

## 6 Workforce

### Chapter outline

This chapter presents findings relating to the education workforce, as reported by teachers and principals. Sections relate to principals' and teachers' qualifications, teachers' major areas of study during training and professional development. These are followed by sections that examine factors related to teaching and teaching practices including: the extent to which teachers collaborate in order to improve their teaching practice and levels of job satisfaction. Outcomes for Northern Ireland are compared with the international averages, and where relevant, with those of other countries.

### Key findings

- In Northern Ireland, most pupils participating in TIMSS 2015 (83 per cent) attended schools where the principal has a postgraduate degree. This is considerably higher than the international average.
- On average, teachers in Northern Ireland were less qualified than teachers internationally. Whilst most pupils were taught by teachers who have a degree, only 16 per cent of pupils were taught by teachers who have a postgraduate degree. This is approximately 10 per cent lower than the international average, but is similar to a number of the main comparator group of countries, namely Australia, England, the Republic of Ireland and Singapore.
- In Northern Ireland, the majority of pupils were taught mathematics by teachers whose main area of study was primary education without specialisation in mathematics. The same was true of science, where three-quarters of pupils were taught by non-science specialists. The percentage of pupils in Northern Ireland taught by a teacher with a mathematics specialism was higher than the percentage of pupils taught by a science specialist (18 per cent and 12 per cent respectively).
- The level of participation in professional development activities in mathematics was higher in Northern Ireland than on average internationally. This was not the case for science, where levels of participation in professional development activities were relatively low (both in Northern Ireland and on average internationally).
- Teachers in Northern Ireland reported relatively frequent collaboration with colleagues to improve teaching.
- In Northern Ireland, 96 per cent of pupils had teachers who reported that they were 'Very Satisfied' or 'Satisfied' with their jobs. This mirrors the high level of job satisfaction reported in TIMSS 2011. However, higher levels of career satisfaction did not appear to be associated with increased pupil achievement.

### **Interpreting the data: percentages in tables**

Most of the data in this chapter is derived from teacher and principal reports. Reported percentages refer to pupils and can usually be interpreted as the percentage of pupils whose teachers or principals reported a particular practice or circumstance.

Year 6 (Y6) pupils (ages 9-10) were sampled by class. As a result, the Y6 Teacher Questionnaire would, in most cases, have been completed by the class teacher of the sampled class. In some cases, however, it might have been completed by different teachers who teach these pupils mathematics and / or science separately.

This means that the teacher-derived data for mathematics and science may differ slightly, as the sample of teachers in each group is not necessarily the same, or because the distribution of pupils within the sample of teachers may differ by subject.

### **Interpreting the data: indices and scales**

In order to summarise data from a questionnaire, responses to several related items are sometimes combined to form an index or scale. The respondents to the questionnaire items are grouped according to their responses and the way in which responses have been categorised is shown for each index or scale. The data in an index or scale is often considered to be more reliable and valid than the responses to individual items.

## **6.1 Principals' and teachers' formal education**

In order to discover the percentage of pupils attending schools run by principals with a high level of educational qualifications, and the percentage of pupils taught by teachers with a high level of educational qualifications, both principals and teachers were asked to indicate the highest level of formal educational qualification they had completed. (The findings are shown in Tables 6.1 and 6.2.)

In Northern Ireland, the majority of pupils participating in TIMSS 2015 (83 per cent) attended schools where the principal has a postgraduate university degree (for example a doctorate or master's). This is higher than the international average. Among the main comparator countries, only Poland and Finland had a higher percentage of pupils attending schools where the principal has a postgraduate degree.

In Northern Ireland, 16 per cent of pupils were taught by teachers who have a postgraduate university degree. This is lower than the international average, where 26 per cent to 28 per cent of pupils (for mathematics and science respectively) were taught by a teacher with a postgraduate degree. However, the percentage in Northern Ireland was similar to that in some of the comparator countries, namely Australia (12 per cent for mathematics and science), England (13 per cent for mathematics; 12 per cent for science), the Republic of Ireland (13 per cent) and Singapore (13 per cent). In Northern Ireland, nearly all of the

remaining pupils were taught by teachers who had completed a first degree but not a postgraduate degree (83 per cent).

