Education Policy Analysis

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Foreword

Our annual volume Education Policy Analysis *aims to bring some key policy lessons from OECD's work on education to a wide audience. As the incoming Director for Education, this is my first chance to introduce the volume, and I am particularly happy to see how well it reflects both the diversity and quality of our work.*

The focus of this volume is on higher education, following the very successful Meeting of OECD Education Ministers held in Athens, Greece on 27 and 28 June 2006. In our discussions in Athens, it became clear that the challenge for higher education has become that of going beyond growth to improve quality. We looked at issues of funding, equity, accountability and the role of higher education in economic development. There was a recognition that we know much too little about learning outcomes in higher education, and new OECD work was proposed to develop internationally comparable measures. The papers collected here, in Chapter 1, include the background and issues papers prepared in advance of the meeting, the OECD Secretary-General's speech to the meeting, and a summary of the outcomes.

Chapter 2 is also on higher education. It looks at "internationalisation", meaning students travelling abroad to study, or studying in their home country through courses franchised from abroad. Countries need to give more attention to this growing issue, and to think through how they want to organise their strategy for the higher education "industry", linking policies on immigration, visas, and student finance.

Education has played a big part in the economic development of OECD countries, but one of its ironies is that this very growth has created attractive well-paid jobs competing for the attention of those who might have otherwise have embraced teaching. This problem is not simply one of recruitment – although the issue is pressing in a number of countries – but of motivating and developing the skills of the teaching workforce. The third chapter looks at how, in particular, we can help to improve motivation, which will be critical not only to quality teaching but also to the impetus for school reform. Teaching is no longer a profession – if it ever was – in which the teacher stands in front of the class and delivers while the students passively learn. Good teaching involves constant feedback from teacher to student and student to teacher. Chapter 4 concerns one form of that feedback called "formative assessment", an approach designed to inform individual students about their progress in ways that encourage and develop their learning. Research shows it has great potential.

Of course, student motivation may be even more important than that of teachers, even if more difficult to influence. One intriguing dimension of this, explored in Chapter 5, is the way in which the different interests of boys and girls affect both attainment and outcomes. Girls tend to be more interested in reading, and, perhaps unsurprisingly, roundly outperform boys in literacy skills in many OECD countries. Conversely, while girls tend to be less interested than boys in maths, the performance differences between boys and girls are marginal. But these differences in attitudes feed through into big differences in life courses, with many fewer young women pursuing qualifications and careers in science and engineering. This leaves open the policy question of whether to accept these differences, or seek to equalise outcomes by encouraging female interest in maths and science, and/or male interest in literature and art.

I trust that this volume will serve OECD and other countries by providing evidence, stimulating policy thinking, and allowing countries to compare themselves with the best educational practice internationally.

Barbara Ischinger
Director for Education

Acknowledgements. *Chapter 1 draws together four documents emerging from the Meeting of OECD Education Ministers held in Athens on 27-28 June 2006. Chapter 2 was written Stéphan Vincent-Lancrin, Chapter 3 by Paulo Santiago and Phillip McKenzie, Chapter 4 by Janet Looney, and Chapter 5 by Andreas Schleicher. The whole was edited by Simon Field, Susan Copeland and Anne-Lise Prigent, overseen by Abrar Hasan. We are grateful to the many other members of the Directorate for Education who provided helpful input.*

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Chapter 1

Higher Education: Quality, Equity and Efficiency

Meeting of OECD Education Ministers

Athens, Greece

27-28 June 2006

Summary

This chapter draws together four documents emerging from the Meeting of OECD Education Ministers held in Athens on 27-28 June 2006. The first document is the chair's summary of discussions at the meeting. It describes how ministers agreed to go beyond growth by making higher education not just bigger but also better. Reforms are needed in six areas: to improve funding, to make higher education more equitable, to gain a clearer focus on what students learn, to promote responsiveness and diversity, to support research and innovation, and to devise an effective response to growing migration and internationalisation.

The second document is the speech by the new Secretary-General of the OECD, Angel Gurría. He reminded the meeting of how international debate has become central in higher education. This is because of new international policy instruments, like the European Bologna Process, because researchers and students are working and studying outside their home countries, and because of global competition for high-level skills. He argued that reform of funding is needed urgently, particularly in those countries where higher education is publicly funded but inadequately resourced to meet the costs of expansion. Mr. Gurría gave particular emphasis to the need for better measurement of outcomes in higher education, proposing a "PISA for higher education" to survey the skills of students.

The third document is the issues paper used to frame debate at the meeting. It covers the factors affecting the future of higher education, including technology, globalisation, demography, and governance. It looks at the objectives of higher education and the implications for governance, the question of who should pay for higher education, whether there might be better ways to measure quality in higher education, and how we might improve its contribution to the economy.

The final document provides a range of indicators in graphical form. These indicators cover the broader social and economic context; access, participation and progression; expenditure on higher education; economic returns; and internationalisation.

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Summary of Discussions

by
the Chair, Marietta Giannakou,
Minister of National Education and Religious Affairs, Greece

Higher education plays a vital role in driving economic growth and social cohesion. It has grown dramatically – with more than 17 000 higher education institutions in the world. At our meeting, we agreed on a new task: to go beyond growth, by making higher education not just *bigger* but also *better*.

We discussed how to meet this challenge. Every country is different, and there were many points of view. But we agreed that a major programme of reform is needed, giving more emphasis to outcomes in particular. Reforms are needed in six areas:

- *Funding:* Some countries, particularly in Europe, need to invest more in higher education; for others the main issue is to make better use of existing funding. Reform will help to develop new sources of funding. A number of countries remain committed to higher education without fees for students, while others now accept the OECD Secretariat view that contributions from graduates to the costs of study can be an effective way of increasing resources, balanced by measures to support students from poorer backgrounds.
- *More equitable education:* Access to higher education needs to be widened to benefit all social groups. This is a real challenge for school systems, as well as for higher education. Action is therefore needed throughout education systems to tackle the problem.
- *A clearer focus on what students learn:* We need to develop better evidence of learning outcomes. At our meeting, the OECD Secretary-General offered the assistance of the OECD in developing new measures of learning outcomes in higher education, drawing upon its experience with the PISA survey.
- *Promote responsiveness and diversity:* Reforms to improve incentives – to make institutions more accountable for quality and outcomes – are needed in many countries. We want to balance accountability for outcomes with a loosening of regulatory controls, and we intend to encourage institutions to pursue diverse missions, responding to the needs of students as well as a wide range of other groups.
- *Research and innovation:* We all recognize the capacity of research and innovation to drive growth in knowledge-based societies. We recognize the twin challenges facing higher education systems – supporting world-class research, *and* delivering its economic and social benefits both locally and nationally.
- *Migration and internationalization:* We discussed how students, teachers and researchers are increasingly studying and working outside their countries of origin. Most OECD countries are affected, some greatly. Responses include, for example, the Bologna Process in Europe. Countries need to look at immigration policies, as well as higher education policy itself, to develop coherent responses.

We all agreed that higher education cannot escape major change. Sometimes change will be difficult. Our meeting here, and these conclusions, represent a clear signal of our determination to lead the necessary changes rather than be driven by them.

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Opening Remarks

by

Angel Gurría, Secretary-General of the OECD

Athens is an especially fitting location for this meeting. Not far from here, in an olive grove, the philosopher Plato founded the Academy, widely understood as the first centre of advanced learning in Western civilization.

We gather now, however, to discuss the *modern* academy, which is vastly different in size, scope, and economic significance from its ancient predecessor. Today, tens of millions, not just a select few, study in higher education – the *modern* academy. When I say higher education, I mean the more than 17 000 institutions in which those students learn. They include institutes of technology, colleges, polytechnics, and open universities, as well as the traditional universities. For some of you, this is known as "*post-secondary*" or "*tertiary*" education, but for the purposes of the next two days, let us agree on this broad definition of higher education.

We will be addressing the issues of quality, efficiency and equity in higher education. We all agree that these are appropriate objectives for our education systems. However, how to achieve them is a hotly debated issue, including in our host country today. I hope that this meeting will help us advance in our thinking.

Economic importance

The economic significance of higher education is great, and it is growing. Throughout the world, it is now understood that a high-quality system of higher education is central to the ability of nations to participate successfully in the global knowledge economy. This common conviction is well-founded.

In the past three decades, the proportion of young people enrolled in higher education has risen from 20% of the population to just over 50% on average in the OECD. This is a remarkable expansion and worthy of praise. But, as you know, expansion poses some very serious challenges, including how to pay for expanding enrolments and intensified research activity. Perhaps more important – and more challenging – is the problem of shifting our focus from making systems of higher education *bigger* to making them *better*. And I want to share a few ideas with you about how we at the OECD might help you do that.

Role of the OECD

But first, let me share a little of my own perspective. I have been in post for less than four weeks. I came to the OECD because I believe that countries can learn from one another, and can work together for common ends. This is my first OECD Ministerial meeting as Secretary-General, and I am delighted that it concerns such an important topic. And actually, my very first day in office was spent with some of you at the G8 Ministerial Meeting on Education in Moscow.

This task of working together sounds simple, but it involves imagination and vision, as well as painstaking negotiation and diplomacy. Whether we can peaceably share this small planet depends upon our capacity to work together in alleviating poverty, widening access to adequate health care, and coping with the effects of global migration. It also rests on our ability to provide quality education to all, since education plays a critical role in shaping modern economies and in what we might call global citizenship.

International interest in higher education

A generation ago there might have been less interest in international meetings to discuss higher education. That has changed for several reasons.

First, consider the economic importance of higher education. As we all know, knowledge and innovation – the bread and butter of higher education – play a pivotal role in modern economies. In our work at the OECD, we are focusing on the link between education, investment and growth. For example, the Education Directorate's review of tertiary education, now underway in 24 nations, pays close attention to whether national policies help higher education institutions generate research that contributes to innovation.

Second, new international policy instruments bearing on higher education are emerging. These include negotiations in the GATS covering trade in educational services; the European Bologna Process; and in a more modest way, the OECD/UNESCO guidelines on quality provision in cross-border higher education.

The third factor is growing migration. Increasingly, students and researchers are studying and working outside their home country. We can no longer take it for granted that the job of a country's higher education system is to provide skills solely for its own nationals, for its own labour market. In recent OECD work, we have called on countries to address this by co-ordinating their policies at the national level on matters like student visas, student finance and language of instruction. And one particular concern is that developing countries may lose some of their most highly-skilled people to developed countries.

All these issues go well beyond the boundaries of the 30 OECD member countries. As I have already emphasized in public statements, our links with countries outside the OECD "family" have become increasingly important. I am therefore particularly pleased to welcome to this meeting the ministers and representatives from Chile, Estonia, Israel, Russia, Slovenia and South Africa.

The challenges

Now I want to turn to some ideas on how higher education might face up to some new challenges.

Who should pay?

Expanding higher education and improving its quality costs a lot of money. Who should pay these costs? Students? Parents? Employers? All taxpayers?

One model that surely doesn't work is the one which quite a few countries are saddled with, particularly in Europe. In these countries, higher education is publicly financed for the most part, but it is inadequately resourced to meet the costs of expansion. That forces an unacceptable choice between rationing places to an elite or acquiescing to a decline in quality.

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We at the OECD believe that the countries trapped in this dilemma need to pursue reforms urgently, and we think that contributions from graduates to the costs of study can be an efficient way of increasing resources. But this should not occur at the expense of equity: students who can't afford to pay should receive financial help through grants or subsidised loans for example. I look forward to Bill Rammell's observations – and some lively debate – in tomorrow morning's thematic session on who should pay for higher education.

Measuring quality

We will also be looking tomorrow morning at how to measure quality. Quality is critical in higher education, but it is poorly understood and poorly rewarded. I would dare suggest that we do not value good teaching enough. Too often, the practitioners are largely untrained as teachers. Too often, bad teaching goes unnoticed and good teaching goes unrewarded.

We have to do better than that. We at the OECD have been very successful in measuring learning outcomes in secondary education through our Programme for Institutional Student Assessment survey (known as PISA), which focuses on 15 year-olds. We should now also undertake a comparable survey of the skills and abilities of graduates that might measure learning outcomes in higher education, and help families, businesses, and governments develop an evidence-based understanding of where and how higher education systems are meeting their expectations of quality, and where they are not. We stand ready to do so if you give us a mandate. We have developed the expertise and the methodology; we know how to gather the relevant information. If, as a conclusion to this meeting, you decide that we should embark on a "PISA for Higher Education", we will follow-up on this.

Governance

Shifting the focus of higher education from bigger to better has also to do with you or, more precisely, with the relationship between governments and higher education institutions. In our experience, high-performing systems of higher education recognise the need for diversity and performance-based accountability.

All *systems* of higher education have a range of responsibilities – from responding to the need for lifelong learning to conducting world-class basic research. Only the most exceptional *institutions* of higher education can perform all of these well. The great majority of institutions will have to focus on defining their mission and their strengths in an increasingly competitive market.

If higher education institutions are to perform to a high standard – whatever their responsibilities – they need to be accountable for achieving results, while having sufficient autonomy to determine how best to accomplish these results.

No escaping change

Changing a nation's system of higher education in ways that increase resources, strengthen evidence of quality, and widen diversity and performance-based accountability may be painful and controversial.

But in higher education, there is no escaping change. Global competition for high-level skills and research is intensifying. If OECD countries want to remain successful economies, they need to put themselves in the driver's seat for the changes to come. Action is needed on all of these fronts.

In fact, I see now, in governments and higher education institutions – and indeed in your decision as member countries to hold this meeting on this important topic – a determination to make the needed changes.

Indeed, we need look no further than to the leadership of Greece in this respect. Last month's annual OECD Ministerial Council Meeting focused on reforms necessary for delivering economic prosperity. There, Prime Minister Kostas Karamanlis, in his capacity as the Chair, stressed the importance of improving education and its contribution to economic growth. And, in choosing to host this meeting our hosts have signalled their engagement in a wider global dialogue of change.

I hope this meeting will help you to reflect on what changes are needed, and how to introduce them. My job is to put at your disposal the expertise of the OECD, the organisation I have the privilege of leading, to assist you in development of your policies.

I believe we have a good record of success, and we stand ready to help member countries build on decades of achievement in expanding higher education by developing higher education systems which are models of quality, equity and efficiency.

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Issues for Discussion

In recent decades, higher education has grown and diversified in all OECD countries. Governments are among the major players in the sector, particularly in centralized higher education systems, but they are not the only ones. Quasi-governmental or independent quality assurance bodies, public and private institutional providers, employers, and students and their families play significant and sometimes determining roles. There is competition among established and emerging providers, while learners (and their families and employers) have become more sophisticated and demanding. Fiscal pressures continue. The international nature of the market is becoming more evident.

We know that investment in higher education and research has a positive effect on economic growth and regional competitiveness, as well as on individual employment prospects and well-being. The stakes are high and political and media interest is strong. Stakeholders, including governments, are becoming more demanding of evidence of the impact and relevance of the work of the higher education sector, regionally, nationally and globally. Consumer perceptions, influenced by national and international rankings, are having a significant impact on student choices and institutional behaviour.

In this context, higher education systems must address broad objectives of growth, full employment and social cohesion, within governance frameworks which encourage institutions, individually and collectively, to fulfil multiple missions. Institutions, systems and stakeholders must seek to ensure that quality, equity and efficiency characterise all aspects of higher education.

This meeting of the OECD Education Committee at Ministerial level is the first to focus specifically on higher education. A Forum on the Future of Higher Education will look at the changing demographic, technological and socio-economic context within which higher education systems and institutions operate. The meeting will include consultations with the Business and Industry Advisory Committee to the OECD (BIAC) and the Trade Union Advisory Committee to the OECD (TUAC).

The following pages outline some of these developments and ask to what extent they are in the best interests of society in the twenty-first century. They include a set of questions which are intended to help participants determine what actions they, as Ministers responsible for higher education and research, can take to maximise the public good, and how the OECD might help.

Forum on the future of higher education

The Forum will take a long-term view: change in education does not often occur quickly, yet developments in society and economy are moving ever more rapidly, narrowing the room for manoeuvre of the different players. Four forces for change stand out in terms of their impact on higher education in the coming decades: technology, globalisation, demography and new approaches to governance.

Technology

The continuous development of information and communications technologies is one of the drivers of the knowledge economy. Technology continues to gain ground in higher education and has already enhanced the on-campus student experience, through student portals, Internet access, digital libraries, and the availability of laptops, handhelds and other portable devices. E-learning is becoming part of the mainstream of educational programmes. Digital technologies have also dramatically changed academic research, thanks to rapid acceleration of computer and network performance, which has allowed researchers to access and manipulate massive data-sets, to simulate, model and visualise more complex systems, and to strengthen international communication and collaboration in research.

However these technologies have not revolutionised teaching and access to higher education as thoroughly as was predicted by some, and their past influence and future promises now tend to be considered more cautiously. Like other innovations, e-learning might, however, live up to its potential in the future and enable new ways of teaching, learning and interacting. Student expectations will be an important factor. Many of those who will enter higher education in ten years time will never have known a time when they did not have access to the Internet for learning and games. E-learning technologies set important challenges, primarily financial, technical and qualitative. But their versatility, flexibility and the possibilities they offer to expand access, convenience and personalisation open avenues that still need to be explored.

Globalisation

The internationalisation of higher education is a double-edged phenomenon, which has induced both growing collaboration and growing competition between countries and among institutional providers. Cross-border higher education has grown significantly over the past decades, and growth is expected to continue. This growth has been driven by several interlinked forces: greater mobility of skilled workers in an increasingly knowledge-based economy; the drive to develop export industries and expand international collaboration in higher education; the need to build a more educated workforce in sending countries, where study options may be limited; the desire of students and academics to have international experience and promote mutual understanding; and the fall in the cost of transport and communications. This growth has, in turn, fuelled increased competition between countries and higher education institutions for students and academics.

At the same time, domestic higher education systems increasingly face international pressures and competition, under voluntary harmonisation agendas (*e.g.* the Bologna Process in Europe, which has led to similar initiatives at a smaller scale in Latin America and Asia); under the pressures of international comparison, manifested by quality labels, ranking efforts and consumer choice; or due to the increasing frequency of partnerships and recognition agreements. Like the older established research universities, higher education institutions of all types increasingly see themselves as actors in a global market, not restricted to a domestic role or agenda.

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Demography

As OECD societies age, and in some cases shrink, countries are becoming increasingly concerned about the impact of demographic factors in higher education. Reductions in the traditional 18-to-25-year-old student age group will affect institutions in a number of OECD countries. This decline may be offset by increased participation rates, the flow of foreign students (the numbers of young people are rising in many non-OECD countries where demand for education is not fully satisfied) and by the increasing tendency of older adults to enter or return to education and the provision of programs for them. With few exceptions, higher education systems have been slow to adjust to the needs of lifelong learners for shorter courses, more flexible delivery, recognition of prior learning and tailor-made programmes. Longer working lives with more career changes, and the possible growing enrolment of retired people in higher education, might indeed be a transformative force in the medium run.

Changing governance

New approaches to governance in OECD countries combine the authority of the state and the power of markets in new ways. There is a strong demand for better public management. Accountability, transparency, efficiency and effectiveness, responsiveness and forward vision are now considered as the principal components of good public governance, which higher education institutions are and will increasingly be asked to implement. The shift towards more autonomy and entrepreneurship is widespread and institutions with very different profiles are increasingly able to compete with one another both within countries and across borders. These developments are set in a context of debate about national budget priorities; the efficiency of resource use; the organisation of higher education and private provision of higher education; and how costs should be shared among different groups in the society (taxpayers, students and families, companies). Institutions are increasingly freer to develop their own strategies and determine their own priorities. Governments and other policy makers have to combine the encouragement of efficiency and excellence with the promotion of equity.

- Will new technologies transform old ways of teaching, learning, and researching in higher education and will they broaden access to and reduce the cost of tertiary education?
- How is the cross-border mobility of students, academics, educational programmes and institutions changing the higher education landscape and affecting country policies? And how will mounting international pressures and competition change systems domestically?
- How effectively are higher education institutions responding to demographic change, especially in providing lifelong learning to meet the challenge of ageing populations?
- Will higher education institutions become more clearly demand-driven, leading to changes in internal management and teaching practices, and would such changes create a shift in higher education's core missions?

Purposes, governance and sustainable provision of higher education

The purposes and governance of higher education

Forty-five years ago, when the OECD was founded, higher education was not a leading concern of most member governments. Higher education, which was typically synonymous with university education, was not seen to be central to the well-being of most citizens or to the fortunes of national economies. Rather, it was a means of training members of learned professions, scholars, and civil servants.

Transformations in the purpose and scope of higher education have taken place in recent decades. Public officials throughout OECD member nations have come to hold ambitious goals for higher education, viewing it both as a means to foster economic growth – through its capacity to create a highly skilled workforce and research that underpins a knowledge-based economy – and as a principal instrument for the fostering of social cohesion, widely dispersing the benefits of economic growth. Higher education has expanded in many OECD member nations to encompass half or more of all young adults. And it has simultaneously become much more diverse in its providers, in its learners, in the range of skills and training it provides, and in connections to the commercial life of knowledge-based economies.

In response to this expansion of the scope and purposes of higher education, many governments have made fundamental changes to the organisation of higher education systems, and to the means by which they exercise authority over higher education institutions. Faced with the growing diversity of students and institutional missions, some governments have responded by creating newer more vocationally-oriented non-university institutions, assigning to them a leading role in the training of a skilled workforce, as with the Polytechnics in Finland and the Universities of Applied Sciences in Switzerland. Elsewhere, as in the United States and Japan, higher education systems are highly differentiated and policies have encouraged the development of competition among institutions that vary in mission, reputation, price, and ownership.

Faced with expansion, differentiation and the widening influence of international competition in higher education, policy makers are reassessing how best to align the activities of higher education institutions to national purposes. Many countries, such as Japan, have chosen to devise new structures of governance, permitting higher education institutions to exercise wider autonomy over their own finances and management. Other countries, such as New Zealand, where previously systems developed rather independently of educational authorities, have opted to make institutions more accountable for the accomplishment of public purposes through the control of their performance or outputs, and the establishment of performance reporting, performance contracts or similar tools of governance.

Ensuring the long-term sustainability and accessibility of the higher education sector

High levels of higher education qualifications are widely acknowledged to be associated with higher levels of productivity, output growth and standards of living. Even so, investment in higher education varies widely across OECD member nations, owing to long-standing differences in political convictions, social traditions and fiscal capacities. All nations face the challenges of mobilising more resources and using them effectively in meeting the strategic goals of society with maximum efficiency. Publicly-subsidised higher education is heavily reliant on tax revenues at a time when there are growing pressures to contain public spending. Other priorities, such as increasing spending on pensions or medical care, or

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combating social exclusion, also impose pressure on the public education budget. In addition, within education budgets, the higher education sector competes with primary and secondary education, early childhood education and care, and continuing education.

