

chapter 3

THE TEACHING WORKFORCE: CONCERNS AND POLICY CHALLENGES

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SUMMARY

There are serious concerns in many OECD countries about maintaining an adequate supply of good quality teachers. Teacher shortages may result not just in unfilled posts but in under-qualified staff or excessive teacher workloads. A teacher shortage raises quality as well as quantity concerns.

Defining and measuring shortfalls in teacher supply is not easy. However, there is clear evidence of difficulties faced by some countries. For example:

- In half of OECD countries, a majority of 15-year-olds attends schools whose principals think that student learning is hindered at least “a little” by a teacher shortage/inadequacy.
- In certain countries, although by no means all, it is becoming harder to fill teaching posts.
- Attrition rates from the teacher profession vary widely across countries. In some, the majority of people leaving teaching are retiring; in others only a small minority.
- Teaching forces are ageing. In some OECD countries, over 40% of teachers are in their 50s.
- In almost all countries, teacher salaries fell relative to national income per head during the late 1990s.

Educational authorities in countries with the greatest difficulties face a combined challenge: to design incentives to attract high-quality candidates and former teachers to the pool of those who want to teach; exclude from the pool those who lack the skills to teach; and retain and further develop the skills of those effective teachers currently in the profession.

1. INTRODUCTION

The ability of schools to meet pressing needs depends critically on the teaching workforce. Yet there are serious concerns about the quality of teacher supply, and specifically about teacher shortages. OECD Education Ministers meeting in 2001 expressed their concerns as follows:

“Most of our countries face an ageing teaching force, a decline in the status of teaching and serious problems in recruitment. At the same time, there are demands on our institutions to teach in new ways and to fulfil new roles. [...] We have reviewed some of the future development options for our schools. The more optimistic of these could be jeopardised if a serious teacher shortage occurs. We need to explore together strategies to attract and retain high-quality teachers and school principals.”

Such concerns are based on some disturbing signs of shortfalls in teacher supply. For example, in Australia, it has been estimated that the number

of graduates qualifying as secondary teachers will meet only 70% of projected new demand by 2005 (Preston, 2000). In Canada, one in four teaching graduates do not become teachers, and an estimated 25-30% of those who start teaching leave within five years (Canadian Teachers' Federation, 2000). In Finland, it has been increasingly difficult to meet target enrolments in certain subject areas in teacher education programmes: in 1999 the shortfalls were 35% in mathematics and chemistry, 50% in computer science and 65% in physics (National Board of Education, Finland, 2000). The United States Department of Education estimates that 2.5 million additional teachers will be needed over the next decade, which is 200 000 more than at the present production rate of new teachers (Education Commission of the States, 2001).

The issues surrounding teacher shortages, and teacher quality more generally, are attracting much policy attention. A wide range of research studies has confirmed the importance of teacher quality for student learning (see Box 3.1). Teacher shortages and teacher quality are not necessarily

Box 3.1 The importance of teacher quality

A review of the literature indicates that a range of factors relating to teacher quality and teaching quality affects student performance (see OECD, 2001c). However, the literature also reveals the limitations of the information provided by the more measurable characteristics of teachers. Researchers have often found it hard to isolate the effect of characteristics such as subject-matter knowledge, qualifications, academic ability, pedagogical knowledge or teaching experience on student outcomes. The evidence predominantly shows a positive impact of these teacher characteristics on student learning, but to a lesser extent than may have been expected. A possible explanation is that research studies looking at individual school systems with relatively uniform teacher characteristics, are unable to observe sufficient variation in such factors to be able to measure the difference they make. In addition, for most of these characteristics, a “threshold effect” is likely to apply: teachers need a certain level of qualifications or experience to be effective, but further attainments beyond those levels may be progressively less important for student performance.

A further explanation is that the teacher characteristics that are typically measured in research studies might explain less of the variation in teacher quality than other characteristics that are more challenging to measure. These include the ability to convey ideas in clear and convincing ways; to work effectively with colleagues and the school community; to use a wide range of teaching strategies appropriate for student needs; and enthusiasm, creativity and commitment to students' success. The literature reviewed in OECD (2001c) includes recent studies that point to the importance of such variables in influencing student learning. Such results suggest that policy initiatives need to take account of the potentially substantial variation in quality that exists among teachers whose readily measured characteristics are similar.

associated: there can be quality concerns when no shortages are apparent, for example. However, where there are actual or looming teacher shortages, there must at least be a risk that teacher quality is reduced. In particular, where a school system *seeks* to recruit teachers with certain qualifications and experience, a failure to do so warns of a wider malaise that can damage teacher quality more widely than may be implied by lower competencies of teachers who lack the expected qualifications.

The analysis of teacher shortages is not straightforward. First, measuring the extent of a shortage is difficult, and no agreed measure presently exists at international level. This is partly because “teacher shortage” raises quality as well as quantity issues. School systems often respond to teacher shortages in the short term by some combination of: lowering qualification requirements for entry to the profession; assigning teachers to teach in subject areas in which they are not fully qualified; increasing the number of classes that teachers are allocated; or increasing class sizes. Such responses, which may mean that a shortage is not readily evident, nevertheless raise concerns about the quality of teaching and learning. In this chapter, *teacher shortage* is interpreted as a “lack of teachers meeting the qualification standards established by educational authorities”. A *lack* of teachers means not enough to maintain teacher workloads and class sizes that are considered appropriate. In this definition, a shortage refers to a lack of *qualified* teachers. This concept is related, but not equivalent to, a lack of *quality* teachers. For example, if a country does not face a teacher shortage as defined above, it does not necessarily follow that the quality of the teaching workforce is adequate.

A second difficulty is the limited availability of international data on indicators that are closely associated with teacher shortages.¹ However, some individual countries have good, accessible data that provide useful insights on the recruitment and retention of qualified teachers. As a consequence, this chapter refers to some countries, especially the United Kingdom and the United States, more frequently than others. However, this does not mean that teacher issues are necessarily of greater concern in those countries that are cited most often.

This chapter is linked to the recently launched OECD activity *Attracting, Developing and Retaining Effective Teachers*, in which around 25 countries are taking part.² The chapter aims to summarise what is currently known about the nature and severity of teacher shortages among OECD countries. Section 2 characterises the shortage problem, and reviews the available evidence. Section 3 identifies the policy challenges that shortages give rise to, and outlines some policy tools. A summary and conclusions are provided in Section 4.

2. WHAT IS THE EVIDENCE ON TEACHER SHORTAGES?

The implications of teacher shortages can be analysed by looking at how educational systems respond to imbalances between demand for, and supply of, teachers. In the short-run, school systems facing situations of demand for teachers exceeding the available supply typically respond by:

- *Relaxing qualification requirements.* If a qualified applicant is not available to fill a teaching position, a less qualified applicant without full certification may be hired (“out-of-licence” teaching). Alternatively, teachers may be required to teach outside their areas of qualification: teachers trained in another field or level of schooling are assigned to teach in the understaffed area (“out-of-field” teaching). In addition, school systems may feel more pressure to retain poor performing teachers when teachers are generally in short supply.
- *Raising teaching loads.* The number of teachers required can be reduced and brought into line with the available supply by increasing the

1. The OECD is working with Member countries to improve the coverage and international comparability of data on teachers, including data on the teacher labour market.

2. The activity is intended to: (i) synthesise research on issues related to policies concerned with attracting, recruiting, retaining and developing effective teachers; (ii) identify innovative and successful policy initiatives and practices; (iii) facilitate exchanges of lessons and experiences among countries; and (iv) identify policy options. An important purpose is to identify data gaps concerning teachers and contribute to international efforts to improve data coverage and quality. The final report will be produced in 2004. Further information is available on www.oecd.org/els/education/teacherpolicy

workloads of teachers. This can be achieved by increasing class sizes and/or by increasing the average number of classes assigned to each teacher.

It is rarely the case that, when demand exceeds supply, a significant proportion of teaching positions remains unfilled. Hiring practices ensure that teachers are present to staff almost all classrooms. In this way, the immediate effect of a shortage is more likely to be a lower quality of teaching than a dramatic tale of classrooms full of students without teachers.

In the long-run, school systems have a wide range of strategies for enhancing the supply of teachers. The most commonly proposed response is to raise salaries to make the profession more competitive with other occupations. Additional strategies include improving working conditions, the status of the profession, and redesigning other incentives. These are described in more detail in Section 3.

2.1 Approaches to assessing teacher shortages

If teacher shortages rarely translate into empty classrooms, how can they be measured? A teacher shortage is a relative concept and depends on country-specific standards defining a “qualified” teacher. Thus, the meaning of a shortage is not necessarily the same across countries. It is not surprising, then, that there is no clear, universally agreed measure of what actually constitutes a teacher shortage.

Teacher shortages are generally indicated through two dimensions of the outcome of recruitment and assignment processes (Wilson and Pearson, 1993):

- *Vacancy rates*: The simplest measure is the *number of unfilled vacancies* for teachers. Despite its appeal, such a measure is not likely to be reliable on its own. All but a few vacancies can be filled in some way, whether through temporary or less qualified staff. Some schools might not create vacancies for staff if they are convinced that a particular post will not be filled by a teacher with the appropriate skills and abilities. However, even if a low proportion of unfilled vacancies does not necessarily mean the absence of shortages, a high level of unfilled vacancies provides evidence

of their presence. What is of greater interest is the *number of “difficult to fill” vacancies*, those that have been “unfilled” for a significant period of time, or the *proportion of positions filled by teachers without full certification status*.

