaction with the current job, by initial teacher education and training					
			Science teachers who did not complete education or training programme		Science teachers who completed education or training programme		Difference between science teachers who completed and those who did not complete education or training programme		Science teachers who did not complete education or training programme		Science teachers who completed education or training programme		Difference between science teachers who completed and those who did not complete education or training programme	
	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD														
Australia	97.6	(0.3)	0.28	(0.10)	0.06	(0.02)	**-0.22**	(0.10)	0.02	(0.10)	0.11	(0.02)	0.09	(0.10)
Chile	86.0	(1.6)	-0.14	(0.13)	-0.05	(0.05)	0.09	(0.14)	0.05	(0.14)	0.06	(0.06)	0.01	(0.13)
Czech Republic	89.4	(0.9)	-0.36	(0.06)	-0.32	(0.03)	0.05	(0.06)	-0.11	(0.06)	-0.21	(0.03)	-0.10	(0.07)
Germany	95.0	(0.6)	0.70	(0.08)	0.52	(0.03)	**-0.18**	(0.09)	0.05	(0.12)	0.10	(0.04)	0.05	(0.13)
Italy	65.4	(1.5)	-0.15	(0.06)	-0.15	(0.04)	0.00	(0.07)	-0.28	(0.05)	-0.22	(0.04)	0.06	(0.06)
Korea	94.6	(0.8)	-0.66	(0.11)	-0.34	(0.04)	**0.32**	(0.11)	-0.83	(0.10)	-0.45	(0.04)	**0.38**	(0.12)
Portugal	95.7	(0.6)	-0.12	(0.22)	-0.28	(0.03)	-0.16	(0.22)	0.35	(0.14)	0.16	(0.03)	-0.19	(0.14)
Spain	93.8	(0.8)	0.51	(0.11)	0.47	(0.03)	-0.04	(0.12)	0.15	(0.13)	0.20	(0.04)	0.04	(0.13)
United States	93.2	(1.1)	-0.12	(0.10)	-0.06	(0.04)	0.06	(0.11)	0.03	(0.10)	0.07	(0.05)	0.05	(0.11)
OECD average-9	90.1	(0.3)	-0.01	(0.04)	-0.02	(0.01)	-0.01	(0.04)	-0.06	(0.04)	-0.02	(0.01)	0.04	(0.04)
Partners														
Brazil	93.8	(0.7)	-0.40	(0.09)	-0.36	(0.04)	0.04	(0.10)	0.00	(0.12)	-0.05	(0.03)	-0.04	(0.12)
B-S-J-G (China)	97.4	(0.4)	-0.55	(0.18)	-0.43	(0.03)	0.12	(0.19)	-0.35	(0.24)	-0.38	(0.03)	-0.03	(0.25)
Colombia	92.8	(0.9)	0.13	(0.16)	0.60	(0.04)	**0.47**	(0.18)	0.21	(0.14)	0.62	(0.05)	**0.41**	(0.14)
Dominican Republic	92.3	(2.0)	c	c	0.88	(0.06)	c	c	c	c	0.96	(0.05)	c	c
Hong Kong (China)	99.0	(0.2)	c	c	-0.28	(0.03)	c	c	c	c	-0.57	(0.04)	c	c
Macao (China)	88.6	(0.0)	-0.22	(0.00)	-0.22	(0.00)	**0.01**	(0.00)	-0.48	(0.00)	-0.55	(0.00)	**-0.07**	(0.00)
Peru	89.4	(1.3)	0.25	(0.11)	0.16	(0.04)	-0.08	(0.12)	0.44	(0.11)	0.19	(0.04)	**-0.25**	(0.11)
Chinese Taipei	94.1	(1.1)	-0.13	(0.15)	-0.16	(0.02)	-0.03	(0.15)	-0.36	(0.22)	-0.33	(0.03)	0.03	(0.22)
United Arab Emirates	87.3	(0.8)	-0.30	(0.06)	-0.12	(0.03)	**0.18**	(0.07)	0.01	(0.05)	0.01	(0.03)	-0.01	(0.05)
Average-18	91.4	(0.2)	-0.08	(0.03)	0.00	(0.01)	0.04	(0.03)	-0.07	(0.03)	-0.02	(0.01)	0.03	(0.03)
Malaysia*	97.0	(0.7)	0.10	(0.22)	0.46	(0.04)	0.36	(0.23)	-0.28	(0.20)	-0.02	(0.04)	0.26	(0.21)

Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 4.10. Participation in professional qualification activities

Results based on science teachers' self-reports

	Percentage of science teachers who are required to participate in professional activities		Percentage of science teachers who participated in any of the following activities during the previous 12 months:											
			Qualification programme (e.g. a <degree programme>)		Participation in a network of teachers formed specifically for the professional development of teachers		Individual or collaborative research on a topic of interest to [them] professionally		Mentoring and/or peer observation and coaching, as part of a formal school arrangement		Reading professional literature (e.g. journals, evidence-based papers, thesis papers)		Engaging in informal dialogue with [their] colleagues on how to improve [their] teaching	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
OECD														
Australia	98.3	(0.3)	10.8	(0.6)	75.3	(0.8)	47.4	(1.0)	74.3	(0.9)	78.1	(0.8)	97.7	(0.2)
Chile	52.2	(2.7)	32.4	(2.5)	41.6	(2.3)	53.3	(2.8)	38.3	(2.2)	70.5	(2.0)	91.0	(1.6)
Czech Republic	70.2	(1.5)	11.8	(0.8)	41.0	(1.4)	24.0	(1.0)	39.2	(1.7)	92.5	(0.8)	96.0	(0.5)
Germany	61.3	(1.3)	7.6	(0.7)	27.8	(1.4)	83.2	(1.0)	32.4	(1.3)	88.0	(0.9)	95.0	(0.6)
Italy	46.9	(1.6)	15.1	(1.3)	46.5	(1.7)	77.0	(1.5)	21.6	(1.5)	65.8	(1.6)	96.0	(0.7)
Korea	46.6	(2.0)	23.8	(1.8)	57.3	(2.3)	51.3	(2.2)	76.5	(1.8)	62.3	(2.2)	91.9	(1.1)
Portugal	54.5	(1.6)	7.2	(0.7)	33.2	(1.3)	52.9	(1.8)	39.6	(2.1)	86.2	(1.1)	99.0	(0.3)
Spain	41.5	(1.5)	33.2	(1.3)	53.7	(1.6)	59.7	(1.5)	45.5	(1.8)	71.8	(1.3)	95.8	(0.6)
United States	95.3	(0.8)	17.5	(1.6)	77.3	(1.6)	48.7	(1.6)	53.1	(1.9)	70.7	(1.6)	96.9	(0.5)
OECD average-9	63.0	(0.5)	17.7	(0.5)	50.4	(0.6)	55.3	(0.6)	46.7	(0.6)	76.2	(0.5)	95.5	(0.3)
Partners														
Brazil	79.8	(1.2)	66.4	(1.7)	62.9	(1.6)	52.3	(1.8)	65.1	(1.5)	73.7	(1.2)	90.0	(0.9)
B-S-J-G (China)	85.9	(1.0)	41.2	(1.6)	70.6	(1.4)	67.2	(1.6)	98.5	(0.3)	86.0	(1.1)	98.5	(0.3)
Colombia	75.6	(2.1)	56.9	(2.4)	57.1	(2.2)	65.5	(1.8)	44.7	(1.9)	57.6	(2.2)	95.9	(0.9)
Dominican Republic	71.7	(2.8)	59.3	(3.2)	62.7	(3.3)	81.9	(2.3)	73.2	(2.5)	75.3	(3.0)	97.9	(0.9)
Hong Kong (China)	80.7	(1.6)	15.1	(1.1)	45.4	(2.0)	22.6	(1.5)	83.1	(1.4)	43.4	(1.7)	93.3	(1.0)
Macao (China)	81.3	(0.0)	30.8	(0.0)	41.9	(0.0)	47.9	(0.0)	90.8	(0.0)	62.8	(0.0)	97.0	(0.0)
Peru	66.1	(2.0)	56.7	(2.5)	68.8	(2.2)	69.9	(2.2)	63.4	(2.1)	57.9	(2.2)	95.6	(1.0)
Chinese Taipei	75.0	(1.5)	10.5	(0.9)	60.0	(1.8)	72.2	(1.5)	66.9	(1.6)	60.8	(1.6)	95.8	(0.8)
United Arab Emirates	82.7	(1.0)	16.5	(1.2)	80.2	(0.9)	54.3	(1.2)	87.6	(0.9)	68.1	(1.0)	95.2	(0.5)
Average-18	70.3	(0.4)	28.5	(0.4)	55.7	(0.4)	57.3	(0.4)	60.8	(0.4)	70.6	(0.4)	95.5	(0.2)
Malaysia*	85.7	(1.1)	13.6	(1.0)	64.1	(1.5)	35.3	(1.5)	83.8	(1.4)	27.1	(1.4)	77.7	(1.3)

*Coverage is too small to ensure comparability (see Annex A).

Table 5.1. Students' immigrant background and science teachers' satisfaction

Results based on students' and science teachers' reports

	Percentage of science teachers who work in schools where more than 30% of students have an immigrant background		Average satisfaction with the teaching profession, by the following:				Difference in satisfaction with the teaching profession between science teachers who work in schools where more than and less than 30% of students have an immigrant background (more - less)				Average satisfaction with the current job, by the following:				Difference in satisfaction with the current job satisfaction between science teachers who work in schools where more than and less than 30% of students have an immigrant background (more - less)			
			Science teachers who work in schools where less than 30% of students have an immigrant background		Science teachers who work in schools where more than 30% of students have an immigrant background		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Science teachers who work in schools where less than 30% of students have an immigrant background		Science teachers who work in schools where morethan 30% of students have an immigrant background		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Dif.	S.E.
OECD																		
Australia	33.3	(1.6)	0.03	(0.02)	0.13	(0.04)	**0.11**	(0.05)	**0.09**	(0.05)	0.10	(0.03)	0.12	(0.04)	0.02	(0.05)	0.03	(0.05)
Chile	c	c	-0.06	(0.05)	c	c	c	c	c	c	0.06	(0.06)	c	c	c	c	c	c
Czech Republic	c	c	-0.32	(0.03)	c	c	c	c	c	c	-0.20	(0.03)	c	c	c	c	c	c
Germany	20.4	(2.6)	0.53	(0.04)	0.53	(0.07)	0.00	(0.08)	0.03	(0.09)	0.14	(0.05)	-0.08	(0.10)	-0.22	(0.12)	-0.19	(0.13)
Italy	3.3	(1.1)	-0.15	(0.03)	-0.20	(0.07)	-0.05	(0.08)	-0.06	(0.07)	-0.24	(0.03)	-0.23	(0.13)	0.01	(0.13)	-0.03	(0.12)
Korea	c	c	-0.36	(0.03)	m	m	m	m	m	m	-0.47	(0.04)	m	m	m	m	m	m
Portugal	c	c	-0.28	(0.03)	c	c	c	c	c	c	0.17	(0.03)	c	c	c	c	c	c
Spain	7.4	(1.9)	0.47	(0.03)	0.48	(0.09)	0.01	(0.09)	0.13	(0.10)	0.21	(0.04)	-0.02	(0.10)	**-0.23**	(0.11)	-0.11	(0.11)
United States	27.0	(3.2)	-0.07	(0.05)	-0.07	(0.07)	0.00	(0.09)	0.12	(0.09)	0.13	(0.05)	-0.10	(0.09)	**-0.23**	(0.10)	0.04	(0.10)
OECD average-9	18.3	(1.0)	-0.02	(0.01)	0.17	(0.03)	0.01	(0.04)	0.06	(0.04)	-0.01	(0.01)	-0.06	(0.04)	**-0.13**	(0.05)	-0.05	(0.05)
Partners																		
Brazil	c	c	-0.36	(0.03)	m	m	m	m	m	m	-0.04	(0.03)	m	m	m	m	m	m
B-S-J-G (China)	c	c	-0.43	(0.03)	m	m	m	m	m	m	-0.38	(0.03)	m	m	m	m	m	m
Colombia	c	c	0.56	(0.04)	m	m	m	m	m	m	0.59	(0.05)	m	m	m	m	m	m
Dominican Republic	c	c	0.86	(0.06)	m	m	m	m	m	m	0.97	(0.05)	m	m	m	m	m	m
Hong Kong (China)	54.9	(3.8)	-0.22	(0.05)	-0.32	(0.04)	-0.11	(0.06)	-0.07	(0.06)	-0.49	(0.06)	-0.64	(0.05)	-0.14	(0.08)	-0.01	(0.07)
Macao (China)	100.0	c	m	m	-0.22	(0.00)	m	m	m	m	m	m	-0.54	(0.00)	m	m	m	m
Peru	c	c	0.17	(0.04)	c	c	c	c	c	c	0.22	(0.04)	c	c	c	c	c	c
Chinese Taipei	c	c	-0.16	(0.02)	m	m	m	m	m	m	-0.33	(0.03)	m	m	m	m	m	m
United Arab Emirates	69.0	(1.9)	-0.42	(0.04)	-0.02	(0.04)	**0.40**	(0.06)	**0.34**	(0.06)	-0.04	(0.04)	0.03	(0.03)	0.06	(0.05)	**0.11**	(0.05)
Average-18	39.4	(0.8)	-0.01	(0.01)	0.04	(0.02)	0.05	(0.03)	**0.08**	(0.03)	0.02	(0.01)	-0.18	(0.03)	**-0.10**	(0.04)	-0.02	(0.04)
Malaysia*	c	c	0.45	(0.04)	m	m	m	m	m	m	-0.03	(0.04)	m	m	m	m	m	m

1. Science teachers' demographic and schools' socio-economic profile include profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.
Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 5.2. Students' language spoken at home and science teachers' satisfaction