The pressure to at least maintain – and preferably improve – funding and income levels has evoked a debate on alternative sources of revenue, and it has focused attention on individual contributions to educational costs and the capacity of institutions to earn income. Some countries have introduced tuition fees, for at least some students. Others have enacted reforms to permit more institutional latitude over income, including investments. This debate has to be seen in the larger context of discussion of the overall approach to financing the different strands of publicly-subsidised educational systems. Not only is lifelong learning calling for the shifting of financial resources across educational sectors/strands, but it is arguable that inconsistencies in charging policies remain visible in some countries (for example the existence of fees for early childhood education and care and for adult education but not for higher education).

Countries also struggle to ensure an equitable provision of higher education. Access to and completion of higher education typically varies widely, most importantly by social background, minority or immigrant status, or disability. Policy responses include financial aid schemes; career guidance and counselling services which aim to alert youth to the benefits of higher education; institutional funding methodologies that provide added financing for the support of students from disadvantaged backgrounds; non-discrimination policies requiring provision to be physically, pedagogically and socially accessible to students with disabilities; and initiatives to make higher education better adapted to the needs of non-traditional students, such as the recognition of non-formal and informal learning alongside formal qualifications. These approaches also stress that higher education needs to be seen as part of an interdependent system of education and training with an effective connection to secondary education.

- How can countries develop and operate systems of higher education which align the goals of higher education institutions with public objectives?
- What approaches will ensure the quality and accessibility of higher education systems in the face of competing spending priorities?
- What can be learned from the experiences of countries which vary greatly in the proportion of national wealth they devote to higher education?

Who should pay for higher education?

The growth in higher education participation has intensified debate over who should pay for it and how. Beneath those questions lie a number of related issues.

Higher education institutions have benefited from high levels of public and private financing. Public authorities provide the bulk – 80% or more – of expenditure on educational institutions in half of all OECD countries; but in four countries (Australia, Japan, Korea and the United States), public authorities pay less than half. As higher education participation and total outlays rise, the sustainability of a heavily publicly subsidised model of finance is coming under pressure. In more than two-thirds of the countries for which data are available, increased participation was possible because growth in the private share of expenditure outpaced growth in public expenditure. In four

out of the five countries in which the public share of expenditure increased, the increases were manageable only because growth in overall enrolments was so low. The financial pressure on public spending due to rising participation in tertiary education will increase unless individuals finance a larger share of costs or overall costs are reduced, through reductions in total numbers of students linked to population decreases, and/or through improved efficiency of provision.

There are economic incentives for individuals to contribute more to the cost of higher education. A large and growing body of international evidence suggests that individuals who acquire higher education qualifications enjoy substantial private benefits. Adults with higher education, on average, earn a third to three-quarters more than persons with just an upper secondary education, are a third less likely to be unemployed, and four-fifths more likely to participate in formal or non-formal education and training. Such private benefits are over and above the benefits accruing to society in the form of higher tax revenues, lower incidence of economic dependency, and enhanced capacity for innovation. Nevertheless, the pursuit of higher education studies is not a proposition without risk – an appreciable number of graduates earn returns considerably below the average return. The research function of higher education institutions is intermingled with the research and development activity of industry and of government, and industry is both a beneficiary of the educational and research activities of higher education as well as a source of income.

Although there are valid efficiency arguments for diversifying higher education financing by increasing the non-public share of costs, there is concern that an increased private share could have adverse consequences for equity. Historically, participation in higher education has been strongly correlated with family socio-economic status and the educational attainment of parents. Recent expansion of access to higher education has done little to alter this pattern, tending to benefit the least advantaged socio-economic groups less than others. Moreover, in countries where higher education is heavily dependent on public finance, this inequity in access and participation carries the risk of adverse distributional consequences (the less well-off subsidising education for the elite) unless income tax systems are highly progressive. At the same time, the pattern of participation or non-participation appears unrelated to the presence or absence of tuition fees. This suggests that other factors (foregone earnings, cost of living during studies) as well as social factors play a role in influencing participation, and that a change in the proportion of public versus private funding will not itself produce inequity so long as adequate financing exists from whatever source and concerted efforts are made to make higher education more flexible and convenient, and thus more accessible.

- How can policy redress the mismatch between who benefits from and who pays for higher education?
- How important are the indirect costs of higher education (cost of living, foregone earnings) relative to direct costs (fees, books) as barriers to participation, particularly by students with lower socio-economic status, and how might the financial constraints facing prospective students be most equitably and effectively addressed?
- What are the advantages and disadvantages of shifting the limited public resources available for higher education away from institutions and towards individuals?

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Measuring the quality and impact of higher education

Governments are obliged to justify the allocation of public resources and the effectiveness with which they are used. This focus on quality and effectiveness has reshaped the relationship between governments, citizens, and providers of public services, including higher education institutions. In many OECD countries, concerns about quality have given rise in recent decades to national quality assurance systems, the primary focus of which is teaching. In parallel, governments have developed institutions for the award of research funding that emphasize the competitive allocation of funds based upon assessment of research quality, whether of programmes or individual project proposals.

The validity and legitimacy of judgements about quality – especially teaching quality – may be keenly contested. Higher education institutions, governments, and employers typically want different things from quality evaluations. Institutions typically seek localized and detailed information that can lead to improvements in teaching; governments want aggregated and comparable data about systems that enable them to make resource allocation decisions; employers want assurance that the graduates of higher education programs are well-prepared for working life. While these divergent orientations are not insuperable obstacles to the measurement of quality, they do make it difficult.

The focus of governments and higher education institutions differs in a second respect: governments are more often concerned with the outcomes that result from teaching and research, or their impact, whether measured as including student completion rates, graduate employment rates and earnings, or patents obtained. Thus, concerns about impact have fuelled a parallel development, in which the resource allocation mechanisms for funding higher education institutions have increasingly introduced outcome- or performance-related elements. Assessments of quality and impact – and the connection to resource allocation – have advanced farthest in research, where criteria of quality, and methodologies and data to implement them are most widely agreed. They are rudimentary at best when it comes to the social, economic and cultural impact of institutions on their regions.

The growth of cross-border education has focussed attention on the international dimension. The guidelines developed by the OECD and UNESCO seek to address the consumer protection angle, but governments and legitimate cross-border providers also want to protect the "brand image" of their higher education systems and services. A rogue provider can damage these reputations and exploit eager students, while overly strict barriers can deny students the benefit of program options that are locally unavailable, and create incentives for the emergence of unscrupulous providers.

Governments and higher education institutions do not have a monopoly on the measurement of quality or impact, nor are their concerns always identical to those of students and families. Thus, the expansion of governmental schemes for quality has been accompanied by the proliferation of non-governmental rankings or league tables, national and international, aimed at potential students. Typically constructed by news organisations, these rankings target students and families as consumers. While these league tables are often criticised for the selection and weighting of their quality criteria – or the appropriateness of ranking entire institutions rather than faculties or programmes – they nonetheless seem to be shaping the behaviour of institutions, much as international rankings of research institutions may be influencing debate and thinking within government. What is unclear is the extent to which rankings are shaping students' decisions, institutional strategies, and governmental and employer choices, and whether the changes they induce improve or diminish the quality, equity and efficiency of higher education systems.

- How – and by whom – should the quality and impact of teaching and research undertaken by higher education be assessed?
- Is enough being done to protect, inform and advise prospective students and other stakeholders?
- Are there ways that quality assessments can be improved, so that they better serve goals of efficiency, effectiveness, and quality – or the needs of a wider range of students, institutions and other stakeholders?

Higher education's contribution to research and innovation in a global knowledge economy

Higher education institutions make a major contribution to research and innovation by creating new knowledge through scientific and technological research and by training skilled workers through their educational mission. The contribution of higher education to innovation is larger today than in the past, as reflected in its increasing R&D expenditures, rising graduation rates, increased patenting and the growing number of references to scientific literature in patent applications. An effective interface between innovation and higher education systems is more necessary than ever to reap the benefits from public and private investments in research and to ensure the vitality and quality of the higher education system.

Changes in governance and funding structures can make higher education organisations more responsive to economic and societal needs. This could include changes in the mix of project funding and institutional block grants, selective increases of funding for research fields that are linked to social and economic needs, and new organisational structures that concentrate expertise and foster research at the nexus of several disciplines. It may also require a greater commitment to evaluating researchers and research organisations, as well as changes in the way such evaluations are conducted. Evaluation criteria may have to recognise that excellence has become, at least in some disciplines, more tied to economic and social applications. Such changes do not have to come at the expense of creativity and diversity in exploring the knowledge frontier. Indeed, securing support for fundamental research has become a priority for most governments. Safeguards can be put in place to ensure the broad diffusion of public knowledge and to ensure that the shift to more project-oriented funding does not undermine funding for the research infrastructure.

Measures may also be needed to improve the ability of higher education institutions and public and private research organisations to transfer knowledge and technology to the business sector. For example, public-private partnerships can promote co-operation between government agencies, laboratories, universities and the private sector in undertaking joint research or in building knowledge infrastructures. Vocational and technical institutions can be especially effective at supporting small and medium-sized enterprises. All can fill gaps in science and innovation systems and increase the leverage of public support through cost and risk sharing.

As the cost and multidisciplinary nature of research at the scientific frontier increase, countries will also increasingly need to draw on ideas generated abroad. Policy can help increase foreign participation in national programmes, support international partnerships between universities, or engage in global public-private partnerships.

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High-quality human resources are essential to the teaching, research and public service missions of higher education systems and the effectiveness of their contribution to research, innovation and growth. Attracting top talent requires good standards, fairness in hiring, good working conditions and good institutional leadership. In some countries, academic personnel are civil servants, but in many others they are either a separate category of professional or are direct employees of higher education institutions. In all cases, flexibility with regard to such issues as the ability to engage in outside consultation, intellectual property rights, working hours, parental leave and childcare can be helpful. Gender and minority inequities in faculty hiring need to be addressed. On the student side, more industry-oriented degrees as well as less narrowly focused programs help to make higher education more relevant to employers and enhance graduates' chances of both employment and success in modern workplaces.

Efforts may also be needed to promote the exchange of knowledge between the public and private sectors, through the movement of human resources, for example. Regulations on dual employment or restrictions on participation in entrepreneurial activities by public researchers are being removed in many OECD countries. Centres of excellence and fellowships are also being used to foster the mobility of researchers across research institutions and between them and firms.

Growth in OECD member economies requires much more than capital-intensive research that leads to patentable technologies; it also requires the development of well-trained professionals whose numbers and skills are adapted to the demands of local and regional economies, and the application of research-based knowledge in small and medium-sized enterprises. In many nations, the bulk of higher education institutions are engaged primarily in the application of knowledge rather than discovery. Nonetheless, few systems provide incentives or funding streams to reward and foster this work. Considerable room for improvement exists in understanding the distinctive contribution that these institutions make to member economies – and in building upon this to create funding methodologies and performance measures that encourage responsiveness to and excellence in this mission, as distinct from that of the research-intensive university.

- How can higher education systems contribute to success in a competitive, global, knowledge-based economy, and what policies will help optimise their role?
- What national policies are employed to foster international research excellence, and to what effect?
- How can governments and other stakeholders ensure that this research is relevant and applicable?
- How can governments encourage responsiveness to and excellence in the application of research-based knowledge, and in the practice-based training of professionals?

Challenges and opportunities of the global market for education

Higher education has always had an international dimension: study abroad and academic exchange are established features of many systems. Learning knows no borders and the openness of scientific research makes it an intrinsically global activity which has been a major contributory factor to globalisation.

The promotion of higher education as an export industry is, however, a relatively recent phenomenon. The international higher education trade has been growing strongly and is now estimated to be worth some USD 40 billion. Education is the seventh largest export sector in Australia with a total value in 2005 of more than USD 5 billion.

The flows are not all one-way, but there are clear imbalances. It has been estimated that global demand for international student places in English-speaking destinations will more than double by 2020. Growth in masters programmes and in distance learning could be even stronger. East and South Asia are expected to account for the majority of new demand. Students from African countries with very low levels of higher education provision are not well placed to take advantage of opportunities to study in OECD countries.

The inclusion of education in the scope of international trade agreements has caused some concern amongst stakeholders. A number of international organisations of institutions have asked that governments and other competent authorities work together to serve the public interest and preserve higher education's ability to carry out its social and cultural mission. There is concern both about cultural diversity and national capacity, and the needs of individual students.

The voluntary *Guidelines for Quality Provision in Cross-border Higher Education* were jointly developed by UNESCO and the OECD to meet some of these concerns by providing an international framework that national authorities might use to protect students and other stakeholders from low-quality provision and disreputable providers. If the guidelines are to be effective, they need to be actively considered by higher education institutions and providers, and monitored by governments and regulators, as is appropriate within each national system. OECD countries have a wealth of experience of policy development in higher education and of the need for appropriate governance structures. There is growing awareness of the complex impacts of brain-drain – and brain-gain – on developed and developing countries, but policy solutions are difficult to identify and put in place.

- What scope is there for capacity building through the sharing of good practice, the development of academic exchange and institutional links?
- Does more need to be done to protect and inform potential students?
- What can ministers responsible for higher education do to maximise the positive impact of global higher education in developing countries?

Improving the quality, relevance and impact of higher education

In many ways, higher education systems appear to be successful in meeting 21st century social needs. Higher education provides new kinds of education and training to numbers of students unimaginable in decades past. Many have greatly increased the intensity of their research activities and made important contributions to public knowledge and innovation. In some nations, however, higher education research remains only weakly joined to broader public purposes, including the provision of education and training relevant to the demands of working life, and research activity that yields benefits for the development of a knowledge-based economy. Most conspicuous, perhaps, is the modest contribution of higher education to social cohesion. The expansion of higher education enrolments has failed to narrow wide disparities in the rates at which students

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from higher and lower income families enter – let alone complete – tertiary studies. Given the disproportionate take-up of additional study places by middle-income students, and a simultaneous increase in the returns to higher education, there is evidence that higher education has in some instances widened, rather than narrowed, social disparities.

Responsibility for some of these shortcomings may rest outside the higher education system itself, such as wide inequalities that are introduced during primary and secondary schooling, and clearly revealed in the findings of the OECD Programme on International Student Assessment (PISA). Nonetheless, the inability of higher education to meet other needs must be acknowledged to rest, in some instances, with higher education institutions themselves, or with public officials who bear responsibility for aligning their activities to national policy goals. Though higher education institutions often have much wider scope for autonomous action, many have shown a reluctance or inability to fully embrace its possibilities, particularly in the management of human resources. Elsewhere, authorities responsible for higher education have failed to recognise the needs for wider autonomy on the part of institutions, or how to effectively hold institutions accountable for their performance. Institutions may not be sufficiently attentive to the needs of non-traditional students not out of a wilful indifference to their needs, but because public authorities have failed to create proper incentives – or to limit the risks – of working with students whose schooling may be more costly to institutions, or more likely to result in longer study times and lower rates of completion.

At times, the varied demands that are brought to bear on systems of higher education may be difficult to reconcile. In many OECD member states, higher education institutions may be numerous, comparatively small, and widely dispersed, reflecting a longstanding public expectation that they should meet the needs of regions or reinvigorate communities throughout the nation. At the same time, though often from different quarters inside and outside of government, higher education systems are facing strong demands to combine the physical and human resources into larger entities so that these institutions can compete on a global basis for talented students and researchers, and large-scale investment in research.

Many governments have responded to the challenge of these competing and contradictory demands by embracing wider differentiation within systems of higher education. This embrace of differentiation may take the form of establishing formal systems of specialisation, in which institutions are legally distinguished by name, mission, and funding, or it may centre instead on the introduction of student selection, competitive research funding, and differential fees, which encourage substantial differentiation within systems that remain nominally unitary.

- How can persistent inequality in higher education be better understood and addressed?
- How can diversity and differentiation among institutions be encouraged without creating rigid and unproductive hierarchies among them?
- How can the OECD help nations devise better ways to measure the quality, impact, and efficiency of higher education?

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This report draws on existing material and data collection activities in the OECD Directorates for Education (EDU), Employment, Labour and Social Affairs (ELS), Science, Technology and Industry (STI), and Statistics (STD).

Terminology

The terms used in this report to denote the different levels of education are defined with reference to the International Standard Classification of Education (ISCED) of 1997, as explained below.

- **Higher education** (Tertiary education, ISCED 5-6) includes Tertiary-type A education (ISCED 5A), Tertiary-type B education (ISCED 5B) and Advanced Research Qualification (ISCED 6).
- **University-level educational programmes** (Tertiary-type A, ISCED 5A) are largely theory-based and are designed to provide sufficient qualifications for entry to advanced research programmes and professions with high skill requirements, such as medicine, dentistry or architecture. Tertiary-type A programmes have a minimum cumulative theoretical duration (at tertiary level) of three years' full-time equivalent, although they typically last four or more years. These programmes are not exclusively offered at universities. Conversely, not all programmes nationally recognised as university programmes fulfil the criteria to be classified as tertiary-type A. Tertiary-type A programmes include second degree programmes like the American Master. First and second programmes are sub-classified by the cumulative duration of the programmes, *i.e.* the total study time needed at the tertiary level to complete the degree.
- **Advanced vocational education programmes** (Tertiary-type B, ISCED 5B) are typically shorter than those of tertiary-type A and focus on practical, technical or occupational skills for direct entry into the labour market, although some theoretical foundations may be covered in the respective programmes. They have a minimum duration of two years full-time equivalent at the tertiary level.
- **Advanced research qualification** (ISCED 6): This level is reserved for tertiary programmes that lead directly to the award of an advanced research qualification, such as a Ph.D. The theoretical duration of these programmes is three years full-time in most countries (for a cumulative total of at least seven years full-time at the tertiary level), although the actual enrolment time is typically longer. The programmes are devoted to advanced study and original research.
- **Post-secondary non-tertiary educational programmes** (ISCED 4) straddle the boundary between upper secondary and post-secondary education from an international point of view, even though they might clearly be considered upper secondary or post-secondary programmes in a national context. Although their content may not be significantly more advanced than upper secondary programmes, they serve to broaden the knowledge of participants who have already gained an upper secondary qualification. The students tend to be older than those enrolled at the upper secondary level.

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The Broader Context

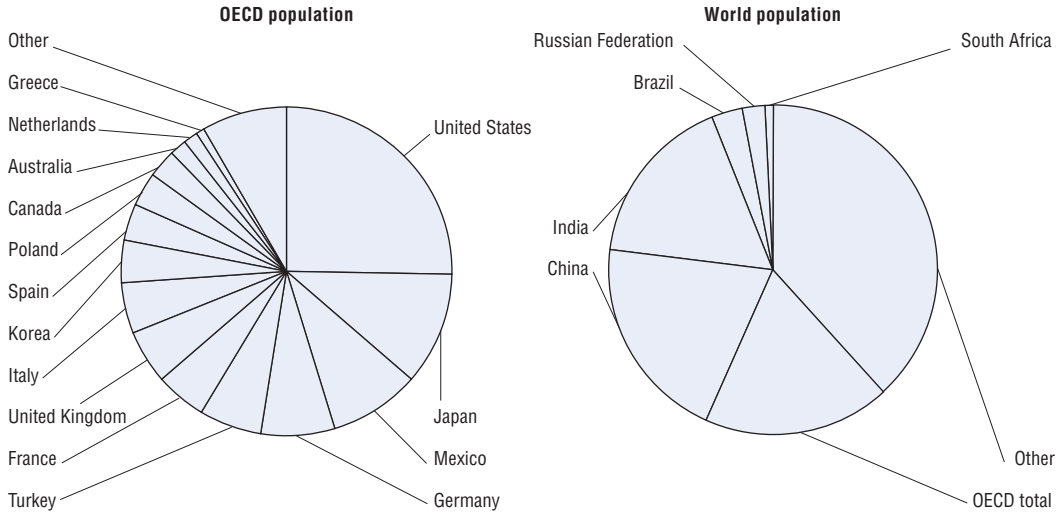
1. Total population

The size and growth of a country's population are both causes and effects of economic and social developments. In 2003, OECD countries accounted for just over 18% of the world's population of 6.3 billion. China accounted for 21% and India for just over 17%. The next two largest countries were Indonesia (3%) and the Russian Federation (2%). Within OECD, the United States accounted for nearly 25% of the OECD total, followed by Japan (11%), Mexico (9%), Germany (7%) and Turkey (6%).

For most OECD countries, population data are based on regular censuses carried out every ten years, with estimates for intercensal years being derived from administrative data such as population registers, notified births and deaths and migration records. In some European countries, including Denmark and the Netherlands, population censuses are no longer carried out and the estimates are based entirely on administrative records.

The data refer to the resident population. For countries such as France, the United Kingdom and the United States which have overseas colonies, protectorates or other territorial possessions, their populations are generally excluded.

Figure 1.1. **Total population**



Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

2. Population growth rates

Growth rates are the annual changes in the population and are the result of births, deaths and net migration during the year. The natural increase in population (births minus deaths) has slowed in all OECD countries, resulting in a rise in the average age of populations. In several countries, falling rates of natural increase have been partly offset by immigration from outside the OECD area.

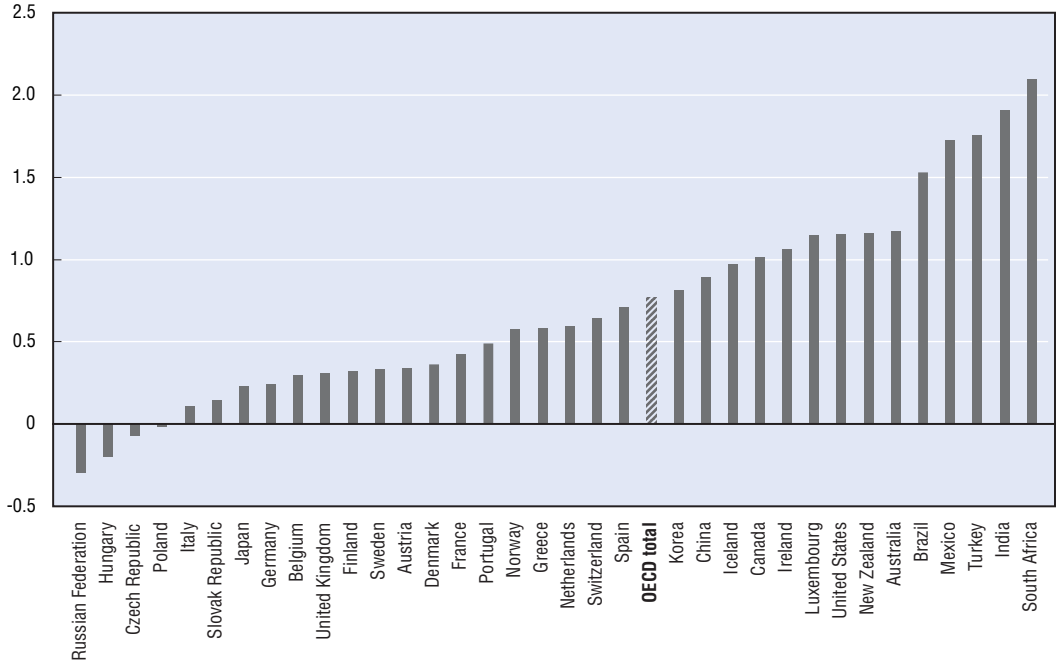
Between 1991 and 2004, population growth rates for all OECD countries averaged 0.8% per annum. Growth rates much higher than this were recorded for Mexico and Turkey (high birth rate countries) and for Australia, Canada, Luxembourg and New Zealand (high net immigration). In the Czech Republic, Hungary and Poland, populations declined from a combination of low birth rates and net emigration. Growth rates were very low, although still positive, in Italy and the Slovak Republic.