**Table 6.1 Principals' formal education**

| Country            | Percent of Students by Principal Educational Level |   |                                    | Current Requirements |  |
|--------------------|--|---|------------------------------------|----------------------|--|
|                    | Completed Postgraduate University Degree**         | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Did Not Complete Bachelor's Degree | Teaching Experience  | Completion of Specialized School Leadership Training Program |
| Northern Ireland   | 83 (3.8)   | 16 (3.6)  | 1 (1.2)                            | ●                    | ○  |
| International Avg. | 48 (0.4)   | 46 (0.5)  | 6 (0.3)                            |                      |  |

● Yes  
○ No

\* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

\*\* For example, doctorate, master's, or other postgraduate degree.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Sources: Exhibit 8.9, international mathematics report (Mullis *et al.*, 2016a) and Exhibit 8.9, international science report (Martin *et al.*, 2016a).

Principal reports are the same for mathematics and science.

**Table 6.2 Teachers' formal education**

### Mathematics

*Reported by teachers*

| Country            | Percent of Students by Teacher Educational Level |   |  |   |
|--------------------|--|---|--|---|
|                    | Completed Postgraduate University Degree**       | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Northern Ireland   | 16 (3.3)   | 83 (3.4)  | 0 (0.0)  | 2 (0.9)                                   |
| International Avg. | 26 (0.3)   | 58 (0.4)  | 12 (0.3)   | 5 (0.2)                                   |

\* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

\*\* For example, doctorate, master's, or other postgraduate degree.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

### Science

*Reported by teachers*

| Country            | Percent of Students by Teacher Educational Level |   |  |   |
|--------------------|--|---|--|---|
|                    | Completed Postgraduate University Degree**       | Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree | Completed Post-Secondary Education but Not a Bachelor's Degree | No Further than Upper-Secondary Education |
| Northern Ireland   | 16 (3.3)   | 83 (3.4)  | 0 (0.0)  | 2 (0.9)                                   |
| International Avg. | 28 (0.4)   | 57 (0.4)  | 11 (0.3)   | 4 (0.2)                                   |

\* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

\*\* For example, doctorate, master's, or other postgraduate degree.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Sources: Exhibit 8.1, international mathematics report (Mullis *et al.*, 2016a) and Exhibit 8.1, international science report (Martin *et al.*, 2016a).

## **6.2 Teachers' educational emphasis / major areas of training**

### **6.2.1 Mathematics: teachers' major area of study during training**

In order to discover the percentage of pupils taught by subject specialists, in this case mathematics, teachers were asked to indicate their main area of study and whether they had specialised in any specific subjects during their post-secondary education. (The findings for teachers in Northern Ireland are shown in Table 6.3.)

In Northern Ireland, the majority of pupils participating in TIMSS 2015 (65 per cent) were taught mathematics by teachers whose main area of study was primary education without specialisation in mathematics. Eighteen per cent of pupils were taught mathematics by teachers who are mathematics specialists (17 per cent of the teachers had a specialism in mathematics and primary education, and a further 1 per cent, of teachers specialised in mathematics but not primary education). This is an increase of 7 per cent since 2011.

Among the comparator countries, Australia, England and the Republic of Ireland had a similar percentage of pupils taught by mathematics specialists. However, in Poland, Hong Kong and Singapore a much larger percentage of pupils were taught by mathematics specialists (100 per cent, 74 per cent and 73 per cent respectively).

There was not a clear pattern within individual countries, or on average, between being taught by a subject specialist and average achievement in mathematics at this level. In Northern Ireland, pupils taught by a subject specialist had higher average achievement. However, this difference is relatively small and unlikely to be statistically significant.