Results based on students' and science teachers' reports

	Percentage of science teachers who work in schools where more than 30% of students speak a language different from the test language at home		Average satisfaction with the teaching profession, by the following:				Difference in satisfaction with the teaching profession between science teachers who work in schools where more than and less than 30% of students speak a language different from the test language at home (more - less)				Average satisfaction with the current job, by the following:				Difference in satisfaction with the current job environment between science teachers who work in schools where more than and less than 30% of students speak a language different from the test language at home (more - less)			
			Science teachers who work in schools where less than 30% of students speak a language different from the test language at home		Science teachers who work in schools where more than 30% of students speak a language different from the test language at home		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Science teachers who work in schools where less than 30% of students speak a language different from the test language at home		Science teachers who work in schools where more than 30% of students speak a language different from the test language at home		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	%	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Dif.	S.E.
OECD																		
Australia	11.1	(1.0)	0.05	(0.02)	0.14	(0.06)	0.08	(0.07)	0.10	(0.07)	0.10	(0.02)	0.20	(0.06)	0.11	(0.06)	**0.18**	(0.06)
Chile	c	c	-0.06	(0.05)	m	m	m	m	m	m	0.06	(0.06)	m	m	m	m	m	m
Czech Republic	1.1	(0.4)	-0.32	(0.03)	-0.31	(0.12)	0.01	(0.13)	-0.10	(0.10)	-0.20	(0.03)	-0.18	(0.10)	0.02	(0.10)	-0.03	(0.10)
Germany	10.8	(2.0)	0.53	(0.03)	0.52	(0.12)	-0.02	(0.12)	0.01	(0.13)	0.12	(0.04)	-0.10	(0.15)	-0.21	(0.16)	-0.16	(0.17)
Italy	16.5	(2.4)	-0.13	(0.04)	-0.23	(0.07)	-0.10	(0.09)	-0.06	(0.08)	-0.25	(0.03)	-0.21	(0.09)	0.03	(0.09)	0.07	(0.09)
Korea	c	c	-0.36	(0.03)	m	m	m	m	m	m	-0.47	(0.04)	m	m	m	m	m	m
Portugal	c	c	-0.27	(0.03)	m	m	m	m	m	m	0.17	(0.03)	m	m	m	m	m	m
Spain	22.5	(1.8)	0.44	(0.03)	0.60	(0.06)	**0.16**	(0.07)	**0.16**	(0.07)	0.19	(0.05)	0.20	(0.07)	0.01	(0.08)	0.00	(0.08)
United States	20.7	(3.0)	-0.07	(0.04)	-0.05	(0.08)	0.02	(0.10)	0.19	(0.11)	0.12	(0.05)	-0.13	(0.11)	**-0.25**	(0.12)	0.08	(0.12)
OECD average-9	13.8	(0.8)	-0.02	(0.01)	0.11	(0.04)	0.03	(0.04)	0.05	(0.04)	-0.02	(0.01)	-0.04	(0.04)	-0.05	(0.04)	0.02	(0.04)
Partners																		
Brazil	c	c	-0.36	(0.03)	m	m	m	m	m	m	-0.04	(0.03)	m	m	m	m	m	m
B-S-J-G (China)	c	c	-0.43	(0.03)	m	m	m	m	m	m	-0.38	(0.03)	m	m	m	m	m	m
Colombia	c	c	0.56	(0.04)	m	m	m	m	m	m	0.59	(0.05)	m	m	m	m	m	m
Dominican Republic	c	c	0.86	(0.06)	m	m	m	m	m	m	0.97	(0.05)	m	m	m	m	m	m
Hong Kong (China)	c	c	-0.29	(0.03)	c	c	c	c	c	c	-0.58	(0.04)	c	c	c	c	c	c
Macao (China)	23.1	(0.0)	-0.25	(0.00)	-0.11	(0.00)	**0.14**	(0.00)	**0.01**	(0.00)	-0.59	(0.00)	-0.36	(0.00)	**0.23**	(0.00)	**0.03**	(0.00)
Peru	6.5	(1.2)	0.18	(0.04)	0.08	(0.15)	-0.10	(0.15)	-0.01	(0.16)	0.22	(0.04)	0.11	(0.19)	-0.12	(0.19)	-0.04	(0.20)
Chinese Taipei	c	c	-0.16	(0.02)	m	m	m	m	m	m	-0.33	(0.03)	m	m	m	m	m	m
United Arab Emirates	45.1	(1.1)	-0.33	(0.02)	0.08	(0.06)	**0.40**	(0.06)	**0.40**	(0.07)	0.00	(0.03)	0.02	(0.05)	0.01	(0.06)	**0.15**	(0.07)
Average-18	17.5	(0.6)	-0.02	(0.01)	0.08	(0.03)	**0.07**	(0.03)	**0.08**	(0.03)	-0.02	(0.01)	-0.05	(0.04)	-0.02	(0.04)	0.03	(0.04)
Malaysia*	37.8	(3.6)	0.61	(0.04)	0.19	(0.06)	**-0.41**	(0.07)	**-0.39**	(0.07)	0.14	(0.05)	-0.31	(0.06)	**-0.45**	(0.07)	**-0.43**	(0.07)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.
Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 5.3. Students' enjoyment of science and science teachers' satisfaction

Results based on students' and science teachers' reports

	Students' index of enjoyment of science at the school level				Average satisfaction with the teaching profession, by quarter of students' index of enjoyment of science at the school level								Change in satisfaction with the teaching profession associated with a one-unit change in students' index of enjoyment of science at the school level				Average satisfaction with the current job, by quarter of students' index of enjoyment of science at the school level								Change in satisfaction with the current job associated with a one-unit change in students' index of enjoyment of science at the school level			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	0.07	(0.05)	1.18	(0.03)	0.03	(0.03)	0.03	(0.04)	0.09	(0.04)	0.10	(0.04)	**0.09**	(0.04)	0.03	(0.05)	0.03	(0.05)	0.09	(0.04)	0.14	(0.04)	0.17	(0.05)	**0.19**	(0.06)	0.07	(0.06)
Chile	0.01	(0.11)	1.13	(0.06)	-0.15	(0.09)	-0.29	(0.09)	0.06	(0.09)	0.17	(0.08)	**0.55**	(0.17)	**0.45**	(0.17)	-0.07	(0.11)	-0.16	(0.13)	0.18	(0.10)	0.30	(0.10)	**0.60**	(0.23)	0.40	(0.22)
Czech Republic	-0.32	(0.06)	1.01	(0.04)	-0.36	(0.05)	-0.28	(0.05)	-0.34	(0.04)	-0.31	(0.05)	0.06	(0.07)	0.00	(0.08)	-0.20	(0.06)	-0.16	(0.06)	-0.26	(0.05)	-0.18	(0.05)	0.04	(0.09)	0.04	(0.10)
Germany	-0.20	(0.09)	1.18	(0.07)	0.56	(0.07)	0.49	(0.07)	0.52	(0.07)	0.57	(0.05)	0.03	(0.07)	-0.03	(0.10)	0.05	(0.10)	0.09	(0.08)	0.10	(0.09)	0.15	(0.06)	0.12	(0.09)	0.04	(0.11)
Italy	0.07	(0.07)	1.00	(0.05)	-0.17	(0.07)	-0.10	(0.06)	-0.16	(0.05)	-0.17	(0.06)	0.02	(0.08)	-0.03	(0.09)	-0.30	(0.07)	-0.25	(0.06)	-0.26	(0.06)	-0.15	(0.05)	0.12	(0.07)	0.10	(0.09)
Korea	-0.11	(0.09)	1.09	(0.07)	-0.37	(0.07)	-0.31	(0.07)	-0.45	(0.07)	-0.30	(0.07)	0.09	(0.11)	0.15	(0.12)	-0.55	(0.09)	-0.50	(0.09)	-0.45	(0.09)	-0.37	(0.06)	**0.22**	(0.11)	**0.31**	(0.13)
Portugal	0.45	(0.07)	0.88	(0.05)	-0.34	(0.08)	-0.27	(0.07)	-0.34	(0.07)	-0.16	(0.09)	0.27	(0.23)	0.22	(0.23)	0.00	(0.07)	0.15	(0.09)	0.22	(0.06)	0.27	(0.06)	**0.45**	(0.15)	**0.38**	(0.15)
Spain	0.02	(0.09)	1.11	(0.05)	0.33	(0.06)	0.51	(0.07)	0.45	(0.06)	0.61	(0.05)	**0.28**	(0.12)	0.15	(0.12)	0.07	(0.08)	0.22	(0.08)	0.16	(0.08)	0.33	(0.07)	**0.31**	(0.12)	0.18	(0.13)
United States	0.27	(0.09)	1.14	(0.06)	-0.23	(0.08)	-0.04	(0.07)	0.02	(0.09)	-0.04	(0.08)	0.16	(0.18)	0.12	(0.17)	-0.16	(0.10)	0.14	(0.08)	0.09	(0.12)	0.19	(0.08)	**0.49**	(0.18)	**0.35**	(0.16)
OECD average-9	0.03	(0.03)	1.08	(0.02)	-0.08	(0.02)	-0.03	(0.02)	-0.02	(0.02)	0.05	(0.02)	**0.17**	(0.04)	**0.12**	(0.05)	-0.12	(0.03)	-0.04	(0.03)	-0.01	(0.03)	0.08	(0.02)	**0.28**	(0.04)	**0.21**	(0.04)
Partners																												
Brazil	0.23	(0.07)	0.95	(0.05)	-0.45	(0.06)	-0.38	(0.05)	-0.32	(0.08)	-0.32	(0.07)	**0.26**	(0.12)	0.13	(0.12)	-0.16	(0.08)	-0.13	(0.07)	0.11	(0.07)	0.00	(0.06)	**0.36**	(0.10)	**0.27**	(0.11)
B-S-J-G (China)	0.41	(0.08)	0.90	(0.06)	-0.45	(0.04)	-0.46	(0.05)	-0.47	(0.06)	-0.35	(0.07)	0.24	(0.14)	0.23	(0.18)	-0.47	(0.06)	-0.44	(0.05)	-0.40	(0.07)	-0.22	(0.08)	**0.46**	(0.16)	**0.43**	(0.19)
Colombia	0.25	(0.06)	0.86	(0.04)	0.53	(0.10)	0.55	(0.07)	0.51	(0.08)	0.66	(0.09)	0.09	(0.17)	0.02	(0.20)	0.51	(0.09)	0.58	(0.11)	0.60	(0.09)	0.67	(0.09)	0.19	(0.15)	0.24	(0.16)
Dominican Republic	0.67	(0.09)	0.98	(0.06)	0.84	(0.11)	0.78	(0.13)	0.77	(0.13)	1.06	(0.10)	0.35	(0.18)	0.30	(0.19)	0.95	(0.09)	0.85	(0.10)	0.89	(0.12)	1.21	(0.06)	**0.46**	(0.17)	**0.44**	(0.18)
Hong Kong (China)	0.26	(0.10)	1.09	(0.07)	-0.30	(0.04)	-0.21	(0.07)	-0.28	(0.07)	-0.32	(0.06)	-0.15	(0.11)	-0.18	(0.13)	-0.66	(0.06)	-0.52	(0.09)	-0.51	(0.07)	-0.59	(0.07)	0.01	(0.15)	-0.08	(0.16)
Macao (China)	0.15	(0.00)	1.08	(0.00)	-0.24	(0.00)	-0.28	(0.00)	-0.08	(0.00)	-0.27	(0.00)	**0.14**	(0.00)	**0.19**	(0.00)	-0.55	(0.00)	-0.55	(0.00)	-0.42	(0.00)	-0.65	(0.00)	**0.04**	(0.00)	**0.07**	(0.00)
Peru	0.37	(0.07)	0.98	(0.05)	0.15	(0.09)	0.15	(0.08)	0.11	(0.06)	0.29	(0.07)	0.18	(0.16)	0.22	(0.18)	0.17	(0.08)	0.18	(0.09)	0.23	(0.08)	0.30	(0.08)	0.06	(0.16)	0.04	(0.16)
Chinese Taipei	-0.21	(0.07)	1.00	(0.05)	-0.19	(0.06)	-0.14	(0.05)	-0.18	(0.04)	-0.12	(0.05)	0.12	(0.09)	0.04	(0.11)	-0.40	(0.08)	-0.31	(0.07)	-0.37	(0.06)	-0.24	(0.07)	**0.28**	(0.14)	0.14	(0.15)
United Arab Emirates	0.49	(0.05)	1.07	(0.04)	-0.22	(0.05)	-0.25	(0.05)	-0.12	(0.06)	0.02	(0.07)	**0.29**	(0.11)	0.16	(0.11)	-0.02	(0.05)	-0.03	(0.04)	0.00	(0.05)	0.08	(0.07)	0.16	(0.10)	0.14	(0.10)
Average-18	0.16	(0.02)	1.04	(0.01)	-0.06	(0.02)	-0.03	(0.02)	-0.01	(0.02)	0.06	(0.02)	**0.17**	(0.03)	**0.12**	(0.03)	-0.10	(0.02)	-0.04	(0.02)	0.00	(0.02)	0.07	(0.02)	**0.25**	(0.03)	**0.20**	(0.03)
Malaysia*	0.49	(0.07)	0.81	(0.06)	0.37	(0.07)	0.27	(0.08)	0.52	(0.07)	0.66	(0.06)	**0.54**	(0.12)	**0.59**	(0.13)	-0.13	(0.08)	-0.20	(0.08)	0.02	(0.08)	0.19	(0.06)	**0.55**	(0.13)	**0.60**	(0.15)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.
Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 5.4. Students' motivation to achieve and science teachers' satisfaction

Results based on students' and science teachers' reports

	Students' index of achievement motivation at the school level				Average satisfaction with the teaching profession, by quarter of students' index of achievement motivation at the school level								Change in satisfaction with the teaching profession associated with a one-unit change in students' index of achievement motivation at the school level				Average satisfaction with the current job, by quarter of students' index of achievement motivation at the school level								Change in satisfaction with the current job associated with a one-unit change in students' index of achievement motivation at the school level			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	0.34	(0.04)	0.97	(0.02)	0.01	(0.04)	0.06	(0.04)	0.07	(0.05)	0.11	(0.04)	0.14	(0.07)	0.06	(0.08)	0.06	(0.05)	0.06	(0.05)	0.09	(0.05)	0.22	(0.05)	**0.25**	(0.08)	0.12	(0.08)
Chile	0.28	(0.07)	0.85	(0.04)	-0.11	(0.11)	0.02	(0.12)	-0.14	(0.10)	-0.01	(0.09)	0.08	(0.24)	-0.17	(0.24)	-0.01	(0.10)	0.04	(0.14)	-0.15	(0.13)	0.36	(0.10)	**0.54**	(0.23)	0.23	(0.23)
Czech Republic	-0.35	(0.05)	0.76	(0.04)	-0.37	(0.04)	-0.41	(0.06)	-0.22	(0.05)	-0.29	(0.04)	0.18	(0.11)	0.13	(0.11)	-0.23	(0.05)	-0.23	(0.07)	-0.17	(0.05)	-0.19	(0.06)	0.12	(0.11)	0.10	(0.11)
Germany	-0.44	(0.06)	0.81	(0.04)	0.48	(0.08)	0.56	(0.04)	0.49	(0.06)	0.55	(0.07)	-0.02	(0.14)	-0.05	(0.15)	0.19	(0.09)	0.19	(0.05)	0.02	(0.07)	-0.07	(0.10)	**-0.52**	(0.17)	**-0.56**	(0.17)
Italy	-0.09	(0.06)	0.84	(0.04)	-0.13	(0.06)	-0.15	(0.06)	-0.14	(0.06)	-0.18	(0.06)	-0.12	(0.14)	-0.08	(0.13)	-0.27	(0.07)	-0.16	(0.06)	-0.25	(0.05)	-0.28	(0.06)	-0.08	(0.14)	-0.07	(0.14)
Korea	0.28	(0.08)	0.96	(0.06)	-0.36	(0.09)	-0.42	(0.06)	-0.36	(0.07)	-0.30	(0.07)	0.05	(0.17)	0.24	(0.16)	-0.59	(0.12)	-0.48	(0.08)	-0.41	(0.07)	-0.40	(0.08)	0.17	(0.19)	**0.39**	(0.19)
Portugal	0.30	(0.07)	0.86	(0.04)	-0.34	(0.05)	-0.31	(0.07)	-0.35	(0.08)	-0.11	(0.06)	**0.41**	(0.11)	**0.36**	(0.15)	0.00	(0.08)	0.02	(0.07)	0.25	(0.06)	0.32	(0.06)	**0.56**	(0.15)	**0.42**	(0.17)
Spain	-0.17	(0.07)	0.95	(0.05)	0.38	(0.05)	0.36	(0.05)	0.43	(0.05)	0.73	(0.08)	**0.52**	(0.12)	**0.37**	(0.14)	0.09	(0.09)	0.13	(0.06)	0.11	(0.07)	0.45	(0.08)	**0.53**	(0.15)	**0.37**	(0.17)
United States	0.79	(0.08)	0.94	(0.04)	-0.14	(0.08)	0.01	(0.09)	-0.09	(0.07)	-0.06	(0.08)	0.04	(0.16)	0.04	(0.15)	0.16	(0.11)	0.05	(0.10)	0.03	(0.09)	0.04	(0.09)	-0.13	(0.21)	-0.12	(0.19)
OECD average-9	0.10	(0.02)	0.88	(0.01)	-0.06	(0.02)	-0.03	(0.02)	-0.04	(0.02)	0.05	(0.02)	**0.14**	(0.05)	**0.10**	(0.05)	-0.07	(0.03)	-0.04	(0.03)	-0.05	(0.02)	0.05	(0.03)	**0.16**	(0.05)	0.10	(0.06)
Partners																												
Brazil	0.08	(0.05)	0.77	(0.03)	-0.38	(0.08)	-0.38	(0.05)	-0.44	(0.06)	-0.24	(0.08)	0.25	(0.15)	-0.02	(0.13)	-0.01	(0.08)	-0.10	(0.07)	-0.07	(0.06)	0.02	(0.06)	0.08	(0.15)	-0.16	(0.16)
B-S-J-G (China)	0.11	(0.06)	0.82	(0.07)	-0.43	(0.04)	-0.43	(0.05)	-0.57	(0.06)	-0.30	(0.06)	0.24	(0.17)	0.20	(0.18)	-0.49	(0.05)	-0.39	(0.06)	-0.46	(0.07)	-0.19	(0.08)	**0.58**	(0.19)	**0.47**	(0.21)
Colombia	0.57	(0.05)	0.72	(0.03)	0.50	(0.10)	0.56	(0.09)	0.55	(0.09)	0.65	(0.08)	0.10	(0.24)	0.26	(0.25)	0.57	(0.10)	0.50	(0.08)	0.64	(0.11)	0.65	(0.09)	-0.03	(0.22)	-0.11	(0.23)
Dominican Republic	0.37	(0.09)	0.81	(0.09)	1.01	(0.13)	0.82	(0.12)	0.72	(0.12)	0.93	(0.08)	-0.16	(0.35)	-0.06	(0.37)	1.14	(0.06)	0.91	(0.11)	0.81	(0.11)	1.07	(0.08)	-0.19	(0.23)	-0.14	(0.23)
Hong Kong (China)	0.17	(0.09)	1.09	(0.09)	-0.22	(0.07)	-0.34	(0.05)	-0.29	(0.06)	-0.25	(0.06)	0.06	(0.15)	-0.01	(0.18)	-0.58	(0.08)	-0.55	(0.06)	-0.62	(0.08)	-0.54	(0.07)	0.15	(0.18)	-0.12	(0.19)
Macao (China)	-0.67	(0.00)	0.93	(0.00)	-0.20	(0.00)	-0.23	(0.00)	-0.38	(0.00)	-0.06	(0.00)	**0.61**	(0.00)	**0.43**	(0.01)	-0.55	(0.00)	-0.63	(0.00)	-0.68	(0.00)	-0.30	(0.00)	**1.00**	(0.00)	**0.69**	(0.01)
Peru	0.38	(0.04)	0.74	(0.04)	0.20	(0.08)	0.13	(0.08)	0.12	(0.06)	0.25	(0.06)	0.21	(0.17)	0.18	(0.19)	0.26	(0.09)	0.10	(0.07)	0.20	(0.07)	0.30	(0.08)	0.04	(0.19)	-0.04	(0.20)
Chinese Taipei	-0.11	(0.07)	0.90	(0.05)	-0.19	(0.04)	-0.17	(0.06)	-0.18	(0.04)	-0.10	(0.05)	0.18	(0.10)	0.06	(0.16)	-0.47	(0.06)	-0.34	(0.07)	-0.33	(0.05)	-0.18	(0.08)	**0.57**	(0.17)	0.37	(0.22)
United Arab Emirates	0.83	(0.05)	0.97	(0.04)	0.09	(0.05)	-0.10	(0.07)	-0.22	(0.06)	-0.34	(0.04)	**-0.54**	(0.10)	**-0.44**	(0.09)	0.04	(0.06)	-0.01	(0.05)	0.00	(0.04)	0.01	(0.05)	-0.09	(0.11)	-0.09	(0.10)
Average-18	0.15	(0.01)	0.87	(0.01)	-0.01	(0.02)	-0.02	(0.02)	-0.06	(0.02)	0.05	(0.02)	**0.12**	(0.04)	**0.08**	(0.04)	-0.04	(0.02)	-0.05	(0.02)	-0.05	(0.02)	0.07	(0.02)	**0.20**	(0.04)	**0.10**	(0.04)
Malaysia*	0.86	(0.07)	0.89	(0.03)	0.20	(0.07)	0.42	(0.05)	0.53	(0.08)	0.66	(0.06)	**0.47**	(0.08)	**0.45**	(0.08)	-0.37	(0.08)	-0.03	(0.08)	0.08	(0.06)	0.19	(0.06)	**0.55**	(0.09)	**0.53**	(0.09)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.5. Students' schoolwork-related anxiety and science teachers' satisfaction