- “Hidden” shortages: These are said to exist when teaching is carried out by someone who is not qualified to teach the subject. It is often referred to as “out-of-field” teaching and is usually measured as the *proportion of teachers teaching an area in which they are not qualified*. Nevertheless, this measure also suffers from certain limitations, as “out-of-field” teaching might result not only from shortages but also from the way schools are managed. In fact, many principals find that assigning teachers to teach out of their fields is often more convenient, less expensive or less time-consuming than the alternatives (Ingersoll, 1999).

These measures reveal, in a somewhat imperfect way, the extent to which school systems face problems in recruiting teachers. This problem is closely related to that of retaining teachers, as the demand for new teachers depends crucially on how many teachers leave the profession in a given year. For example, policies that improve salaries and other conditions for new recruits but which do not address the issues associated with teacher attrition may prove expensive and counterproductive. It is thus important to look also at the flows out of the teaching profession, through such indicators as *attrition rates, characteristics of leavers, or reasons for leaving the teaching profession*. The large size of the teaching force means that even a small rise of one or two percentage points in the attrition rate can have major consequences for the numbers of replacement teachers that need to be recruited.

Problems of teacher shortages are typically uneven. In some regions, subject areas, and educational levels, shortages can be particularly acute. For example, shortages tend to be more intense in subjects such as science and mathematics, in teaching fields such as special education, and in rural areas in some countries. Therefore, it is desirable to have disaggregated indicators that reflect these differences.

Information regarding the qualifications of the current stock of teachers is also important in

designing teacher policy. Useful information includes *the percentage of teachers holding a qualification in education, the distribution by highest qualification, certification status, years of experience, and level of participation in professional development activities*. Although such characteristics are only indirect and imperfect measures of quality, they do provide useful information on the teaching workforce.

Further, the *age distribution of the current teaching workforce* provides a basis for assessing how acute retirement-related supply shortages are likely to be. Also, evidence on factors related to the attractiveness of the profession, such as *relative salaries, fringe benefits and working conditions of teachers*, can prove useful in explaining the development of shortages. Finally, as an insufficient number of teachers is defined relative to given needs, it is also important to look at the pressures on the demand side, in particular at *expected changes in the size of the school-age population*.

2.2 Data on teacher shortages

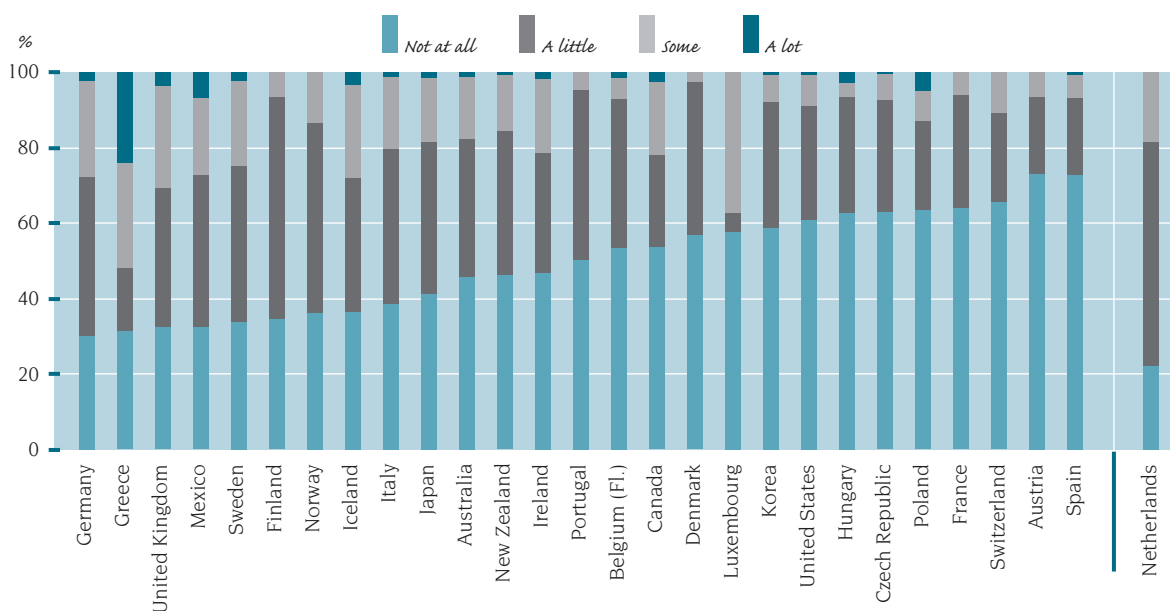
This section uses a range of sources to provide data on the shortage indicators outlined in Section 2.1. It needs to be emphasised, though, that the indicators are imperfect measures, and the available evidence is far from complete in terms of the range of countries covered. To introduce the data, it is useful first to see what school principals think about the impact of teacher shortages on student learning.

School principals' perceptions

In 2000, secondary school principals in all but two OECD countries were asked whether, and to what extent, “the learning of 15-year-old students is hindered by a shortage/inadequacy of teachers”. This question was part of the Programme for International Student Assessment (PISA) survey (OECD, 2001*b*). Figure 3.1 summarises the results.³

Figure 3.1 Principals' perceptions on whether a shortage/inadequacy of teachers hinders student learning, 2000

Percentage of 15-year-old students enrolled in schools where principals report that learning is hindered by a shortage/inadequacy of teachers to the following extent:



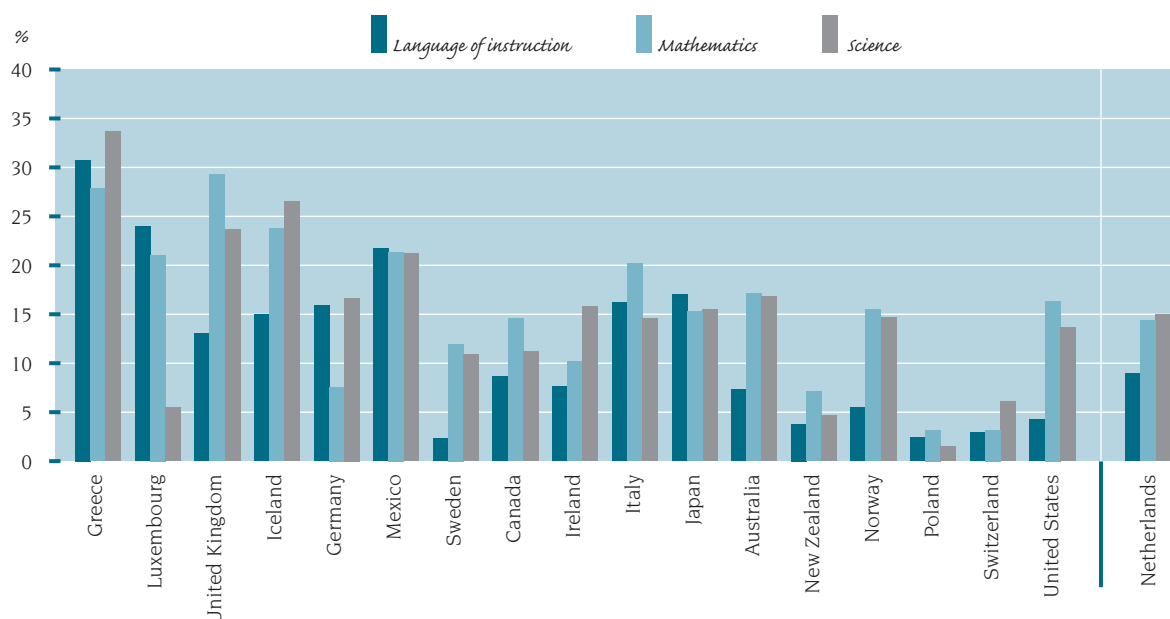
Note: For the Netherlands, the response rate is too low to ensure comparability.

Source: OECD PISA database at www.pisa.oecd.org

Data for Figure 3.1, p. 87.

Figure 3.2 Principals' perceptions on whether a shortage/inadequacy of teachers hinders student learning, by subject area, 2000

Percentage of 15-year-old students enrolled in schools where principals report that learning is hindered "to some extent" or "a lot" by a shortage/inadequacy of teachers in the following subject areas:



Note: Only countries for which the perception of principals on whether shortages in general hinder student learning is above a certain threshold are considered. The threshold is defined as the sum of "to some extent" or "a lot" responses being 8% for shortages in general (indicator shown in Figure 3.1). Countries are ordered, from left to right, according to the value of that sum.

For the Netherlands, the response rate is too low to ensure comparability.

Source: OECD PISA database at www.pisa.oecd.org

Data for Figure 3.2, p. 87.

It should be borne in mind that such reports may well be influenced by cross-cultural differences in how principals interpret a "shortage/inadequacy of teachers". For example, principals in countries generally less affected by a teacher shortage/inadequacy may consider a modest level of shortages as having an important impact on student learning, whereas principals in countries with more serious shortage problems may see things differently. Moreover, although principals are obviously well placed to provide information about their own school, they are a single source of information. Nevertheless, the information obtained from school principals is instructive.

In half of the countries, principals report that learning is hindered at least "a little" by a shortage/inadequacy of teachers in schools covering at least half of the 15-year-old student population. In the Netherlands, Germany, Greece, the United Kingdom

and Mexico, at least two-thirds of students are enrolled in schools where principals thought that there was at least some effect. In contrast, over 65% of students in Spain, Austria and Switzerland are enrolled in schools where principals thought there was no effect.