The total fertility rate is the total number of children that would be born to each woman if she were to live to the end of her child-bearing years and give birth to children in that period in agreement with the prevailing age-specific fertility rates.

Total fertility rates have declined dramatically over the past few decades, falling on average from 2.7 in 1970 to 1.6 children per woman of childbearing age in 2002. By 2002, the total fertility rate was below its replacement level of 2.1 in all OECD countries except Mexico and Turkey. In all OECD countries, fertility rates have declined for young women and increased at older ages, because women are postponing the age at which they start their families.

Figure 1.2. **Population growth rates**

Average annual growth in percentage, 1991-2004 or latest available year



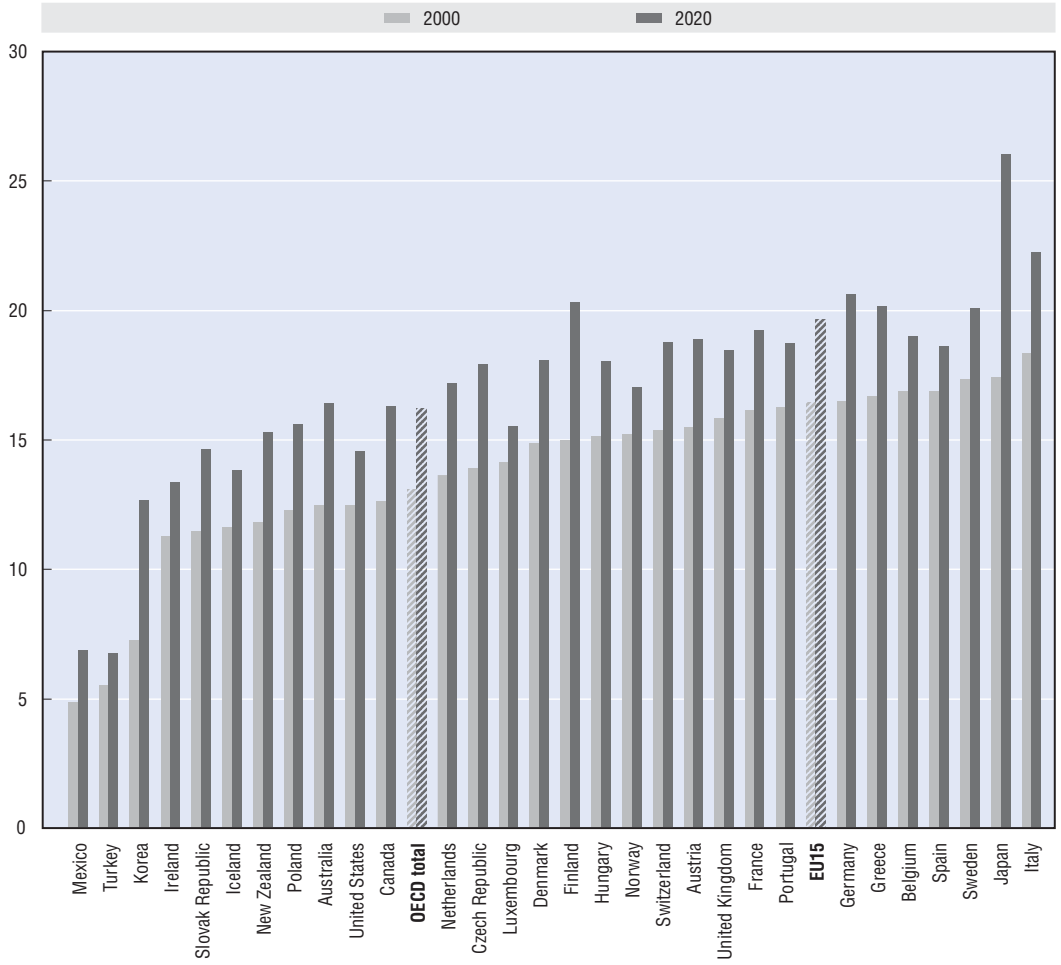
Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

3. Ageing societies

The percentage of the population 65 years or older is rising in all OECD countries and is expected to continue doing so. Dependency ratios are the number of persons 65 or older as a ratio of the numbers in the labour force. These ratios are also increasing. These trends have implications for government and private spending on pensions and health care and for economic growth and welfare.

The youngest populations (low shares of population aged 65 or over) are in countries with high birth rates such as Mexico, Iceland and Turkey or with high immigration, such as Australia, Canada and New Zealand. All these countries will, however, experience significant ageing up to 2020. The dependency ratio is projected to exceed 50% in Hungary, France, Italy and Japan by 2020. This means that, for each elderly person, there will be only two persons in the labour force. The lowest dependency ratios, under 30%, are projected for Mexico, Iceland, Turkey and Ireland. Over the period from 2000 to 2020, dependency ratios are forecast to rise particularly sharply in the Czech Republic, Finland, Japan, Korea and Turkey; growth of dependency ratios will be lowest in Greece, Ireland, Portugal and Spain.

Figure 1.3. **Population aged 65 and over**



Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

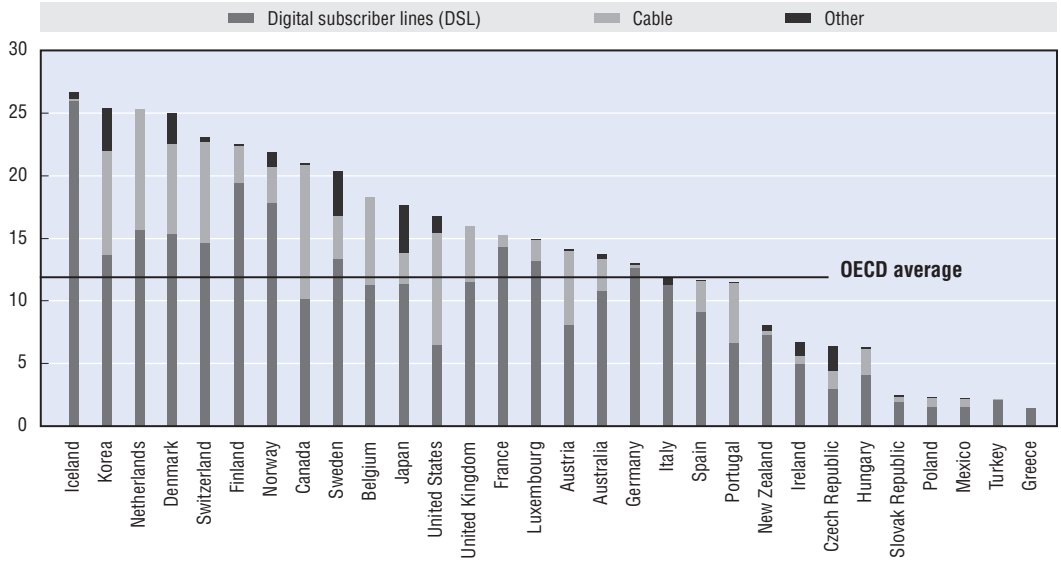
4. Broadband connections

The rapid development and diffusion of information technology has led to new ways of learning and scientific research, allowing researchers to engage in more complex and data-intensive areas of research, and has also changed the innovation process, *e.g.* in allowing greater international co-operation and networking. This process has already been underway for some time, but looks set to continue for some time to come. The uptake of information technologies continues to increase across the OECD, notably in terms of the growth of broadband.

The number of broadband subscriptions in the OECD area increased during 2005 from 136 million in June 2005 to 158 million by December 2005. Broadband penetration growth in the OECD held steady at 15% in the second half of the year reaching 13.6 subscribers per 100 inhabitants in December. In December 2005, four countries (Iceland, Korea, the Netherlands and Denmark) led the OECD in broadband penetration, each with more than 25 subscribers per 100 inhabitants. Iceland now leads the OECD with a broadband penetration rate of 26.7 subscribers per 100 inhabitants.

DSL (digital subscriber lines) is still the leading platform in 28 OECD countries. Cable subscribers outnumber DSL in Canada and the United States. The United States has the largest total number of broadband subscribers in the OECD at 49 million. US broadband subscribers represent 31% of all broadband connections in the OECD. Canada leads the G7 group of industrialized countries in broadband penetration.

Figure 1.4. **Broadband connections**



Source: OECD, Broadband Statistics, December 2005, see *www.oecd.org/sti/ict/broadband*.

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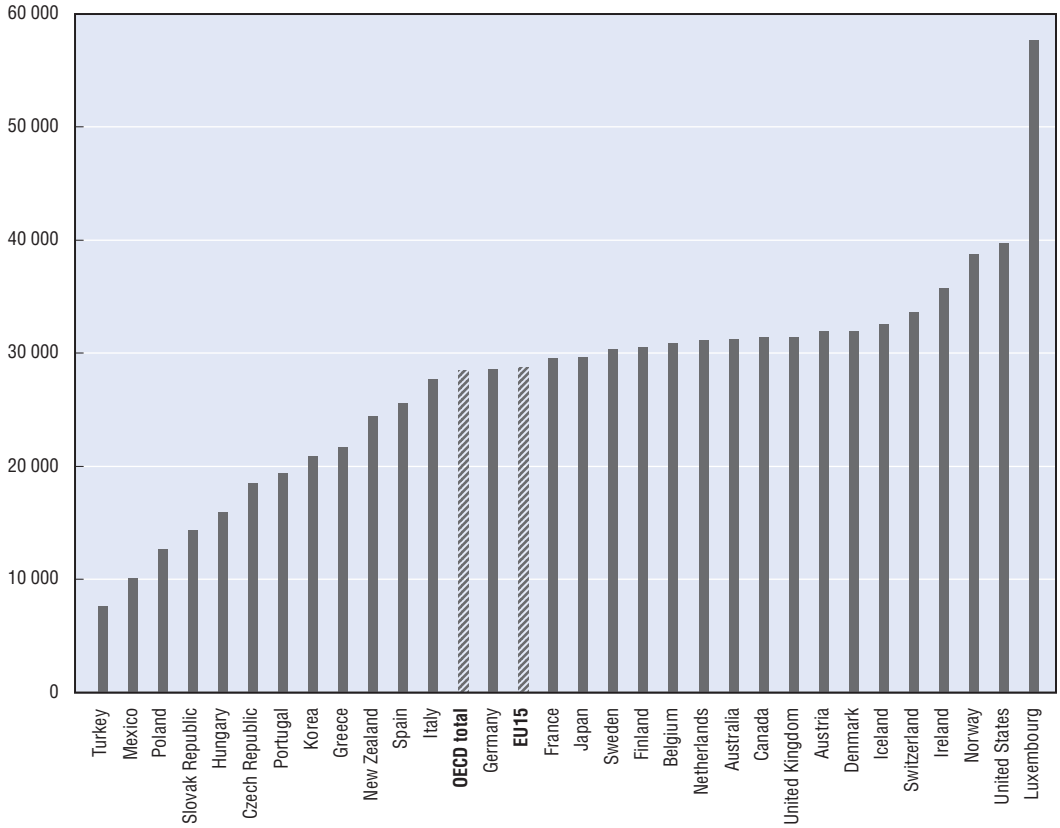
5. Gross domestic product per capita

Gross domestic product (GDP) per capita is a broad indicator of economic living standards. As each country calculates GDP in its own currency, comparisons of real GDP between countries can only be made using purchasing power parities (PPPs) to convert each country's GDP into a common currency.

In terms of total GDP, the United States is, by far, the largest member country. Since 1997, its GDP has exceeded even the combined GDP of the European Union with 15 members. Japan is the second largest economy followed, at some distance, by the four large EU members – Germany, United Kingdom, France and Italy. The next four largest are Spain, Mexico, Korea and Canada. These rankings have not changed significantly over the period shown, although, in 1991, the combined GDP of the EU15 was higher than that of the United States. Per capita GDP for the OECD as a whole was close to USD 28 500 per head in 2004, compared to USD 9 300 for the 150 countries generally defined as developing. Six OECD countries had per capita GDP in excess of USD 32 000 – Luxembourg, United States, Norway, Ireland, Switzerland and Iceland. Nearly half of the 30 OECD members had per capita GDP between USD 25 000 and 32 000, while 10 countries had per capita GDP below USD 25 000. Turkey, Mexico and the four new member countries from central Europe had the lowest per capita GDP.

Figure 1.5. **GDP per capita**



Note: Both GDP and PPPs contain statistical errors, and differences between countries in per capita GDP of 5% or less are not significant.

Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

6. Labour productivity

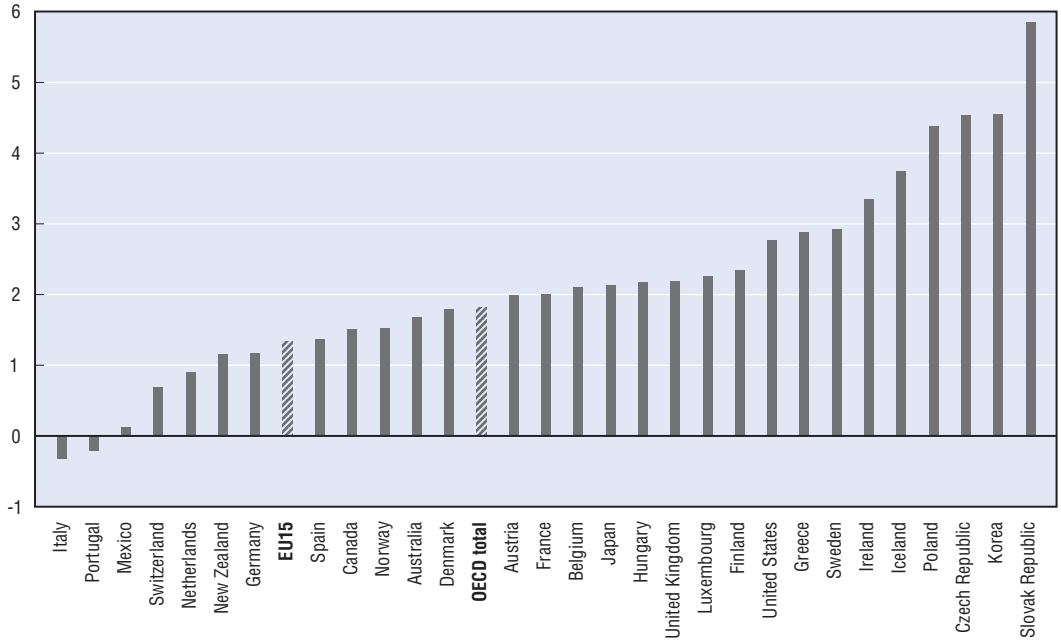
Productivity growth can be measured by relating changes in output to changes in one or more inputs to production. The most common productivity measure is labour productivity, which links changes in output to changes in labour input. It is a key economic indicator and is closely associated with standards of living.

Over the full period since 1991, Italy, Mexico and Switzerland have recorded the lowest growth rates in GDP per hour worked, while Ireland, Korea, and the four new OECD countries from Central Europe have been among the leaders. France, Germany, Japan and the United States all had growth rates near to the OECD average.

This figure focuses on performance in the latest three years. Poland, Korea, the Czech Republic and the Slovak Republic are the clear leaders. In Italy and Portugal, GDP per hour worked has actually declined and average annual growth in Mexico, Switzerland and the Netherlands has been below 1%. Among the larger OECD countries, the United Kingdom, France, Japan and the United States all had growth rates near to the OECD average, while in Canada, Spain and Germany, GDP per capita grew at lower rates.

Figure 1.6. **GDP per hour worked**

Average annual growth in percentage, 2002-04 or latest period available



Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

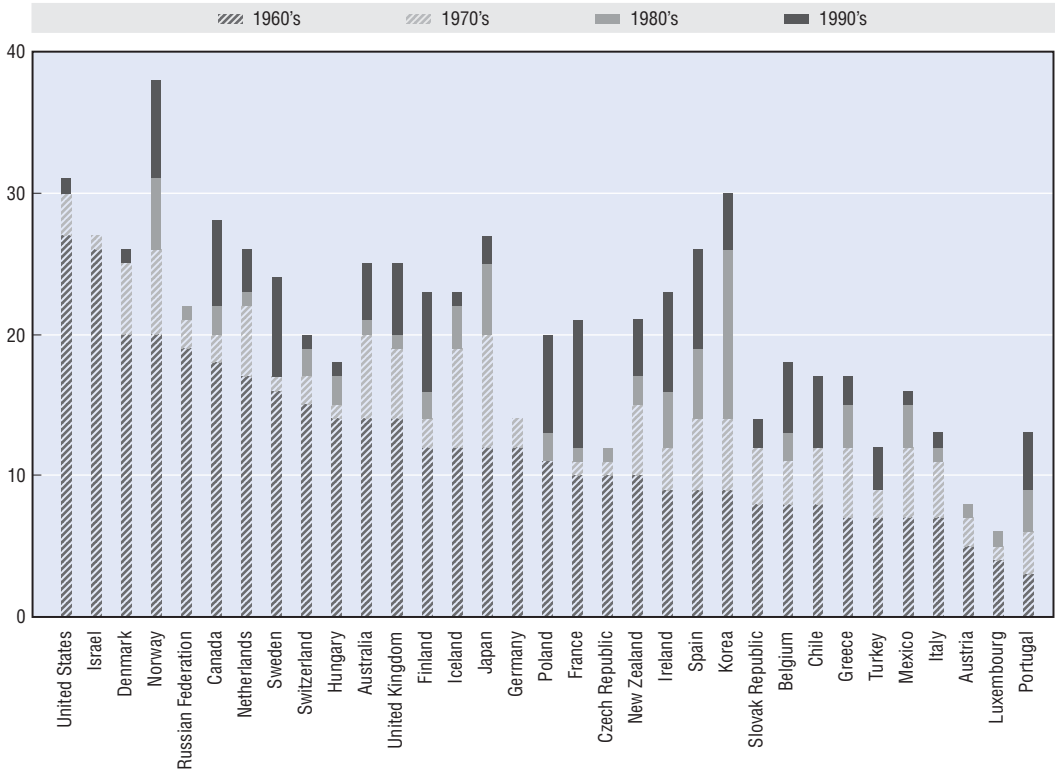
Access, Participation, Progression

7. Educational attainment

A well-educated and well-trained population is important for the social and economic well-being of countries and individuals. Education plays a key role in providing individuals with the knowledge, skills and competencies to participate effectively in society and the economy. Education also contributes to an expansion of scientific and cultural knowledge. The level of educational attainment of the population is a commonly used proxy for the stock of "human capital", that is the skills available in the population.

Figure 1.7. **Growth in university-level qualifications (2003)**

Approximated by the percentage of persons that attained university-level education in the age groups 55-64, 45-55, 35-44 and 25-34



Source: OECD, *Education at a Glance 2005*, Table A1.3a.

A comparison of the levels of educational attainment in younger and older age groups indicates marked progress with regard to the percentage of the population graduating from higher education. In countries in which a high proportion of the population achieves the

level of higher education, important increases in attainment are generally seen from one generation to another. Across all OECD countries, an average of 29% of 25-to-34-year-olds attained the level of higher education. In contrast, for 45-to-54-year-olds, the corresponding share was 22%.

The proportion of 25-to-34-year-olds who have attained university-level qualifications is more than 20% in 18 of the 30 OECD countries. This figure represents the result of a dramatic effort to expand educational attainment over the last 40 years. For countries at the top level, the gap in university-level attainment between the oldest and youngest age groups (25-to-34-year olds and 55-to-64-year olds) is about 10 percentage points. The gap is particularly pronounced in Australia, France, Iceland, Ireland, Japan, Korea, New Zealand, Norway, and Spain.

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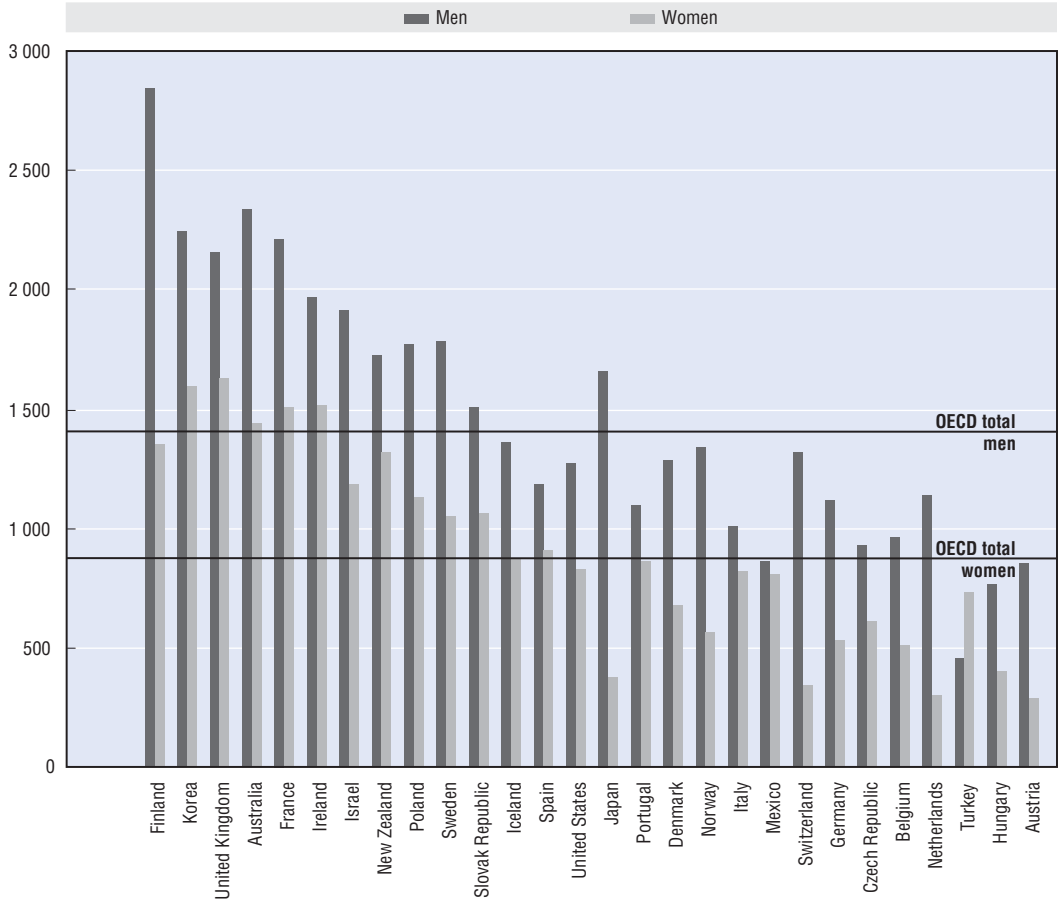
8. Number of science graduates

Changing opportunities in the job market, differences in earnings among occupations and sectors, and the admission policies and practices of higher education institutions may affect which field students choose to study. In turn, the relative popularity of the various fields of education affects the demand for courses and teaching staff, as well as the supply of new graduates. The distribution of higher education graduates across fields sheds light on the relative importance of the different fields between countries, as well as on the relative proportion of female graduates in those fields.