Results based on students' and science teachers' reports

	Students' index of schoolwork-related anxiety at the school level				Average satisfaction with the teaching profession, by quarter of students' index of schoolwork-related anxiety at the school level								Change in satisfaction with the teaching profession associated with a one-unit change in students' index of schoolwork-related anxiety at the school level				Average satisfaction with the current job, by quarter of students' index of schoolwork-related anxiety at the school level								Change in satisfaction with the current job associated with a one-unit change in students' index of schoolwork-related anxiety at the school level			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	0.21	(0.04)	0.93	(0.03)	0.15	(0.04)	0.06	(0.04)	0.05	(0.04)	-0.01	(0.04)	**-0.20**	(0.06)	**-0.18**	(0.06)	0.17	(0.04)	0.15	(0.05)	0.09	(0.04)	0.03	(0.04)	**-0.20**	(0.08)	-0.14	(0.08)
Chile	0.13	(0.07)	0.86	(0.05)	-0.02	(0.11)	0.04	(0.10)	-0.17	(0.11)	-0.09	(0.11)	-0.30	(0.25)	-0.11	(0.26)	0.23	(0.08)	-0.02	(0.14)	0.06	(0.13)	-0.05	(0.10)	**-0.49**	(0.24)	-0.25	(0.24)
Czech Republic	-0.15	(0.05)	0.87	(0.05)	-0.33	(0.04)	-0.31	(0.05)	-0.34	(0.05)	-0.31	(0.05)	0.02	(0.07)	-0.01	(0.07)	-0.15	(0.06)	-0.21	(0.05)	-0.27	(0.06)	-0.18	(0.07)	-0.05	(0.12)	-0.07	(0.11)
Germany	-0.34	(0.07)	0.83	(0.06)	0.44	(0.05)	0.53	(0.06)	0.56	(0.07)	0.55	(0.06)	0.19	(0.10)	**0.28**	(0.11)	0.03	(0.07)	0.16	(0.09)	0.06	(0.09)	0.08	(0.07)	-0.07	(0.15)	0.06	(0.15)
Italy	0.44	(0.08)	1.04	(0.05)	-0.13	(0.06)	-0.15	(0.05)	-0.14	(0.06)	-0.17	(0.07)	-0.09	(0.13)	-0.09	(0.13)	-0.25	(0.05)	-0.30	(0.07)	-0.20	(0.04)	-0.22	(0.07)	0.02	(0.12)	0.02	(0.11)
Korea	-0.02	(0.08)	0.91	(0.07)	-0.29	(0.10)	-0.40	(0.05)	-0.45	(0.06)	-0.30	(0.05)	-0.10	(0.19)	-0.10	(0.18)	-0.40	(0.11)	-0.44	(0.07)	-0.49	(0.09)	-0.54	(0.08)	-0.22	(0.22)	-0.25	(0.20)
Portugal	0.58	(0.07)	0.94	(0.06)	-0.31	(0.09)	-0.31	(0.06)	-0.19	(0.07)	-0.29	(0.06)	0.20	(0.25)	0.35	(0.26)	0.14	(0.08)	0.14	(0.07)	0.23	(0.06)	0.15	(0.06)	0.17	(0.19)	0.36	(0.20)
Spain	0.38	(0.06)	0.82	(0.04)	0.57	(0.05)	0.38	(0.07)	0.50	(0.06)	0.44	(0.06)	**-0.33**	(0.13)	-0.20	(0.14)	0.26	(0.08)	0.27	(0.08)	0.12	(0.09)	0.13	(0.08)	**-0.40**	(0.17)	-0.28	(0.17)
United States	0.32	(0.08)	1.03	(0.06)	-0.04	(0.07)	-0.08	(0.08)	-0.14	(0.08)	-0.02	(0.08)	0.03	(0.17)	0.13	(0.18)	0.21	(0.08)	0.10	(0.12)	-0.06	(0.10)	0.04	(0.09)	-0.29	(0.21)	-0.09	(0.19)
OECD average-9	0.17	(0.02)	0.91	(0.02)	0.00	(0.02)	-0.03	(0.02)	-0.03	(0.02)	-0.02	(0.02)	-0.06	(0.05)	0.01	(0.06)	0.03	(0.03)	-0.02	(0.03)	-0.05	(0.03)	-0.06	(0.03)	**-0.17**	(0.06)	-0.07	(0.06)
Partners																												
Brazil	0.60	(0.05)	0.77	(0.04)	-0.35	(0.07)	-0.39	(0.06)	-0.31	(0.06)	-0.40	(0.07)	-0.07	(0.20)	-0.03	(0.19)	-0.03	(0.08)	-0.08	(0.07)	-0.02	(0.07)	-0.04	(0.06)	0.09	(0.19)	0.13	(0.20)
B-S-J-G (China)	0.30	(0.06)	0.93	(0.07)	-0.47	(0.04)	-0.40	(0.07)	-0.42	(0.04)	-0.44	(0.06)	0.14	(0.14)	0.21	(0.13)	-0.35	(0.05)	-0.40	(0.08)	-0.42	(0.07)	-0.37	(0.07)	0.07	(0.14)	0.14	(0.14)
Colombia	0.47	(0.05)	0.68	(0.05)	0.43	(0.09)	0.73	(0.09)	0.54	(0.09)	0.54	(0.08)	0.17	(0.20)	0.15	(0.22)	0.37	(0.09)	0.64	(0.09)	0.67	(0.09)	0.65	(0.09)	**0.73**	(0.20)	**0.77**	(0.21)
Dominican Republic	0.35	(0.08)	0.74	(0.07)	0.74	(0.12)	0.91	(0.11)	0.88	(0.11)	0.89	(0.13)	0.18	(0.28)	0.41	(0.28)	0.82	(0.12)	1.15	(0.06)	0.84	(0.12)	1.05	(0.08)	0.23	(0.27)	0.39	(0.28)
Hong Kong (China)	0.37	(0.08)	1.00	(0.08)	-0.31	(0.06)	-0.22	(0.07)	-0.33	(0.06)	-0.25	(0.05)	-0.09	(0.16)	-0.13	(0.16)	-0.71	(0.07)	-0.44	(0.09)	-0.61	(0.05)	-0.52	(0.07)	0.17	(0.22)	0.10	(0.20)
Macao (China)	0.18	(0.00)	1.26	(0.00)	-0.17	(0.00)	-0.31	(0.00)	-0.25	(0.00)	-0.15	(0.00)	**0.03**	(0.00)	**0.08**	(0.00)	-0.56	(0.00)	-0.54	(0.00)	-0.60	(0.00)	-0.48	(0.00)	0.00	(0.00)	**0.13**	(0.00)
Peru	0.15	(0.05)	0.76	(0.05)	0.17	(0.08)	0.20	(0.07)	0.12	(0.08)	0.21	(0.07)	0.09	(0.24)	0.01	(0.24)	0.08	(0.09)	0.36	(0.07)	0.10	(0.09)	0.31	(0.07)	0.33	(0.23)	0.27	(0.23)
Chinese Taipei	0.27	(0.06)	0.90	(0.07)	-0.14	(0.04)	-0.19	(0.05)	-0.12	(0.05)	-0.19	(0.04)	-0.03	(0.13)	-0.08	(0.13)	-0.37	(0.06)	-0.28	(0.05)	-0.30	(0.08)	-0.37	(0.07)	-0.01	(0.17)	-0.11	(0.16)
United Arab Emirates	0.21	(0.05)	0.92	(0.04)	-0.01	(0.08)	-0.13	(0.05)	-0.25	(0.06)	-0.18	(0.04)	**-0.29**	(0.14)	-0.17	(0.14)	0.03	(0.07)	0.05	(0.05)	-0.06	(0.05)	0.01	(0.05)	-0.09	(0.14)	-0.08	(0.13)
Average-18	0.25	(0.01)	0.90	(0.01)	0.00	(0.02)	0.00	(0.02)	-0.02	(0.02)	-0.01	(0.02)	-0.03	(0.04)	0.03	(0.04)	-0.02	(0.02)	0.02	(0.02)	-0.05	(0.02)	-0.02	(0.02)	0.00	(0.04)	0.06	(0.04)
Malaysia*	0.40	(0.05)	0.73	(0.04)	0.47	(0.08)	0.52	(0.07)	0.52	(0.08)	0.30	(0.05)	**-0.53**	(0.23)	**-0.50**	(0.25)	-0.03	(0.10)	0.05	(0.08)	0.07	(0.07)	-0.21	(0.06)	-0.47	(0.27)	-0.40	(0.27)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.6. Students' perception of teacher fairness and science teachers' satisfaction