Another issue of interest is how principals perceive the relative effect of a teacher shortage/inadequacy by subject area. Figure 3.2 provides strong indications that, for countries in which general shortages/inadequacies are perceived as more problematic, the shortage/inadequacy problem is seen by principals as hindering student learning more severely in mathematics and science

3. The country-level averages shown are based on relating principals' responses to students who completed the PISA reading literacy assessment; similar results apply to the mathematics and science assessments.

than in the language of instruction. This is particularly the case in Australia, Iceland, Norway, Sweden, the United Kingdom and the United States.

It is important to put these principals' perceptions about teacher shortage/inadequacy in context. The 2000 PISA survey also asked principals for their perceptions of the impact of a range of other aspects relating to teachers: (i) teachers not meeting individual students' needs; (ii) teacher turnover; (iii) low expectations of teachers; (iv) teacher absenteeism; and (v) students lacking respect for teachers. In most countries, school principals reported that teacher shortages were not among the main teacher-related factors directly hindering student learning. Teachers not meeting individual students' needs, student discipline problems, and students lacking respect for teachers emerged as larger concerns. Of course, there may be knock-on effects of teacher shortage/inadequacy that influence these other factors. For example, if many temporary teachers are used, this could influence discipline problems and student respect.

Outcomes of recruitment processes

A direct way to assess the difficulty experienced by schools in recruiting qualified teachers is to consider measurable aspects of recruitment outcomes, including the number of unfilled vacancies, the number of "difficult to fill" vacancies, the proportion of vacancies "unfilled" for a significant period of time, the proportion of positions filled by teachers without regular qualifications, and the number of applicants for positions.

Comparable international data on these shortage indicators are not readily available. However, some countries conduct surveys on the recruitment of qualified teachers which, although not strictly comparable, provide useful insights. The available data show that the situation differs substantially among countries. While some seem to be facing difficulties in hiring qualified teachers, others appear to have a large pool of qualified applicants.

Figure 3.3 provides information on unfilled teaching vacancies in England and Wales, New Zealand and the Netherlands. These indicators suggest some concerns with teacher recruitment. For instance, around one in seven regular new teaching positions in Dutch secondary schools were not filled when the

2000 school year started, which was over twice the rate in 1997 (Figure 3.3A). Using a different measure, in New Zealand, 1.5% of all secondary posts were unfilled at the commencement of the school year, in January 2002 (Figure 3.3B). In England, for the school year 2000-01, 1.4% of all teaching posts were not filled by January, some four months after the start of the school year (Figure 3.3C).

Figure 3.3 indicates that in the Netherlands and England the level of unfilled teacher vacancies has worsened in recent years, and less markedly so in New Zealand. In addition, the extent of the problem varies across at least three dimensions. It tends to be more serious: (i) in secondary schools than in primary schools; (ii) in specific regions of the country (*e.g.* in London in the case of England, and in the west of the Netherlands); and (iii) in specific subject areas such as mathematics and information technology (Figure 3.3D). In New Zealand, unfilled teacher vacancies are more likely in rural areas than in other locations, and in schools with larger proportions of students from low socio-economic backgrounds (Ministry of Education, New Zealand, 2002).

Nevertheless, some signs suggest that teacher recruitment problems are not general across the OECD area. For instance, in Japan, the 2001 results of the yearly teacher appointment examination reveal that only 6% of qualified examinees were appointed as teachers in lower secondary education, which suggests a large pool of eligible applicants. The figures for primary and upper secondary education were 11% and 7%, respectively.⁴ Likewise, in France, in the 2000 teacher recruitment national competition, only 21% of candidates were admitted into the profession (Ministère de l'Éducation Nationale, France, 2002).

Flows out of the profession

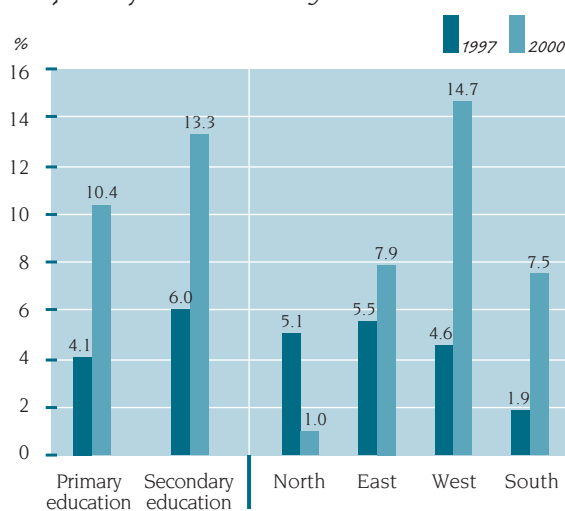
Important measures for characterising problems associated with teacher supply are the levels of teacher turnover and attrition.⁵ These measures

4. Data provided by the Ministry of Education, Culture, Sports, Science and Technology of Japan.

5. Turnover and attrition have distinct meanings throughout this chapter. Turnover refers to those teachers who leave their current teaching position, including those that transfer to different teaching jobs in other schools, while attrition refers to those teachers who leave the teaching profession altogether. Attrition is a subset of turnover.

Figure 3.3 Unfilled teaching vacancies – The Netherlands, New Zealand, England and Wales
(Note that the scale used is different for each figure)

A Percentage of unfilled teaching vacancies, the Netherlands, by level of education and region, 1997 and 2000



B Percentage of unfilled teaching vacancies, New Zealand, by level of education, 2001 and 2002



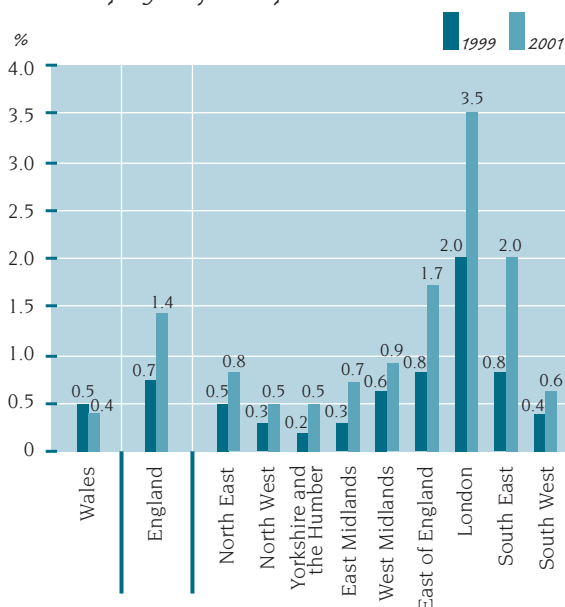
Figures correspond to the percentage of regular vacancies unfilled at the beginning of the school year, relative to the total number of regular vacancies before the school year.

Source: Ministry of Education, Culture and Science, the Netherlands (2002).

Figures correspond to open positions not filled by a permanent teacher or long-term reliever as a proportion of all positions in a school that are funded by the government.

Source: Ministry of Education, New Zealand (2002).

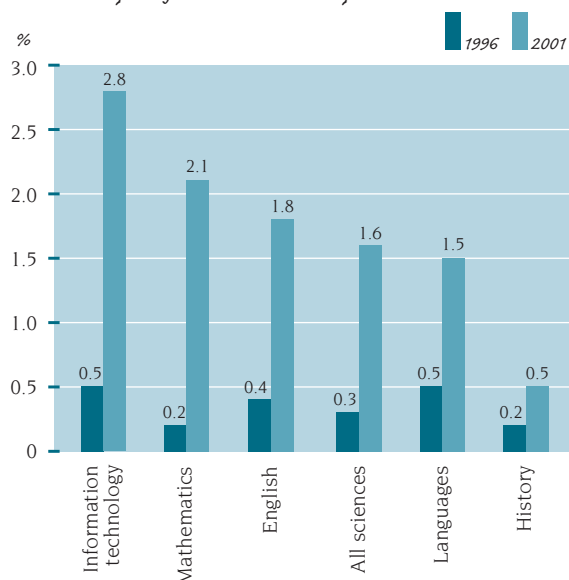
C Percentage of unfilled teaching vacancies, England and Wales, by region of country, 1999 and 2001



Figures correspond to unfilled vacancies in January as a percentage of teachers in post for the respective region, in publicly funded nursery, primary, secondary and special schools.

Source: Department for Education and Skills (2001).

D Percentage of unfilled teaching vacancies, England and Wales, by subject area, secondary level, 1996 and 2001



Figures correspond to unfilled vacancies in January as a percentage of teachers in post for the respective subject area in publicly funded secondary schools.

Source: Department for Education and Skills (2001).

Figure 3.4 Teacher turnover and attrition rates – England, New Zealand and the United States
(Note that the scale used is different for each figure)

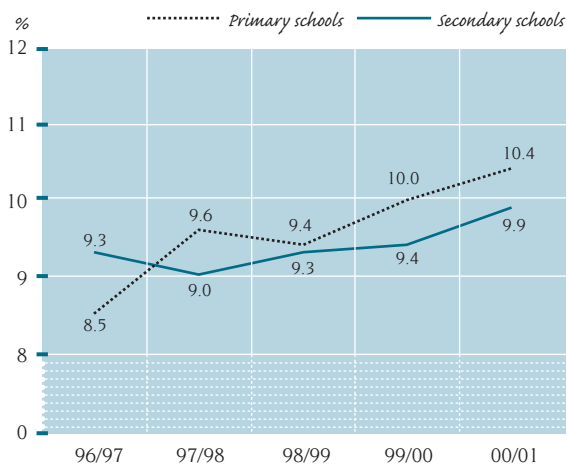
A Turnover rate, England, all schools for full-time service in the publicly funded school sector, 1998-99



Turnover rate is defined as the proportion of all teachers in full-time service in the English publicly funded schools sector on 31 March 1998 who were not in full-time service in the same establishment on 31 March 1999. It therefore includes individuals leaving the profession and transfers to other establishments.