Figure 1.8. **Science university-level graduates per 100 000 employed in the age range 25-34 years (2003)**



Source: OECD, *Education at a Glance 2005*, Table A3.2.

Examining the number of science graduates per 100 000 25-to-34-year-olds in employment provides another way of gauging the recent output of high-level skills from different education systems. The number of higher education science graduates per 100 000 employed persons ranges from below 700 in Hungary to above 2 200 in Australia, Finland, France, Ireland, Korea and the United Kingdom. This indicator does not, however, provide information on the number of graduates actually employed in scientific fields or, more generally, the number of those using their degree-related skills and knowledge at

work. Taking the OECD average, the number of higher education science graduates is three times higher for university-level education and advanced research programmes than for advanced vocational education. Overall, university-level graduation rates for females equal or exceed those for males in 21 out of 27 OECD countries.

On average in OECD countries, 57% of all first university-level graduates are females. However, major differences remain among fields of study. In humanities, arts, education, health and welfare, more than two-thirds of the university-level graduates are females, on average in OECD countries, whereas less than one-third of science graduates are females.

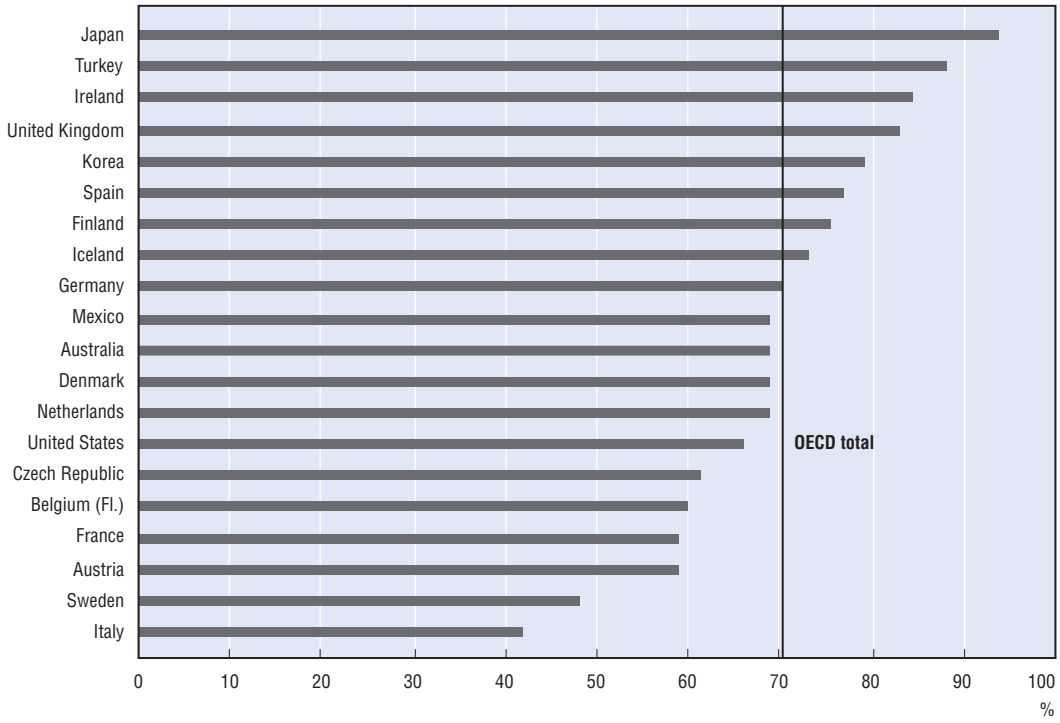
9. Survival rates in university-level education

Higher education dropout and survival rates can be useful indicators of the internal efficiency of higher education systems. However, students' specific reasons for leaving a higher education programme are varied: students may realise that they have chosen the wrong subject or educational programme; they may fail to meet the standards set by their educational institution, particularly in systems that provide broader access; or they may find attractive employment before completing their programme. "Dropping out" is not necessarily an indication of failure by individual students, but high dropout rates may well indicate that the education system is not meeting the needs of its clients. Students may find that the educational programmes offered do not meet their expectations or their labour market needs. Students may also find that programmes take longer than the number of years which they can justify being outside the labour market.

On average, one-third of students in OECD countries "drop out" before they complete their first degree, regardless of whether they are following university level or advanced programmes. The "drop out" rate is much higher for advanced research programmes, with a survival rate of less than 60%. University-level survival rates differ widely among OECD countries, ranging from below 60% in Austria, France, Italy and Sweden to above 80% in Ireland, Japan, Turkey and the United Kingdom. Advanced vocational survival rates range from above 80% in Denmark, the Flemish Community of Belgium, Japan, Mexico, Poland and Sweden, to around 50% in Ireland and Italy.

Figure 1.9. **Survival rates in university-level education (2000)**

Percentage of graduates in relation to the number of new entrants in the typical year of entrance to the specified programme



Source: OECD, *Education at a Glance 2005*, Table A3.4.

10. Students with disabilities in higher education

Giving students with disabilities the opportunity to study in higher education institutions enhances their employment participation and at the same time meets economic, political and social goals. It favours employment, responds to the requirements of a knowledge society and meets equity demands by helping to reduce social exclusion. In the past decade, there has been a significant rise in enrolment of students with disabilities in numerous OECD countries. Sweden recorded 125% growth from 1993 to 1998 and France around 100% from 1990 to 2000. In Ontario, Canada, disabled student enrolments at university have risen from 1 668 in 1989-90 to 6 883 in 2000-01 (OECD, 2003).

This trend can be explained by inclusion policies that increased the number of students with disabilities in regular settings: in New South Wales, Australia, the proportion of students with disabilities enrolled in mainstream settings increased from 8% in 1988 to 34% in 1997 (OECD, 1999). In France, the number of students with disabilities enrolled at upper secondary level grew by 38% between 1990 and 1999. The focus on quality of teaching at school may have led to better completion for students with disabilities: in the United States the proportion of school leavers with disabilities who had received a high school diploma or certificate of completion increased from 54% to 70% between 1987 and 2003 (Wagner *et al.*, 2005).

Such an evolution reflects the impact of non-discrimination policies developed in the past decade in many OECD countries. Such policies have changed the way disability is understood: instead of describing the difficulties disabled people face in terms of a within-person model, non-discrimination policies pointed to the importance of schools and higher education institutions (HEIs) being able to adapt to meet these students needs. In some countries, such as Canada, legislation (in the province of Ontario) addresses the identification, removal and prevention of barriers which impede persons with disabilities from full participation.

The various forms of statutory support available to both institutions and individuals have also been a key factor in the growth of disabled student enrolment. In financial terms, many countries have taken steps to facilitate work that makes institutions accessible to the disabled. Many countries seek also to provide institutions with methodological support and give them more scope to upgrade the skills of special staff responsible for disabled students. Many institutions employ advisors to give disabled students better access to the financial and technical support to which they are legally entitled and ensure they are in a position to make career choices.

The accessibility of universities and colleges depends on the perspective adopted to assess student needs and deliver appropriate support. Countries that have chosen needs-based approaches have a higher level of accessibility than countries having impairment-based perspectives that link the supports and the subsidies with a status of disability. At the level of the HEIs, the needs perspective requires integrated strategies that enlarge their ability to deliver appropriate services and support to all students and to cope with diversity within the community.

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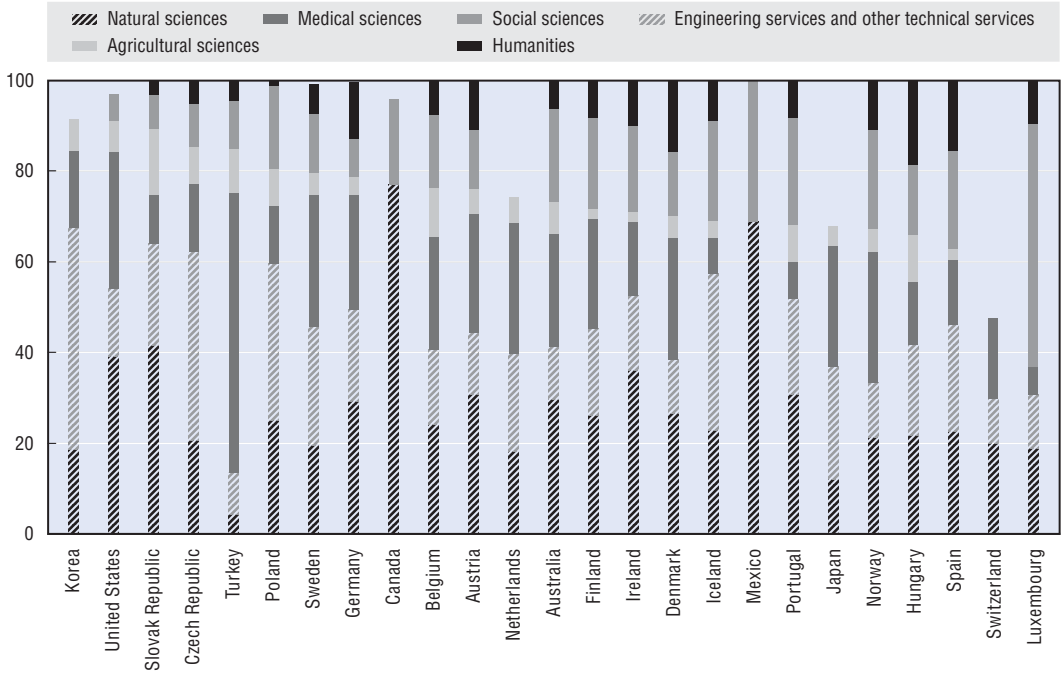
11. Higher education R&D expenditure by field of study

OECD data allow a breakdown of higher education R&D by field of study. The data show that countries are not equally engaged in all fields of science. In the Slovak Republic and the Czech Republic, over 85% of all research and development is carried out in natural sciences, engineering, medical sciences and agricultural sciences, with social sciences and humanities accounting for only a small share. In some other OECD countries, such as Hungary, Norway and Spain, around 35% of all higher education R&D is carried out in social sciences and humanities. These differences may be linked to the specialisation of science systems in different countries.

Figure 1.10. **Higher education R&D expenditure by field of science,[1] 2003**

As a percentage of total higher education R&D expenditure



1. In Korea, R&D in social sciences and the humanities is excluded, as is R&D in the humanities in the United States.

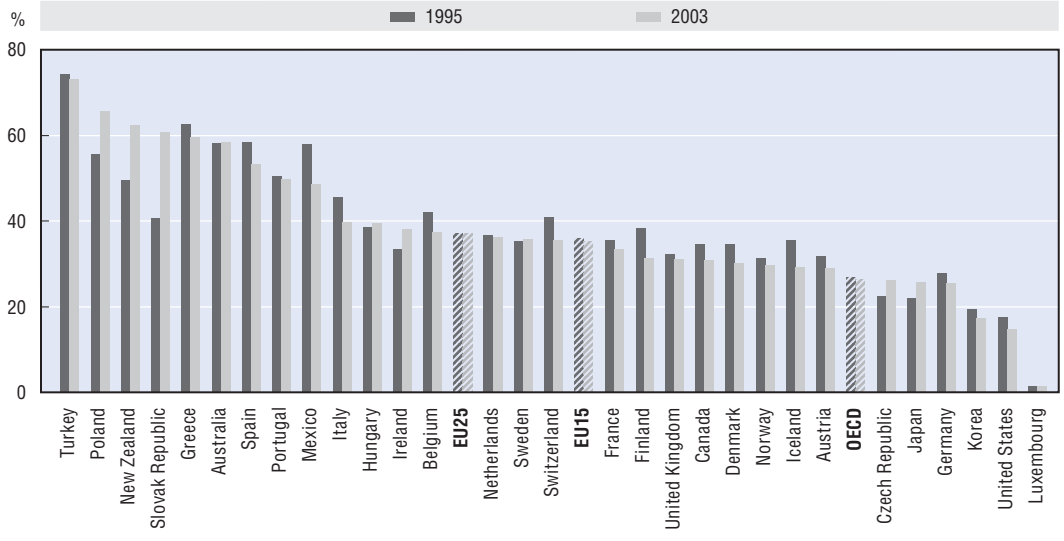
Source: OECD, R&D Statistics (RDS), November 2005.

12. Higher education researchers

Researchers are viewed as the central element of the research and development system. They are defined as professionals engaged in the conception and creation of new knowledge, products, processes, methods and systems and are directly involved in the management of projects. In 2002, approximately 3.6 million researchers were engaged in research and development (R&D) in the OECD area. This corresponds to about 8.3 researchers per 1 000 employees, a significant increase from the 1995 level of 7 researchers per 1 000 employees. Out of these 3.6 million researchers, most were engaged in the business sector and just over 25% were engaged in the higher education sector. The lowest shares of higher education researchers in all researchers are found in Germany, Japan, Korea and the United States, which is linked to the large share of business R&D in total R&D in these countries. The highest shares of higher education researchers can be found in New Zealand, Poland and Turkey. On average, the share of higher education researchers in the total number of researchers has changed relatively little over the period from 1995 to 2003.

Figure 1.11. **Higher education researchers, 1995-2003**

As a percentage of all researchers



Source: OECD, *Main Science and Technology Indicators*, 2005-2, November 2005.

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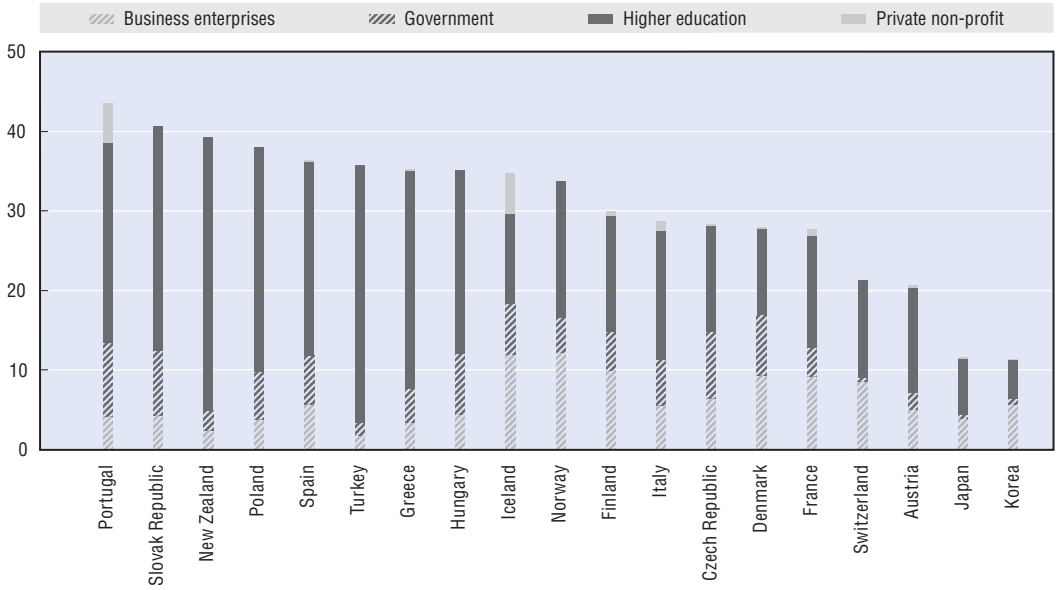
13. Women researchers

The under-representation of women in R&D activities is increasingly gaining the attention of policy makers. In most countries for which data are available, women represent only between 25% and 35% of total researchers. While women represent over 40% of researchers in Portugal and the Slovak Republic, they represent only 11% in Japan and Korea. Women researchers are principally found in the higher education sector and their participation is particularly low in the business sector, which employs the largest number of researchers in most countries. This is partly linked to the uneven distribution of women science and technology graduates across fields of study, with few women engaged in engineering and more in life sciences and social sciences.

Figure 1.12. **Women researchers, 2003**

By sector of employment, as a percentage of total researchers



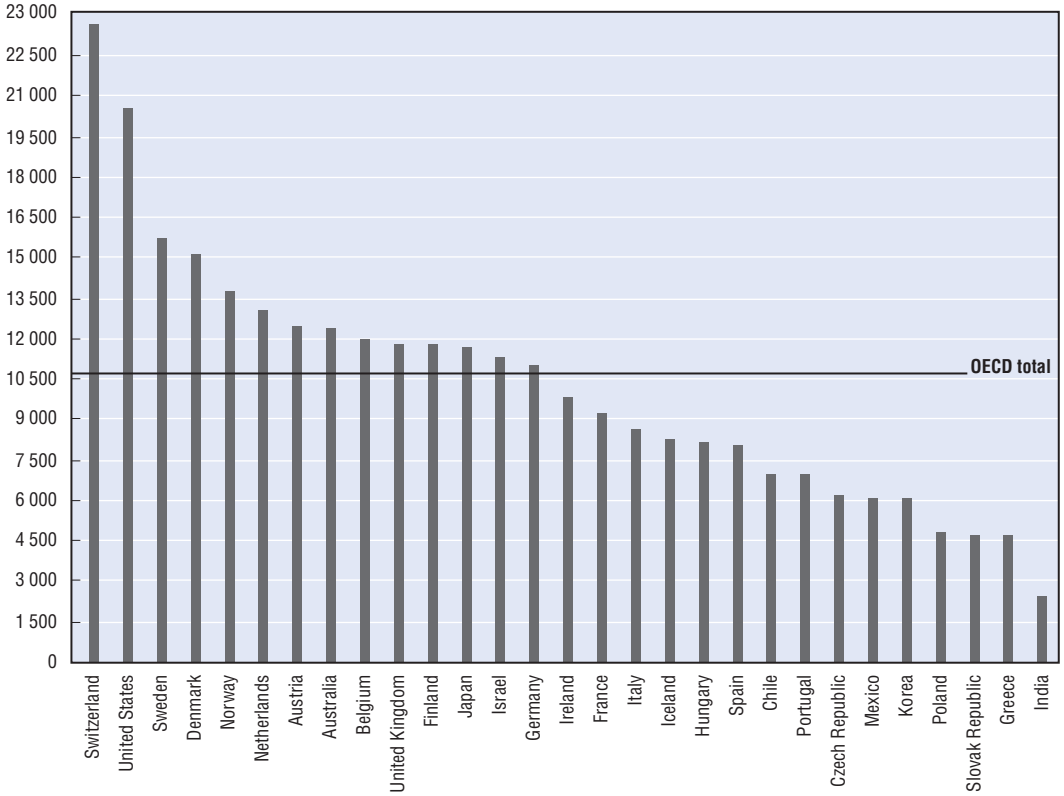
Source: OECD, Main Science and Technology Indicator database, May 2005.

Expenditure on Higher Education

14. Expenditure per student

Effective schools require the right combination of trained and talented personnel, adequate facilities, state-of-the-art equipment and motivated students ready to learn. The demand for high-quality education, which can translate into higher costs per student, must be balanced against placing undue burden on taxpayers. As a result, the question of whether the resources devoted to education yield adequate returns to the investments made figures prominently in the public debate. Although it is difficult to assess the optimal volume of resources required to prepare each student for life and work in modern societies, international comparisons of spending on education per student can provide a starting point for evaluating the effectiveness of different models of educational provision.

Figure 1.13. **Annual expenditure per student in higher education (2002) on educational institutions, in equivalent US dollars converted using PPPs**



Source: OECD, *Education at a Glance 2005*, Table B1.1.

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Even if overall spending per student is similar in some OECD countries, the way in which resources are allocated across the different levels of education varies widely. Spending on education per student in the typical OECD country, as represented by the simple mean across all OECD countries, amounts to USD 5 313 at the primary level, USD 7 002 at the secondary level and USD 10 655 in higher education.

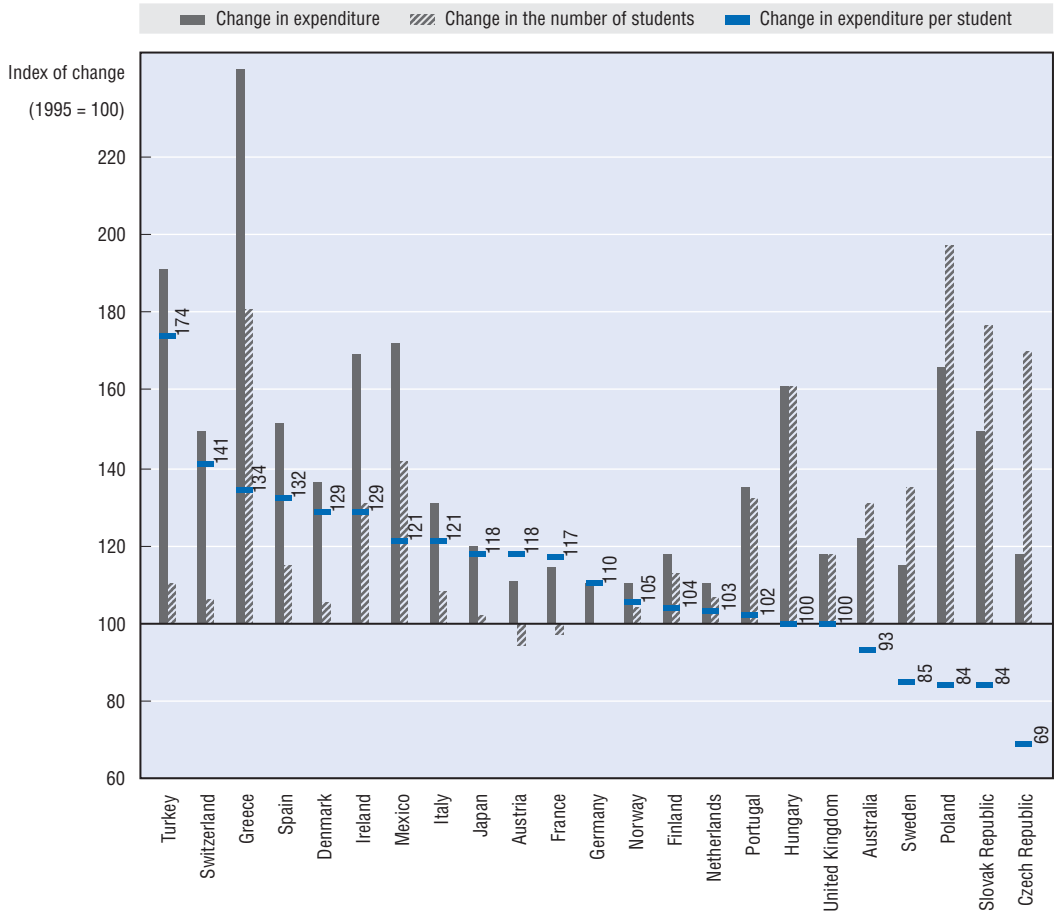
Expenditure on higher education per student ranges from USD 4 731 in Greece to more than USD 20 000 in Switzerland and the United States. On average, expenditure on R&D in higher education represents one-quarter of all higher education expenditure. In 5 out of 20 OECD countries for which higher education expenditure is separated by type of services, R&D expenditure in higher education institutions represents more than 35% of expenditure on higher education. On a per-student basis, this can translate into significant amounts, as in Austria, Finland, Germany, the Netherlands and Sweden, where expenditure for R&D in higher education institutions amounts to more than USD 4 000 per student.