Results based on students' and science teachers' reports

	Student-reported index of teacher fairness at the school level				Average satisfaction with the teaching profession, by quarter of student-reported index of teacher fairness at the school level								Change in satisfaction with the teaching profession associated with a one-unit change in student-reported index of teacher fairness at the school level				Average satisfaction with the current job, by quarter of student-reported index of teacher fairness at the school level								Change in satisfaction with the current job associated with a one-unit change in student-reported index of teacher fairness at the school level			
	Mean		Variation		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	10.46	(0.18)	4.25	(0.14)	0.06	(0.04)	0.08	(0.04)	0.07	(0.04)	0.04	(0.05)	-0.02	(0.02)	0.00	(0.02)	0.14	(0.04)	0.19	(0.04)	0.09	(0.05)	0.00	(0.05)	**-0.04**	(0.02)	-0.01	(0.02)
Chile	9.14	(0.32)	3.47	(0.30)	-0.04	(0.11)	-0.16	(0.09)	0.03	(0.13)	-0.06	(0.11)	-0.03	(0.07)	-0.02	(0.06)	0.09	(0.13)	-0.01	(0.13)	0.01	(0.10)	0.16	(0.11)	-0.04	(0.08)	-0.04	(0.08)
Czech Republic	9.54	(0.21)	3.26	(0.21)	-0.35	(0.05)	-0.27	(0.04)	-0.34	(0.06)	-0.33	(0.05)	0.00	(0.02)	0.01	(0.02)	-0.23	(0.07)	-0.15	(0.06)	-0.24	(0.06)	-0.19	(0.06)	0.00	(0.03)	0.00	(0.03)
Germany	9.62	(0.18)	2.97	(0.14)	0.64	(0.06)	0.56	(0.06)	0.48	(0.07)	0.42	(0.06)	**-0.09**	(0.03)	**-0.08**	(0.03)	0.18	(0.09)	0.10	(0.07)	0.06	(0.10)	-0.01	(0.09)	-0.07	(0.05)	-0.06	(0.05)
Italy	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Korea	8.39	(0.28)	3.14	(0.31)	-0.29	(0.07)	-0.39	(0.06)	-0.38	(0.10)	-0.39	(0.07)	-0.05	(0.05)	-0.06	(0.05)	-0.40	(0.09)	-0.41	(0.07)	-0.52	(0.10)	-0.55	(0.08)	-0.09	(0.07)	-0.10	(0.07)
Portugal	10.16	(0.34)	4.17	(0.38)	-0.30	(0.08)	-0.22	(0.07)	-0.32	(0.07)	-0.25	(0.08)	0.01	(0.05)	0.00	(0.05)	0.18	(0.06)	0.22	(0.07)	0.08	(0.09)	0.19	(0.07)	-0.03	(0.04)	-0.04	(0.04)
Spain	9.07	(0.26)	3.55	(0.25)	0.47	(0.06)	0.49	(0.07)	0.45	(0.06)	0.48	(0.06)	0.00	(0.03)	0.01	(0.03)	0.23	(0.08)	0.19	(0.09)	0.17	(0.07)	0.18	(0.07)	-0.06	(0.04)	-0.04	(0.04)
United States	10.16	(0.29)	3.81	(0.27)	-0.02	(0.08)	0.01	(0.07)	-0.03	(0.07)	-0.25	(0.08)	-0.09	(0.05)	-0.07	(0.05)	0.13	(0.10)	0.34	(0.09)	-0.06	(0.10)	-0.16	(0.10)	**-0.19**	(0.06)	**-0.16**	(0.06)
OECD average-9	9.57	(0.09)	3.58	(0.09)	0.02	(0.03)	0.01	(0.02)	0.00	(0.03)	-0.04	(0.03)	**-0.03**	(0.02)	-0.03	(0.02)	0.04	(0.03)	0.06	(0.03)	-0.05	(0.03)	-0.05	(0.03)	**-0.07**	(0.02)	**-0.06**	(0.02)
Partners																												
Brazil	9.26	(0.24)	3.65	(0.26)	-0.27	(0.08)	-0.35	(0.06)	-0.35	(0.08)	-0.48	(0.05)	-0.06	(0.03)	-0.05	(0.03)	0.01	(0.07)	-0.03	(0.05)	0.05	(0.09)	-0.21	(0.07)	-0.06	(0.04)	-0.06	(0.04)
B-S-J-G (China)	10.12	(0.29)	3.80	(0.27)	-0.38	(0.06)	-0.43	(0.05)	-0.47	(0.05)	-0.45	(0.06)	-0.02	(0.03)	-0.01	(0.03)	-0.34	(0.07)	-0.38	(0.06)	-0.43	(0.06)	-0.38	(0.07)	-0.01	(0.03)	0.01	(0.03)
Colombia	9.10	(0.22)	3.23	(0.23)	0.74	(0.10)	0.47	(0.09)	0.57	(0.08)	0.49	(0.07)	-0.07	(0.06)	-0.04	(0.06)	0.72	(0.10)	0.44	(0.09)	0.69	(0.08)	0.53	(0.10)	-0.06	(0.05)	-0.05	(0.05)
Dominican Republic	8.60	(0.29)	3.36	(0.29)	1.11	(0.10)	0.85	(0.11)	0.71	(0.13)	0.83	(0.11)	-0.10	(0.05)	-0.06	(0.07)	1.20	(0.08)	0.95	(0.10)	0.82	(0.11)	0.96	(0.08)	**-0.11**	(0.04)	-0.11	(0.06)
Hong Kong (China)	10.86	(0.32)	3.75	(0.26)	-0.23	(0.07)	-0.25	(0.06)	-0.31	(0.06)	-0.32	(0.05)	-0.03	(0.03)	-0.02	(0.03)	-0.46	(0.07)	-0.50	(0.08)	-0.69	(0.07)	-0.65	(0.07)	**-0.08**	(0.03)	-0.05	(0.03)
Macao (China)	10.43	(0.00)	3.02	(0.00)	-0.15	(0.00)	-0.25	(0.00)	-0.26	(0.00)	-0.20	(0.00)	**-0.01**	(0.00)	**-0.03**	(0.00)	-0.53	(0.00)	-0.54	(0.00)	-0.59	(0.00)	-0.50	(0.00)	**0.03**	(0.00)	**-0.01**	(0.00)
Peru	9.87	(0.20)	3.30	(0.15)	0.35	(0.08)	0.16	(0.06)	0.06	(0.07)	0.14	(0.08)	-0.08	(0.04)	-0.06	(0.04)	0.36	(0.08)	0.15	(0.08)	0.26	(0.07)	0.10	(0.07)	-0.07	(0.03)	-0.06	(0.03)
Chinese Taipei	8.15	(0.21)	2.87	(0.28)	-0.07	(0.06)	-0.18	(0.05)	-0.16	(0.04)	-0.22	(0.05)	-0.06	(0.03)	-0.06	(0.03)	-0.18	(0.08)	-0.36	(0.07)	-0.37	(0.05)	-0.41	(0.06)	-0.10	(0.05)	-0.08	(0.05)
United Arab Emirates	10.66	(0.25)	4.42	(0.22)	-0.27	(0.07)	-0.10	(0.06)	-0.11	(0.06)	-0.10	(0.05)	**0.06**	(0.02)	**0.06**	(0.02)	0.02	(0.05)	-0.01	(0.06)	0.01	(0.05)	0.03	(0.05)	0.00	(0.02)	0.01	(0.02)
Average-18	9.62	(0.06)	3.53	(0.06)	0.06	(0.02)	0.00	(0.02)	-0.02	(0.02)	-0.04	(0.02)	**-0.04**	(0.01)	**-0.03**	(0.01)	0.07	(0.02)	0.01	(0.02)	-0.04	(0.02)	-0.05	(0.02)	**-0.06**	(0.01)	**-0.05**	(0.01)
Malaysia*	11.49	(0.35)	3.90	(0.27)	0.58	(0.07)	0.48	(0.06)	0.35	(0.10)	0.39	(0.06)	**-0.08**	(0.03)	**-0.11**	(0.04)	0.16	(0.08)	-0.10	(0.08)	-0.09	(0.08)	-0.09	(0.07)	**-0.08**	(0.04)	**-0.11**	(0.04)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.7. Students' exposure to bullying and science teachers' satisfaction

Results based on students' and science teachers' reports

	Student-reported index of being bullied at the school level				Average satisfaction with the teaching profession, by quarter of student-reported index of being bullied at the school level								Change in satisfaction with the teaching profession associated with a one-unit change in student-reported index of being bullied at the school level				Average satisfaction with the current job, by quarter of student-reported index of being bullied at the school level								Change in satisfaction with the current job associated with a one-unit change in student-reported index of being bullied at the school level			
	Mean		Variation		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	0.45	(0.01)	0.35	(0.01)	0.08	(0.04)	0.17	(0.04)	0.03	(0.04)	-0.03	(0.04)	**-0.13**	(0.05)	-0.07	(0.06)	0.26	(0.04)	0.16	(0.05)	0.06	(0.05)	-0.06	(0.05)	**-0.35**	(0.07)	**-0.22**	(0.07)
Chile	0.14	(0.01)	0.19	(0.01)	-0.03	(0.08)	-0.06	(0.11)	-0.01	(0.09)	-0.14	(0.11)	-0.20	(0.25)	-0.14	(0.23)	0.10	(0.10)	-0.03	(0.11)	-0.04	(0.13)	0.19	(0.14)	0.18	(0.27)	0.22	(0.25)
Czech Republic	0.15	(0.02)	0.36	(0.01)	-0.38	(0.04)	-0.26	(0.06)	-0.32	(0.06)	-0.34	(0.05)	0.04	(0.06)	0.06	(0.06)	-0.21	(0.06)	-0.13	(0.06)	-0.24	(0.05)	-0.23	(0.06)	-0.04	(0.08)	-0.02	(0.08)
Germany	0.18	(0.02)	0.25	(0.03)	0.63	(0.07)	0.49	(0.07)	0.52	(0.05)	0.45	(0.07)	**-0.28**	(0.13)	-0.23	(0.14)	0.13	(0.07)	0.18	(0.07)	0.07	(0.08)	-0.05	(0.07)	**-0.37**	(0.13)	**-0.30**	(0.14)
Italy	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Korea	-1.44	(0.02)	0.22	(0.01)	-0.30	(0.06)	-0.32	(0.07)	-0.40	(0.09)	-0.41	(0.08)	-0.25	(0.16)	-0.23	(0.17)	-0.45	(0.06)	-0.37	(0.08)	-0.48	(0.09)	-0.57	(0.08)	-0.21	(0.18)	-0.21	(0.19)
Portugal	-0.56	(0.02)	0.21	(0.01)	-0.27	(0.06)	-0.32	(0.07)	-0.18	(0.07)	-0.33	(0.10)	-0.06	(0.16)	0.00	(0.16)	0.17	(0.06)	0.14	(0.07)	0.24	(0.08)	0.12	(0.08)	0.01	(0.15)	0.06	(0.14)
Spain	-0.09	(0.01)	0.21	(0.01)	0.46	(0.06)	0.51	(0.06)	0.39	(0.06)	0.53	(0.07)	0.05	(0.15)	0.05	(0.15)	0.21	(0.08)	0.18	(0.08)	0.12	(0.08)	0.27	(0.08)	0.08	(0.19)	0.08	(0.19)
United States	0.16	(0.02)	0.24	(0.02)	-0.11	(0.07)	-0.04	(0.08)	-0.03	(0.08)	-0.10	(0.08)	0.10	(0.16)	0.08	(0.16)	-0.05	(0.11)	0.06	(0.10)	0.08	(0.09)	0.20	(0.09)	0.16	(0.21)	0.01	(0.19)
OECD average-9	-0.13	(0.01)	0.25	(0.01)	0.01	(0.02)	0.02	(0.02)	0.00	(0.02)	-0.05	(0.03)	-0.09	(0.05)	-0.06	(0.05)	0.02	(0.03)	0.02	(0.03)	-0.02	(0.03)	-0.02	(0.03)	-0.07	(0.06)	-0.05	(0.06)
Partners																												
Brazil	-0.25	(0.01)	0.29	(0.01)	-0.40	(0.06)	-0.41	(0.06)	-0.24	(0.07)	-0.41	(0.07)	0.04	(0.10)	0.01	(0.11)	0.00	(0.05)	-0.04	(0.06)	0.04	(0.09)	-0.20	(0.08)	-0.15	(0.12)	-0.20	(0.12)
B-S-J-G (China)	0.09	(0.02)	0.27	(0.02)	-0.41	(0.07)	-0.46	(0.05)	-0.32	(0.05)	-0.54	(0.05)	-0.07	(0.16)	0.01	(0.16)	-0.26	(0.08)	-0.46	(0.06)	-0.29	(0.06)	-0.52	(0.06)	-0.26	(0.16)	-0.12	(0.18)
Colombia	0.17	(0.01)	0.20	(0.01)	0.69	(0.08)	0.54	(0.08)	0.51	(0.09)	0.53	(0.09)	-0.07	(0.21)	-0.04	(0.21)	0.82	(0.08)	0.53	(0.10)	0.51	(0.10)	0.52	(0.09)	-0.39	(0.23)	-0.31	(0.23)
Dominican Republic	-0.34	(0.03)	0.35	(0.03)	0.93	(0.10)	1.06	(0.12)	0.80	(0.10)	0.54	(0.13)	**-0.36**	(0.15)	**-0.31**	(0.14)	1.09	(0.08)	1.05	(0.09)	0.94	(0.10)	0.73	(0.11)	**-0.27**	(0.11)	**-0.26**	(0.11)
Hong Kong (China)	0.22	(0.03)	0.31	(0.02)	-0.29	(0.07)	-0.29	(0.04)	-0.25	(0.04)	-0.29	(0.07)	0.02	(0.11)	-0.01	(0.11)	-0.57	(0.08)	-0.59	(0.07)	-0.51	(0.06)	-0.61	(0.08)	-0.04	(0.12)	-0.08	(0.11)
Macao (China)	0.49	(0.00)	0.27	(0.00)	-0.41	(0.00)	-0.08	(0.00)	-0.16	(0.00)	-0.23	(0.00)	**0.01**	(0.00)	**-0.13**	(0.00)	-0.75	(0.00)	-0.46	(0.00)	-0.38	(0.00)	-0.60	(0.00)	0.00	(0.00)	**-0.27**	(0.00)
Peru	-0.22	(0.02)	0.30	(0.01)	0.32	(0.07)	0.17	(0.09)	0.13	(0.07)	0.08	(0.08)	**-0.29**	(0.11)	**-0.25**	(0.12)	0.30	(0.07)	0.26	(0.10)	0.10	(0.07)	0.20	(0.08)	-0.23	(0.12)	-0.22	(0.13)
Chinese Taipei	-0.57	(0.01)	0.22	(0.01)	-0.15	(0.05)	-0.12	(0.05)	-0.21	(0.05)	-0.17	(0.04)	-0.05	(0.11)	-0.06	(0.11)	-0.33	(0.07)	-0.34	(0.07)	-0.32	(0.06)	-0.33	(0.07)	-0.01	(0.14)	-0.01	(0.13)
United Arab Emirates	0.30	(0.02)	0.42	(0.02)	-0.27	(0.05)	-0.12	(0.06)	-0.09	(0.05)	-0.10	(0.06)	0.09	(0.07)	0.09	(0.08)	0.01	(0.04)	-0.02	(0.03)	0.03	(0.06)	0.00	(0.07)	-0.03	(0.07)	-0.07	(0.07)
Average-18	-0.07	(0.00)	0.28	(0.00)	0.01	(0.02)	0.03	(0.02)	0.01	(0.02)	-0.06	(0.02)	**-0.08**	(0.03)	**-0.07**	(0.03)	0.03	(0.02)	0.01	(0.02)	0.00	(0.02)	-0.05	(0.02)	**-0.11**	(0.04)	**-0.11**	(0.04)
Malaysia*	0.66	(0.02)	0.28	(0.02)	0.64	(0.08)	0.43	(0.05)	0.44	(0.07)	0.30	(0.06)	**-0.49**	(0.14)	**-0.47**	(0.13)	0.21	(0.08)	-0.02	(0.09)	-0.05	(0.07)	-0.27	(0.07)	**-0.60**	(0.13)	**-0.58**	(0.13)

1. Science teachers' demographic profile includes the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Notes: Student variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.8. Science teachers' satisfaction and students' science-related career expectations