### **6.2.2 Science: teachers' major area of study during training**

Almost three-quarters of pupils in Y6 in Northern Ireland were taught science by teachers whose main area of study was primary education (without specialisation in science) (Table 6.4). Only 12 per cent of pupils were taught science by teachers who are science specialists (3 per cent of these were taught by teachers with a specialism in science but not primary education; the remainder had teachers who specialised in science and primary education). This is very similar to the findings from 2011.

The picture among the comparator countries was varied. In the Republic of Ireland, a smaller percentage of pupils were taught by subject specialists – only 8 per cent. In England on the other hand, over a quarter of pupils were taught by a science specialist (10 per cent of these were taught by teachers with a specialism in science but not primary education, and 17 per cent had teachers who specialised in science and primary education). This is different from 2011, where the percentage of pupils taught by science specialists in Northern Ireland was similar to a number of the comparator countries.

Among the highest achieving countries for science the percentages of pupils taught by subject specialists was high. In Singapore, for example, 69 per cent of pupils were taught by science specialists. There was generally no clear association within individual countries between teacher specialisation during training and average achievement in science at this

level, but in Northern Ireland, there appears to be some association. Further analysis would be required to determine if the differences in achievement are statistically significant.

**Table 6.3 Teachers' major area of study during training (mathematics)**

*Reported by teachers*

| Country            | Major in Primary Education and Major (or Specialization) in Mathematics |                     | Major in Primary Education but No Major (or Specialization) in Mathematics |                     | Major in Mathematics but No Major in Primary Education |                     | All Other Majors    |                     | No Formal Education Beyond Upper-Secondary* |                     |
|--------------------|---|---------------------|--|---------------------|--|---------------------|---------------------|---------------------|---|---------------------|
|                    | Percent of Students   | Average Achievement | Percent of Students  | Average Achievement | Percent of Students                                    | Average Achievement | Percent of Students | Average Achievement | Percent of Students                         | Average Achievement |
| Northern Ireland   | r 17 (4.0)  | 581 (11.2)          | 65 (4.7)   | 572 (4.2)           | 1 (1.0)  | ~ ~                 | 16 (3.7)            | 567 (5.6)           | 2 (0.9)                                     | ~ ~                 |
| International Avg. | 27 (0.4)  | 505 (1.1)           | 46 (0.5)   | 512 (1.5)           | 14 (0.3)   | 487 (2.9)           | 8 (0.3)             | 495 (2.0)           | 5 (0.2)                                     | 434 (4.0)           |

\* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.3, international mathematics report (Mullis *et al.*, 2016a).

**Table 6.4 Teachers' major area of study during training (science)**

*Reported by teachers*

| Country            | Major in Primary Education and Major (or Specialization) in Science |                     | Major in Primary Education but No Major (or Specialization) in Science |                     | Major in Science but No Major in Primary Education |                     | All Other Majors    |                     | No Formal Education Beyond Upper-Secondary* |                     |
|--------------------|---|---------------------|--|---------------------|--|---------------------|---------------------|---------------------|---|---------------------|
|                    | Percent of Students   | Average Achievement | Percent of Students  | Average Achievement | Percent of Students                                | Average Achievement | Percent of Students | Average Achievement | Percent of Students                         | Average Achievement |
| Northern Ireland   | r 9 (2.8)   | 541 (12.2)          | 71 (4.3)   | 519 (2.9)           | 3 (1.9)  | 528 (6.2)           | 15 (3.6)            | 518 (4.9)           | 2 (0.9)                                     | ~ ~                 |
| International Avg. | 23 (0.5)  | 511 (1.3)           | 49 (0.5)   | 510 (1.6)           | 15 (0.3)   | 496 (2.7)           | 9 (0.3)             | 496 (2.3)           | 5 (0.2)                                     | 457 (3.7)           |

\* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.3, international science report (Martin *et al.*, 2016).