15. Changes in expenditure per student

Policy makers must balance the importance of improving the quality of educational services with the desirability of expanding access to educational opportunities, notably at the level of higher education. The comparative review of how trends in educational expenditure per student have evolved shows that in many OECD countries the expansion of enrolments, particularly at the level of higher education, has not always been paralleled by changes in educational investment.

Although institutional arrangements are often slow in adapting to changing demographic conditions, changes in enrolments do not seem to have been the main factor driving changes in expenditure per primary, secondary and post-secondary non-tertiary student. The pattern is different at the level of higher education. In 5 out of 23 OECD countries for which data are available – Australia, the Czech Republic, Poland, the Slovak Republic and Sweden – expenditure on higher education per student declined between 1995 and 2002. In all of these countries, this was mainly the result of a rapid increase (more than 30%) in the number of students in higher education during the same period. On the other hand, expenditure per student in higher education rose significantly in Greece, Ireland and Mexico despite a growth in enrolment of 81, 31 and 42%, respectively. Austria and France were the only OECD countries in which the number of students in higher education declined.

Figure 1.14. **Changes in spending per student in higher education relative to different factors (1995 = 100, 2002 constant prices)**



Source: OECD, *Education at a Glance 2005*, Table B1.4.

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16. Cumulative expenditure per student

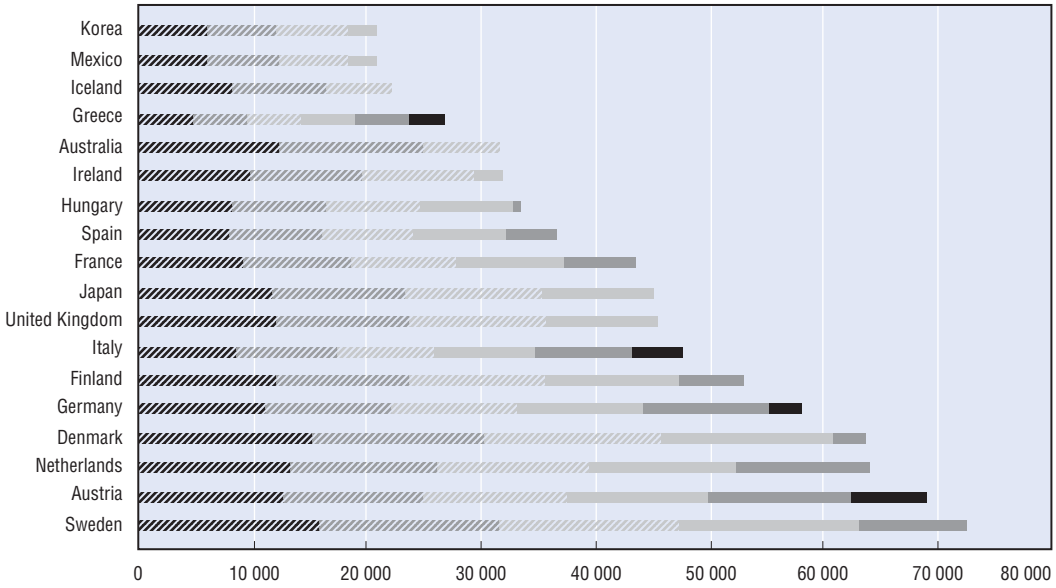
Both the typical duration and the intensity of higher education vary among OECD countries. Therefore, the differences among countries in annual expenditure on educational services per student, as shown in this figure, do not necessarily reflect the variation in the total cost of educating the typical student in higher education.

Comparatively low annual expenditure on education per student can result in comparatively high overall costs of higher education if the typical duration of studies is long. This figure shows the average expenditure that is incurred per student throughout the course of higher education studies. The figures account for all students for whom expenditure is incurred, including those who do not finish their studies. Although the calculations are based on a number of simplified assumptions and therefore should be treated with some caution, some striking shifts can be noted in the rank order of OECD countries between the annual and aggregate expenditure.

For example, annual spending per student in higher education in Japan is about the same as in Austria (USD 11 716 in Japan compared with USD 12 448 in Austria). But because of differences in the degree structure, the average duration of studies is almost two years longer in Austria than in Japan (5.5 years in Austria, compared with 3.8 years in Japan). As a consequence, the cumulative expenditure for each higher education student is almost USD 20 000 higher in Austria than in Japan (USD 68 959 compared with USD 45 095).

Figure 1.15. **Cumulative expenditure on educational institutions per student over the average duration of higher education (2002)**

Equivalent US dollars converted using PPPs



Note: Each segment of the bar represents the annual expenditure on educational institutions per student. The number of segments represents the number of years a student remains on average in higher education.

Source: OECD, *Education at a Glance 2005*, Table B1.3.

17. Expenditure on educational institutions as percentage of GDP

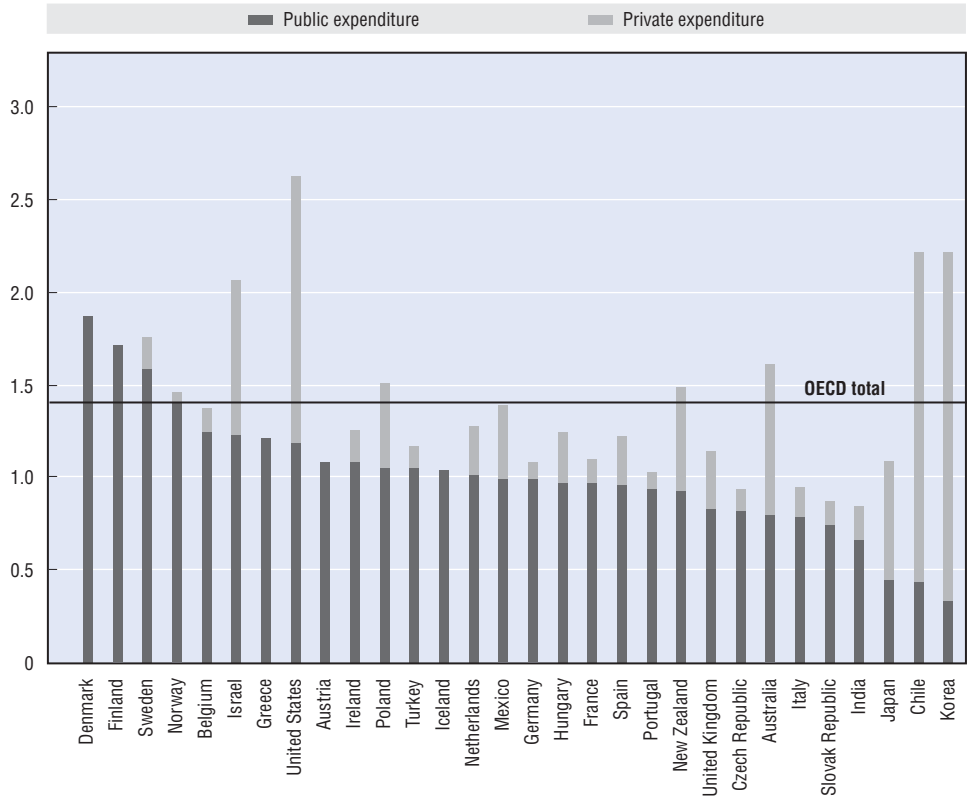
Expenditure on education is an investment that can help to foster economic growth, enhance productivity, contribute to personal and social development, and reduce social inequality. Relative to gross domestic product, expenditure on education shows the priority given to education in a country in terms of allocating its overall resources. The proportion of total financial resources devoted to education is one of the key choices made in each OECD country; this is an aggregate choice made by government, enterprise and individual students and their families.

All OECD countries invest a substantial proportion of national resources in education. Taking into account both public and private sources of funds, OECD countries as a whole spend 6.1% of their collective GDP on their educational institutions at the pre-primary, primary, secondary and higher education levels.

More than one-quarter of combined OECD expenditure on educational institutions is accounted for by higher education. At this level of education, pathways available to students, programme durations and the organisation of teaching vary greatly between OECD countries, which leads to greater differences in the level of expenditure allocated to higher education. Korea and the United States spend 2.2 and 2.6%, respectively, of their GDP on higher education institutions and these two countries are also those with the highest proportion of private expenditure at the level of higher education. Australia, Denmark, Finland and Sweden also show high spending levels, with 1.6% or more of GDP devoted to higher education institutions. On the other hand, France, Iceland, Mexico, Portugal, Switzerland and the United Kingdom spend slightly below the average proportion of GDP on higher education institutions but are among the OECD countries with the highest proportion of GDP spent on primary, secondary and post-secondary non-tertiary education.

Figure 1.16. **Investment in higher education**

Expenditure on higher education institutions as a percentage of GDP (2002)



Source: OECD, *Education at a Glance* 2005, Table B2.1b.

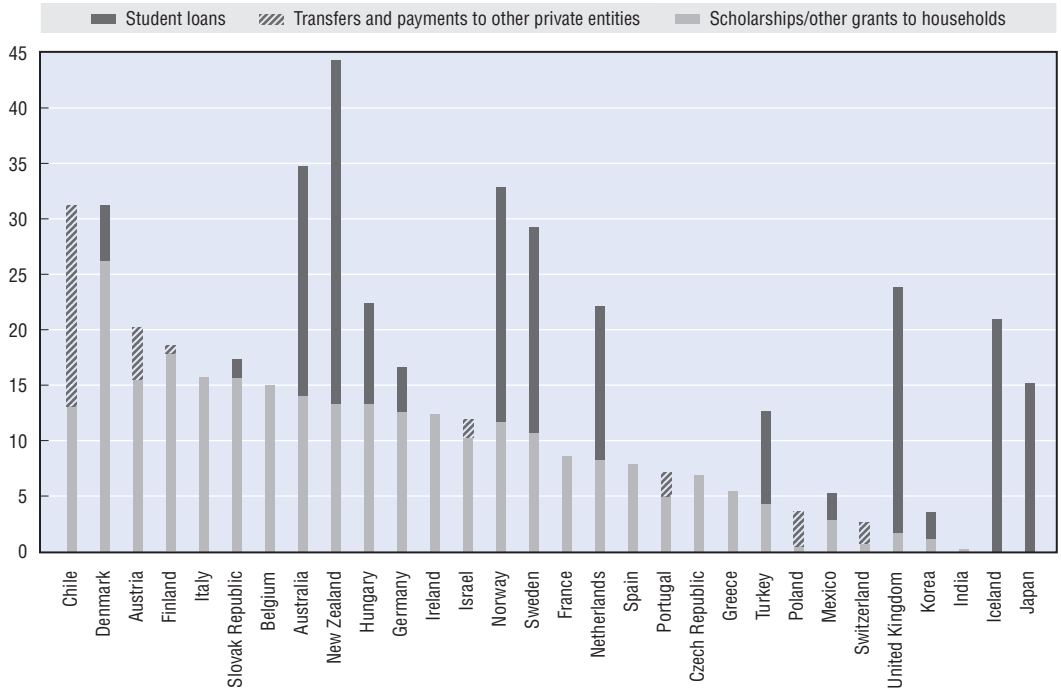
18. Public subsidies in higher education

Subsidies to students and their families are policy levers through which governments can encourage participation in education, particularly among students from low-income families, by covering part of the cost of education and related expenses. Governments can thereby seek to address issues of access and equality of opportunity. The success of such subsidies must therefore be judged, at least in part, through examination of indicators of participation, retention and completion. Furthermore, public subsidies play an important role in indirectly financing educational institutions.

This figure shows different forms of public subsidies for education to households and other private entities as a percentage of total public expenditure on education, by type of subsidy and considers whether financial subsidies for households are provided in the form of grants or loans. An average of 17% of public spending on higher education is devoted to supporting students, households and other private entities. In Australia, Denmark, New Zealand, Norway and Sweden, public subsidies account for about 29% or more of public higher education budgets. Twelve out of 27 reporting OECD countries rely exclusively on grants or scholarships and transfers and payments to other private entities at the level of higher education. The remaining OECD countries provide both grants or scholarships and loans to students (except Iceland, which relies only on students loans). In general, the highest subsidies to students are provided by those OECD countries offering student loans; in most cases these countries spend an above-average proportion of their budgets on grants and scholarships alone.

Figure 1.17. **Public subsidies for education in higher education (2002)**

Percentage of total public expenditure on education

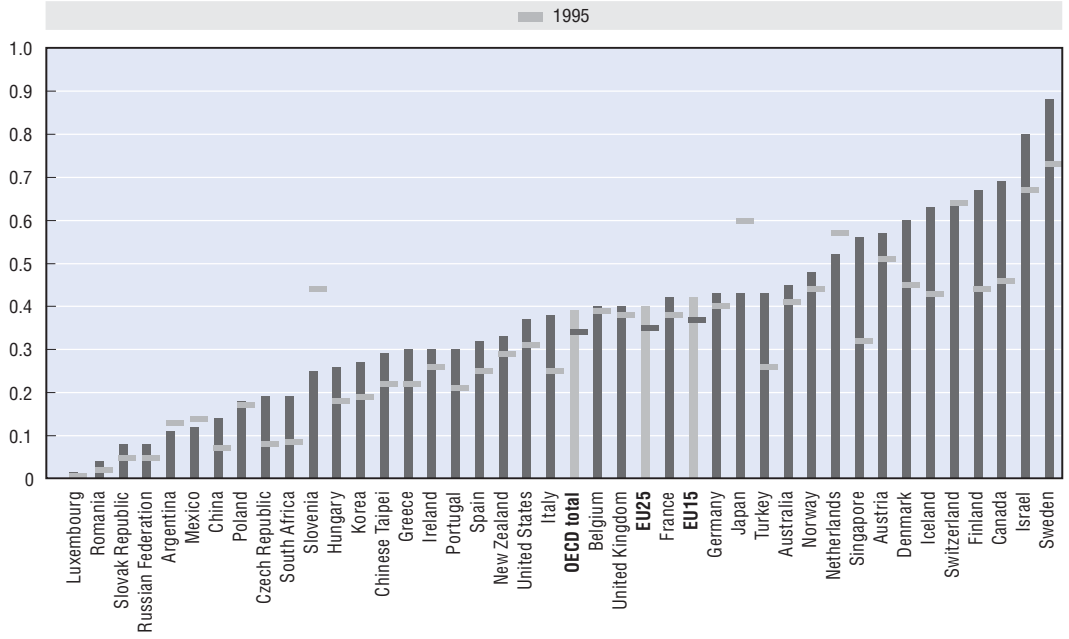


Source: OECD, *Education at a Glance 2005*, Table B5.2.

19. Research and development in higher education

Higher education institutions make a growing contribution to research and development (R&D) in OECD countries. For the OECD as whole, their R&D spending as a percentage of GDP increased from 0.34% of GDP in 1995 to 0.39% of GDP in 2003. The largest increases in R&D spending by higher education institutions occurred in Canada, Finland and Iceland. R&D spending by higher education institutions as a percentage of GDP declined in Mexico and the Netherlands over this period. Sweden has the highest ratio of higher education R&D to GDP in the OECD area, at almost 0.9% in 2003, followed by Canada, Finland, Switzerland, Iceland and Denmark. Luxembourg had the lowest ratio in 2003, which was also the year it established its university. Other OECD countries with low R&D spending by higher education institutions are the Slovak Republic, Mexico and Poland. Most large OECD countries, including the United States, Japan, Germany, France, Italy and the United Kingdom, devote between 0.35 and 0.45% of GDP on R&D in higher education institutions. In several non-member economies, including China and South Africa, higher education R&D also increased substantially over the past decade.

Figure 1.18. **Higher education expenditure on R&D as a percentage of GDP, 1995 and 2003**



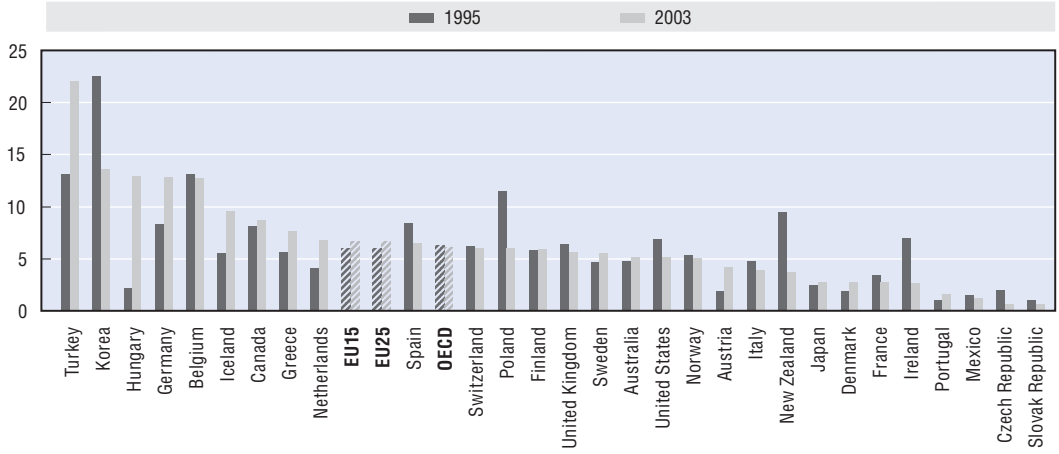
Source: OECD, *Main Science and Technology Indicators*, 2005-2, November 2005.

20. Higher education R&D financed by industry

Co-operation among actors in science and innovation systems takes many forms and is often difficult to quantify. Direct financial flows for R&D between government and the business enterprise sector are one way to track such linkages. Likewise, business funds a growing share of the R&D performed in the higher education and government sectors, averaging 6.1% in 2003 in the OECD area (and 6.5% in the EU25). In spite of increases in many countries, these flows still represent less than 7% in most large OECD economies, Germany being an important exception, with almost 13% of higher education R&D being financed by the business sector. Turkey had the highest share of higher education R&D financed by the business sector in 2003, at 22%. In the Czech Republic and the Slovak Republic, hardly any research in the higher education sector was financed by the business sector.

Figure 1.19. **Percentage of higher education R&D financed by industry 1995-2003**

As a percentage of total higher education R&D



Source: OECD, *Main Science and Technology Indicators*, 2005-2, November 2005.

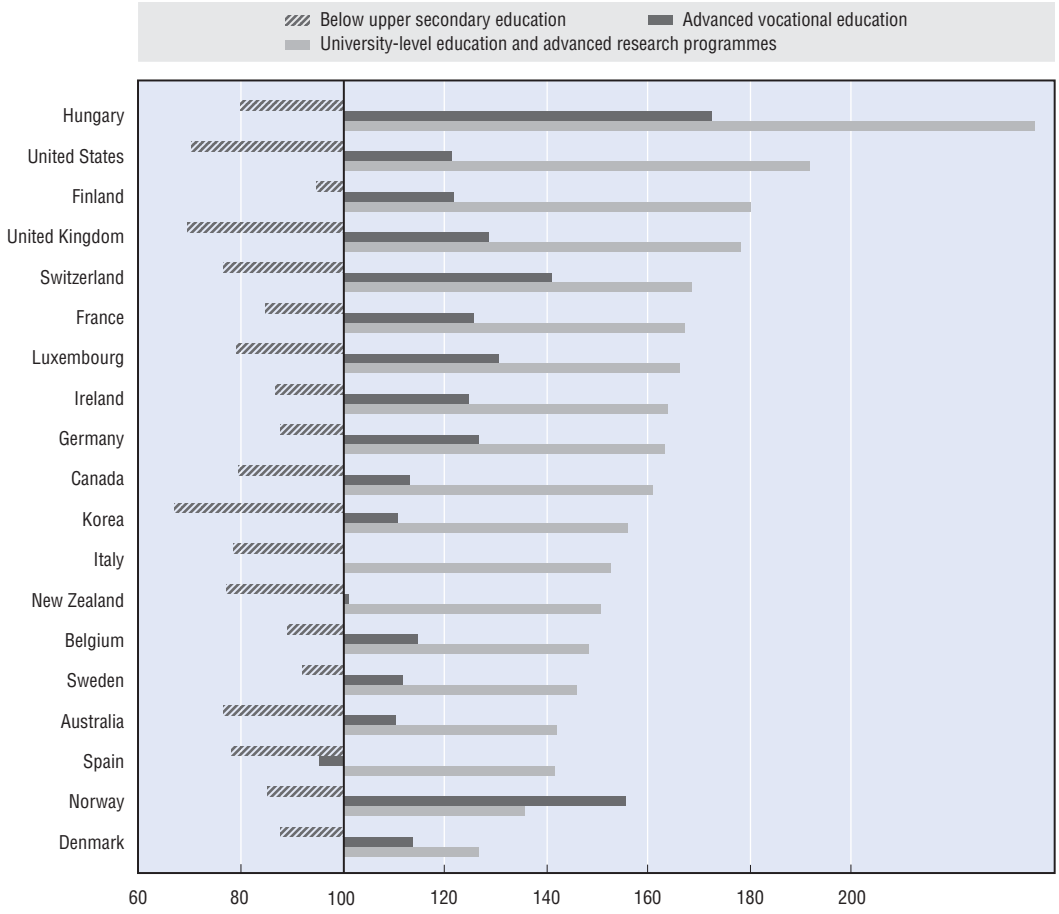
The Returns on Higher Education

21. Education and earnings

One way in which markets provide incentives for individuals to develop and maintain appropriate levels of skills is through wage differentials, in particular through the enhanced earnings accorded to persons with higher levels of education. The pursuit of higher levels of education can also be viewed as an investment in human capital. Human capital includes the stock of skills that individuals maintain or develop, usually through education or training that produces an economic return in the form of earnings in the labour market. The higher the earnings that result from increases in human capital, the higher the returns on that investment and the premium paid for enhanced skills and/or for higher productivity.