Results based on students' and science teachers' reports

	Percentage of students who expect to work in science-related occupations at age 30[1]		Percentage of student who expect to work in science-related occupations at age 30, by quarters of satisfaction with the teaching profession at the school level								Likelihood that students expect to work in science-related occupations at age 30 if their science teachers are satisfied with the teaching profession at the school level				Percentage of student who expect to work in science-related occupations at age 30, by quarters of satisfaction with the current job at the school level								Likelihood that students expect to work in science-related occupations at age 30 if their science teachers are satisfied with their the current job at the school level			
			Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile[1]		After accounting for students' and schools' socio-economic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile		After accounting for students' and schools' socio-economic profile	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD																										
Australia	29.9	(0.6)	28.9	(0.9)	29.4	(0.9)	29.6	(1.0)	32.1	(1.4)	**1.12**	(0.05)	1.06	(0.05)	26.6	(0.9)	31.5	(1.0)	29.9	(1.2)	32.0	(1.2)	**1.16**	(0.05)	1.05	(0.04)
Chile	38.5	(0.8)	34.7	(1.4)	38.5	(1.8)	43.0	(1.8)	39.4	(1.7)	**1.17**	(0.06)	**1.11**	(0.05)	33.3	(1.8)	36.9	(1.7)	42.2	(1.8)	43.1	(1.5)	**1.29**	(0.07)	**1.20**	(0.07)
Czech Republic	17.1	(0.7)	15.5	(1.4)	18.3	(1.4)	17.3	(1.5)	17.3	(1.5)	1.08	(0.12)	0.93	(0.11)	13.1	(1.4)	21.7	(1.6)	17.6	(1.6)	16.0	(1.4)	1.08	(0.12)	1.02	(0.10)
Germany	17.3	(0.5)	15.6	(1.3)	17.8	(1.4)	18.2	(1.3)	18.7	(1.4)	1.21	(0.14)	1.07	(0.10)	16.1	(1.7)	17.3	(1.3)	19.1	(1.3)	17.6	(1.3)	1.08	(0.11)	0.97	(0.08)
Italy	23.0	(1.0)	23.5	(2.1)	22.8	(2.2)	23.8	(2.1)	25.4	(2.4)	1.15	(0.14)	1.01	(0.12)	19.8	(2.0)	22.4	(2.0)	27.0	(2.3)	26.2	(2.2)	1.19	(0.15)	1.10	(0.13)
Korea	19.4	(0.7)	20.3	(1.6)	18.8	(1.6)	20.1	(1.6)	18.0	(1.9)	0.92	(0.13)	0.95	(0.13)	18.0	(1.9)	19.3	(1.8)	19.6	(1.6)	20.4	(1.7)	1.10	(0.15)	1.12	(0.15)
Portugal	27.8	(0.8)	29.4	(1.8)	27.5	(1.6)	33.1	(1.6)	32.3	(1.9)	1.13	(0.14)	1.05	(0.11)	28.3	(1.4)	30.2	(1.8)	32.3	(1.7)	31.5	(1.6)	**1.15**	(0.07)	1.05	(0.07)
Spain	28.9	(0.7)	27.4	(1.4)	25.7	(1.4)	31.9	(1.4)	30.4	(1.5)	**1.21**	(0.09)	1.04	(0.08)	28.8	(1.7)	29.1	(1.2)	27.9	(1.2)	29.8	(1.5)	1.06	(0.06)	0.93	(0.05)
United States	38.3	(0.8)	38.2	(1.6)	39.0	(1.6)	36.6	(1.7)	41.0	(1.5)	1.05	(0.07)	1.03	(0.06)	36.4	(1.5)	37.2	(1.6)	38.2	(1.7)	43.0	(1.7)	**1.21**	(0.07)	**1.17**	(0.07)
OECD average-9	26.7	(0.2)	26.0	(0.5)	26.4	(0.5)	28.2	(0.5)	28.3	(0.6)	**1.12**	(0.04)	1.03	(0.03)	24.5	(0.5)	27.3	(0.5)	28.2	(0.5)	28.8	(0.5)	**1.15**	(0.03)	**1.07**	(0.03)
Partners																										
Brazil	40.8	(0.6)	42.7	(1.4)	41.2	(1.3)	41.5	(1.3)	45.5	(1.7)	1.05	(0.06)	0.98	(0.06)	39.1	(1.3)	41.6	(1.3)	45.8	(1.5)	44.5	(1.6)	**1.15**	(0.06)	1.09	(0.05)
B-S-J-G (China)	16.9	(0.7)	16.9	(1.6)	15.0	(1.4)	15.2	(1.2)	20.7	(1.1)	1.18	(0.17)	1.10	(0.14)	15.0	(1.5)	18.4	(1.3)	16.5	(1.5)	17.9	(1.2)	1.16	(0.12)	1.05	(0.11)
Colombia	40.3	(0.8)	37.6	(1.6)	40.5	(1.6)	42.8	(1.5)	40.5	(1.9)	1.09	(0.07)	1.09	(0.07)	40.4	(1.7)	39.0	(1.5)	40.3	(1.3)	41.7	(1.7)	1.02	(0.06)	1.01	(0.06)
Dominican Republic	46.0	(1.0)	46.0	(1.8)	47.6	(1.9)	50.2	(1.8)	45.6	(2.6)	1.01	(0.06)	1.02	(0.06)	46.0	(1.9)	48.1	(1.9)	46.1	(1.4)	49.2	(2.8)	1.11	(0.09)	1.12	(0.09)
Hong Kong (China)	24.0	(0.7)	21.3	(1.5)	24.5	(1.8)	23.5	(1.3)	26.9	(1.4)	1.24	(0.18)	1.11	(0.15)	19.9	(1.5)	24.9	(1.3)	24.3	(1.4)	26.9	(1.5)	**1.40**	(0.14)	1.19	(0.12)
Macao (China)	20.8	(0.6)	20.7	(1.2)	20.8	(1.1)	18.0	(1.0)	23.8	(1.2)	**1.26**	(0.13)	1.05	(0.11)	21.6	(1.2)	19.7	(1.1)	17.9	(1.2)	24.2	(1.2)	1.12	(0.08)	0.96	(0.07)
Peru	38.7	(0.8)	36.9	(1.5)	41.6	(1.5)	41.2	(1.8)	37.3	(1.6)	0.98	(0.05)	0.95	(0.05)	38.1	(1.6)	40.2	(1.6)	40.1	(1.9)	38.7	(1.8)	1.03	(0.05)	1.03	(0.05)
Chinese Taipei	20.9	(0.8)	20.6	(2.0)	19.1	(1.3)	20.5	(1.5)	24.6	(1.8)	**1.53**	(0.25)	1.40	(0.25)	18.7	(1.9)	19.1	(1.6)	23.4	(2.0)	23.6	(1.9)	1.29	(0.20)	1.11	(0.16)
United Arab Emirates	42.2	(0.5)	42.7	(1.1)	41.9	(1.2)	44.0	(1.3)	41.7	(1.4)	1.03	(0.05)	1.03	(0.05)	43.2	(1.1)	42.9	(1.1)	41.8	(1.5)	42.4	(1.4)	0.95	(0.05)	0.96	(0.05)
Average-18	29.5	(0.2)	28.8	(0.4)	29.5	(0.4)	30.6	(0.4)	31.2	(0.4)	**1.13**	(0.03)	**1.05**	(0.03)	27.9	(0.4)	30.0	(0.4)	30.6	(0.4)	31.6	(0.4)	**1.14**	(0.02)	**1.06**	(0.02)
Malaysia*	29.3	(0.9)	26.9	(1.4)	28.8	(1.8)	30.9	(2.2)	30.8	(1.8)	**1.23**	(0.12)	**1.29**	(0.11)	27.4	(1.5)	28.6	(1.8)	32.0	(2.0)	29.4	(1.9)	1.12	(0.09)	**1.18**	(0.09)

1. See Annex for the list of science-related occupations.
2. Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.

Notes: Teacher variables are aggregated at the school level.
Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 5.9. Science teachers' satisfaction and disciplinary climate

Results based on students' and science teachers' reports

	Average student-reported index of discliplinary climate, by quarters of satisfaction with the teaching profession at the school level								Change in student-reported index of discliplinary climate associated with a one-unit change in satisfaction with the teaching profession at the school level				Average student-reported index of discliplinary climate, by quarters of satisfaction with the current job at the school level								Change in student-reported index of discliplinary climate associated with a one-unit change in satisfaction with the current job at the school level			
	Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile[1]		After accounting for students' and schools' socio-economic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile		After accounting for students' and schools' socio-economic profile	
	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																								
Australia	-0.23	(0.03)	-0.24	(0.04)	-0.14	(0.03)	-0.16	(0.03)	0.04	(0.03)	0.01	(0.03)	-0.27	(0.03)	-0.23	(0.03)	-0.14	(0.03)	-0.12	(0.03)	**0.09**	(0.03)	0.03	(0.03)
Chile	-0.20	(0.06)	-0.15	(0.04)	-0.01	(0.07)	-0.07	(0.05)	**0.10**	(0.05)	0.08	(0.05)	-0.23	(0.06)	-0.11	(0.07)	-0.07	(0.05)	-0.03	(0.06)	**0.11**	(0.04)	0.08	(0.05)
Czech Republic	-0.30	(0.05)	-0.29	(0.06)	-0.21	(0.05)	-0.15	(0.04)	**0.18**	(0.06)	**0.12**	(0.06)	-0.36	(0.05)	-0.25	(0.06)	-0.14	(0.05)	-0.20	(0.05)	**0.18**	(0.06)	**0.16**	(0.05)
Germany	-0.03	(0.04)	0.10	(0.04)	0.11	(0.04)	0.03	(0.05)	0.04	(0.05)	0.01	(0.04)	-0.02	(0.05)	0.07	(0.04)	0.04	(0.05)	0.11	(0.04)	**0.08**	(0.04)	0.05	(0.04)
Italy	-0.05	(0.04)	-0.12	(0.06)	-0.05	(0.04)	0.01	(0.04)	0.06	(0.05)	0.02	(0.04)	-0.17	(0.06)	-0.08	(0.04)	0.03	(0.05)	0.02	(0.04)	**0.13**	(0.06)	0.10	(0.05)
Korea	0.52	(0.06)	0.66	(0.04)	0.72	(0.06)	0.66	(0.07)	0.15	(0.08)	**0.16**	(0.06)	0.60	(0.07)	0.56	(0.06)	0.67	(0.06)	0.72	(0.06)	0.09	(0.07)	**0.13**	(0.05)
Portugal	0.06	(0.05)	0.14	(0.05)	0.07	(0.04)	0.18	(0.07)	0.08	(0.07)	0.07	(0.07)	0.04	(0.05)	0.11	(0.05)	0.15	(0.06)	0.15	(0.04)	0.10	(0.05)	0.09	(0.06)
Spain	-0.20	(0.04)	-0.12	(0.04)	-0.01	(0.06)	0.00	(0.06)	**0.15**	(0.06)	**0.14**	(0.07)	-0.09	(0.05)	-0.21	(0.05)	-0.08	(0.05)	0.05	(0.05)	**0.10**	(0.05)	0.10	(0.05)
United States	0.17	(0.06)	0.30	(0.04)	0.37	(0.04)	0.36	(0.05)	**0.12**	(0.06)	0.09	(0.06)	0.17	(0.05)	0.33	(0.04)	0.31	(0.04)	0.38	(0.05)	**0.14**	(0.04)	**0.09**	(0.04)
OECD average-9	-0.03	(0.02)	0.03	(0.02)	0.10	(0.02)	0.10	(0.02)	**0.10**	(0.02)	**0.08**	(0.02)	-0.03	(0.02)	0.02	(0.02)	0.09	(0.02)	0.12	(0.02)	**0.11**	(0.02)	**0.09**	(0.02)
Partners																								
Brazil	-0.24	(0.04)	-0.30	(0.04)	-0.22	(0.04)	-0.06	(0.04)	**0.10**	(0.04)	0.06	(0.03)	-0.37	(0.04)	-0.28	(0.04)	-0.10	(0.03)	-0.08	(0.04)	**0.19**	(0.03)	**0.16**	(0.03)
B-S-J-G (China)	0.29	(0.05)	0.26	(0.05)	0.31	(0.04)	0.29	(0.06)	0.04	(0.12)	0.00	(0.10)	0.25	(0.05)	0.22	(0.04)	0.28	(0.05)	0.38	(0.06)	0.16	(0.09)	0.11	(0.08)
Colombia	0.08	(0.04)	0.01	(0.05)	0.00	(0.03)	0.06	(0.06)	-0.02	(0.04)	-0.02	(0.04)	0.02	(0.04)	0.01	(0.04)	0.01	(0.04)	0.10	(0.05)	0.04	(0.03)	0.04	(0.03)
Dominican Republic	0.00	(0.05)	0.01	(0.06)	0.04	(0.05)	0.13	(0.06)	0.08	(0.04)	0.08	(0.04)	-0.08	(0.05)	0.03	(0.04)	0.16	(0.05)	0.05	(0.05)	**0.14**	(0.06)	**0.14**	(0.06)
Hong Kong (China)	0.33	(0.04)	0.38	(0.06)	0.29	(0.05)	0.40	(0.06)	-0.01	(0.08)	-0.06	(0.07)	0.26	(0.05)	0.35	(0.06)	0.27	(0.05)	0.50	(0.05)	**0.13**	(0.06)	0.07	(0.07)
Macao (China)	0.13	(0.03)	0.20	(0.02)	0.11	(0.03)	0.19	(0.03)	0.00	(0.04)	0.02	(0.04)	0.18	(0.03)	0.15	(0.02)	0.11	(0.03)	0.20	(0.02)	-0.01	(0.03)	0.01	(0.03)
Peru	0.08	(0.03)	0.09	(0.04)	0.17	(0.04)	0.19	(0.04)	**0.11**	(0.03)	**0.11**	(0.02)	0.09	(0.03)	0.15	(0.04)	0.11	(0.03)	0.18	(0.04)	**0.06**	(0.03)	**0.06**	(0.03)
Chinese Taipei	0.15	(0.05)	0.19	(0.04)	0.19	(0.03)	0.21	(0.04)	0.11	(0.07)	0.08	(0.07)	0.18	(0.05)	0.12	(0.03)	0.22	(0.04)	0.21	(0.04)	0.09	(0.05)	0.05	(0.05)
United Arab Emirates	-0.04	(0.03)	0.00	(0.03)	0.07	(0.03)	0.11	(0.04)	**0.11**	(0.03)	**0.12**	(0.03)	-0.02	(0.03)	0.01	(0.03)	0.03	(0.04)	0.12	(0.03)	**0.12**	(0.03)	**0.13**	(0.03)
Average-18	0.03	(0.01)	0.06	(0.01)	0.10	(0.01)	0.13	(0.01)	**0.08**	(0.01)	**0.06**	(0.01)	0.01	(0.01)	0.05	(0.01)	0.10	(0.01)	0.15	(0.01)	**0.11**	(0.01)	**0.09**	(0.01)
Malaysia*	0.04	(0.04)	0.11	(0.04)	0.08	(0.04)	0.19	(0.04)	**0.15**	(0.06)	**0.14**	(0.05)	0.06	(0.04)	0.01	(0.04)	0.16	(0.04)	0.18	(0.04)	**0.14**	(0.04)	**0.15**	(0.04)

1. Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.

Notes: Teacher variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.10. Science teachers' satisfaction and students skipping day of school