Source: Department for Education and Skills (2001).

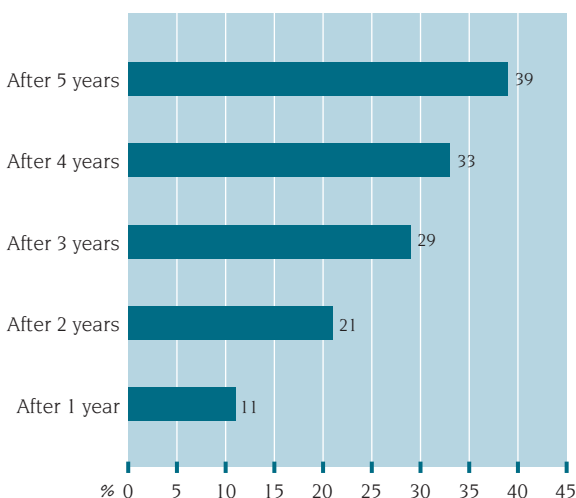
B Loss rates of regular teachers, New Zealand, 1996-97 to 2000-01



Loss rate is defined as the yearly rate at which permanent full-time and part-time teachers leave the New Zealand School State System. Losses include individuals deciding to teach overseas or in private schools, teachers moving to limited term appointments and teachers on leave without pay.

Source: Data provided by the Ministry of Education, New Zealand.

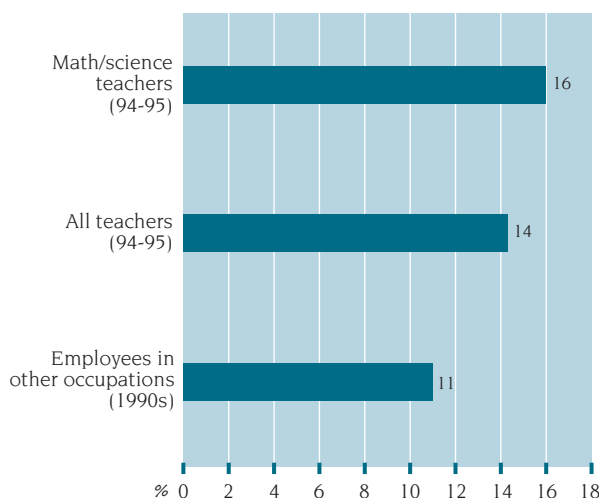
C Teacher attrition by years of experience, United States, 1994-95



The figures correspond to the cumulative percentage of beginning teachers having left the teaching occupation by 1994-95.

Source: Figure reproduced from Ingersoll (2002a).

D Turnover rate, United States, by type of activity



Turnover rate is defined as the yearly rate at which workers leave their current employment position. It includes employment movements within the same occupation – transfers to a different post in another workplace – and **attrition** – those who leave the occupation altogether.

Source: Figure reproduced from Ingersoll (2002b).

are more informative when considered alongside inflow rates of new recruits and changes in the size of the student-age population, but their change over time and regional or subject-matter specificity help to characterise retention issues. Countries differ markedly in the general level of teacher attrition:

- England, with 9% for all schools in 1999-2000 (Department for Education and Skills, 2001);
- The Netherlands, with 7% for primary schools in 2000 (Ministry of Education, Culture and Science, the Netherlands, 2002);
- Australia, with 5% for secondary and 4% for primary teachers in 1999 (Ministerial Council on Employment, Education, Training and Youth Affairs, 2001);
- Germany, with 5% for all schools in 1999/2000 (Federal Statistical Office, Germany, 2001);
- Canada, with 2.4% for all schools, on average, between 1988 and 1998 (Gervais and Thony, 2001);
- Japan, with around 2-3% in 1997 (see footnote 4); and
- Korea, with around 2% in 2001 (Ministry of Education and Human Resources Development, Republic of Korea, 2001).

Figure 3.4 shows data on turnover and attrition rates. The rates vary markedly among regions within countries. For instance, in England, turnover rates are considerably higher in the London area than in other regions (Figure 3.4A). In some countries, turnover or attrition rates have been rising over time. The case of New Zealand is shown in Figure 3.4B, where the attrition rate among government primary school teachers rose from 8.5% to 10.4% between 1996-97 and 2000-01, and for secondary schools from 9.3% to 9.9%.⁶ Teacher attrition rates are cumulative in their impact. As Figure 3.4C shows for the United States in the mid-1990s, although attrition rates tend to decline the longer that teachers are in the profession, around 39% of the intake to teaching had left the profession after five years. Figure 3.4D also shows that, in the United States, turnover rates for teachers, and particularly for mathematics and science teachers, are above those of employees in other occupations.

Figure 3.5 provides information on the destinations of leavers and the reasons given by teachers for leaving their job in England and Wales in 2001, and in the United States in 1994-95. Interestingly, while in both countries concerns about working conditions and school climate figured prominently among the reasons that teachers provided, significant differences emerge regarding the dominant reason. Those in the United States nominated poor salaries as the main reason for leaving, whereas British teachers emphasised the heavy workload.

An important issue is whether attrition is mostly retirement-related or not. The data available show that this depends on the country concerned. For instance, in Japan for 1997, 60% of all teachers who left the profession did so because of retirement. Similarly, in France, according to the Ministère de l'Éducation Nationale (2001), 78% of secondary school teachers are expected to leave within the period 2000-09 because of retirement. In other countries, the figures for retirement-related attrition are considerably lower: around 12% in New Zealand (2001); 38% and 23% in Australia in primary and secondary schools, respectively (1999); 34% in England in secondary schools (2001); and 11% in the United States in 1994-95.⁷ Clearly, in some countries retention is a major consideration as a substantial number of teachers leave the profession for reasons other than retirement.

Teacher qualifications

An indication of the adequacy of the teaching workforce can also be provided by the qualifications of the current stock of teachers. The 2000 PISA survey asked secondary school principals how many teachers were fully qualified by the appropriate authority.⁸ In over half of the OECD countries, more than 90% of the full-time secondary teaching workforce was reported as

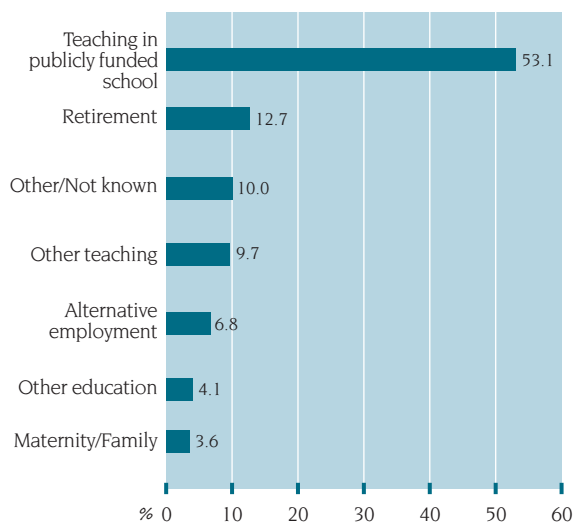
6. Similar data, not shown in Figure 3.4, indicate that between 1996 and 1999 teacher attrition rates increased in Australia from 3% to 4% in primary schools and from 4% to 5% in secondary schools. In the Netherlands, teacher attrition rates in primary schools rose from 4% to 7% between 1996 and 2000.

7. As retirement schemes differ considerably across countries, comparisons of retirement-related attrition rates should take into account the specific national contexts.

8. These data rely on principals' definitions and judgements of who is a qualified teacher, which may vary across countries.

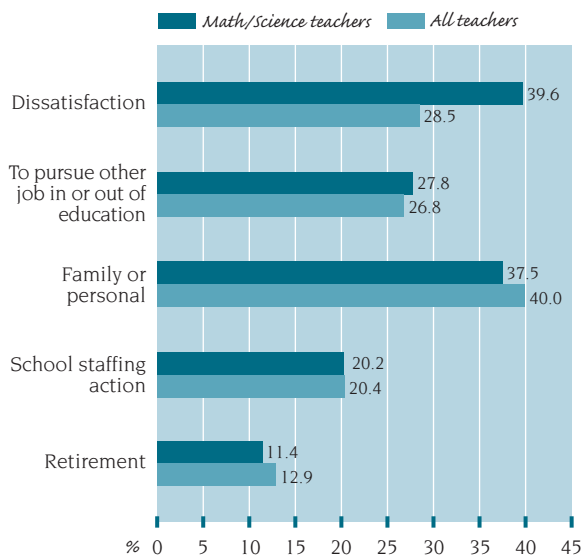
Figure 3.5 Destinations of teachers who leave their position, and reasons for leaving – England and Wales, and the United States

A Destinations of teachers who leave their current teaching position, England and Wales, secondary education, Summer 2001



Source: Smithers and Robinson (2001).

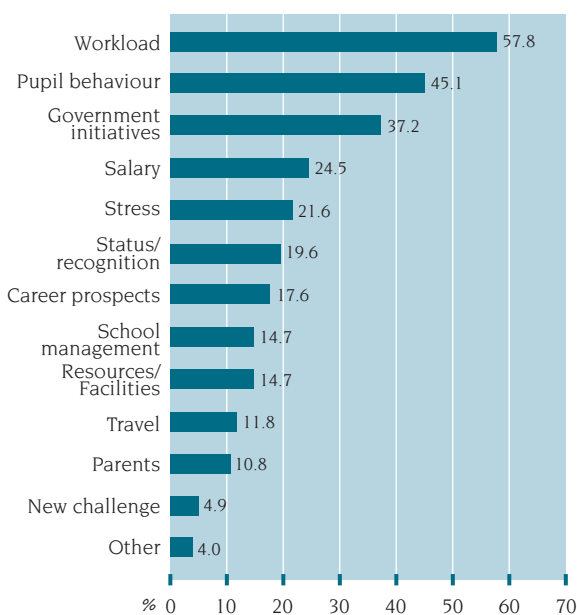
B Reasons for turnover according to teachers, United States, 1994-95



Note: Respondents could indicate more than one reason and so figures add up to more than 100% for each category of teachers.