Figure 1.20. **The earnings advantage of education**

Relative earnings of 25-64-year-olds with income from employment (upper secondary education = 100)



Source: OECD, *Education at a Glance 2005*, Table A9.1a.

This figure shows a strong positive relationship between educational attainment and average earnings. In all countries, graduates of higher education earn substantially more than upper secondary and post-secondary non-tertiary graduates. Earnings differentials between those who have higher education and those who have upper secondary education are generally more pronounced than the differentials between upper secondary and lower secondary or below, suggesting that in many countries upper secondary (and with a small number of exceptions, post-secondary non-tertiary) education forms a break-point beyond which additional education attracts a particularly high premium.

22. Differences in earnings between females and males

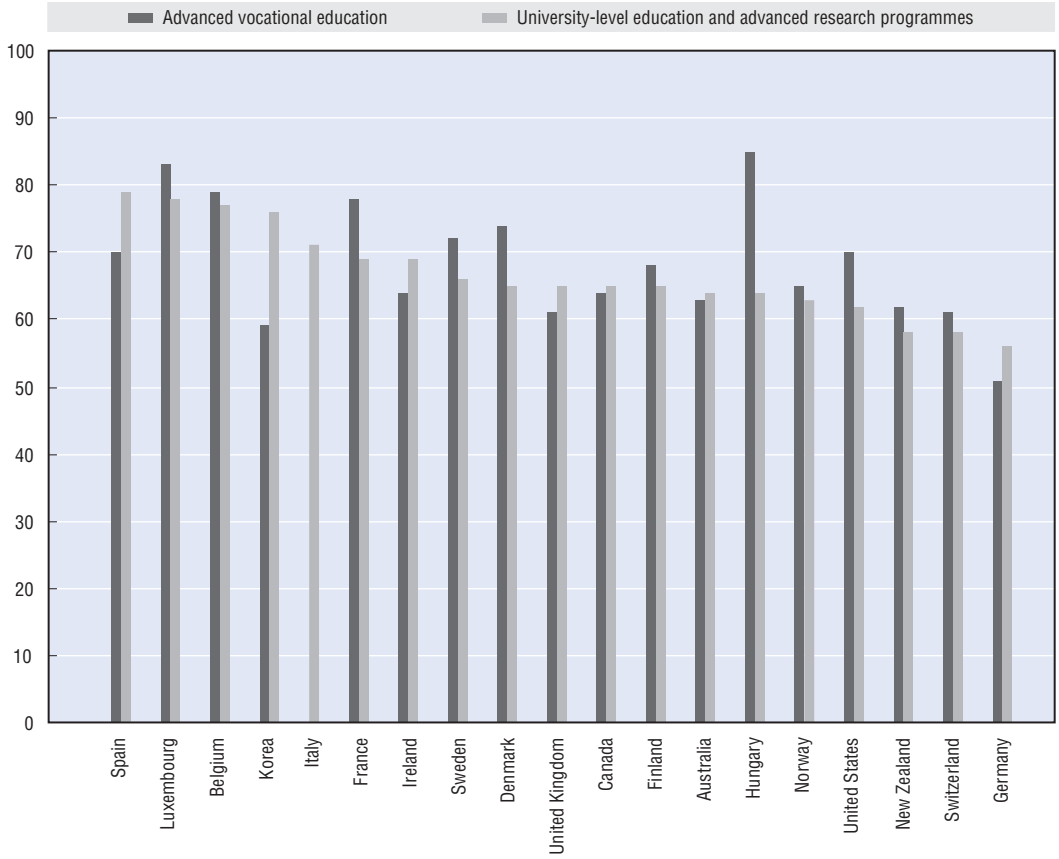
Although both males and females with upper secondary, post-secondary non-tertiary or higher education attainment have substantial earnings advantages compared with those of the same gender who do not complete upper secondary education, earnings differentials between males and females with the same educational attainment remain substantial

Females still earn less than males with similar levels of educational attainment. For a given level of educational attainment, women typically earn between 60 and 80% of what men earn. When all levels of education are taken together (*i.e.* total earnings are divided by the total number of income earners, by gender), the earnings of females between the ages of 30 and 44 range from 50% of those of males in Switzerland to 86% of those of males in both Hungary and Luxembourg.

The gap in earnings between males and females may be explained in part by different choices of career and occupation, differences in the amount of time that males and females spend in the labour force, and the relatively high incidence of part-time work among females (part-time employment is excluded in Belgium, Hungary, Luxembourg and the United States).

Figure 1.21. **Differences in earnings between females and males in higher education**

Average annual earnings of females as a percentage of males by level of educational attainment of 30-to-44-year-olds



Source: OECD, *Education at a Glance* 2005, Table A9.1b.

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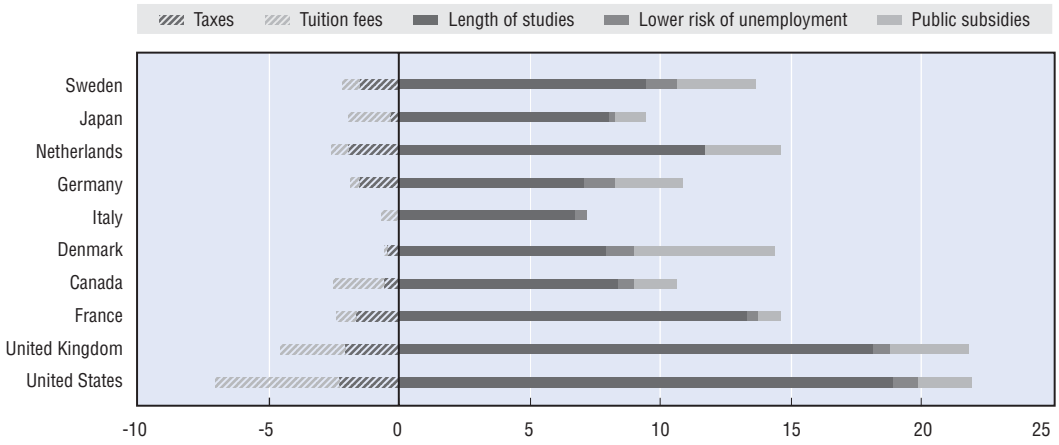
23. Private internal rate of return of higher education

The rate of return represents a measure of the returns obtained, over time, relative to the cost of the initial investment in education. It is expressed as a percentage and is analogous to percentage returns from investing in a savings account. In its most comprehensive form, the costs equal tuition fees, plus foregone earnings net of taxes adjusted for the probability of being in employment, minus the resources made available to students in the form of grants and loans. The benefits are the gains in post-tax earnings adjusted for higher employment probability minus the repayment, if any, of public support during the period of study. The calculations assume that the student is in full-time education and has no work activity, and hence no earnings while studying. The calculated rates of return are, however, likely to be biased upwards as unemployment, retirement and early retirement benefits are not taken into account. The rate of return calculations reported in this indicator do not take into account the non-monetary benefits of education.

For studies in higher education, three groups of countries can be identified depending on the estimated values of the internal rate of return, which includes the combined effect of earnings, length of studies, taxation, unemployment risk, tuition fees and public student support. First, with its very high rewards from higher education, the United Kingdom is in a group of its own. Second, Denmark, France, the Netherlands, Sweden and the United States have relatively high internal rates of return, ranging from 10 to 15%. Third, in the remaining countries, rates are below 10%, with the lowest rates recorded for Italy and Japan.

Figure 1.22. **The returns of high-level qualifications**

Private internal rates of return (RoR) for an individual obtaining a higher-education degree (ISCED 5/6) from an upper secondary and post-secondary non-tertiary level of education (ISCED 3/4), MALES



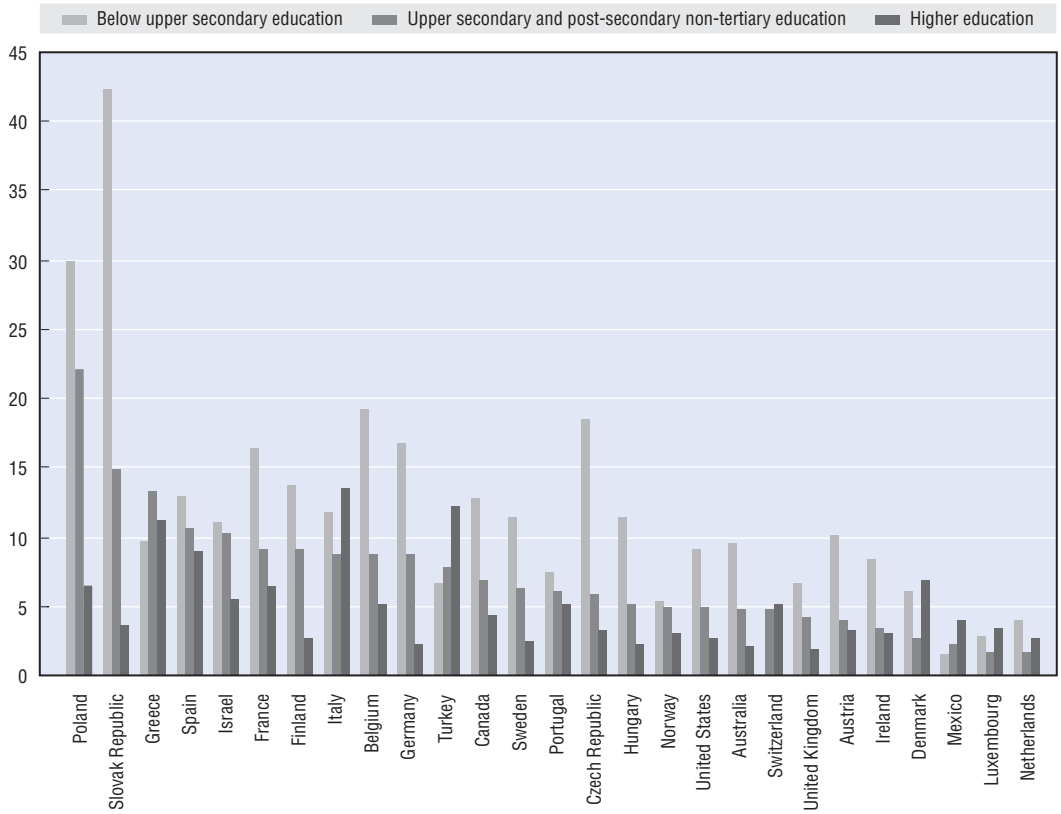
Source: OECD, *Education at a Glance 2003*, Table A14.3.

24. Education and work status (25-to-29-year-olds)

All OECD countries are experiencing rapid social and economic changes that are making the transition to working life more uncertain. In some OECD countries, education and work largely occur consecutively, while in other OECD countries they may be concurrent. The ways in which education and work are combined can significantly affect the transition process. Of particular interest, for example, is the extent to which working while studying (beyond the usual summer jobs for students), may facilitate entry into the labour force. It is also important to consider whether students who work many hours while studying may be more likely to drop out of education, and to examine if working and studying simultaneously contributes to a successful transition to the labour market.

The height of the bars in this figure indicates the percentage of the age group not in education and unemployed for each level of attainment. At the end of the transition period, between the ages of 25 and 29, when most young people have finished studying, differences in access to employment are linked to the education level attained. Not attaining an upper secondary qualification is clearly a serious handicap. Conversely, higher education offers a premium for most job seekers. In 16 OECD countries, for upper secondary graduates aged 25 to 29, the ratio of persons not in education and unemployed to the total youth population is above 5%. In a few OECD countries, even young people who have completed higher education studies are subject to considerable unemployment risk when they enter the labour market.

Figure 1.23. **Share of the 25-to-29-year-olds who are unemployed and not in education, by level of educational attainment (2003)**



Source: OECD, *Education at a Glance 2005*, Table C4.3.

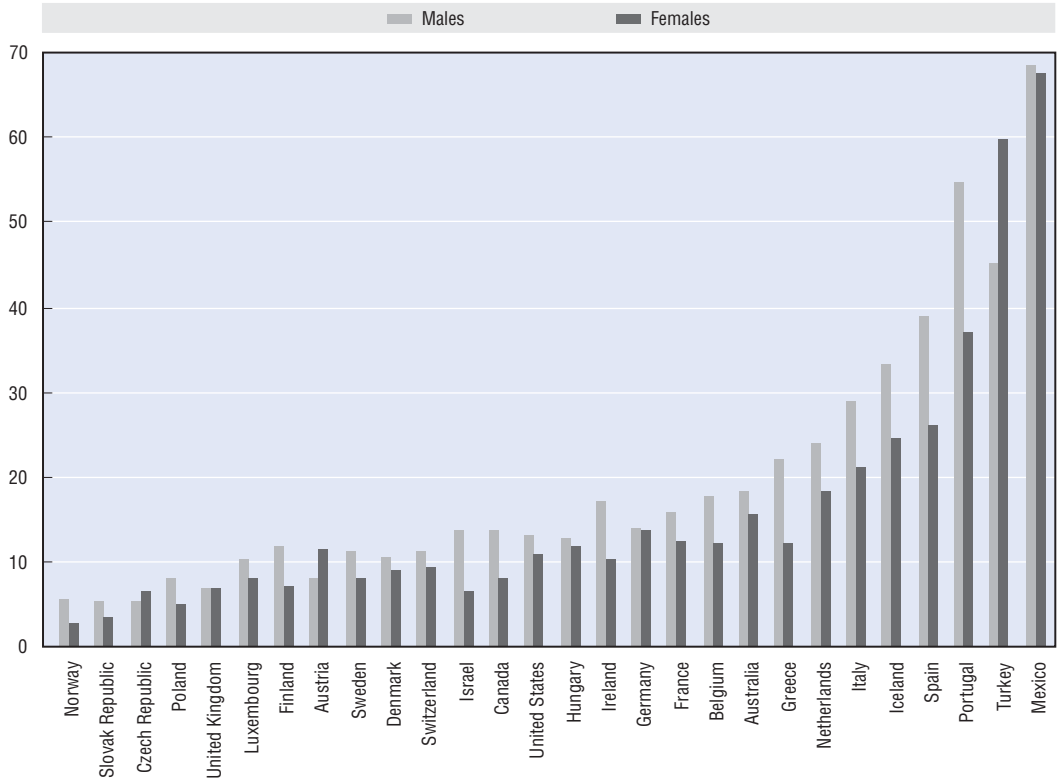
25. Situation of the youth population with low levels of education (20-to-24-year-olds)

As the importance of education for economic success and general well-being grows, providing effective educational careers for young people and ensuring successful transitions from initial education to working life become major policy concerns. Rising skill demands in OECD countries have made upper secondary diplomas a minimum requirement for successful entry into the labour market and a basis for further participation in lifelong learning. Young people with lower qualifications run a higher risk of long-term unemployment or unstable or unfulfilling employment, which can have additional consequences, such as social exclusion.

This figure shows the share of 20-to-24-year olds – employed, unemployed or not in the labour force – who have not attained upper secondary education and who are no longer in education. Across 27 OECD countries, an average of 18% of 20-to-24-year-olds are without upper secondary education and not in education. In Austria, the Czech Republic, Norway, Poland, the Slovak Republic and the United Kingdom, the proportion of young people aged 20 to 24 no longer in education and without upper secondary education remains under 10%. The problem affects more males than females in 22 out of 27 countries, including Greece, Iceland, Ireland, Italy, Portugal and Spain. The reverse is true in Austria, Czech Republic and Turkey. Differences according to gender remain small in the other countries.

Figure 1.24. **The situation of the youth population with low levels of education (2003)**

Share of 20-to-24-year-olds who have not attained upper secondary education and who are no longer in education



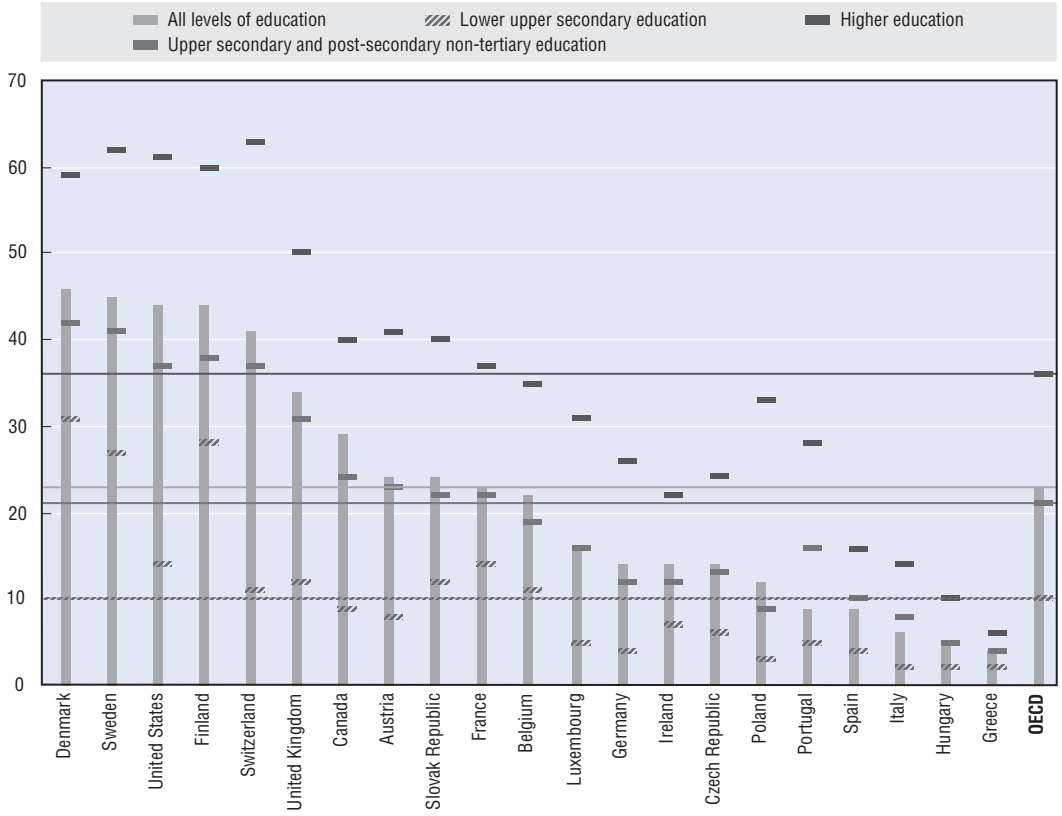
Source: OECD, *Education at a Glance 2005*, Table C5.1.

26. Participation in continuing education and training (25-to-64-year-olds)

Participation in continuing education and training is increasing due to new and increasingly complex work tasks and because of job mobility. It is more common in large firms, the public sector and in sectors such as business services, banking or finance and is usually provided to full-time or more established workers in a firm. Though it is generally equally accessible to women as to men, such training is more prevalent for management and senior posts than for non-executive or unskilled jobs and occurs more often for young and mid-aged workers than for older workers. It is likely to increase in line with the level of initial qualifications: training leads to training.

Some characteristics refer to features of employment; others relate more to individuals. The most striking and common feature is that adult education and training increases in line with the level of initial qualifications. The participation rate varies considerably according to prior levels of educational attainments. In other words, all countries share inequalities in access to adult learning. On average for the OECD countries surveyed, participation in adult non-formal continuing education and training is almost 26 percentage points higher for individuals who have completed higher education than for persons who have only attained a lower upper secondary education. A greater understanding of the underlying causes of this participation differential by initial education could assist with strategies for promoting lifelong learning among the less qualified.

Figure 1.25. **Participation rate in non-formal job-related continuing education and training for the labour force 25-to-64 years of age, by level of educational attainment (2003)**



Source: OECD, *Education at a Glance 2005*, Table C6.2.

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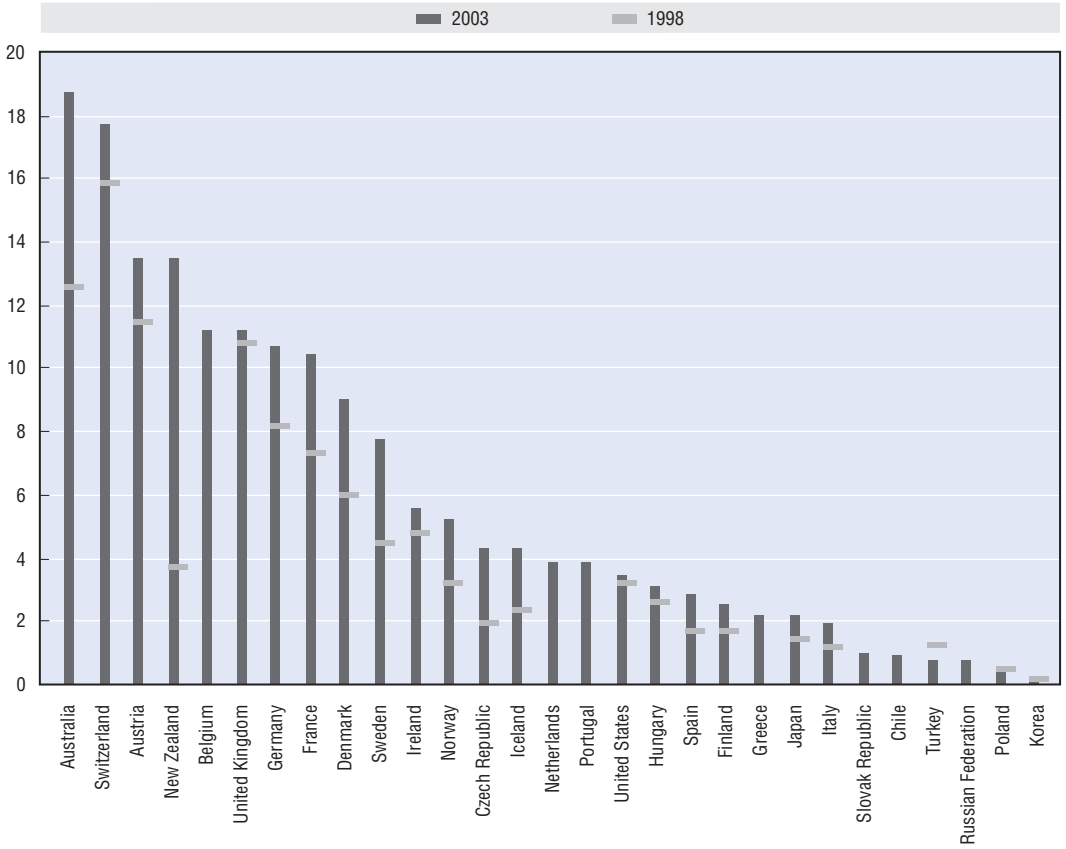
Internationalisation of Higher Education

27. Foreign students in higher education

The general trend towards freely circulating capital, goods and services coupled with changes in the openness of labour markets has increased the demand for new kinds of educational provision in OECD countries. Governments as well as individuals are looking increasingly to higher education to play a role in broadening the horizons of students and allowing them to develop a deeper understanding of the multiplicity of languages, cultures and business methods in the world. One way for students to expand their knowledge of other societies and languages and hence to leverage their labour market prospects is to

Figure 1.26. **Percentage of foreign students in higher education (1998, 2003)**

Percentage of foreign students to total enrolment in higher education



Source: OECD, *Education at a Glance 2005*, Table C3.1.

study in higher education institutions in countries other than their own. Indeed, several OECD governments have set up schemes and policies to promote such mobility, especially so in the EU.