Results based on students' and science teachers' reports

	Percentage of students who reported skipping a whole day of school at least once in the two weeks prior to the PISA test		Percentage of students who reported skipping a whole day of school at least once in the two weeks prior to the PISA test, by quarter of satisfaction with the teaching profession, at the school level								Likelihood that students skip a whole day of school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with the teaching profession, at the school level				Percentage of students who reported skipping a whole day of school at least once in the two weeks prior to the PISA test, by quarter of satisfaction with the current job, at the school level								Likelihood that students skip a whole day of school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with their the current job, at the school level			
			Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile[1]		After accounting for students' and schools' socio-economic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile		After accounting for students' and schools' socio-economic profile	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD																										
Australia	41.0	(0.6)	40.5	(1.2)	41.7	(1.2)	42.4	(1.2)	39.3	(1.4)	0.93	(0.04)	0.96	(0.04)	43.5	(1.0)	41.1	(1.3)	40.3	(1.1)	39.0	(1.2)	0.89	(0.03)	0.95	(0.03)
Chile	66.7	(0.9)	70.4	(2.1)	65.1	(1.7)	63.4	(2.1)	65.6	(1.5)	**0.84**	(0.05)	**0.87**	(0.06)	72.1	(1.9)	67.0	(1.9)	65.1	(1.7)	60.4	(1.8)	**0.75**	(0.04)	**0.79**	(0.05)
Czech Republic	51.9	(0.9)	50.4	(1.9)	54.3	(1.8)	51.6	(1.8)	51.2	(1.6)	1.01	(0.10)	1.07	(0.10)	53.8	(1.9)	51.2	(1.6)	49.8	(1.9)	52.6	(1.8)	0.91	(0.07)	0.93	(0.07)
Germany	39.8	(1.0)	40.6	(2.4)	39.5	(2.1)	40.4	(1.8)	38.6	(2.0)	0.88	(0.07)	0.91	(0.07)	41.7	(2.4)	37.7	(2.0)	41.0	(2.4)	38.7	(2.0)	0.88	(0.06)	0.91	(0.06)
Italy	36.2	(0.9)	38.0	(2.1)	33.3	(1.8)	36.1	(1.7)	36.4	(1.8)	1.00	(0.09)	1.05	(0.09)	37.8	(2.0)	36.8	(1.3)	33.1	(1.9)	36.2	(1.8)	0.97	(0.10)	1.00	(0.09)
Korea	19.4	(1.0)	19.7	(1.9)	17.7	(1.6)	17.3	(1.8)	18.9	(2.1)	0.99	(0.16)	0.93	(0.13)	18.6	(2.2)	20.5	(2.5)	18.5	(1.8)	16.1	(1.4)	0.89	(0.14)	0.84	(0.11)
Portugal	45.7	(1.0)	41.8	(1.9)	47.7	(2.2)	43.0	(2.1)	48.0	(2.8)	1.18	(0.13)	1.12	(0.14)	46.7	(2.0)	44.2	(2.1)	45.6	(2.2)	44.0	(2.7)	0.96	(0.10)	0.88	(0.11)
Spain	41.8	(0.9)	41.6	(1.7)	41.6	(2.1)	39.8	(2.0)	44.4	(2.0)	1.09	(0.09)	1.06	(0.10)	42.6	(2.2)	43.6	(1.5)	38.8	(2.0)	42.4	(2.2)	0.99	(0.07)	0.96	(0.08)
United States	34.9	(1.1)	37.3	(2.4)	30.7	(1.6)	34.7	(2.3)	33.7	(2.4)	0.93	(0.11)	1.00	(0.12)	39.3	(2.6)	34.5	(2.3)	31.3	(2.0)	31.5	(1.9)	**0.75**	(0.06)	0.86	(0.08)
OECD average-9	41.9	(0.3)	42.2	(0.7)	41.3	(0.6)	41.0	(0.6)	41.8	(0.7)	0.98	(0.03)	1.00	(0.03)	44.0	(0.7)	41.8	(0.6)	40.4	(0.6)	40.1	(0.6)	**0.89**	(0.03)	**0.90**	(0.03)
Partners																										
Brazil	39.9	(0.7)	37.6	(1.6)	39.5	(1.6)	38.1	(1.3)	39.5	(1.9)	1.06	(0.06)	1.04	(0.06)	37.6	(1.8)	38.7	(1.6)	38.2	(1.6)	40.0	(1.5)	1.06	(0.05)	1.05	(0.06)
B-S-J-G (China)	39.8	(1.1)	40.3	(2.3)	42.2	(2.2)	42.0	(2.4)	34.9	(2.9)	0.85	(0.10)	0.95	(0.11)	44.4	(1.5)	40.5	(3.1)	39.5	(2.9)	34.9	(1.9)	**0.76**	(0.07)	0.88	(0.08)
Colombia	42.9	(0.9)	44.2	(1.9)	43.2	(2.4)	44.2	(1.9)	40.6	(2.1)	0.90	(0.06)	0.92	(0.06)	48.0	(2.2)	39.4	(1.6)	42.7	(2.0)	42.2	(2.1)	0.89	(0.06)	0.90	(0.06)
Dominican Republic	41.5	(1.1)	43.2	(2.6)	42.5	(3.0)	38.4	(2.1)	39.5	(2.8)	0.84	(0.08)	0.85	(0.08)	43.9	(2.5)	43.5	(2.9)	42.4	(2.2)	33.7	(2.5)	**0.81**	(0.08)	**0.82**	(0.08)
Hong Kong (China)	24.4	(0.7)	27.0	(2.1)	24.2	(1.8)	22.9	(1.5)	23.2	(1.8)	0.82	(0.12)	0.89	(0.12)	27.4	(1.5)	22.8	(2.0)	24.5	(2.0)	22.8	(1.5)	0.83	(0.08)	0.95	(0.10)
Macao (China)	29.1	(0.6)	25.6	(1.2)	23.9	(1.1)	32.3	(1.4)	34.7	(1.2)	**1.99**	(0.18)	**2.26**	(0.22)	25.8	(1.2)	22.8	(1.0)	33.4	(1.3)	34.3	(1.3)	**1.56**	(0.09)	**1.75**	(0.12)
Peru	59.7	(0.9)	62.8	(1.8)	62.2	(1.8)	57.5	(2.0)	57.1	(2.5)	**0.83**	(0.07)	**0.84**	(0.07)	63.7	(1.5)	59.0	(2.0)	58.8	(2.0)	58.2	(2.3)	0.89	(0.06)	0.89	(0.06)
Chinese Taipei	33.8	(0.8)	33.9	(2.0)	34.0	(1.7)	36.4	(1.8)	31.0	(1.9)	0.90	(0.11)	0.92	(0.12)	34.7	(2.0)	33.1	(1.5)	34.4	(1.5)	33.1	(1.9)	0.90	(0.09)	0.93	(0.11)
United Arab Emirates	43.5	(0.7)	50.2	(1.8)	46.3	(1.3)	40.1	(1.9)	35.4	(2.0)	**0.66**	(0.04)	**0.65**	(0.05)	44.9	(1.7)	40.6	(1.9)	43.3	(1.6)	43.2	(1.9)	0.93	(0.06)	0.89	(0.06)
Average-18	40.7	(0.2)	41.4	(0.5)	40.5	(0.4)	40.0	(0.4)	39.6	(0.5)	0.98	(0.02)	1.02	(0.02)	42.6	(0.5)	39.8	(0.5)	40.0	(0.5)	39.1	(0.4)	**0.92**	(0.02)	**0.96**	(0.02)
Malaysia*	34.5	(0.9)	29.2	(1.3)	36.1	(2.1)	37.2	(2.2)	35.6	(1.9)	**1.25**	(0.11)	**1.29**	(0.11)	31.8	(1.8)	33.6	(1.8)	35.6	(2.2)	37.2	(2.0)	1.11	(0.10)	1.13	(0.10)

1. Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.

Notes: Teacher variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 5.11. Science teachers' satisfaction and students arriving late for school

Results based on students' and science teachers' reports

	Percentage of students who reported arriving late for school at least once in the two weeks prior to the PISA test		Percentage of students who reported arriving late for school at least once in the two weeks prior to the PISA test, by quarter of satisfaction with the teaching profession, at the school level								Likelihood that students arrived late for school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with the teaching profession, at the school level				Percentage of students who reported arriving late for school at least once in the two weeks prior to the PISA test, by quarter of satisfaction with the current job, at the school level								Likelihood that students arrived late for school at least once in the two weeks prior to the PISA test if their science teachers are satisfied with their the current job, at the school level			
			Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile[1]		After accounting for students' and schools' socio-economic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for students' and schools' socio-economic profile		After accounting for students' and schools' socio-economic profile	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
OECD																										
Australia	28.9	(0.6)	28.3	(1.0)	29.6	(1.2)	28.6	(1.0)	28.9	(1.2)	0.98	(0.05)	1.03	(0.06)	29.4	(1.1)	30.0	(1.3)	29.4	(1.2)	26.8	(0.9)	0.91	(0.04)	0.99	(0.04)
Chile	9.3	(0.6)	9.6	(1.1)	7.8	(1.2)	9.2	(1.2)	8.9	(0.9)	1.04	(0.09)	1.11	(0.09)	11.3	(1.2)	9.1	(1.4)	7.7	(0.9)	7.5	(0.7)	**0.81**	(0.07)	0.89	(0.08)
Czech Republic	8.0	(0.4)	8.9	(0.7)	8.5	(1.0)	7.9	(0.9)	6.6	(0.8)	0.83	(0.14)	0.92	(0.14)	9.3	(0.8)	9.1	(1.0)	5.9	(0.8)	7.5	(0.9)	0.81	(0.11)	0.85	(0.10)
Germany	8.7	(0.5)	10.1	(1.2)	8.4	(0.8)	8.7	(0.9)	7.2	(1.0)	**0.72**	(0.09)	**0.76**	(0.09)	11.3	(1.2)	9.6	(0.9)	8.6	(0.9)	5.2	(0.6)	**0.63**	(0.07)	**0.67**	(0.07)
Italy	55.2	(0.8)	58.6	(2.1)	54.4	(2.0)	50.4	(1.6)	55.6	(2.1)	0.89	(0.08)	0.95	(0.08)	59.3	(2.0)	55.7	(2.1)	50.7	(1.9)	53.6	(1.7)	**0.85**	(0.07)	0.89	(0.08)
Korea	1.9	(0.2)	2.8	(0.6)	1.0	(0.2)	1.1	(0.5)	2.1	(0.5)	1.07	(0.43)	0.84	(0.24)	2.1	(0.6)	2.3	(0.6)	1.2	(0.4)	1.4	(0.5)	0.77	(0.33)	0.69	(0.23)
Portugal	20.8	(0.7)	19.3	(1.7)	20.5	(1.6)	18.7	(1.3)	18.8	(1.2)	1.01	(0.09)	1.06	(0.10)	21.0	(1.6)	20.6	(1.7)	17.2	(1.1)	18.5	(1.3)	0.87	(0.09)	0.92	(0.09)
Spain	24.6	(0.7)	26.0	(1.4)	25.6	(1.4)	22.4	(1.3)	24.3	(1.6)	0.87	(0.08)	0.94	(0.09)	26.5	(1.3)	25.4	(1.7)	24.8	(1.4)	21.6	(1.6)	**0.85**	(0.07)	0.91	(0.07)
United States	37.1	(0.7)	38.3	(1.4)	35.2	(1.7)	38.4	(1.8)	35.9	(1.6)	0.95	(0.06)	0.99	(0.06)	37.5	(1.6)	37.3	(1.9)	35.8	(1.7)	37.3	(1.6)	0.99	(0.06)	1.08	(0.06)
OECD average-9	21.6	(0.2)	22.5	(0.4)	21.2	(0.4)	20.6	(0.4)	20.9	(0.4)	0.93	(0.06)	0.96	(0.04)	23.1	(0.4)	22.1	(0.5)	20.1	(0.4)	19.9	(0.4)	**0.83**	(0.04)	**0.88**	(0.03)
Partners																										
Brazil	48.0	(0.6)	48.9	(1.8)	50.4	(1.7)	51.1	(1.6)	43.1	(1.5)	**0.89**	(0.05)	0.91	(0.05)	52.7	(1.7)	47.7	(1.9)	46.4	(2.1)	46.8	(1.5)	**0.87**	(0.04)	**0.89**	(0.05)
B-S-J-G (China)	2.3	(0.2)	1.7	(0.4)	2.5	(0.5)	2.5	(0.5)	2.6	(0.6)	1.52	(0.38)	**1.91**	(0.41)	2.5	(0.5)	2.4	(0.5)	1.8	(0.4)	2.6	(0.6)	0.98	(0.31)	1.25	(0.40)
Colombia	43.8	(0.8)	44.5	(1.6)	42.7	(1.6)	42.3	(1.9)	43.9	(1.7)	1.01	(0.05)	0.98	(0.05)	46.0	(1.5)	42.2	(1.4)	44.5	(1.6)	40.8	(1.7)	0.90	(0.06)	0.91	(0.05)
Dominican Republic	51.4	(0.9)	52.6	(1.9)	51.0	(3.2)	47.0	(2.2)	49.2	(2.3)	0.89	(0.07)	**0.85**	(0.06)	51.9	(1.7)	50.8	(3.0)	49.5	(2.3)	47.5	(1.7)	0.88	(0.06)	**0.85**	(0.06)
Hong Kong (China)	3.5	(0.2)	3.4	(0.5)	3.3	(0.6)	4.3	(0.7)	2.9	(0.6)	1.00	(0.30)	1.09	(0.36)	4.3	(0.6)	3.7	(0.7)	3.8	(0.6)	2.2	(0.5)	0.69	(0.17)	0.78	(0.22)
Macao (China)	6.3	(0.4)	5.4	(0.6)	4.4	(0.6)	7.8	(0.9)	7.8	(0.7)	**2.43**	(0.41)	**1.52**	(0.30)	4.7	(0.6)	4.7	(0.6)	7.7	(0.7)	8.2	(0.8)	**2.01**	(0.23)	**1.48**	(0.20)
Peru	39.9	(0.8)	39.1	(1.6)	39.9	(1.6)	38.8	(1.8)	40.9	(1.5)	1.07	(0.06)	1.05	(0.06)	41.5	(1.7)	40.6	(1.8)	38.7	(1.5)	38.0	(1.7)	0.94	(0.06)	0.93	(0.05)
Chinese Taipei	3.2	(0.2)	4.0	(0.6)	3.6	(0.5)	2.1	(0.4)	2.7	(0.5)	**0.50**	(0.15)	0.73	(0.19)	4.3	(0.8)	3.4	(0.6)	2.5	(0.4)	2.1	(0.3)	**0.49**	(0.11)	0.70	(0.15)
United Arab Emirates	20.9	(0.7)	14.3	(1.8)	18.8	(1.3)	23.0	(1.7)	26.9	(1.9)	**1.63**	(0.16)	**1.58**	(0.17)	18.9	(1.3)	21.9	(2.3)	19.5	(1.1)	22.9	(1.7)	1.14	(0.12)	1.21	(0.12)
Average-18	23.0	(0.1)	23.1	(0.3)	22.6	(0.3)	22.5	(0.3)	22.7	(0.3)	1.07	(0.05)	1.07	(0.04)	24.1	(0.3)	23.1	(0.4)	22.0	(0.3)	21.7	(0.3)	**0.91**	(0.03)	0.94	(0.04)
Malaysia*	12.4	(0.7)	16.2	(1.7)	10.7	(1.1)	12.6	(1.4)	10.0	(1.2)	**0.56**	(0.09)	**0.59**	(0.09)	16.1	(1.5)	15.3	(1.5)	10.9	(1.0)	7.2	(1.0)	**0.55**	(0.06)	**0.56**	(0.06)

1. Students' and schools' socio-economic profile include students' gender, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels.

Notes: Teacher variables are aggregated at the school level.

Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 6.1. Science teachers' collaboration, and satisfaction