Source: Figure reproduced from Ingersoll (2002b).

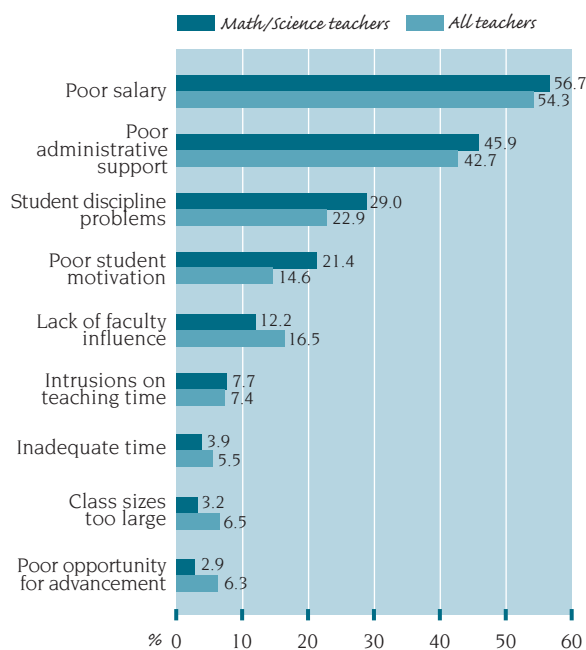
C Reasons given by teachers for resigning, England and Wales, secondary education, Summer 2001



Note: Respondents could indicate more than one reason and so figures add up to more than 100%.

Source: Smithers and Robinson (2001).

D Reasons for dissatisfaction-related turnover given by teachers, United States, 1994-95

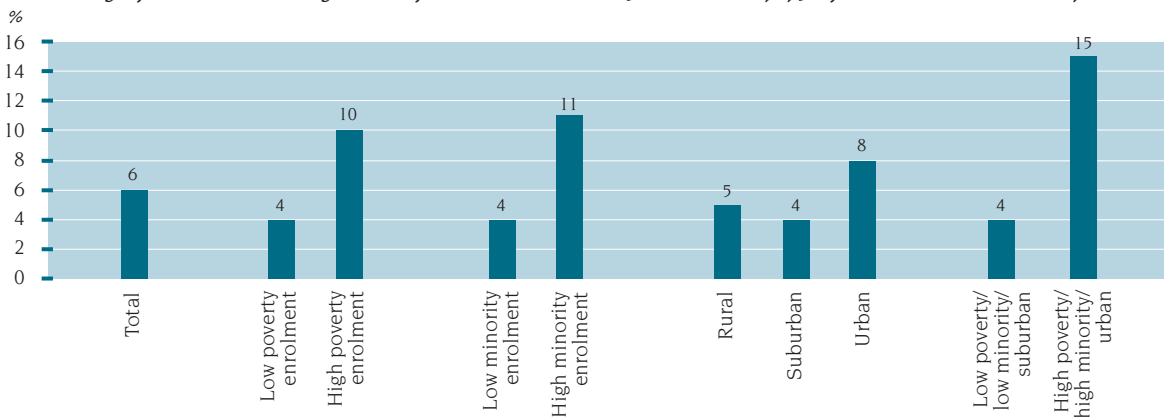


Note: Respondents could indicate more than one reason and so figures add up to more than 100% for each category of teachers.

Source: Figure reproduced from Ingersoll (2002b).

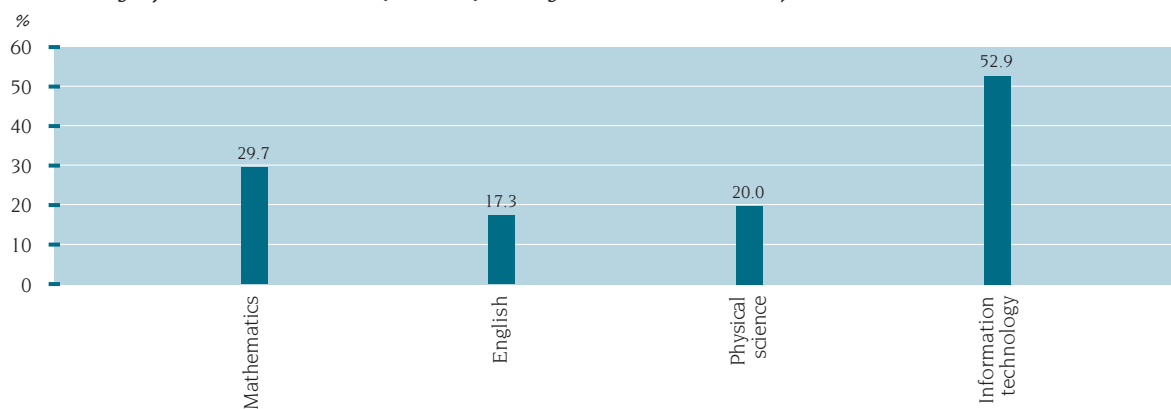
Figure 3.6 Qualifications of teachers, United States and Australia

A Percentage of teachers without regular certification, United States, public schools, by type of enrolment and community, 1993-94



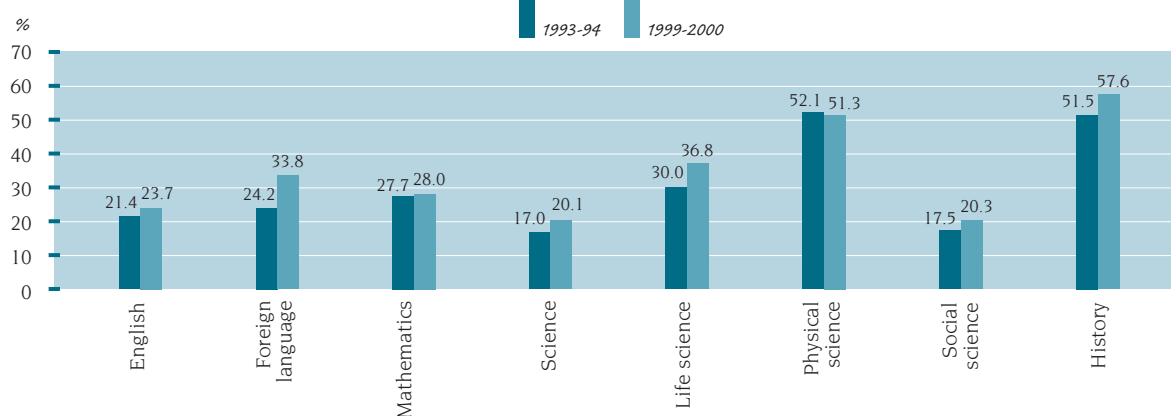
Source: Ingersoll (2002c).

B Percentage of teachers without a major in subject taught, Australia, secondary schools, 1999



Source: Ministerial Council on Employment, Education, Training and Youth Affairs (2001).

C Percentage of public high school teachers without a major or minor in course taught, United States, 1993-94 and 1999-2000



Source: U.S. Department of Education (2002).

fully qualified (OECD PISA database, 2001). In this respect, the situation seems to be more problematic in Portugal, New Zealand, Luxembourg and Mexico, where less than 80% of full-time secondary teachers were reported as fully qualified.

Figure 3.6 provides information from other sources on the qualifications of teachers in the United States (1993-94 and 1999-2000) and Australia (1999). As can be seen from Figure 3.6A, in the United States teacher qualification status tends to differ depending on the type of enrolment and community. In particular, the percentage of teachers with no regular certification status is greater in high-poverty, urban and high-minority enrolment schools. Figures 3.6B and 3.6C show that for Australia and the United States respectively, the percentage of secondary teachers without a qualification in the subject taught was strikingly high for some subjects (particularly mathematics, physical science and information technology).

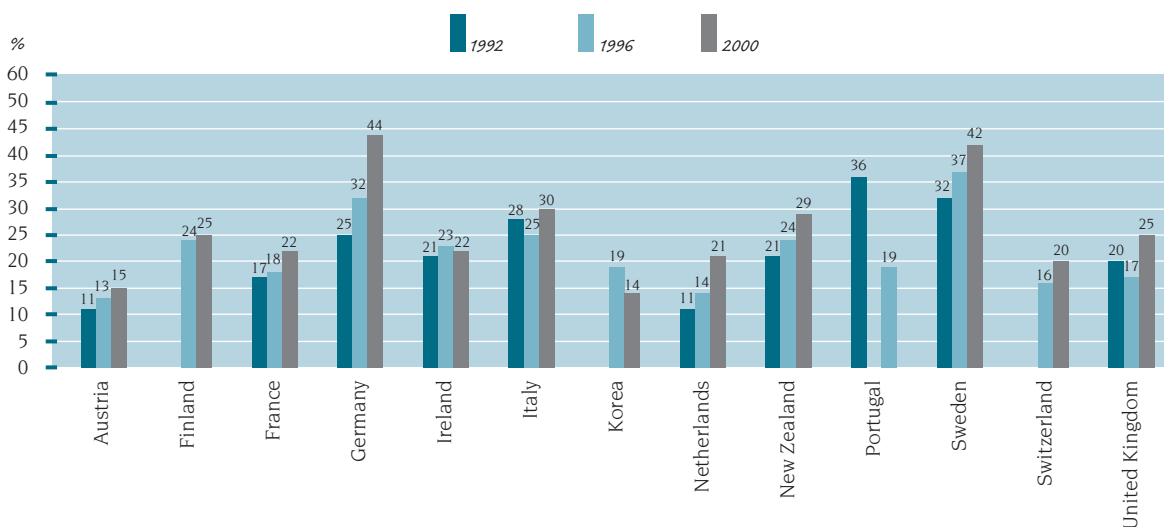
Age distribution of teachers

One important indicator of likely pressures on teacher supply is the proportion of teachers who are

in their 50s and thus approaching retirement age. There is no single rule about what is an appropriate proportion in each age-band, given that typical entry and exit ages vary by country. However, within each country, a growing percentage of older teachers can potentially create staffing difficulties through increased retirement rates. As Figures 3.7 and 3.8 show, in 2000 several countries had a very high percentage of teachers aged over 50 years, particularly in secondary education. Around 50% of the teachers in German and Italian lower-secondary schools were aged over 50 years. About 40% of teachers were in this age group in Swedish and German primary schools. However, in other countries, notably Austria, Korea and Portugal, there was no such skewing towards older teachers.