## 6.3 Teachers' participation in professional development

### 6.3.1 Professional development in mathematics

In order to discover the percentage of pupils taught mathematics by teachers participating in professional development activities, teachers were asked to indicate what professional development activities in mathematics they had been involved in during the last two years. Teachers could indicate participating in more than one area of professional development. (The findings for teachers in Northern Ireland are shown in Table 6.5.) The areas of professional development covered by the questionnaire were:

- mathematics content
- mathematics pedagogy / instruction
- mathematics curriculum
- integrating information technology and mathematics

- improving students' critical thinking or problem solving skills
- mathematics assessment
- addressing individual students' needs.

**Table 6.5 Teachers' participation in professional development in mathematics**

*Reported by teachers*

Teachers could indicate participating in more than one area of professional development.

| Country            | Percent of Students by Teachers' Area of Professional Development |                                   |                        |   |   |                        |                                       |
|--------------------|---|-----------------------------------|------------------------|---|---|------------------------|---------------------------------------|
|                    | Mathematics Content   | Mathematics Pedagogy/ Instruction | Mathematics Curriculum | Integrating Information Technology into Mathematics | Improving Students' Critical Thinking or Problem Solving Skills | Mathematics Assessment | Addressing Individual Students' Needs |
| Northern Ireland   | r 50 (4.6)  | r 63 (4.3)                        | r 54 (5.0)             | r 40 (4.7)  | r 46 (4.8)  | r 57 (4.9)             | r 45 (4.3)                            |
| International Avg. | 43 (0.5)  | 45 (0.5)                          | 40 (0.5)               | 36 (0.5)  | 41 (0.5)  | 36 (0.5)               | 42 (0.5)                              |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.7, international mathematics report (Mullis *et al.*, 2016a).

In general, more pupils in Northern Ireland were taught by teachers who had been involved in a professional development activity in the last two years than was the case on average internationally. If, as research evidence suggests,<sup>31</sup> teacher involvement in content based professional development can influence pupil achievement in mathematics, the level of involvement in Northern Ireland in such activities is encouraging.

In Northern Ireland, at least 40 per cent of pupils were taught by teachers who had participated in one of the forms of mathematics professional development. The largest percentage of pupils were taught by teachers who had participated in a professional development activity on mathematics pedagogy / instruction (63 percent), nearly 20 per cent higher than the international average. The next most commonly attended area of professional development in Northern Ireland was mathematics assessment. Again, a much higher percentage of pupils in Northern Ireland were taught by teachers who had participated in a professional development activity on mathematics assessment than was the case on average internationally (57 per cent and 36 per cent respectively). Forty per cent of pupils were taught by teachers who had attended a professional development activity focusing on integrating information technology into mathematics – slightly above the international average (36 per cent).

Levels of participation in professional development in mathematics varied across the comparator countries. Finland had the lowest level of participation, with between 3 per cent and 24 per cent of pupils taught mathematics by a teacher who had participated in one of the activities covered in the Teacher Questionnaire. In Poland on the other hand, involvement in professional development in mathematics was more common, with 85 per cent of pupils having been taught by a teacher who had undertaken professional development on mathematics content, for example.

<sup>31</sup> Mullis and Martin (2013).

There was no clear pattern in the most commonly undertaken professional development activities across the comparator countries, perhaps reflecting different emphases on the importance of particular areas and / or existing skills of the teaching population.

### 6.3.2 Professional development in science

Teachers were asked to indicate what professional development activities in science they had been involved in during the last two years. As with mathematics, teachers could indicate participating in more than one area of professional development. (The findings for teachers in Northern Ireland are shown in Table 6.6.) The areas of professional development covered by the Teacher Questionnaire were:

- science content
- science pedagogy / instruction
- science curriculum
- integrating information technology and science
- improving students' critical thinking or inquiry skills
- science assessment
- addressing individual students' needs
- integrating science with other subjects.