	Index of science teachers' collaboration				Average satisfaction with the teaching profession, by quarter of the index of science teachers' collaboration								Change in satisfaction with the teaching profession associated with a one-unit change in the index of science teachers' collaboration				Average satisfaction with the current job, by quarter of the index of science teachers' collaboration								Change in satisfaction with the current job associated with a one-unit change in the index of science teachers' collaboration			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	0.19	(0.02)	0.94	(0.01)	-0.18	(0.04)	-0.07	(0.04)	0.13	(0.04)	0.39	(0.04)	**0.23**	(0.02)	**0.23**	(0.02)	-0.30	(0.04)	-0.03	(0.03)	0.21	(0.04)	0.59	(0.03)	**0.36**	(0.02)	**0.35**	(0.02)
Chile	-0.23	(0.08)	1.22	(0.04)	-0.26	(0.11)	-0.32	(0.09)	-0.02	(0.08)	0.35	(0.11)	**0.18**	(0.06)	**0.18**	(0.06)	-0.40	(0.09)	-0.05	(0.10)	0.06	(0.10)	0.62	(0.09)	**0.28**	(0.04)	**0.26**	(0.04)
Czech Republic	-0.26	(0.03)	0.80	(0.02)	-0.49	(0.05)	-0.40	(0.05)	-0.31	(0.04)	-0.08	(0.05)	**0.21**	(0.03)	**0.21**	(0.03)	-0.55	(0.06)	-0.27	(0.04)	-0.12	(0.05)	0.15	(0.05)	**0.35**	(0.04)	**0.35**	(0.04)
Germany	-0.52	(0.04)	0.94	(0.02)	0.28	(0.07)	0.47	(0.05)	0.62	(0.05)	0.78	(0.06)	**0.20**	(0.04)	**0.21**	(0.04)	-0.26	(0.08)	-0.03	(0.06)	0.17	(0.06)	0.53	(0.06)	**0.32**	(0.04)	**0.34**	(0.04)
Italy	-0.16	(0.03)	0.84	(0.02)	-0.27	(0.06)	-0.27	(0.04)	0.01	(0.08)	0.05	(0.08)	**0.16**	(0.04)	**0.17**	(0.04)	-0.58	(0.06)	-0.35	(0.04)	-0.06	(0.08)	0.16	(0.07)	**0.33**	(0.04)	**0.34**	(0.04)
Korea	0.45	(0.04)	0.90	(0.03)	-0.56	(0.05)	-0.46	(0.07)	-0.29	(0.07)	-0.08	(0.08)	**0.19**	(0.04)	**0.19**	(0.04)	-0.71	(0.06)	-0.60	(0.10)	-0.43	(0.07)	-0.08	(0.10)	**0.28**	(0.05)	**0.27**	(0.05)
Portugal	0.30	(0.04)	0.96	(0.02)	-0.64	(0.07)	-0.31	(0.07)	-0.17	(0.06)	0.05	(0.05)	**0.28**	(0.04)	**0.25**	(0.04)	-0.22	(0.05)	0.00	(0.06)	0.29	(0.05)	0.63	(0.05)	**0.35**	(0.03)	**0.34**	(0.03)
Spain	-0.01	(0.04)	1.08	(0.02)	0.28	(0.05)	0.34	(0.05)	0.56	(0.06)	0.77	(0.05)	**0.17**	(0.03)	**0.16**	(0.03)	-0.16	(0.07)	0.08	(0.06)	0.31	(0.05)	0.60	(0.06)	**0.26**	(0.03)	**0.26**	(0.03)
United States	-0.12	(0.04)	0.99	(0.03)	-0.21	(0.08)	-0.05	(0.09)	-0.09	(0.06)	0.07	(0.06)	**0.12**	(0.04)	**0.12**	(0.04)	-0.35	(0.08)	0.18	(0.07)	0.06	(0.08)	0.40	(0.07)	**0.25**	(0.04)	**0.24**	(0.03)
OECD average-9	-0.04	(0.01)	0.96	(0.01)	-0.23	(0.02)	-0.12	(0.02)	0.05	(0.02)	0.25	(0.02)	**0.19**	(0.01)	**0.19**	(0.01)	-0.39	(0.02)	-0.12	(0.02)	0.05	(0.02)	0.40	(0.02)	**0.31**	(0.01)	**0.31**	(0.01)
Partners																												
Brazil	-0.18	(0.03)	1.02	(0.04)	-0.64	(0.05)	-0.45	(0.05)	-0.28	(0.09)	0.02	(0.08)	**0.22**	(0.04)	**0.21**	(0.04)	-0.44	(0.06)	-0.22	(0.04)	0.06	(0.08)	0.60	(0.04)	**0.37**	(0.03)	**0.36**	(0.03)
B-S-J-G (China)	0.71	(0.03)	0.93	(0.02)	-0.69	(0.04)	-0.55	(0.05)	-0.36	(0.04)	-0.07	(0.07)	**0.28**	(0.03)	**0.28**	(0.03)	-0.82	(0.04)	-0.62	(0.06)	-0.27	(0.05)	0.26	(0.07)	**0.48**	(0.03)	**0.48**	(0.03)
Colombia	0.18	(0.05)	1.03	(0.03)	0.28	(0.08)	0.41	(0.07)	0.63	(0.09)	0.93	(0.07)	**0.25**	(0.04)	**0.25**	(0.03)	0.08	(0.09)	0.40	(0.08)	0.79	(0.07)	1.07	(0.05)	**0.39**	(0.05)	**0.38**	(0.05)
Dominican Republic	0.73	(0.07)	1.07	(0.05)	0.43	(0.11)	0.67	(0.10)	1.10	(0.09)	1.23	(0.09)	**0.26**	(0.05)	**0.25**	(0.05)	0.41	(0.13)	0.96	(0.09)	1.21	(0.05)	1.30	(0.04)	**0.32**	(0.05)	**0.32**	(0.05)
Hong Kong (China)	-0.04	(0.03)	0.77	(0.02)	-0.43	(0.05)	-0.41	(0.04)	-0.19	(0.08)	0.01	(0.06)	**0.21**	(0.03)	**0.21**	(0.03)	-0.87	(0.05)	-0.70	(0.05)	-0.50	(0.10)	-0.14	(0.07)	**0.38**	(0.04)	**0.38**	(0.04)
Macao (China)	0.25	(0.00)	0.80	(0.00)	-0.45	(0.00)	c	c	-0.23	(0.00)	0.26	(0.00)	**0.32**	(0.00)	**0.31**	(0.00)	-0.84	(0.00)	c	c	-0.59	(0.00)	0.04	(0.00)	**0.45**	(0.00)	**0.43**	(0.00)
Peru	0.13	(0.04)	0.99	(0.03)	-0.10	(0.07)	0.04	(0.05)	0.25	(0.08)	0.51	(0.07)	**0.24**	(0.03)	**0.24**	(0.03)	-0.11	(0.07)	-0.10	(0.07)	0.34	(0.07)	0.72	(0.07)	**0.35**	(0.04)	**0.34**	(0.04)
Chinese Taipei	0.01	(0.02)	0.80	(0.02)	-0.32	(0.05)	-0.36	(0.03)	0.00	(0.06)	0.22	(0.04)	**0.28**	(0.03)	**0.28**	(0.03)	-0.69	(0.06)	-0.44	(0.05)	-0.13	(0.08)	0.13	(0.07)	**0.40**	(0.04)	**0.39**	(0.04)
United Arab Emirates	0.68	(0.03)	1.01	(0.01)	-0.53	(0.04)	-0.25	(0.04)	-0.02	(0.06)	0.24	(0.06)	**0.27**	(0.02)	**0.26**	(0.02)	-0.54	(0.04)	-0.17	(0.04)	0.23	(0.05)	0.55	(0.04)	**0.41**	(0.02)	**0.41**	(0.02)
Average-18	0.12	(0.01)	0.95	(0.01)	-0.25	(0.02)	-0.12	(0.01)	0.07	(0.02)	0.31	(0.02)	**0.23**	(0.01)	**0.22**	(0.01)	-0.41	(0.02)	-0.12	(0.02)	0.09	(0.02)	0.45	(0.01)	**0.35**	(0.01)	**0.35**	(0.01)
Malaysia*	0.41	(0.03)	0.87	(0.02)	0.14	(0.05)	0.40	(0.08)	0.59	(0.06)	0.80	(0.05)	**0.30**	(0.03)	**0.30**	(0.03)	-0.45	(0.05)	-0.07	(0.09)	0.08	(0.06)	0.49	(0.05)	**0.42**	(0.04)	**0.43**	(0.04)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 6.2. Views on staff shortage, and satisfaction

Results based on science teachers' reports

	Index of science teachers' views on staff shortage				Average satisfaction with the teaching profession, by quarter of the index of science teachers' views on staff shortage								Change in satisfaction with the teaching profession associated with a one-unit change in the index of science teachers' views on staff shortage				Average satisfaction with the current job, by quarter of the index of science teachers' views on staff shortage								Change in satisfaction with the current job associated with a one-unit change in the index of science teachers' views on staff shortage			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	-0.24	(0.02)	0.96	(0.01)	0.34	(0.03)	0.16	(0.03)	-0.04	(0.04)	-0.23	(0.04)	**-0.24**	(0.02)	**-0.24**	(0.02)	0.49	(0.03)	0.23	(0.03)	0.00	(0.04)	-0.32	(0.04)	**-0.33**	(0.02)	**-0.31**	(0.02)
Chile	-0.07	(0.04)	0.88	(0.03)	0.33	(0.09)	-0.15	(0.11)	-0.09	(0.09)	-0.37	(0.10)	**-0.29**	(0.06)	**-0.26**	(0.07)	0.55	(0.09)	0.14	(0.10)	-0.02	(0.09)	-0.47	(0.10)	**-0.44**	(0.05)	**-0.41**	(0.05)
Czech Republic	-0.64	(0.03)	0.89	(0.01)	-0.19	(0.04)	-0.23	(0.06)	-0.36	(0.05)	-0.50	(0.04)	**-0.13**	(0.03)	**-0.12**	(0.02)	0.02	(0.04)	-0.12	(0.06)	-0.26	(0.04)	-0.50	(0.06)	**-0.24**	(0.03)	**-0.23**	(0.03)
Germany	0.39	(0.02)	0.80	(0.02)	0.70	(0.05)	0.64	(0.06)	0.57	(0.06)	0.20	(0.06)	**-0.21**	(0.03)	**-0.21**	(0.04)	0.52	(0.04)	0.22	(0.07)	0.03	(0.08)	-0.43	(0.08)	**-0.41**	(0.04)	**-0.41**	(0.04)
Italy	0.04	(0.04)	0.95	(0.04)	-0.05	(0.06)	-0.16	(0.07)	-0.18	(0.05)	-0.20	(0.07)	-0.06	(0.03)	**-0.06**	(0.03)	-0.04	(0.07)	-0.19	(0.05)	-0.31	(0.06)	-0.42	(0.06)	**-0.16**	(0.04)	**-0.15**	(0.04)
Korea	0.54	(0.03)	0.80	(0.03)	-0.15	(0.06)	-0.26	(0.08)	-0.48	(0.05)	-0.56	(0.06)	**-0.18**	(0.04)	**-0.17**	(0.04)	-0.12	(0.07)	-0.38	(0.08)	-0.65	(0.06)	-0.73	(0.08)	**-0.28**	(0.06)	**-0.26**	(0.06)
Portugal	0.62	(0.03)	0.77	(0.02)	-0.06	(0.06)	-0.25	(0.08)	-0.37	(0.07)	-0.42	(0.06)	**-0.21**	(0.04)	**-0.22**	(0.04)	0.41	(0.06)	0.16	(0.06)	0.16	(0.05)	-0.09	(0.06)	**-0.22**	(0.03)	**-0.22**	(0.03)
Spain	0.18	(0.03)	0.97	(0.02)	0.75	(0.07)	0.53	(0.06)	0.37	(0.06)	0.24	(0.06)	**-0.18**	(0.03)	**-0.16**	(0.03)	0.49	(0.06)	0.35	(0.05)	0.15	(0.06)	-0.22	(0.07)	**-0.27**	(0.03)	**-0.25**	(0.03)
United States	-0.07	(0.04)	0.99	(0.02)	0.20	(0.07)	-0.01	(0.10)	-0.16	(0.06)	-0.30	(0.06)	**-0.16**	(0.04)	**-0.15**	(0.04)	0.55	(0.06)	0.10	(0.08)	0.05	(0.07)	-0.43	(0.07)	**-0.34**	(0.03)	**-0.31**	(0.03)
OECD average-9	0.08	(0.01)	0.89	(0.01)	0.21	(0.02)	0.03	(0.03)	-0.08	(0.02)	-0.24	(0.02)	**-0.18**	(0.01)	**-0.18**	(0.01)	0.32	(0.02)	0.06	(0.02)	-0.10	(0.02)	-0.40	(0.02)	**-0.30**	(0.01)	**-0.28**	(0.01)
Partners																												
Brazil	0.03	(0.04)	1.16	(0.02)	-0.06	(0.06)	-0.34	(0.08)	-0.51	(0.05)	-0.59	(0.06)	**-0.18**	(0.03)	**-0.16**	(0.03)	0.39	(0.05)	0.10	(0.06)	-0.20	(0.05)	-0.53	(0.06)	**-0.30**	(0.02)	**-0.29**	(0.03)
B-S-J-G (China)	0.44	(0.05)	1.34	(0.03)	-0.20	(0.06)	-0.39	(0.04)	-0.57	(0.04)	-0.58	(0.07)	**-0.10**	(0.03)	**-0.10**	(0.03)	0.03	(0.06)	-0.43	(0.05)	-0.61	(0.05)	-0.52	(0.08)	**-0.14**	(0.03)	**-0.13**	(0.03)
Colombia	0.02	(0.05)	1.05	(0.03)	0.66	(0.09)	0.62	(0.07)	0.61	(0.08)	0.37	(0.09)	**-0.09**	(0.04)	**-0.11**	(0.04)	0.86	(0.11)	0.71	(0.07)	0.53	(0.07)	0.25	(0.09)	**-0.22**	(0.05)	**-0.23**	(0.05)
Dominican Republic	-0.30	(0.08)	1.04	(0.04)	1.05	(0.09)	0.82	(0.12)	0.78	(0.12)	0.79	(0.12)	**-0.10**	(0.05)	**-0.14**	(0.05)	1.18	(0.08)	0.95	(0.10)	0.86	(0.10)	0.87	(0.12)	**-0.12**	(0.05)	**-0.14**	(0.05)
Hong Kong (China)	-0.02	(0.04)	0.90	(0.03)	-0.03	(0.07)	-0.26	(0.05)	-0.39	(0.04)	-0.43	(0.06)	**-0.17**	(0.04)	**-0.17**	(0.04)	-0.29	(0.07)	-0.56	(0.05)	-0.69	(0.05)	-0.76	(0.07)	**-0.20**	(0.04)	**-0.20**	(0.04)
Macao (China)	0.55	(0.00)	0.92	(0.00)	0.20	(0.00)	-0.21	(0.00)	-0.28	(0.00)	-0.63	(0.00)	**-0.32**	(0.00)	**-0.32**	(0.00)	-0.04	(0.00)	-0.50	(0.00)	-0.67	(0.00)	-1.03	(0.00)	**-0.41**	(0.00)	**-0.40**	(0.00)
Peru	0.23	(0.05)	1.07	(0.03)	0.32	(0.07)	0.18	(0.08)	0.07	(0.07)	0.16	(0.09)	**-0.08**	(0.04)	-0.07	(0.04)	0.45	(0.07)	0.28	(0.07)	0.18	(0.06)	-0.02	(0.08)	**-0.17**	(0.04)	**-0.19**	(0.04)
Chinese Taipei	0.04	(0.03)	0.85	(0.03)	0.08	(0.05)	-0.19	(0.03)	-0.20	(0.06)	-0.39	(0.06)	**-0.22**	(0.03)	**-0.21**	(0.03)	0.12	(0.05)	-0.30	(0.06)	-0.51	(0.07)	-0.80	(0.06)	**-0.42**	(0.04)	**-0.40**	(0.04)
United Arab Emirates	0.27	(0.04)	1.25	(0.02)	0.32	(0.05)	-0.03	(0.04)	-0.32	(0.04)	-0.56	(0.04)	**-0.25**	(0.02)	**-0.24**	(0.03)	0.52	(0.04)	0.00	(0.03)	-0.20	(0.04)	-0.29	(0.05)	**-0.22**	(0.02)	**-0.26**	(0.02)
Average-18	0.11	(0.01)	0.98	(0.01)	0.23	(0.01)	0.03	(0.02)	-0.09	(0.01)	-0.22	(0.02)	**-0.18**	(0.01)	**-0.17**	(0.01)	0.34	(0.01)	0.04	(0.02)	-0.12	(0.01)	-0.36	(0.02)	**-0.27**	(0.01)	**-0.27**	(0.01)
Malaysia*	-0.08	(0.05)	1.10	(0.02)	0.65	(0.05)	0.57	(0.06)	0.37	(0.06)	0.18	(0.06)	**-0.16**	(0.02)	**-0.15**	(0.02)	0.25	(0.06)	0.05	(0.05)	-0.10	(0.06)	-0.36	(0.07)	**-0.21**	(0.03)	**-0.20**	(0.03)

1. Science teachers' demographic and schools' socio-economic profile the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.

Note: Values that are statistically significant are indicated in bold (see Annex A).

*Coverage is too small to ensure comparability (see Annex A).