Figures 3.7 and 3.8 show, for primary and lower secondary teachers respectively, how the teaching force aged quite markedly during the 1990s. Between 1992 and 2000, the proportion of teachers aged over 50 years rose sharply in some countries – most dramatically in Germany, from a quarter to almost a half in just eight years. It also rose substantially in New Zealand, the Netherlands and Sweden in primary education, and in France, Italy and the

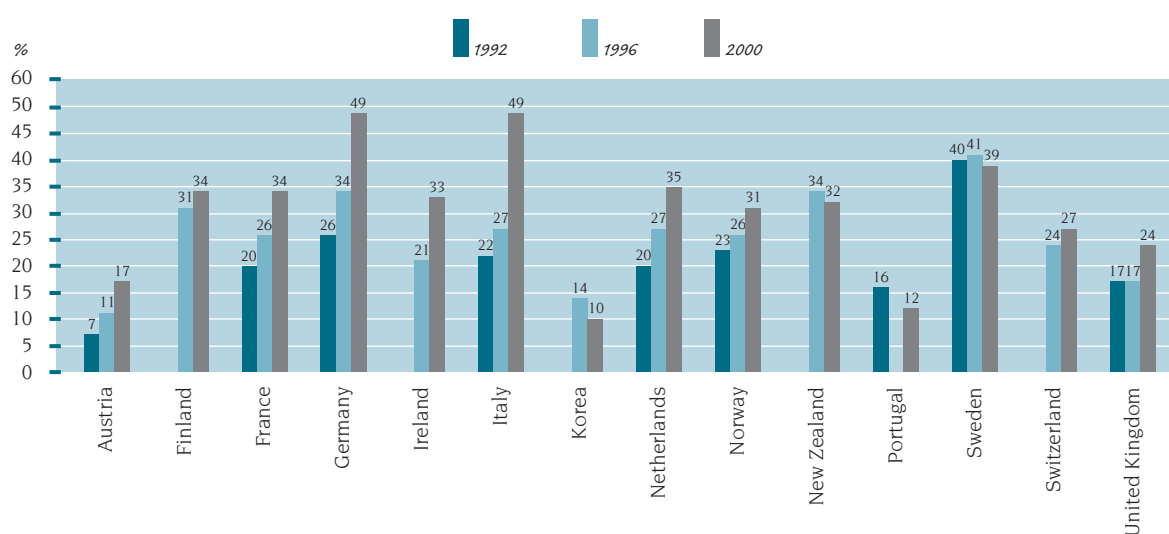
Figure 3.7 Percentage of teachers 50 years old and over, primary education



Note: While data for 2000 include private and public sectors, data for 1992 and 1996 are limited to the public sector. 1992 data for France, Ireland and the United Kingdom and 2000 data for the Netherlands include pre-primary sector. Data for 1992 for Germany refer to the former Federal Rep. of Germany and include government-dependent private institutions. 2000 data for Switzerland include only public institutions. The 1992 figure for the United Kingdom is limited to England and Wales while the 1996 figure is limited to England and Scotland. The 2000 figures for Austria and Switzerland refer to 1999.

Source: OECD (1995, 1998) and OECD Education Database, 2002.

Figure 3.8 Percentage of teachers 50 years old and over, lower secondary education



Note: While data for 2000 include private and public sectors, data for 1992 and 1996 are limited to the public sector. 1992 data for France, the Netherlands, Portugal and the United Kingdom, 1996 data for Ireland and New Zealand, and 2000 data for Ireland and the Netherlands include upper secondary sector. Data for 1992 for Germany refer to the former Federal Rep. of Germany and include government-dependent private institutions. 2000 data for Switzerland include only public institutions and 2000 data for Norway include primary level. The 1992 figure for the United Kingdom is limited to England and Wales while the 1996 figure is limited to England and Scotland. The 2000 figures for Austria and Switzerland refer to 1999.

Source: OECD (1995, 1998) and OECD Education Database, 2002.

Netherlands in lower secondary education. In other countries, there was a less pronounced “ageing” trend (Ireland, Austria, Switzerland for both sectors, France in primary education), while Korea and Portugal showed no marked trend in this direction.

An increase in the average age of the teaching workforce can have several effects. First, it generally has budgetary implications since in most school systems there is a link between pay and years of teaching experience (although in some systems teachers’ salaries peak quite early in their careers). Second, although a more experienced teaching workforce can bring benefits to schools, it can also be the case that additional resources are needed to update skills, knowledge and motivation among those who have been teaching for a long time. Third, unless appropriate action to train and recruit more teachers is already underway, shortages are likely if the proportion of teachers retiring remains high or continues to rise.

Relative salaries

Teacher supply is affected by the relative attractiveness of the profession. However, despite the

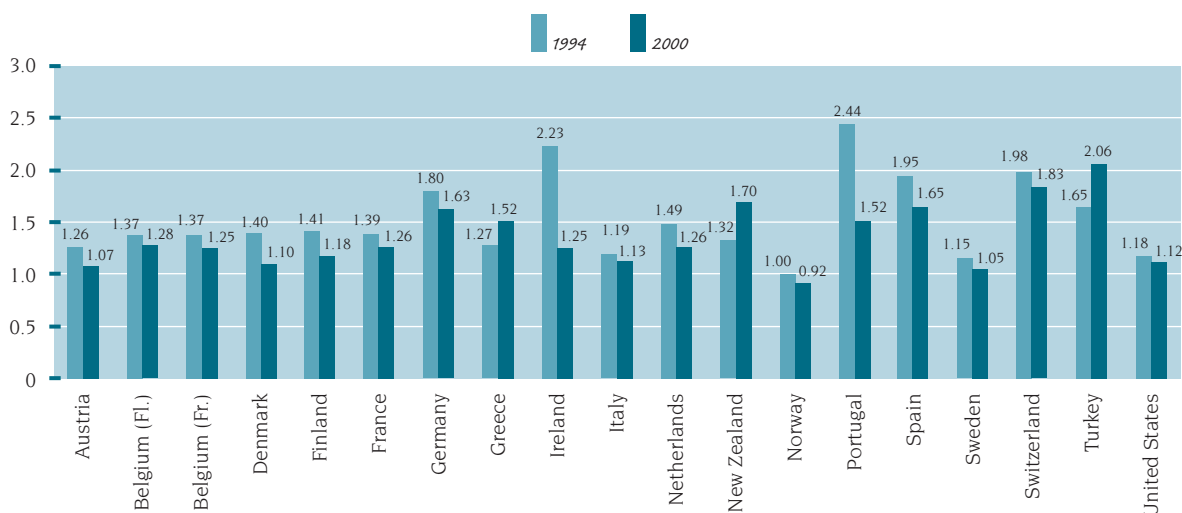
prominence that teachers’ relative salaries play in debates about the attractiveness of teaching, there are only limited internationally comparable data available. The main indicator that is currently used, teachers’ statutory salary expressed as a ratio of GDP per capita, has a number of limitations,⁹ and is not available over time for all Member countries.

Figure 3.9 shows what happened to this ratio between 1994 and 2000 for teachers in lower secondary education with 15 years of teaching experience.¹⁰ The trend is clear. In every country,

9. The indicator is limited because it is based on statutory rather than actual salaries, financial benefits other than salaries are not included, and the reference point, GDP per capita, does not reflect salary levels in comparable occupations. A more appropriate indicator would compare teachers’ actual salaries and other benefits with those of workers in professions requiring similar qualifications and at similar age levels. Such data are not yet available at international level. The OECD is working with Member countries to improve the international data on teacher salaries and other working conditions.

10. Similar changes in relative salary levels to those shown in Figure 3.9 are also evident for primary and upper secondary teachers in the countries that report such data.

Figure 3.9 Ratio of teachers' statutory salaries after 15 years of experience to GDP per capita, public institutions, lower secondary education



Note: For 1994, common data were used for both Belgian Communities. For Turkey, the figures refer to primary education. All OECD countries for which data are available for both years considered are shown.

Source: OECD (1996, 2001a, 2002).

except Greece, New Zealand and Turkey, the statutory salaries of such teachers relative to GDP per capita have declined. In some cases, such as Ireland, Portugal and Spain, the decline was very steep over the six-year period. However, it should be borne in mind that this measure is an imperfect one.