**Table 6.6 Teachers' participation in professional development in science**

*Reported by teachers*

Teachers could indicate participating in more than one area of professional development.

| Country            | Percent of Students by Teachers' Area of Professional Development |                               |                    |   |   |                    |                                       |   |
|--------------------|---|-------------------------------|--------------------|---|---|--------------------|---------------------------------------|---|
|                    | Science Content   | Science Pedagogy/ Instruction | Science Curriculum | Integrating Information Technology into Science | Improving Students' Critical Thinking or Inquiry Skills | Science Assessment | Addressing Individual Students' Needs | Integrating Science with Other Subjects |
| Northern Ireland   | r 27 (4.1)  | r 31 (4.2)                    | r 25 (4.0)         | r 24 (4.3)                                      | r 31 (4.1)  | r 7 (2.5)          | r 20 (3.7)                            | r 31 (4.1)                              |
| International Avg. | 32 (0.5)  | 32 (0.5)                      | 32 (0.5)           | 30 (0.5)  | 33 (0.5)  | 25 (0.4)           | 32 (0.5)                              | 29 (0.5)                                |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Source: Exhibit 8.7, international science report (Martin *et al.*, 2016a).

In Northern Ireland, compared with mathematics, there were relatively lower levels of participation in professional development in science. This was also the case on average internationally. Given the potential link between teacher involvement in professional development activities and achievement<sup>32</sup>, this could be one of the contributing factors towards lower attainment in science in Northern Ireland.

Between 7 per cent and 31 per cent of pupils in Northern Ireland were taught science by a teacher who had participated in one of the activities covered in the Teacher Questionnaire. The most commonly attended areas of professional development in Northern Ireland were science pedagogy / instruction, improving critical thinking or inquiry skills, and integrating

<sup>32</sup> Mullis and Martin (2013).

science with other subjects; 31 per cent of pupils were taught science by a teacher who had participated in at least one of these areas. In contrast to mathematics, only 7 per cent of pupils were taught by teachers who had participated in a professional development activity on science assessment. This is much lower than the international average of 25 per cent.

As with mathematics, the levels of participation in professional development in science varied across the comparator countries, although this was generally lower than it was for mathematics activities. Once again, Finland had the lowest level of participation, with between 2 per cent and 12 per cent of pupils taught science by a teacher who had participated in one of the activities covered in the questionnaire. In Singapore on the other hand, involvement in professional development in science was more common, with 78 per cent of pupils having been taught by a teacher who had undertaken professional development on science pedagogy and instruction, for example. There was no clear pattern in the most commonly undertaken professional development activities in science across the comparator countries, perhaps reflecting different emphases in each of the countries.

## 6.4 Teacher reports of collaboration to improve teaching in each subject

Teachers were asked to indicate the extent to which they worked with their colleagues in particular aspects of teaching. Table 6.7 shows the percentage of pupils in Northern Ireland who were taught by teachers who reported having these types of interactions with other teachers 'Very Often' or 'Often'.

In general, teachers in Northern Ireland reported relatively high levels of collaboration with their colleagues. This was also the case internationally. For all but one of the interactions described in the questionnaire, over 50 per cent of pupils were taught mathematics by teachers who 'Very Often' or 'Often' work with their colleagues in that particular aspect of teaching. The same was true of science.

The most common interaction reported by teachers was working with colleagues to implement the curriculum; 77 per cent of pupils were taught mathematics / science by a teacher who was involved in that aspect of teaching 'Very Often' or 'Often'. This was a higher percentage than was seen on average internationally. However, teachers in Northern Ireland were not so frequently involved in visits to another classroom; only 24 per cent of pupils were taught mathematics / science by a teacher who visited other classrooms 'Very Often' or 'Often'. This is slightly lower than the international average (29 per cent for both mathematics and science).