In 2003, 2.12 million students were enrolled in higher education outside their country of origin, of which 1.98 million (or 93%) studied in the OECD area. According to available data, this represented an 11.5% increase in total foreign enrolments since the previous year – or 219 000 additional individuals in absolute numbers.

Overall the number of foreign students enrolled higher education in OECD and partner countries reporting data to the OECD increased by 31% in the first three years of the new millennium. Looking only at the OECD countries allows comparisons over a longer time span, and identification of trends over the past five years. Since 1998, the absolute number of foreign students reported in the OECD area has increased by nearly 50%, which amounts to an 8.3% annual increase on average.

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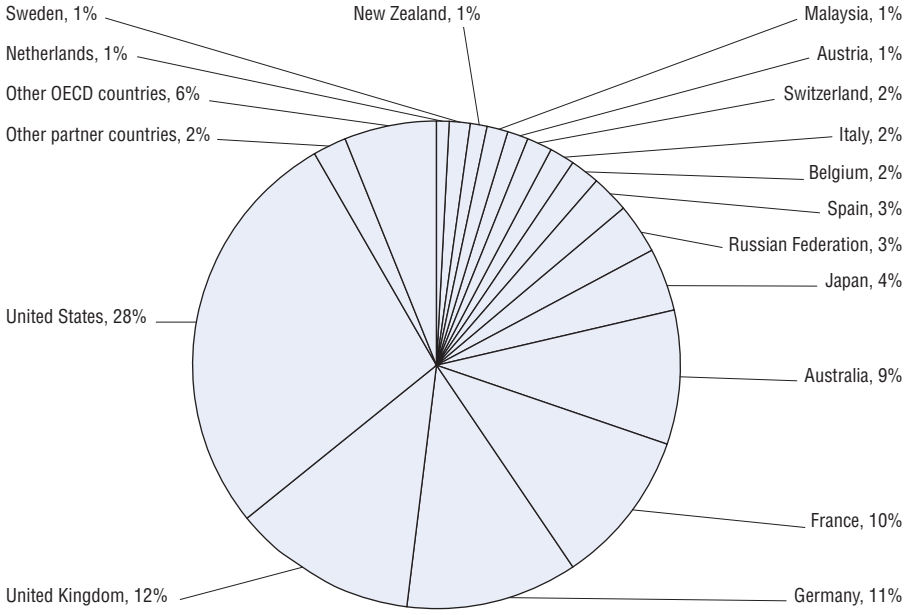
28. Foreign students in higher education by country of destination

In 2003, as in previous years, seven out of ten foreign students are attracted to a relatively small number of destinations. Indeed, only five countries enrol the vast majority of foreign students studying in the OECD area and in other partner countries reporting such data. The United States receives the most foreign students (in absolute terms) with 28% of the total of all foreign students, followed by the United Kingdom (12%), Germany (11%), France (10%) and Australia (9%). Altogether, these five major destinations account for 70% of all students pursuing their studies in higher education institutions abroad.

Besides these five major destinations, significant numbers of foreign students are also attracted to Japan (4%), the Russian Federation (3%) and Spain (3%) to pursue their studies. Among other destinations, Malaysia is also playing an increasing role in international education, with rapidly growing numbers of foreign students, mainly from China, India and neighbouring Asian countries (including Oman).

Figure 1.27. **Borderless education: where international students go**

Percentage of foreign students in higher education reported to the OECD who are enrolled in each country of destination



Source: OECD, *Education at a Glance 2005*, Table C3.7.

29. Migration of the highly educated

The figure compares the number of foreign-born persons with higher education (ISCED levels 5A, 5B and 6) living in or from OECD countries as a percentage of the total number of similarly-qualified residents.

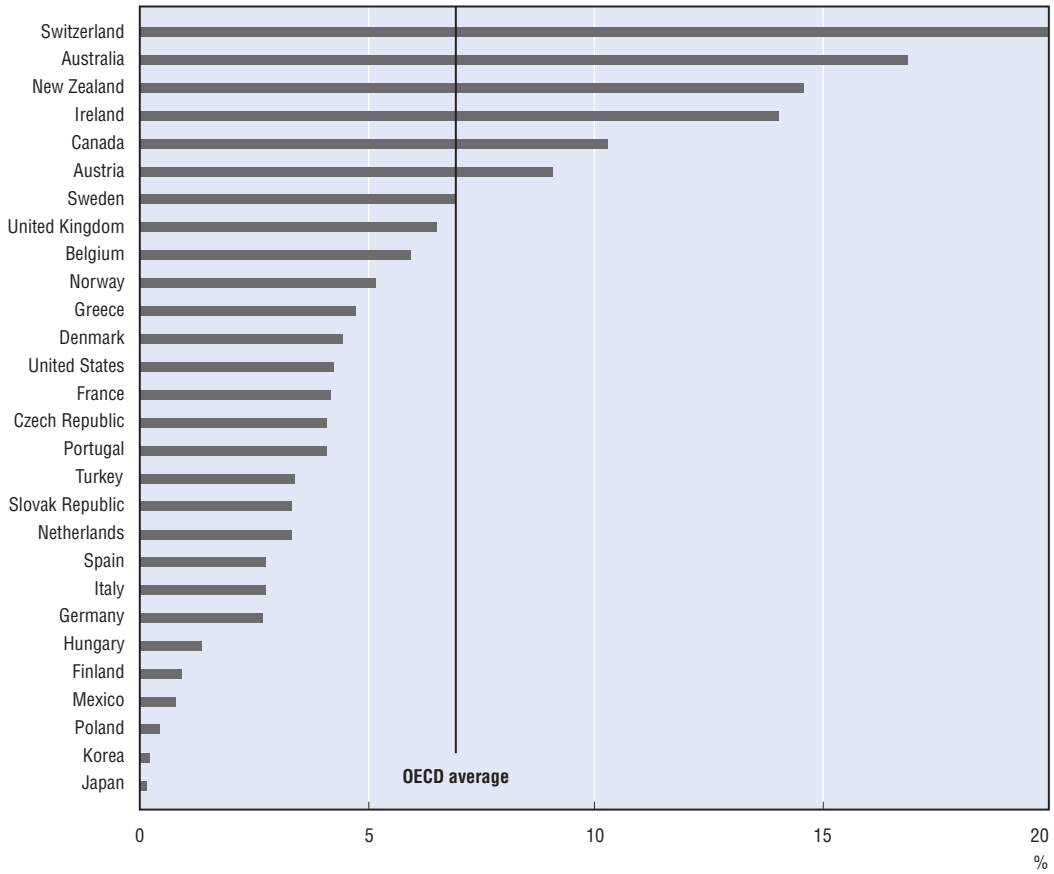
In the total OECD area, about 4% of persons with higher education are immigrants from other OECD countries. Those from non-OECD countries account for about 6% of all current residents with higher attainment. Many OECD countries "gain" more than they "lose" from migration of the highly educated. The proportions are highest in the traditional "settlement" countries of Australia, Canada and the United States, but also in Luxembourg and Switzerland. Other countries with a large excess include Sweden and France (8-9%).

On the other hand, countries having a large percentage of highly-educated former residents living in other OECD countries include Ireland and New Zealand (at close to 25%); Austria, Switzerland, the United Kingdom, Luxembourg, Poland, Portugal and the Slovak Republic (all at more than 10%); and the Czech Republic, Germany and the Netherlands (at close to 9%).

Several countries have close to zero net movements overall, essentially because they gain as many as they lose to within-OECD migration (Austria, United Kingdom, Italy, Netherlands, New Zealand) or they do not show many movements in general (Japan and Korea).

Figure 1.28. **Foreign-born persons with higher education**

As a percentage of all residents with higher education, circa 2000



Source: OECD Factbook 2006: Economic, Environmental and Social Statistics.

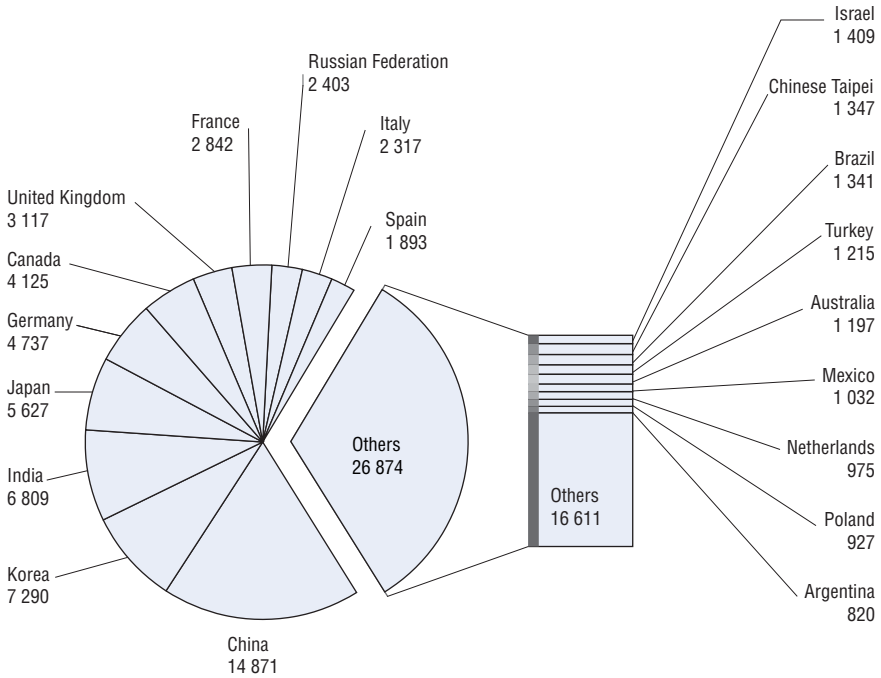
30. Foreign scholars in the United States

The presence of foreign scholars in US higher education institutions is an indicator of the international attractiveness of the country's universities and of opportunities for researchers in the United States. In 2003/04, US higher education institutions hosted 82 900 foreign scholars to conduct teaching or research activities. Most of these scholars were engaged in research activities, although the share for whom teaching or non-research activities are the primary function has increased over the past decade. Two-thirds are in scientific or engineering fields, with a fast-growing proportion involved in life and biological sciences. Just 20 countries account for 80% of foreign scholars in the United States. Almost one in two was from a non-OECD country and a quarter came from the European Union. China was the first country of origin and Asia the most important region. Around 18% of non-US scholars were Chinese; around 8% were Korean or Indian and more than 6% Japanese. The four major European countries (Germany, France, United Kingdom and Italy) and Spain each provided between 2% and 6% of foreign academic staff. In addition, Canada and the Russian Federation accounted for 5% and almost 3% of the total, respectively.

Scholarly mobility compared to the size of the local academic population varies across countries. For most OECD countries, two to four scholars hold positions in US universities per 100 working at home. Academic mobility is most significant from Korea (13), Russian Federation (8) and Chinese Taipei (6). Expansion of the population of foreign scholars has been driven by a massive and sustained arrival of Asian academics. Although a large number of Asian academics already worked in US universities in the mid-1990s, the number of scholars from Korea, India and China has kept growing at average annual rates of 9%, 6% and 4%, respectively. Academic mobility from Turkey (7.7%) and the Russian Federation (6.6%) has also increased. However, mobility from European countries has slowed. The number of scholars originating from Finland, Hungary and Iceland decreased by more than 2.5% annually between 1995 and 2004. Although most foreign scholars are still men, women are more numerous than in the past; in 2003/04 female academics accounted for a third of total foreign scholars in the United States.

Figure 1.29. **Foreign scholars in the United States**

82 905 foreign scholars working in the United States academia in 2003/04



Source: OECD, based on Institute of International Education (IIE), April 2005.

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Chapter 2

The Internationalisation of Higher Education: Towards an Explicit Policy

Summary

Only twenty years ago, countries often saw student mobility as a way of reaching out to the world, hoping thereby to create elite international networks. Universities welcomed international students but rarely went out of their way to recruit them. Today, cross-border education is more often perceived as a lever for economic development. Between 1998 and 2004, the number of foreign students in the OECD area rose by 70% to reach 2.3 million students. Increased competition between countries and between institutions to attract foreign students and academics, as well as the emergence of new forms of cross-border education, represent a new context for policy. In addition, the benefits, particularly economic benefits arising from cross-border education, appear to have growing importance. This chapter looks at policies for the internationalisation of higher education, taking into account this new context and objectives.

Cross-border higher education provides countries with real educational, cultural, policy and economic opportunities. To take advantage of these, countries need to define an approach adapted to their situation and objectives, in a perspective that goes beyond the field of education alone. Policy on this needs to be linked to economic and social policies, since it requires policy instruments that lie outside the direct responsibility of the field of education, including visa and trade policies.

Four main approaches to cross-border higher education are identified. The *mutual understanding approach* mainly emphasises political, cultural, academic and development assistance goals. The *skilled migration approach* encompasses the goals of the mutual understanding approach, but also involves a more active and targeted approach to the recruitment of foreign students. It aims to attract talented students (and academics) to work in the host country's economy or to help make its higher education and research sectors more competitive. The *revenue-generating approach* incorporates the goals of the mutual understanding and skilled migration approaches, but it also has directly commercial objectives. Under this approach, international students pay the full cost of their education, generally without public subsidies. The *capacity-building approach* encourages the use of imported higher education, however delivered, as a relatively quick way to build an emerging country's capacity. Not all these approaches are equally within the reach of all countries, and each raises its own problems. The objective is not simply to promote export of education services. As several Asian and Middle Eastern countries have shown, importing educational services can be just as beneficial as exporting them.

The chapter raises many challenging policy questions. How can cross-border higher education equitably benefit both developed and developing countries? Although it can help the latter to build their economic and educational capacities, it could also lead to a brain drain and reduced assistance to post-secondary education. And what is the impact of cross-border education on national higher education systems and countries' education policies in the fields of access, quality and public financing? What position should be adopted in non-English speaking countries regarding English as the language of instruction?

The Internationalisation of Higher Education: Towards an Explicit Policy

1. Introduction

In the 1990s, there was a sharp increase in cross-border higher education – that is, the international mobility of students and teachers, educational programmes and higher education institutions (Knight, 2004). The number of foreign students in the OECD area rose by 70% between 1998 and 2004, at a rate of 14% a year on average, to reach 2.3 million students. The mobility of students alone can be estimated to have been worth more than 40 billion USD in export income in 2004, only a little less than the export income generated by financial services.[1] Flows of academics into the United States increased by 49% between 1994 and 2005, to reach 89 600 in 2005 (IIE, 2005). The intra-European mobility of academics under the Socrates programme grew by 71% between 1997 and 2000, to reach some 12 000 persons in 2000 (OECD, 2004a).

Only twenty years ago, the objectives of cross-border education related essentially to politics, geo-strategy, culture and development assistance. Countries saw mobility as a way of reaching out to the world, hoping thereby to create elite international networks. Universities welcomed international students but rarely went out of their way to recruit them. Today, cross-border education is perceived as a lever for economic development. Educational institutions see it as a competitive advantage. There is thus a need to reconsider policies for the internationalisation of higher education, taking into account this new context and these new objectives. The internationalisation of higher education takes place in a policy context which goes beyond education. The instruments and mechanisms to support and regulate it need to take account of this. Their effectiveness is therefore highly dependent on clarity of objectives and the degree of co-ordination with policies in other fields. Adopting this wider perspective on cross-border higher education helps to understand how strategies for importing education services can be just as beneficial as export strategies.[2] It also makes it easier to understand the dilemmas posed by cross-border education.

The main trends in cross-border education and the challenges involved are analysed in two OECD publications (2004a and 2004b): *Internationalisation and Trade in Higher Education* and *Quality and Recognition in Higher Education: The Cross-border Challenge*. On the basis of the latest policy developments and most recent data available, this chapter aims to demonstrate that it is important for countries to rethink their policies on internationalisation of higher education as well as the variety of considerations to be taken into account for this purpose. The effectiveness of policies on internationalisation of higher education is highly dependent on their co-ordination with national economic, social and cultural development policies.

Section 2 explains why the definition of an internationalisation policy has become so important today. Section 3 shows how the effectiveness of such a policy depends on the harmonisation of policy instruments outside the normal field of education, ranging from

migration policies to trade policies. Section 4 then sets out four major internationalisation strategies with the aim of promoting both the export and the import of education services. The final section before the conclusion describes some issues and dilemmas arising from recent developments in cross-border higher education.

2. Why the need for an internationalisation policy?

There are two main reasons for renewed emphasis on policies for the internationalisation of higher education. First of all, increased competition between countries and between institutions to attract foreign students and academics, as well as the emergence of new forms of cross-border education, represent a new context for such policies. Secondly, the benefits, particularly economic benefits arising from cross-border education, appear to have growing importance.

2.1. A change of context

Cross-border education is growing in part for reasons which have little to do with education policies. The fall in the cost of transport and communications, the globalisation of economies and of the labour market, and the unmet demand for higher education in some emerging countries, particularly in Asia, all go some way to explaining this growth. The demand for cross-border education has increased as a result of the birth of a middle class in certain emerging economies, of students' desire for international experience and of increased ease of international mobility. In response to this increased demand, and other factors such as decreasing public funding per domestic student in some countries, the supply of cross-border education has also grown.

However, apart from this increase in supply and demand, the policy adopted by certain countries (or institutions) to attract a greater number of foreign students has led to a new form of international competition. In this new context, countries cannot be sure that the old internationalisation policies will be as effective as in the past. To either improve or maintain their current capacity to receive foreign students, countries today must formulate their strategy for internationalisation of higher education in this context of increased competition.

Previously, cross-border education was basically limited to student mobility. Today, the field has become much more complex with the many forms of cross-border education that do not involve student mobility; over the last ten years, there has been a significant trend of increasing mobility of programmes and educational institutions. In Singapore, for example, today there are more undergraduate students following foreign programmes in their own country than Singaporean students studying abroad at this level. In Hong Kong, China, in 2001, there were 150 foreign educational institutions and 40 foreign professional organisations offering 645 programmes, either on their own or in partnership with local actors (Olsen, 2002). Half of these foreign diplomas were issued by the United Kingdom, one third by Australia and the rest by other countries, including the United States. Lastly, China reports a nine-fold increase, between 1995 and 2003, in foreign programmes (which always have to be offered in co-operation with local institutions). At the beginning of 2003, 37% of these 712 programmes were courses at post-secondary and higher levels that led to a diploma. Offshore campuses are beginning to open there under new arrangements, with infrastructure construction financed entirely by Chinese capital. This is the case, for example, of the Chinese campus of the University of Nottingham (England) which opened in September 2004 (and the University has another campus in Malaysia). Countries' regulatory frameworks are not always well suited to hosting foreign educational programmes or institutions on their territory. Often there is no

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provision either for the establishment abroad of their own public higher education institutions or for exporting their educational programmes. Furthermore, policies formulated when foreign students were a small proportion of the student population are not necessarily suitable when this proportion increases (whether within certain institutions or in the sector as a whole).

2.2. Increased benefits for countries

Apart from this new context, the most important reason why countries should look again at their policies in this area remains, naturally, the benefits they hope to gain from the internationalisation of higher education in an era of globalisation.

What benefits are we talking about? First, as before, cultural, political and geo-strategic advantages: internationalisation helps countries to know and understand each other better, and forges links between nations. With globalisation, such benefits are even more likely to materialise.

Second, professionalisation and globalisation of science and research also make the internationalisation of higher education very important at the academic level. Participating in international knowledge networks helps improve the quality of higher education systems through more rapid dissemination of new knowledge and, in some cases, better training for future academics and researchers. In ageing societies, or when domestic students show less interest in certain subjects, cross-border education can also help ensure a varied range of course offerings and maintain higher education capacity. In the United States and the United Kingdom for example, the declining interest shown by domestic students in science and engineering is offset by the high enrolment of foreign students in these fields

Third, cross-border education can also have a positive impact on economic growth in various ways:

- By *increasing participation* in higher education when domestic higher education capacity is insufficient: In principle, the additional graduates will contribute to an increase in national productivity and growth – assuming the graduates stay in or return to their home country.
- By *attracting highly-skilled workers* to the economy: These are particularly important for the construction of a knowledge economy. Integration into international knowledge networks generally stimulates innovation at a national level and can, thereby, stimulate economic growth. Here again, the ageing of the population renders these requirements more important.
- By *generating export income*, *i.e.* foreign student expenditures in the host country and the sale abroad of education services: In Australia, education services rank third in the country's service exports (and fourteenth in its exports as a whole).

Fourth, cross-border education can be an effective form of development assistance, either by training students from developing countries or by offering technical assistance to the institutions of such countries.

In this new context of growth and diversification, it is important to rethink and to clarify the goals of participation in cross-border education. Whatever the goals a country decides to pursue in this field, the formulation of its policy for the internationalisation of higher education must necessarily take into account its cultural, social and geo-strategic objectives and, increasingly, its economic and academic objectives.

3. An effective internationalisation policy depends on co-ordinating several types of policy instruments

An effective internationalisation policy requires the co-ordination of different policy instruments which go well beyond traditional education policies. Ensuring the coherence of such a policy thus extends far beyond the usual scope of ministries of education and higher education institutions.