Size of the school-age population

Figures 3.10 and 3.11 provide information on the expected changes in the size of the school-aged population from 2000 to 2010 in OECD countries for the age groups 5-14 and 15-19, respectively. These data indicate one aspect of the likely demand for teachers over this period. For the 5-14 age range, which broadly covers primary and lower secondary education, 23 countries are expecting a decline between 2000 and 2010 (Figure 3.10). Substantial declines of over 20% are projected for the Czech Republic, Hungary, Poland, the Slovak Republic, and Sweden. The main exceptions are Turkey, Luxembourg, Japan, and Ireland where small increases are projected, and Korea, Mexico and New Zealand where the 2010 population of 5-14 year-olds is expected to be around the same size as in 2000.

For the age group 15-19, which broadly corresponds with upper secondary education, the population projections reveal more mixed results (Figure 3.11).

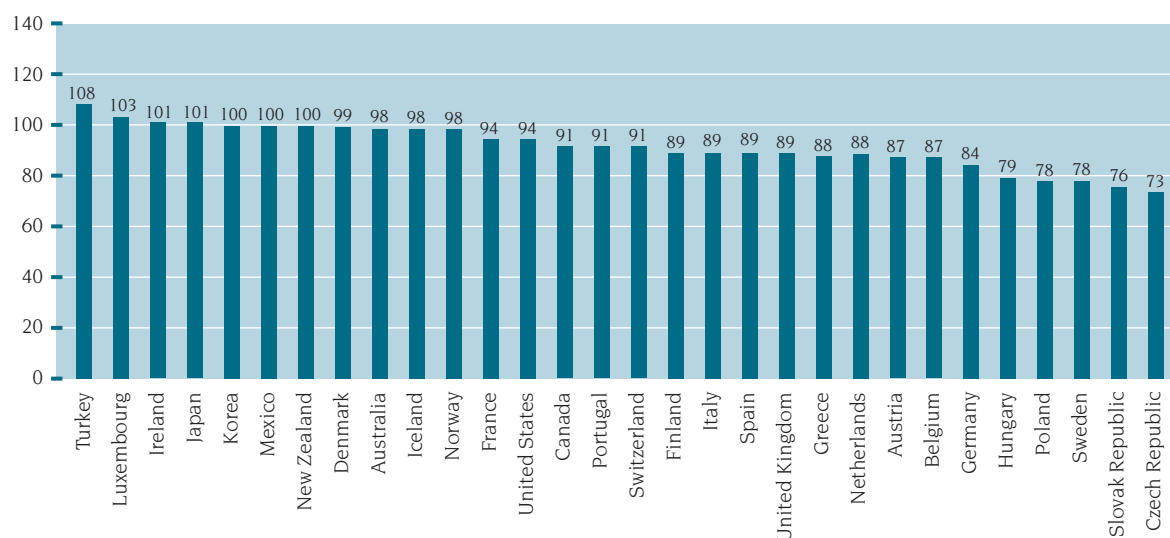
Of the 30 Member countries, 16 are projected to see a decline by 2010, with declines of over 20% projected for Greece, Ireland, Poland, and Spain. However, 13 countries are projected to see an increase by 2010, with rises of over 10% projected for Denmark, Luxembourg, Norway and Sweden. To the extent that education participation rates among 15-19 year-olds rise between 2000 and 2010, these population projections may understate the numbers enrolled in upper secondary education by 2010. As seen earlier, it is generally in upper secondary education that the recruitment challenges implied by an ageing teaching force are likely to be most marked.

3. POLICY TOOLS AND CHALLENGES

In considering possible policy responses, governments need to take account of the kinds of evidence presented in this chapter about the linked nature of the problem – teaching quality is likely to suffer when there is inadequate supply. The potentially wide range of policy tools involved is summarised in Table 3.1 and elaborated in OECD (2001c).

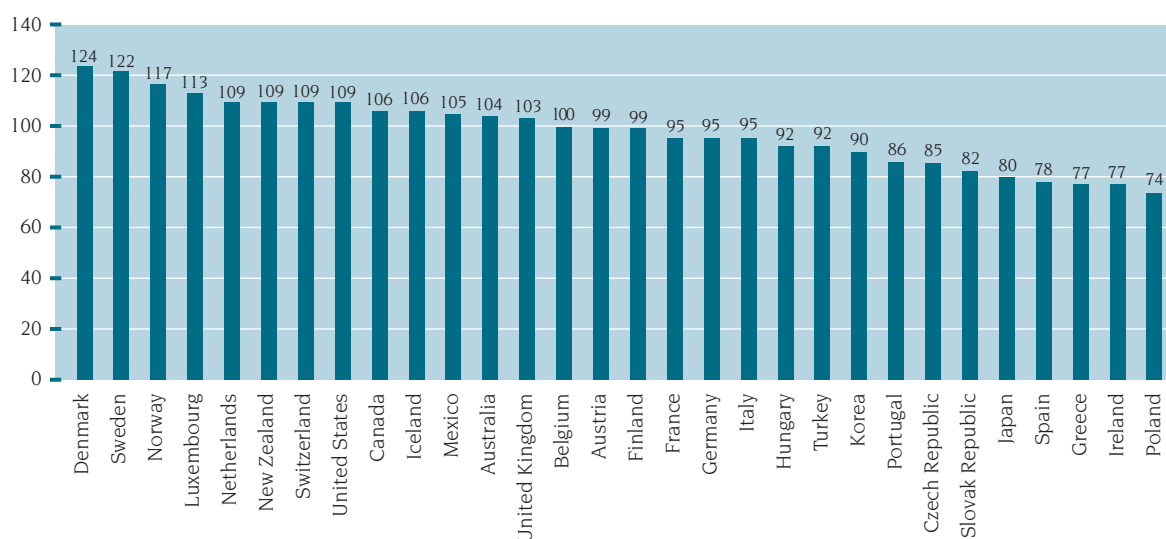
An important area for intervention relates to the determination of the number of teachers needed to respond to the educational needs of a given student population. At this level, educational

Figure 3.10 Expected changes in the school-age population from 2000 to 2010 (2000=100), ages 5-14



Source: OECD (2001a).

Figure 3.11 Expected changes in the school-age population from 2000 to 2010 (2000=100), ages 15-19



Source: OECD (2001a).

authorities can use class size, teaching loads, quantity of instruction, or the number and role of teaching assistants and other support staff, to influence the number of teachers needed. These can be labelled “demand-side” tools. “Supply-side” tools include the structure of teacher education programmes, training more teachers, determining entry requirements to the profession, and making

teaching more attractive as a career. Other tools are concerned more with the mechanisms through which demand and supply interact, and are related to the structure of the labour market for teachers. Such “matching process” tools include the definition of bargaining mechanisms, the level of centralisation of bargaining and the recruitment, selection and assignment processes.

Table 3.1 Potential policy tools to manage the teaching workforce

“Demand-side” tools	“Supply-side” tools	“Matching process” tools
<ul style="list-style-type: none"> – Class size; – Teaching loads; – Required learning time for students; – Use of teaching assistants and other support staff; – Use of technology and distance learning; – Structure of curriculum and educational programmes; – Starting and ending age of compulsory education; – Academic standards defining requirements for graduation. 	<p>Attractiveness of the profession</p> <p>Monetary incentives</p> <ul style="list-style-type: none"> – Relative salaries; – Career structure and salary scale; – Other (<i>e.g.</i> merit-based awards, signing bonuses, differentiated pay, housing subsidies, childcare, income tax credits). <p>Non-monetary incentives</p> <ul style="list-style-type: none"> – Vacation time, flexibility to take leave; – Working conditions: opportunities for collaboration and decision-making, school safety and student discipline, class size, working loads, quality of facilities and instructional materials. <p>Teacher education and certification</p> <p>Teacher initial education and professional development:</p> <p>Supply, structure, content and accreditation of teacher education programmes; incentives to engage in teacher education; induction and mentoring programmes; provision of professional development activities.</p> <p>Certification of teachers:</p> <p>Definition of certification standards; alternative certification programmes.</p>	<p>Bargaining mechanisms</p> <p>Set of mechanisms for bargaining: setting of salaries, pay differentiation to account for shortages, opening of profession to international markets.</p> <p>Level of centralisation of bargaining</p> <p>Degree of autonomy of schools regarding: recruitment, selection and assignment of teachers; and setting of incentive structure.</p> <p>Recruitment and selection processes</p> <p>Organisation; definition of qualification requirements; delegation of authority to recruit, select and assign teachers; methods for screening candidates; emergency recruitment programmes.</p>

There is little evidence available internationally on the impact of a number of the policy tools outlined in Table 3.1, such as the greater use of other types of personnel in schools, and more school autonomy in setting teachers' salaries and working conditions. The recently launched OECD review is investigating current country experience with such approaches.¹¹

Policy making on teachers faces two major difficulties. First, the sheer size and diversity of the teaching force, and the wide range of schools in which they work, suggest that it is difficult to develop policies that can be applied across-the-board with equally effective results. The evidence

presented in Section 2 on how shortages vary by subject area, level of schooling and regional location suggests that it may be more productive for policy to focus on the factors that may attract particular types of people into teaching, and teachers to particular schools, than on teacher supply in more generic terms. For example, it seems that experiences in the first few years help determine whether a teacher will have a long career (Stinebrickner, 1999), suggesting that policies countering teacher attrition should focus on relatively recent entrants. Attrition is also greater in certain

11. The OECD review is outlined in footnote 2.

academic disciplines, such as science, and for teachers with higher academic credentials (Murnane *et al.*, 1989). Research suggests that women are more likely to leave teaching for family reasons, while men are more likely to leave for alternative careers (Dolton and van der Klaauw, 1999). It would thus be pertinent to increase the attractiveness of teaching to women with disrupted careers, and to provide more supportive services such as childcare. Such findings support the case for targeted teacher policies, and yet there are often pressures for “one size fits all” responses.