**Table 6.7 Collaborate to improve teaching**

### Mathematics

| How often do you have the following types of interactions with other teachers? | Percentage of pupils |                           |
|--|----------------------|---------------------------|
|  | Northern Ireland (%) | International Average (%) |
| Discuss how to teach a particular topic  | 69                   | 70                        |
| Collaborate in planning and preparing instructional materials                  | 73                   | 66                        |
| Share what I have learned about my teaching experiences                        | 68                   | 72                        |
| Visit another classroom to learn more about teaching                           | 24                   | 29                        |
| Work together to try out new ideas   | 60                   | 53                        |
| Work as a group on implementing the curriculum                                 | 77                   | 63                        |
| Work with teachers from other grades to ensure continuity in learning          | 52                   | 50                        |

Source: 2015 Mathematics Teacher Context Data Almanac by Mathematics Achievement questions ATBG09A – G.

## Science

| How often do you have the following types of interactions with other teachers? | Percentage of pupils |                           |
|--|----------------------|---------------------------|
|  | Northern Ireland (%) | International Average (%) |
| Discuss how to teach a particular topic  | 69                   | 69                        |
| Collaborate in planning and preparing instructional materials                  | 73                   | 66                        |
| Share what I have learned about my teaching experiences                        | 69                   | 71                        |
| Visit another classroom to learn more about teaching                           | 24                   | 29                        |
| Work together to try out new ideas   | 60                   | 53                        |
| Work as a group on implementing the curriculum                                 | 77                   | 62                        |
| Work with teachers from other grades to ensure continuity in learning          | 52                   | 49                        |

Source: 2015 Science Teacher Context Data Almanac by Mathematics Achievement questions ATBG09A – G.

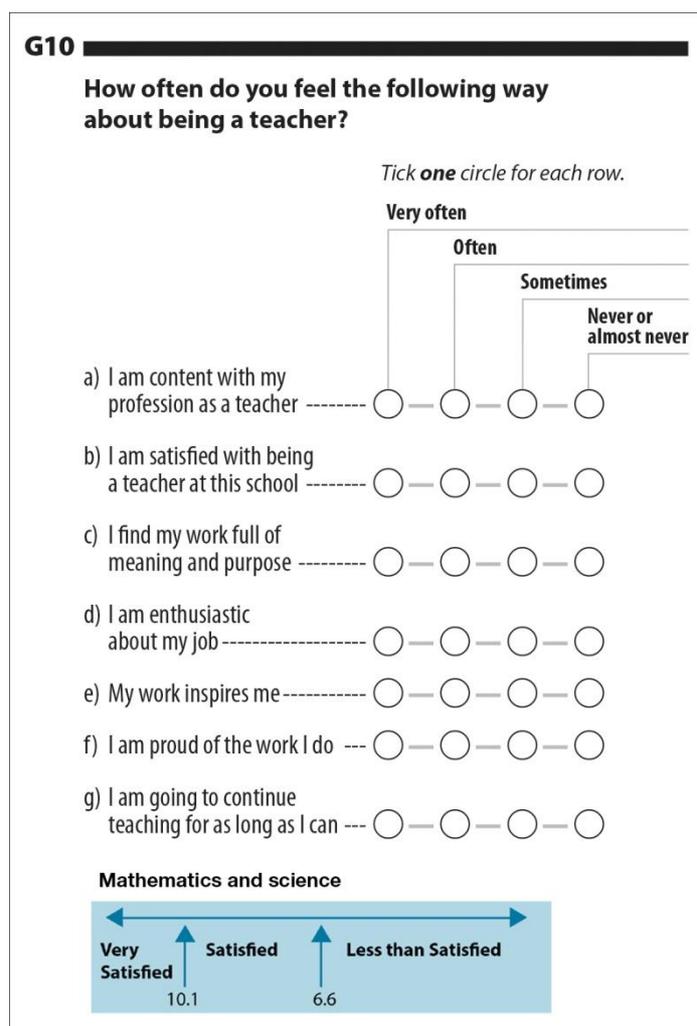
### 6.5 Teachers' reported job satisfaction

Teachers were asked to indicate the extent to which they were satisfied with their profession as a teacher. The statements and details of the scaling are shown in Figure 6.1 and the results for mathematics and science are shown in Table 6.8.