Table 6.3. Views on shortage of educational material, and satisfaction

Results based on science teachers' reports

	Index of science teachers' views on educational material shortage				Average satisfaction with the teaching profession, by quarter of the index of science teachers' views on educational material shortage								Change in satisfaction with the teaching profession associated with a one-unit change in the index of science teachers' views on educational material shortage				Average satisfaction with the current job, by quarter of the index of science teachers' views on educational material shortage								Change in satisfaction with the current job associated with a one-unit change in the index of science teachers' views on educational material shortage			
	Mean index		Variation in the index		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Bottom quarter		Second quarter		Third quarter		Top quarter		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Index change	S.E.	Index change	S.E.
OECD																												
Australia	-0.33	(0.02)	0.86	(0.01)	0.34	(0.03)	0.15	(0.04)	-0.06	(0.03)	-0.19	(0.04)	**-0.23**	(0.02)	**-0.23**	(0.02)	0.44	(0.04)	0.20	(0.03)	0.00	(0.04)	-0.23	(0.04)	**-0.29**	(0.03)	**-0.26**	(0.03)
Chile	-0.09	(0.06)	0.99	(0.04)	0.12	(0.08)	0.04	(0.09)	-0.22	(0.13)	-0.26	(0.10)	**-0.18**	(0.06)	**-0.16**	(0.06)	0.49	(0.11)	0.14	(0.09)	-0.20	(0.11)	-0.35	(0.10)	**-0.33**	(0.05)	**-0.30**	(0.05)
Czech Republic	-0.40	(0.03)	0.78	(0.02)	-0.12	(0.05)	-0.28	(0.04)	-0.39	(0.04)	-0.50	(0.04)	**-0.18**	(0.03)	**-0.18**	(0.03)	0.10	(0.05)	-0.16	(0.04)	-0.34	(0.05)	-0.41	(0.06)	**-0.26**	(0.03)	**-0.25**	(0.03)
Germany	0.16	(0.04)	0.95	(0.02)	0.78	(0.04)	0.55	(0.06)	0.51	(0.07)	0.24	(0.06)	**-0.21**	(0.03)	**-0.21**	(0.03)	0.59	(0.04)	0.15	(0.06)	-0.02	(0.07)	-0.42	(0.08)	**-0.40**	(0.03)	**-0.40**	(0.03)
Italy	0.50	(0.05)	1.02	(0.02)	0.00	(0.06)	-0.13	(0.06)	-0.22	(0.07)	-0.28	(0.05)	**-0.12**	(0.03)	**-0.11**	(0.03)	-0.03	(0.05)	-0.13	(0.07)	-0.37	(0.05)	-0.44	(0.07)	**-0.18**	(0.03)	**-0.18**	(0.04)
Korea	0.42	(0.04)	0.87	(0.02)	-0.18	(0.07)	-0.43	(0.08)	-0.46	(0.04)	-0.43	(0.08)	**-0.14**	(0.04)	**-0.13**	(0.04)	-0.23	(0.08)	-0.49	(0.09)	-0.59	(0.06)	-0.64	(0.08)	**-0.21**	(0.05)	**-0.20**	(0.05)
Portugal	0.21	(0.05)	0.99	(0.02)	-0.05	(0.06)	-0.24	(0.06)	-0.37	(0.06)	-0.47	(0.09)	**-0.16**	(0.04)	**-0.15**	(0.04)	0.45	(0.07)	0.18	(0.06)	0.05	(0.06)	-0.06	(0.09)	**-0.19**	(0.04)	**-0.18**	(0.04)
Spain	0.25	(0.04)	0.99	(0.02)	0.82	(0.06)	0.40	(0.06)	0.38	(0.05)	0.28	(0.07)	**-0.20**	(0.03)	**-0.18**	(0.03)	0.54	(0.06)	0.19	(0.07)	0.08	(0.06)	-0.05	(0.08)	**-0.21**	(0.03)	**-0.19**	(0.03)
United States	-0.20	(0.04)	0.88	(0.02)	0.09	(0.08)	-0.06	(0.10)	-0.07	(0.07)	-0.25	(0.08)	**-0.16**	(0.05)	**-0.15**	(0.05)	0.41	(0.08)	0.10	(0.08)	0.03	(0.07)	-0.29	(0.08)	**-0.31**	(0.04)	**-0.30**	(0.04)
OECD average-9	0.06	(0.01)	0.93	(0.01)	0.20	(0.02)	0.00	(0.02)	-0.10	(0.02)	-0.21	(0.02)	**-0.18**	(0.01)	**-0.17**	(0.01)	0.31	(0.02)	0.02	(0.02)	-0.15	(0.02)	-0.32	(0.03)	**-0.26**	(0.01)	**-0.25**	(0.01)
Partners																												
Brazil	0.28	(0.04)	1.18	(0.02)	-0.02	(0.08)	-0.31	(0.05)	-0.54	(0.06)	-0.59	(0.06)	**-0.18**	(0.03)	**-0.16**	(0.03)	0.35	(0.07)	0.05	(0.06)	-0.21	(0.06)	-0.38	(0.06)	**-0.25**	(0.02)	**-0.24**	(0.03)
B-S-J-G (China)	0.21	(0.04)	1.12	(0.02)	-0.22	(0.05)	-0.35	(0.05)	-0.58	(0.04)	-0.59	(0.06)	**-0.14**	(0.02)	**-0.14**	(0.02)	0.01	(0.06)	-0.38	(0.06)	-0.60	(0.05)	-0.56	(0.07)	**-0.21**	(0.03)	**-0.20**	(0.03)
Colombia	0.63	(0.06)	1.09	(0.03)	0.56	(0.09)	0.51	(0.08)	0.62	(0.09)	0.56	(0.08)	-0.01	(0.04)	-0.06	(0.04)	0.83	(0.09)	0.57	(0.09)	0.47	(0.10)	0.45	(0.07)	**-0.15**	(0.04)	**-0.17**	(0.03)
Dominican Republic	-0.03	(0.08)	1.03	(0.04)	0.73	(0.12)	0.98	(0.11)	1.02	(0.09)	0.69	(0.12)	-0.03	(0.05)	-0.08	(0.06)	0.94	(0.10)	1.06	(0.09)	1.07	(0.07)	0.80	(0.13)	-0.06	(0.06)	-0.10	(0.06)
Hong Kong (China)	-0.32	(0.04)	0.77	(0.02)	-0.08	(0.07)	-0.32	(0.04)	-0.45	(0.18)	-0.41	(0.06)	**-0.18**	(0.04)	**-0.18**	(0.04)	-0.32	(0.08)	-0.65	(0.04)	-0.70	(0.17)	-0.71	(0.06)	**-0.20**	(0.06)	**-0.20**	(0.05)
Macao (China)	0.19	(0.00)	0.86	(0.00)	0.15	(0.00)	-0.30	(0.00)	-0.40	(0.00)	-0.34	(0.00)	**-0.23**	(0.00)	**-0.21**	(0.00)	-0.21	(0.00)	-0.66	(0.00)	-0.62	(0.00)	-0.67	(0.00)	**-0.21**	(0.00)	**-0.17**	(0.00)
Peru	0.30	(0.06)	1.12	(0.02)	0.30	(0.06)	0.12	(0.07)	0.18	(0.07)	0.10	(0.11)	-0.06	(0.04)	-0.05	(0.04)	0.42	(0.07)	0.17	(0.07)	0.12	(0.08)	0.18	(0.10)	**-0.09**	(0.04)	**-0.11**	(0.04)
Chinese Taipei	-0.11	(0.03)	0.83	(0.02)	0.09	(0.06)	-0.20	(0.03)	-0.34	(0.05)	-0.25	(0.05)	**-0.19**	(0.03)	**-0.18**	(0.03)	0.13	(0.06)	-0.35	(0.04)	-0.56	(0.07)	-0.62	(0.06)	**-0.35**	(0.04)	**-0.33**	(0.04)
United Arab Emirates	-0.08	(0.03)	1.17	(0.02)	0.16	(0.05)	-0.11	(0.05)	-0.26	(0.06)	-0.37	(0.05)	**-0.16**	(0.03)	**-0.14**	(0.03)	0.44	(0.03)	-0.01	(0.04)	-0.22	(0.05)	-0.19	(0.04)	**-0.18**	(0.02)	**-0.22**	(0.02)
Average-18	0.09	(0.01)	0.97	(0.01)	0.19	(0.02)	0.00	(0.02)	-0.09	(0.02)	-0.17	(0.02)	**-0.15**	(0.01)	**-0.15**	(0.01)	0.30	(0.02)	0.00	(0.01)	-0.15	(0.02)	-0.26	(0.02)	**-0.23**	(0.01)	**-0.22**	(0.01)
Malaysia*	0.30	(0.05)	1.08	(0.02)	0.62	(0.06)	0.52	(0.07)	0.32	(0.04)	0.34	(0.08)	**-0.11**	(0.03)	**-0.11**	(0.03)	0.23	(0.06)	-0.02	(0.06)	-0.12	(0.05)	-0.23	(0.09)	**-0.15**	(0.03)	**-0.16**	(0.03)

1. Science teachers' demographic and schools' socio-economic profile the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 6.4. Difference in perceptions of staff shortage and science teachers' satisfaction

Difference between science teachers' and school principals' views, results based on school principals' and science teachers' reports

	Index of difference in the views on staff shortage between teachers and school principals				Change in satisfaction with the teaching profession associated with a one-unit change in the index of difference in the views on staff shortage between teachers and school principals				Change in satisfaction with the current job associated with a one-unit change in the index of difference in the views on staff shortage between teachers and school principals			
	Mean index		Variation in the index		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Index change	S.E.	Index change	S.E.	Index change	S.E.	Index change	S.E.
OECD												
Australia	0.78	(0.02)	0.65	(0.02)	**-0.08**	(0.03)	**-0.07**	(0.03)	**-0.08**	(0.03)	-0.06	(0.04)
Chile	0.77	(0.04)	0.66	(0.03)	-0.16	(0.10)	-0.13	(0.09)	**-0.24**	(0.08)	**-0.20**	(0.08)
Czech Republic	0.78	(0.03)	0.64	(0.03)	-0.02	(0.03)	-0.01	(0.03)	0.00	(0.04)	0.01	(0.04)
Germany	0.80	(0.03)	0.68	(0.05)	-0.09	(0.05)	-0.10	(0.05)	-0.12	(0.07)	-0.12	(0.07)
Italy	0.97	(0.04)	0.76	(0.03)	0.01	(0.03)	0.02	(0.03)	**-0.11**	(0.04)	**-0.10**	(0.04)
Korea	0.92	(0.05)	0.79	(0.04)	0.08	(0.05)	0.06	(0.05)	0.03	(0.06)	-0.01	(0.05)
Portugal	0.81	(0.03)	0.68	(0.04)	0.03	(0.05)	0.01	(0.05)	-0.08	(0.05)	-0.09	(0.05)
Spain	0.98	(0.04)	0.82	(0.04)	-0.03	(0.04)	-0.02	(0.04)	**-0.08**	(0.04)	-0.08	(0.04)
United States	0.81	(0.03)	0.66	(0.02)	**-0.12**	(0.06)	-0.11	(0.06)	**-0.20**	(0.06)	**-0.18**	(0.06)
OECD average-9	0.85	(0.01)	0.71	(0.01)	**-0.04**	(0.02)	**-0.04**	(0.02)	**-0.10**	(0.02)	**-0.09**	(0.02)
Partners												
Brazil	1.01	(0.04)	0.90	(0.03)	**-0.15**	(0.03)	**-0.13**	(0.03)	**-0.18**	(0.03)	**-0.16**	(0.03)
B-S-J-G (China)	1.06	(0.04)	0.89	(0.05)	-0.03	(0.04)	-0.03	(0.04)	0.01	(0.04)	0.02	(0.04)
Colombia	0.92	(0.05)	0.78	(0.04)	0.01	(0.05)	-0.02	(0.05)	-0.02	(0.06)	-0.04	(0.05)
Dominican Republic	0.80	(0.06)	0.76	(0.06)	-0.09	(0.06)	-0.10	(0.07)	-0.04	(0.06)	-0.04	(0.06)
Hong Kong (China)	0.83	(0.04)	0.66	(0.02)	-0.03	(0.05)	-0.03	(0.05)	0.02	(0.07)	0.01	(0.07)
Macao (China)	1.05	(0.00)	0.84	(0.00)	**0.00**	(0.00)	**0.05**	(0.00)	**-0.02**	(0.00)	**0.05**	(0.00)
Peru	0.89	(0.05)	0.88	(0.05)	-0.08	(0.04)	-0.08	(0.05)	**-0.11**	(0.05)	**-0.11**	(0.05)
Chinese Taipei	0.78	(0.03)	0.61	(0.02)	0.03	(0.05)	0.03	(0.04)	0.05	(0.06)	0.04	(0.06)
United Arab Emirates	1.10	(0.04)	0.98	(0.02)	**-0.11**	(0.03)	**-0.08**	(0.02)	**-0.09**	(0.03)	**-0.10**	(0.03)
Average-18	0.89	(0.01)	0.76	(0.01)	**-0.05**	(0.01)	**-0.04**	(0.01)	**-0.07**	(0.01)	**-0.06**	(0.01)
Malaysia*	0.99	(0.03)	0.74	(0.02)	-0.06	(0.04)	-0.04	(0.05)	0.01	(0.05)	0.03	(0.04)

1. Science teachers' demographic and schools' socio-economic profile the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).

Table 6.5. Difference in perception of shortage of educational materials and science teachers' satisfaction

Difference between science teachers' and school principals' views, results based on school principals' and science teachers' reports

	Index of difference in the views on educational material shortage between teachers and school principals				Change in satisfaction with the teaching profession associated with a one-unit change in the index of difference in the views on educational material shortage between teachers and school principals				Change in satisfaction with the current job associated with a one-unit change in the index of difference in the views on educational material shortage between teachers and school principals			
	Mean index		Variation in the index		Before accounting for science teachers' demographic profile[1]		After accounting for science teachers' demographic profile		Before accounting for science teachers' demographic profile		After accounting for science teachers' demographic profile	
	Mean index	S.E.	S.D.	S.E.	Index change	S.E.	Index change	S.E.	Index change	S.E.	Index change	S.E.
OECD												
Australia	0.95	(0.02)	0.74	(0.01)	-0.05	(0.03)	-0.04	(0.03)	-0.04	(0.03)	-0.03	(0.03)
Chile	0.89	(0.04)	0.73	(0.05)	0.06	(0.07)	0.06	(0.07)	-0.04	(0.07)	-0.03	(0.07)
Czech Republic	0.90	(0.03)	0.75	(0.02)	**-0.07**	(0.03)	**-0.06**	(0.03)	-0.06	(0.04)	-0.05	(0.04)
Germany	0.82	(0.04)	0.67	(0.03)	-0.05	(0.05)	-0.05	(0.05)	0.04	(0.06)	0.04	(0.06)
Italy	1.06	(0.04)	0.82	(0.02)	**0.09**	(0.04)	**0.10**	(0.04)	0.04	(0.05)	0.05	(0.05)
Korea	0.89	(0.04)	0.70	(0.03)	0.02	(0.05)	0.01	(0.05)	-0.04	(0.06)	-0.06	(0.06)
Portugal	0.78	(0.04)	0.67	(0.04)	0.06	(0.06)	0.08	(0.07)	-0.04	(0.06)	-0.03	(0.06)
Spain	0.96	(0.03)	0.77	(0.02)	0.01	(0.04)	-0.01	(0.04)	-0.04	(0.05)	-0.06	(0.05)
United States	1.01	(0.04)	0.81	(0.03)	-0.05	(0.05)	-0.04	(0.05)	-0.10	(0.05)	-0.07	(0.05)
OECD average-9	0.92	(0.01)	0.74	(0.01)	0.00	(0.02)	0.00	(0.02)	-0.03	(0.02)	-0.03	(0.02)
Partners												
Brazil	1.12	(0.03)	0.88	(0.02)	-0.05	(0.03)	-0.03	(0.03)	-0.05	(0.03)	-0.03	(0.03)
B-S-J-G (China)	1.26	(0.04)	1.01	(0.04)	0.02	(0.03)	0.02	(0.03)	**0.09**	(0.03)	**0.09**	(0.03)
Colombia	1.08	(0.06)	0.87	(0.05)	-0.03	(0.06)	-0.03	(0.06)	-0.04	(0.06)	-0.04	(0.06)
Dominican Republic	0.92	(0.06)	0.82	(0.05)	**-0.14**	(0.07)	**-0.14**	(0.07)	**-0.14**	(0.05)	**-0.15**	(0.05)
Hong Kong (China)	1.07	(0.04)	0.80	(0.03)	0.04	(0.04)	0.04	(0.04)	0.05	(0.05)	0.05	(0.04)
Macao (China)	1.13	(0.00)	0.89	(0.00)	**-0.08**	(0.00)	**-0.09**	(0.00)	**-0.14**	(0.00)	**-0.13**	(0.00)
Peru	1.04	(0.04)	0.84	(0.04)	0.04	(0.04)	0.03	(0.04)	0.00	(0.04)	-0.01	(0.04)
Chinese Taipei	0.82	(0.03)	0.67	(0.02)	**0.12**	(0.04)	**0.11**	(0.04)	**0.15**	(0.06)	**0.14**	(0.05)
United Arab Emirates	1.25	(0.03)	0.97	(0.03)	**-0.10**	(0.03)	**-0.09**	(0.02)	**-0.09**	(0.03)	**-0.08**	(0.03)
Average-18	1.00	(0.01)	0.80	(0.01)	-0.01	(0.01)	-0.01	(0.01)	**-0.03**	(0.01)	**-0.02**	(0.01)
Malaysia*	1.01	(0.03)	0.78	(0.02)	-0.03	(0.03)	-0.04	(0.03)	-0.05	(0.04)	-0.06	(0.04)

1. Science teachers' demographic and schools' socio-economic profile include the PISA index of economic, social and cultural status (ESCS) at the school level, science teachers' gender, total number of years working as a teacher, highest level of formal education completed, teacher education or training programme completed, and employment type at the current school.
Note: Values that are statistically significant are indicated in bold (see Annex A).
*Coverage is too small to ensure comparability (see Annex A).