A second difficulty is that teacher policy can require some stark trade-offs. Class size provides a clear example. As shown in Table 3.1, class size is a factor on both the demand and the supply sides of the teacher labour market. Most school systems have reduced average class sizes in recent years. Yet the research evidence tends to suggest that, while targeted class size reductions can be beneficial for some students (such as those in the early years of primary education or from disadvantaged backgrounds), across-the-board reductions in class size are expensive and unlikely to lead to substantial learning gains (Hanushek, 2000; Hoxby, 2000; Meuret, 2001). Indeed, there could even be a case for using an increase in average class size to fund higher teacher salaries and thereby make teaching more attractive to higher quality candidates.¹² However, the size of classes also affects teachers’ working conditions, and teachers faced with larger classes may become more dissatisfied and inclined to leave the profession, thereby worsening supply. One of the few studies to look at this aspect (Mont and Rees, 1996) found that in the United States high schools with above-average class sizes were associated with a higher resignation rate of teachers. On the other hand, Stinebrickner (1999) concluded that, while the student-teacher ratio (which is highly correlated with class size) plays a significant role in whether teachers consider a school to be desirable, it is less important than salary.

Salary questions figure prominently in debates on teacher policy. The research reviewed in OECD (2001c) suggests that pay can influence:

- *The decision to become a teacher:* For example, Dolton (1990) found that graduates’ choices in the

United Kingdom were associated with relative earnings in teaching and non-teaching occupations, and their likely growth.

- *The decision to remain in teaching:* Research from the United States and the United Kingdom suggests that not only do teachers who are paid more stay in teaching longer, but also that those who are likely to be able to get higher-paid jobs outside teaching, as indicated by their educational qualifications or test scores, have on average shorter teaching careers (Murnane and Olsen, 1990; Dolton and van der Klaauw, 1999).
- *The decision to return to teaching after a career interruption:* Only one in four American teachers returns to the classroom within five years of leaving it (Murnane, 1996); returning rates tend to be higher among those teaching subjects that provide fewer opportunities for employment elsewhere (Beaudin, 1993).

It would seem that the main linkages between teacher salaries and quality apply at two points. One is where the financial attractiveness of teaching relative to other professions influences the pool of people who consider teaching as a career: the higher teacher salaries, the larger this pool is likely to be and, therefore, the higher the likely quality of those available for employment as teachers. The second point is in terms of the incentive structures facing those currently in teaching – salary progression, the length of the salary scale, and promotion opportunities. Some salary structures reward formal qualifications and years spent in teaching rather than those teacher characteristics which, although harder to measure – enthusiasm, commitment and sensitivity to student needs – may be more directly related to the quality of teaching and learning.

12. Correspondingly, a policy to improve outcomes by reducing class size may fail if it results in the hiring of teachers of lower quality. This appears to have occurred in the class-size reduction programme in California which started in 1996 to reduce the size of all classes in the first three years of primary school from an average of 30 students to a maximum of 20 students. Improved student behaviour and learning was evident in the reduced classes but the gains have been fairly small, in part because teachers did not always adapt their teaching behaviour to capitalise on the smaller classes, and because the increased demand has led to a shortage of qualified teachers (Stecher *et al.*, 2001).

Despite the undoubted importance of salary issues, they form just part of the policy package, as Table 3.1 makes clear. Educational authorities in those countries more seriously affected by shortfalls face the following challenges: to design incentives to attract high-quality candidates and former teachers to the pool of those who want to teach; exclude from the pool those who lack the skills to teach; and retain and further develop the skills of those effective teachers currently in the profession. Policies aimed at attracting and retaining effective teachers need both to recruit able people into the profession, and also to provide support and incentives for on-going performance at high levels and professional growth. Teachers are not necessarily going to reach their full potential in settings that do not provide appropriate support, or sufficient challenge and recognition.

4. CONCLUSION

This chapter has used the currently available data to review some of the policy issues concerning the teaching workforce in OECD countries, especially in regard to actual or looming shortfalls in teacher supply.

Several things are clear. First, measuring the nature and extent of teacher shortages is difficult. Agreed indicators do not yet exist at international level, and there is uneven coverage of available data among OECD countries. A large part of the difficulty arises because a teacher shortage raises quality as well as quantity issues. Even though a school system may have few, if any, unstaffed classrooms, problems with teacher recruitment may still have necessitated responses that raise concerns about the quality of teaching. The lack of comparative international information on teacher shortages, their causes and effects, has been a major factor in launching the new OECD project.

Second, the limited but suggestive data available provide indications that some countries are currently experiencing difficulties in recruiting and retaining qualified teachers. In such countries there are indications that: (i) there is a sizeable proportion of unfilled vacancies; (ii) attrition and turnover rates have increased in recent years; (iii) the proportion of “out-of-field” teaching assignments is high in some key subject areas; (iv) the age profile of teachers is skewed towards the upper end of the age-range; and (v) school principals report that a teacher shortage/inadequacy is hindering student learning. Other countries, however, still seem to have relatively large pools of qualified individuals from which to recruit. These countries may still consider teacher quality to be an issue, but not because of shortages of qualified staff.

Third, the problems of teacher shortages are uneven. Shortages tend to be more marked in certain subject areas such as science, mathematics, information technology or foreign languages in secondary education, and in some specific regions within countries.

Teacher policy is currently high on the agenda of OECD countries. In addition to general questions to do with the changing roles of teachers and the attractiveness of teaching overall, there are also important issues concerned with the differentiation within the teaching profession, more flexible pathways into teaching, incentive structures rewarding the skills and performance that most closely relate to student learning, as well as teacher evaluation and accountability. The immediate challenges raised in some countries by teacher shortages are helping to open up significant long-term questions about how to improve the quality of teaching and the effectiveness of teachers’ work.

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Data for the Figures

CHAPTER 3

Data for Figures 3.3–3.11 are shown on the Figures.

Data for Figure 3.1

Principals' perceptions on whether a shortage/inadequacy of teachers hinders student learning, 2000

	Percentage of 15-year-old students enrolled in schools where principals report that learning is hindered by a shortage/inadequacy of teachers to the following extent:			
	Not at all	A little	Some	A lot
Australia	45.5	36.9	16.7	0.9
Austria	72.6	21.0	6.4	0.0
Belgium (Fl.)	53.2	39.8	5.6	1.4
Canada	53.8	24.4	19.3	2.5
Czech Republic	62.9	29.5	7.1	0.4
Denmark	56.9	40.5	2.6	0.0
Finland	34.5	59.2	6.2	0.0
France	64.0	29.9	6.2	0.0
Germany	30.0	42.6	25.2	2.2
Greece	31.6	16.9	27.6	23.9
Hungary	62.6	30.8	3.8	2.8
Iceland	36.3	35.7	24.8	3.2
Ireland	46.6	32.1	19.5	1.8
Italy	38.6	41.4	19.0	1.0
Japan	41.4	40.0	17.1	1.4
Korea	58.6	33.7	7.1	0.6
Luxembourg	57.5	5.6	36.9	0.0
Mexico	32.6	40.3	20.3	6.8
Netherlands	22.2	59.4	18.5	0.0
New Zealand	46.3	38.1	15.0	0.6
Norway	36.2	50.6	13.3	0.0
Poland	63.1	24.2	7.8	4.9
Portugal	50.2	45.3	4.5	0.0
Spain	72.9	20.2	6.3	0.6
Sweden	33.8	41.5	22.7	2.0
Switzerland	65.4	24.1	10.5	0.0
United Kingdom	32.4	37.0	27.0	3.7
United States	60.9	30.2	8.2	0.7

Notes: Two Member countries, the Slovak Republic and Turkey, did not participate in the 2000 PISA assessments. For the Netherlands the response rate is too low to ensure comparability with other countries.

Source: OECD PISA database at www.pisa.oecd.org

Data for Figure 3.2

Principals' perceptions on whether a shortage/inadequacy of teachers hinders student learning, by subject area, 2000

	Percentage of 15-year-old students enrolled in schools where principals report that learning is hindered "to some extent" or "a lot" by a shortage/inadequacy of teachers in the following subject areas:		
	Language of instruction	Mathematics	Science
Australia	7.2	17.1	16.8
Canada	8.7	14.5	11.3
Germany	15.8	7.5	16.6
Greece	30.7	27.9	33.6
Iceland	15.0	23.8	26.5
Ireland	7.6	10.2	15.8
Italy	16.2	20.1	14.5
Japan	16.9	15.4	15.4
Luxembourg	23.9	21.1	5.4
Mexico	21.7	21.4	21.3
Netherlands	9.0	14.4	15.1
New Zealand	3.9	7.1	4.7
Norway	5.4	15.5	14.8
Poland	2.4	3.2	1.5
Sweden	2.3	12.0	11.0
Switzerland	2.8	3.2	6.1
United Kingdom	13.0	29.2	23.6
United States	4.3	16.4	13.7

Notes: Only countries for which the perception of principals on whether shortages in general hinder student learning is above a certain threshold are reported in this table. The threshold is defined as the sum of "to some extent" and "a lot" responses being 8% for shortages in general (the indicator shown in Figure 3.1). Two Member countries, the Slovak Republic and Turkey, did not participate in the 2000 PISA assessments. For the Netherlands the response rate is too low to ensure comparability with other countries.

Source: OECD PISA database at www.pisa.oecd.org