The international analysis uses responses to these statements to create the 'Teacher Job Satisfaction' scale. Teachers were categorised as being 'Very Satisfied', 'Satisfied' and 'Less than Satisfied'. As construction of the scale has changed since 2011, caution should be exercised when interpreting trends over time<sup>33</sup>.

<sup>33</sup> In 2011, teachers responded to six statements about their career satisfaction and were categorised into three bands: 'Satisfied', 'Somewhat Satisfied' and 'Less than Satisfied'. In addition, a number of the statements have changed since 2011 (only statements a) and b) were used in 2011).

**Figure 6.1 Teacher job satisfaction**



Source: adapted from Exhibit 6.6 international mathematics report (Mullis *et al.*, 2016a) and Exhibit 6.6, international science report (Martin *et al.*, 2016a).

**Table 6.8 Teacher job satisfaction**

### Mathematics

#### Reported by teachers

Students were scored according to how often their teachers responded positively to the seven statements on the *Teacher Job Satisfaction* scale. Students with **Very Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers responding "very often" to four of the seven statements and responding "often" to the other three, on average. Students with **Less than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers responding "sometimes" to four of the seven statements and "often" to the other three, on average. All other students had **Satisfied** teachers.

| Country            | Very Satisfied      |                     | Satisfied           |                     | Less than Satisfied |                     | Average Scale Score |
|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                    | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |                     |
| Northern Ireland   | 59 (5.0)            | 574 (4.3)           | 37 (4.7)            | 572 (6.4)           | 4 (2.0)             | 563 (23.8)          | 10.3 (0.21)         |
| International Avg. | 52 (0.5)            | 508 (0.6)           | 42 (0.5)            | 503 (0.8)           | 6 (0.2)             | 501 (2.0)           |                     |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. An "r" indicates data are available for at least 70% but less than 85% of the students.

## Science

### Reported by teachers

Students were scored according to how often their teachers responded positively to the seven statements on the *Teacher Job Satisfaction* scale. Students with **Very Satisfied** teachers had a score on the scale of at least 10.1, which corresponds to their teachers responding "very often" to four of the seven statements and responding "often" to the other three, on average. Students with **Less than Satisfied** teachers had a score no higher than 6.6, which corresponds to their teachers responding "sometimes" to four of the seven statements and "often" to the other three, on average. All other students had **Satisfied** teachers.

| Country            | Very Satisfied      |                     | Satisfied           |                     | Less than Satisfied |                     | Average Scale Score |
|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                    | Percent of Students | Average Achievement | Percent of Students | Average Achievement | Percent of Students | Average Achievement |                     |
| Northern Ireland   | 59 (4.9)            | 522 (3.3)           | 37 (4.7)            | 520 (4.6)           | 4 (2.1)             | 514 (21.2)          | 10.3 (0.21)         |
| International Avg. | 52 (0.5)            | 509 (0.7)           | 42 (0.5)            | 504 (0.8)           | 6 (0.3)             | 502 (2.4)           |                     |

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Sources: Exhibit 6.6 international mathematics report (Mullis *et al.*, 2016a) and Exhibit 6.6, international science report (Martin *et al.*, 2016a).

In Northern Ireland, in both mathematics and science, 59 per cent of pupils participating in TIMSS 2015 had teachers who reported that they were 'Very Satisfied' with their job, and a further 37 per cent (in both subjects) had teachers who were 'Satisfied'. Teachers of only 4 per cent of pupils reported that they were 'Less Than Satisfied'. These are similar findings to those seen in 2011.

The percentage of pupils in Northern Ireland taught by teachers falling into the highest category of job satisfaction was higher than the international averages on this scale.

Among the comparator countries, the highest percentage of pupils who had 'Very Satisfied' teachers was in the Republic of Ireland (62 per cent). This compared with an international average of 52 per cent of pupils taught by 'Very Satisfied' teachers. Teacher job satisfaction among the remaining comparator countries was lower than in Northern Ireland. For example, the percentages of pupils in England taught by teachers who reported being 'Very Satisfied' with their jobs was 42 per cent for mathematics and 43 per cent for science.

As was the case in TIMSS 2011, teacher job satisfaction in some high performing Pacific Rim countries was considerably lower than in Northern Ireland. For example, the percentage of pupils in Singapore taught by teachers who reported being 'Very Satisfied' with their careers was 37 per cent for mathematics and 35 per cent for science. At the opposite end of the scale, the percentages of pupils taught by teachers who reported being 'Less than Satisfied' in their role in Singapore were 11 and 12 per cent (for mathematics and science respectively), compared with international averages of 6 per cent.

The international averages for mathematics and science show that, as levels of teacher satisfaction increase, so does achievement generally (although not in the highest achieving countries), but we do not know if this association is statistically significant across all three categories. The same is true in Northern Ireland, although the difference between scores is relatively small and unlikely to be statistically significant.

## 6.6 Conclusion

In terms of levels of qualification, principals and teachers were asked about the highest level of formal education they had completed and teachers were also asked about the focus of their formal education and training. In Northern Ireland, more than three-quarters of pupils participating in TIMSS 2015 attended schools where the principal has a postgraduate degree (for example a doctorate or master's). This is much higher than the international average. The majority of pupils, 83 per cent, were taught by a teacher with a first degree. However only 16 per cent of pupils were taught by teachers who have a postgraduate degree. This is approximately 10 per cent lower than the international averages (26 per cent for mathematics and 28 per cent for science).

For mathematics, just under two-thirds of pupils were taught by teachers whose main area of study was primary education without specialisation in mathematics. The percentage of pupils taught by a mathematics specialist was 18 per cent; an increase of 7 per cent since 2011. The picture for science was slightly different, where three-quarters of pupils were taught by non-subject specialists and only 12 per cent were taught by teachers who had a specialism in science. This is similar to 2011.

The survey explored what professional development activities teachers had participated in during the last two years. For mathematics, the level of participation in professional development activities in Northern Ireland was higher than on average internationally. The most common areas for teachers in Northern Ireland to participate in professional development were mathematics pedagogy / instruction and mathematics assessment. In contrast to mathematics, the levels of participation in professional development in science were relatively low. This was the case both in Northern Ireland and on average internationally. The most commonly attended areas of professional development in Northern Ireland were science pedagogy / instruction, improving critical thinking or inquiry skills, and integrating science with other subjects; 31 per cent of pupils were taught science by a teacher who had participated in these areas. Levels of participation in professional development activities on assessment were much lower for science than for mathematics, with only 7 per cent of pupils taught by teachers who had participated in a professional development activity on science assessment. This is also much lower than the international average of 25 per cent.

In terms of working with colleagues to improve teaching, teachers in Northern Ireland reported relatively frequent collaboration with their colleagues. For both mathematics and science, the most common collaborative practice reported by teachers was working with colleagues to implement the curriculum. Just over three-quarters of pupils were taught mathematics / science by a teacher who was involved in that aspect of teaching 'Very Often' or 'Often'. Visits to another classroom was the least common form of collaborative practice undertaken by teachers in Northern Ireland; just under a quarter of pupils were taught by a teacher who was involved in that sort of collaboration 'Very Often' or 'Often'.

In Northern Ireland, teachers reported high levels of job satisfaction. This was true of mathematics and science and reflects a similar level of job satisfaction to that seen in 2011. As was the case in 2011, in Northern Ireland, higher levels of career satisfaction did not appear to be associated with increased pupil achievement.