3.1. Education policy instruments

The most important education instruments in the field of cross-border higher education are as follows:

- *Mobility grants* for domestic and foreign students: These grants have increased in most countries but more slowly than the growth of international student mobility, which means that most student mobility is financed by students themselves and their families. Providing such grants facilitates international mobility and can make access to cross-border education more equitable.
- *Tuition fees* for foreign students: Are foreign students eligible for host-country public subsidies or do they have to pay the full market price for their studies? Although most OECD countries continue to subsidise foreign students, many countries are discussing the possibility of making them pay the real cost of their studies, as is the case in English-speaking countries and in the Netherlands (under the constraint, for EU member states, of charging nationals and foreign students from other EU members the same tuition fees). Denmark voted the introduction of (differential) tuition fees for non-EU foreign students in 2005, and Finland, Sweden and Norway are considering doing the same in a near future. Policies with regard to tuition fees vary depending on the objectives countries are pursuing. Differential tuition fees can be used to incite universities to recruit more foreign students, to generate income to help finance higher education in the host country, to attract Asian students, who are sometimes (culturally) suspicious of low-cost education, or can simply be construed as fiscal equity.
- *Access* to higher education: In the same way as they sometimes do for their own nationals, countries may introduce quotas for foreign students, particularly when their studies are subsidised by the host country.
- *Promotion abroad* of a country's national higher education system: Today, countries wishing to attract foreign students use international fairs to promote their education system. This, for example, is one of the roles of the German Academic Exchange Service (DAAD, Germany), Australia Education International and IDP Australia (Australia), EduFrance (France) and the British Council (United Kingdom).
- Encouraging *academic partnerships and participation in regional internationalisation programmes*: Forging links between institutions in different countries and partnerships of this type, actively promoted by the European Commission, have grown considerably in Europe; they facilitate the mobility of academics and students, and agreements for the mutual recognition of diplomas.
- If some *autonomy* is granted to public universities, notably in financial terms, this can help and indeed encourage public institutions to develop commercial activities abroad. Under such arrangements, as in Australia, New Zealand and the United Kingdom, governments usually prohibit such institutions from using public funds to finance their international commercial activities. In this way, the entrepreneurial risk remains entirely private.

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- *Quality assurance* and the *recognition of foreign diplomas*: These are two crucial aspects of educational policies to promote the mobility of students (and their return to their home country), and to regulate cross-border education programmes and institutions effectively. For some years, there has been a large increase in national and international endeavours in this respect. One of the objectives of the harmonisation of higher education systems in Europe under the Bologna Process is precisely to facilitate mobility and the recognition of foreign diplomas through, for example, credit transfer systems. Quality regulation is just as important for countries which import education services as for those which export them; the former need to protect their students from programmes of doubtful quality, while the latter are anxious to protect the reputation abroad of their national system (OECD, 1999, 2004a, 2004b).

3.2. Other policy instruments

But an effective internationalisation policy requires more than education policy instruments alone. Countries must co-ordinate this with their policies on immigration, trade and development assistance, as well as economic and social policies. Otherwise, the policy instruments relating to these other policy fields can come into conflict with the objectives of their policy on internationalisation of higher education.

Immigration policy

The policy on visas for students and academics, and immigration policy in general, are the most obvious example. Trying to attract foreign students only makes sense if they are allowed entry – ideally easy entry – in order to pursue their studies. If the policy is to attract foreign students and ask them to pay market-rate tuition fees, authorisation to work in the host country will help persuade them to come. Migration policies can also authorise, facilitate or prohibit the settlement of foreign students in the host country, once their studies are over. Australia, Canada and New Zealand, for example, make it easy for foreigners who have studied in their universities to settle by granting them additional points for their immigration file (Tremblay, 2005). This makes these countries more attractive to students while, at the same time, strengthening their knowledge economy. The total freedom of movement of workers within Europe no doubt explains in part the importance of student mobility in Europe compared to that between the countries of North America, as the North America Free Trade Agreement (NAFTA) does not include the free movement of workers within a common labour market.

A country's national migration policy can sometimes conflict with its internationalisation strategy, especially when the latter is decentralised. Sometimes, migration authorities fear that making the procedure for obtaining student visas more flexible will lead to abuse and fraud, or other priorities of these policies can have unintended negative effects on this strategy.

After the events of 11 September 2001, the United States, for example, tightened the conditions for entry into the country, which meant that the procedure for obtaining a student visa became more cumbersome. This led to significant delays, as all applicants for a student visa must now have an individual interview with a representative of the US authorities. Combined with stronger competition from other countries, this policy probably contributed to the reduction in the number of applicants and to the slowdown in foreign student enrolment in the United States. The number of foreign students grew by only 0.6% between 2002 and 2003, compared to 6.4% the two previous academic years, and fell by 2.4% and 1.3%, respectively, in 2003-04 and 2004-05 – the first drop in foreign student enrolment in 32 years

(IIE, 2005). The geographical composition of foreign students has also changed, with a fall in the number of students from the Arab countries and the Middle East, compensated by an increase in Indian and Chinese students. This problem was brought to the attention of the US authorities by their academics, and, since 2003, the visa policy for foreign students and teachers has been made more flexible and efficient. As a result, the number of applications for student visas rose by 9% in the first half of 2004. This is the first increase since the attacks of 11 September 2001, even though student visa applications are still down compared to the numbers before these events (United States Department of State, 2004).[3]

Trade policy

One other possible policy instrument is trade policy, as illustrated by the inclusion of education services in the multilateral negotiations for the General Agreement on Trade in Services (GATS) within the World Trade Organization. Moreover, the bilateral agreement on free trade signed by Australia and the United States in 2004 includes commitments on education services. The possible impact of the GATS has raised many questions and given rise to much discussion in the world of education. Concern has focused on two issues in particular: does the GATS allow countries to continue to finance their higher education system out of the public purse and to go on regulating the quality of such education as they see fit? The short answer to these two questions is yes. But technical clarifications are needed and there is still a degree of uncertainty given that the GATS regulatory framework remains incomplete.[4] Overall, although negotiations are continuing, the members of the WTO have shown limited enthusiasm for making commitments and negotiating on education services. The commitments undertaken so far have been limited and cautious (OECD, 2004a). Trade in education services has for the most part developed in the absence of commitments under the GATS and should continue to develop independently of it.

In these circumstances, what role can the GATS play? Why are countries which export education services, such as Australia and the United States, but also countries which import them, like Norway and Malaysia, taking an active part in the GATS trade negotiations? Today, importing countries are using the GATS to show their interest in cross-border education to potential exporters. For their part, exporting countries are using it as a means of stabilising access to foreign markets for their programmes and their institutions of higher and, more generally, post-secondary education. The main contribution made by trade agreements to the growth of cross-border education would indeed seem to be guaranteeing a degree of stability to foreign investors in the framework of commercial services (when commitments are undertaken). The inclusion of education services in the GATS negotiations has opened an unprecedented debate on cross-border education and raised awareness of the changes occurring in this field world wide. While the use of trade agreements will no doubt remain a marginal instrument of internationalisation policies for some years, they could assume greater importance in the longer term. It follows that co-ordination between trade and education interests in a given country is essential if trade negotiations are to be conducted in a manner which is coherent with its policy for the internationalisation of higher education. Only a few countries, including Australia, Norway and Malaysia, involve their education ministries in the GATS negotiations on education services.

Economic, social and international aid policies

A country's approach to the internationalisation of higher education needs to be linked to its economic, social and international aid objectives. On the one hand, it is

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important to understand how policy on internationalisation can help achieve these wider objectives; on the other, these wider objectives need to be in line with the policy adopted on internationalisation. For example, if foreign students have access to different types of social insurance, it adds significantly to a country's attractiveness, as do arrangements to welcome them and help them settle in and make a success of their studies (university residences, counselling, language support, etc.). Countries and institutions recruiting foreign students on the basis of market-rate tuition fees have established measures of the latter type.

Industrialised countries also have to pay particular attention to the role played by cross-border higher education in their international aid policies. If objectives are not clearly set, commercial higher education services sometimes interfere with aid policies, and the same country can be offering identical services sometimes on a commercial and sometimes on an aid basis. Aid and trade are not mutually exclusive; rather they represent two complementary ways of helping developing countries. However, it can be counter-productive for development assistance and for the credibility of donors if the two activities are carried out in the same countries without serious thought being given to their co-ordination.

3.3. Effectiveness and coherence of policy choices

Concretely, the requirement for coherence means that a policy for the internationalisation of higher education should be formulated at inter-ministerial level, involving all the actors concerned, rather than by those in charge of education policy alone. Cross-border education will not necessarily be a country's priority, but it is affected by many non-education policies and can at the same time help improve the effectiveness of such policies. It is therefore important for countries to be aware of the opportunities it offers (and the challenges involved) and to consider these opportunities in the light of other objectives – economic, social or relating to public safety – which they may well advance. There is no single recipe in this field, and different countries do not necessarily have the same needs or the same assets.

4. The major current approaches to the internationalisation of higher education

While not all (or even many) countries have an explicit policy on the internationalisation of higher education, four main approaches can be identified that reflect the rationales and policy instruments described in the preceding sections, although their outcomes vary considerably. These approaches are not always co-ordinated, or even decided directly at governmental level, but they do make it possible to describe the current situation of internationalisation policies. These approaches are not mutually exclusive. One of them, mutual understanding, is the traditional approach in this field, while three others which emerged in the 1990s – skilled migration, revenue generation and capacity building – have a strong economic drive.

The *mutual understanding approach* mainly emphasises political, cultural, academic and development assistance goals. It encourages the international mobility of domestic as well as foreign students and staff, through grant and academic exchange programmes, and it supports academic partnerships between institutions of higher education. This approach does not generally involve any vigorous campaigns to recruit international students, but targets a small elite of domestic and foreign students. Co-ordination efforts are chiefly focused on development assistance and national geostrategic choices. Other policy

instruments essentially do not come into play. In this type of approach, it is not unusual for grant programmes to be managed by foreign affairs ministries. This is no doubt the easiest and least costly strategy. Examples of countries currently using this approach are Japan, Mexico, Korea and Spain. The European Union's Socrates-Erasmus programme also first corresponded to this approach, involving student and teacher exchanges, networking of facilities and institutions across Europe and joint development of study programmes. The aim was to create a feeling of "European citizenship" among young Europeans by enabling them to achieve better mutual understanding and learn different European languages.

The *skilled migration approach* encompasses the goals of the mutual understanding approach as set out above, but it involves a more active and targeted approach to the recruitment of foreign students. In order to promote the knowledge economy, it also aims to attract talented students (and academics) to work in the host country's economy, or to help make its higher education and research sectors more competitive. Grant programmes may remain a major policy instrument, but they are supplemented by active promotion abroad of the country's higher education sector, combined with an easing of the relevant visa or immigration regulations. Sometimes, specific services are designed to help international students in their studies and their stay abroad and more teaching takes place in English (in non-English-speaking countries). Under this system the studies of international students are subsidised by the host country in the same way as for domestic students (and foreign residents). The target populations can be quite varied: students from certain regions, graduates students or future researchers rather than undergraduates, or students specialising in a specific field. This approach typically results in an increase in the number of international students. The co-ordination of this policy with the country's economic, immigration and development assistance policies is a particularly important aspect of this approach. Since it is based on subsidies for foreign students and on grant programmes, the skilled migration approach can be costly for countries. The problem is to provide universities with incentives to recruit international students. Funding systems based on enrolment can provide these incentives when the number of domestic students is falling, but this is not always the case. Because of a lack of financial autonomy, universities have little or no incentive to enhance mobility of their programmes and institutions. Where there is mobility, it generally remains tied to aid policy or traditional academic partnerships. Examples of countries having adopted this approach are Germany, Canada (some provinces), France, the United Kingdom (for EU students) and the United States (for post-graduate students).

Initiated in 1998, the Bologna Process marked a shift in internationalisation policy at the European level, and it is orienting the EU Socrates-Erasmus programme towards this second approach. Student and academic mobility is now helping to create an environment of higher education and research in Europe, making European higher education more attractive outside Europe and helping to transform the economies of European countries into knowledge-based economies (Huismans and van der Wende, 2004, 2005). The purpose of harmonising European systems is no longer only to promote mobility within Europe, but also to make European higher education more attractive internationally, in particular as compared to the United States, which received 41% of international students from Asia in 2003.

The *revenue-generating approach* incorporates the goals of the mutual understanding and skilled migration approaches, but it also has directly commercial objectives. Under this approach, international students pay the full cost of their education, generally without public subsidies. Compared with domestic students, foreign students therefore often

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generate additional income for institutions, which encourages institutions to become entrepreneurial in the international education market. Under this strategy, governments tend to grant institutions considerable autonomy, seeking to secure the reputation of their higher education sector and to protect international students through quality assurance arrangements. This approach generally results in a significant growth in the number of students paying the full cost of their education and in greater mobility of for-profit programmes and institutions. It is often accompanied by a reduction in the relative share of public financing in universities' resources, or even the reduction of public financing per student. It can also include an active trade negotiations policy aimed at lowering the barriers to cross-border education activities, for example through bilateral agreements or trade negotiations in education services under the General Agreement on Trade in Services (GATS). To implement this type of strategy, university autonomy and sound co-ordination of education policy with the country's trade and immigration policies are essential. Co-ordination with development assistance policy in post-secondary education is particularly difficult here. Examples of this approach are Australia, the United Kingdom (for non-EU students), New Zealand, the United States (for undergraduates), the Netherlands, Canada (some provinces) and Ireland.

The *capacity-building approach* encourages the use of imported higher education, however delivered, as a relatively quick way to build an emerging country's capacity. When a country lacks sufficient domestic capacity to meet all domestic demand or wants to improve the quality of its system, cross-border education can help build its capacities in terms of education provision and human capital for its economy and higher education system (Vincent-Lancrin, 2005; Middlehurst and Woodfield, 2004; Larsen and Vincent-Lancrin, 2002). While the two preceding approaches are geared towards exporting education services, the capacity-building

Box 2.1. **Germany: an example of a skilled migration approach**

Germany provides a typical example of a country using a skilled migration approach. Like other European countries, Germany has an ageing society and is seeking to build (or at least maintain) its knowledge economy. Can it succeed in doing so in the long run using its domestic human resources alone? In this context, a proactive cross-border higher education policy should help it to offset its potential lack of skilled human resources in the future. Germany promotes its higher education abroad through the German Academic Exchange Service (DAAD), which participates in international education fairs, pays for publicity campaigns abroad and above all finances ambitious mobility grant programmes aimed more at foreign than at German students. The government also facilitates the permanent immigration of foreigners who have studied in Germany. Foreign students, like local students, are not required to pay any tuition fees and therefore benefit from the same public subsidies. Since not all foreign students stay on in the host country, this approach complements Germany's co-operation and development assistance policy in the field of education. Germany has few cross-border education activities through programme and institution mobility, despite the example of the German university in Egypt, financed through Egyptian capital and German development assistance funds. The university provides some of its courses in English and grants degrees recognised in Germany and Egypt. This skilled migration approach has met with a certain success, since for some years Germany has ranked third as a host country for foreign students world wide (although 30% of these students are not actually mobile students, but students from an immigrant background). See Hahn (2004) for a detailed analysis of the case of Germany.

Box 2.2. **Australia: an example of a revenue generating approach**

Australia is a typical example of a country using the revenue-generating approach – the other major country using this approach being the United Kingdom. Australia is explicitly seeking to build an export industry in education services to promote its economic growth and has included cross-border education in a reform of its higher education sector. Its policy is focused on three areas: the progressive introduction of new rules for the financing of universities, the co-ordination of marketing activities for Australian university programmes and an immigration and visa policy that facilitates the entry of international students.

In 1988, Australia decided to charge foreign students higher tuition fees than those applied to domestic (or resident) students, which gave universities a strong incentive to recruit foreign students. The government initially set the level of tuition fees so that they would cover the full cost of higher education for foreign students, and prohibited universities from subsidising fee-paying international students. It then did away with the enrolment cap on the number of fee-paying international students and progressively eliminated most of the subsidised openings available to this category of students. Once the "new international market" was established, the level of tuition fees was deregulated, leaving universities free to set their fees on the basis of market mechanisms.

The Australian government began to market Australian university programmes internationally in 1985-88, at the same time that it decided that both public and private financing would be an integral part of the co-ordination of the higher education sector. The government subsidised the co-ordinated development of Australian educational activities in East and South-East Asia by setting up education centres in each Australian embassy. Universities changed their organisation and culture, defined more commercially-oriented activities and improved the management of their commercial services. In this way, Australian institutions learned how to co-operate and compete with each other effectively in recruiting foreign students.

In order to maintain the reputation of its higher education sector and protect foreign students in Australia, the Australian government also adopted domestic measures in the field of quality assurance, in particular a mandatory nationwide code of ethics. Higher education institutions must comply with certain standards and requirements and must be registered with the Australian government if they wish to provide programmes for international students in Australia; foreign students can only obtain a visa if they are enrolling in an institution that meets the required conditions. The purpose of these measures is to protect the interests of students while promoting the integrity of the student visa programme. Australian universities can also use the Australian quality assurance system to cover their activities abroad, although they are not required to do so. Foreign students are generally not authorised to stay in Australia after completing their studies, but they can easily obtain a student visa which generally allows them to work. The revenue-generating approach obviously does not prevent Australia from encouraging certain types of students to settle in Australia or from thinking about the issue of skilled migration.

This policy has produced spectacular results. Between 1990 and 2003, the number of foreign students in Australia has multiplied by a factor of 6, rising to 188 160 students, or 9% of the international students in the OECD area. Australia now ranks fifth as a receiving country world wide, which is all the more remarkable given that it only has a population of 20 million (the other five major receiving countries have populations at least three times as large). If the number of students enrolled in Australian offshore programmes were included, Australia would rank even higher. Each of Australia's 38 public universities is now involved in providing "offshore education". The number of offshore programmes of Australian universities has risen from just 25 in 1991 to almost 1 600 in 2003. More than 85 per cent of these programmes are in China (including Hong Kong), Singapore and Malaysia, with the remaining much smaller programmes scattered around the world, from India and Indonesia to Canada and South Africa. Offshore students accounted for 33% of the international students enrolled in Australian institutions in 2004, representing a 9% increase since 1996. As a result, education services in Australia were the third highest services export item in 2005, amounting to 7.2 billion AUD (IDP Australia). The only cloud on the horizon is that enrolments in cross-border education through programme and institution mobility fell by 4% for the first time in 2003.

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Box 2.3. **Malaysia: an example of a capacity building approach**

Malaysia is pursuing a dual strategy, for although it is a net importer of education services, it is at the same time seeking to become an exporter of these services to developing countries using a revenue-generating approach. Singapore is another example using the same approach.

The Malaysian government finances major grant programmes for its civil servants and students, with guaranteed jobs when they return, and it has opened up offices in some countries to assist its nationals studying abroad. As a result, Malaysia was the tenth-ranking sending country in 2003, with a total of 41 000 students studying abroad. Since the late 1990s, the Malaysian government has been encouraging foreign universities to establish campuses in Malaysia. There are currently four offshore campuses of foreign universities and over 600 other private higher education institutions that grant local and foreign degrees and diplomas, generally through franchise or twinning agreements with foreign universities. Malaysia is also one of the few countries that is using the GATS to try to attract foreign institutions. The objective is to create a stable and attractive environment for foreign research universities, with a marked preference for institution mobility (rather than programme mobility, which is more common today). As an incentive, foreign universities established in the country will also be allowed to apply for financing of their research by the Malaysian government. To support these policies, Malaysia regulates the services of foreign providers in legislation dating from 1996, when the first foreign offshore campuses were established. A five-tier review and approval system covering educational, commercial and legal requirements was introduced for foreign providers that wished to be fully accredited. To ensure that cross-border education is consistent with national objectives, the legislation on private education institutions (1996) specifies the skills that Malaysian citizens must master in order to obtain their degree irrespective of the discipline studied (Kandasamy and Santhiram, 2000; McBurnie and Ziguras, 2001).

As an exporter Malaysia is seeking to recruit Asian students, mainly from China and Indonesia (and increasingly from Pakistan and other Islamic countries, as nationals of these countries may find it difficult to obtain visas in some countries since the September 11 attacks). The lower cost of living than in Western countries and the presence of foreign (English-speaking) providers contribute to the country's attractiveness. Between 2000 and 2003, the number of foreign students in Malaysia rose eight-fold to 27 700.

approach is aimed at importing education services. It rejects the view that exports are necessarily more beneficial to a country than imports. Grant programmes supporting the outward mobility of domestic civil servants, teachers, academics and students are important policy instruments, as is encouraging foreign institutions, programmes and academic staff to enter the country and provide their education services on a commercial basis. Countries can use the GATS and other trade negotiations to indicate their interest in this type of cross-border services, although they can also use other means for that purpose. Programme and institution mobility is generally accomplished under a government regulation that ensures the compatibility of these activities with the country's academic and economic development. Twinning arrangements and partnerships with local providers are encouraged (and sometimes compulsory) in order to facilitate knowledge transfers between foreign and local higher education institutions. In the short run, this approach results in large numbers of outgoing students and of foreign revenue-generating programmes and institutions inside the country to meet local demand. Once the country's capacities have been developed, this approach is no

longer needed and should theoretically lead to a change in strategy. In the capacity-building approach, the co-ordination of education policy with economic and commercial policy becomes crucial. In particular, countries must ensure that their quality assurance system covers foreign programmes and institutions and that the latter really do contribute to their national objectives. Examples of this approach are mostly found in South-East and North Asia and in the Middle East, *e.g.* Malaysia; Hong Kong, China; China; Singapore; Indonesia; Vietnam; Dubai and the United Arab Emirates. No OECD country appears to have adopted this approach so far.

5. Some problems raised by cross-border higher education

Although cross-border higher education creates opportunities for countries, it also involves some difficult choices and creates problems that countries must resolve. These must be taken into consideration when defining internationalisation policies. This section raises two broad types of issues: the possible drawbacks of cross-border education for developing countries and consequently for aid policies of developed countries; and the impact of cross-border education on national higher education systems, in particular in terms of equity, quality, financing and language policy.

5.1. *The ambiguous nature of cross-border education for developing countries*

An initial problem resides in the mixed consequences of cross-border education for developing countries. Although it can help such countries to build their capacities (Vincent-Lancrin, 2005), it can also create problems for it can promote a brain drain rather than the circulation of skills between the host and the sending country, and can lead to a reduction in development assistance without building capacity in the poorest countries.

From the exchange of skills to the brain drain

The competition between countries to attract highly skilled workers has intensified in recent years, as reflected in the latest migration policy trends (OECD, 2005). As has been seen above, the internationalisation strategies of exporting countries have increasingly similar objectives. There are no systematic data on the relationship between the mobility of students and researchers and immigration, but the few data available show that this relationship does indeed exist. Some 75% of Chinese who studied abroad between 1978 and 1999 have not returned to China (Iguchi, 2003). In 1999, approximately 25% of the temporary emigrants to the United States under the H1-B visa programme had previously been enrolled in US universities (Cervantes and Guellec, 2002). The United States is in fact the only country for which the stay rates of foreign students after they obtain their diploma are known (Finn, 2003). The ability of the United States to attract skills is related to the fact that it receives large numbers of international students, and the magnitude of this attraction has been growing steadily since the beginning of the 1990s because of the combined effect of the increasing number of doctorates granted to foreign citizens by US universities and the number of foreign-born doctorate-holders who stay in the United States. The average stay rate[5] for foreign doctorate-holders in science and engineering in the United States four or five years after they obtain their diploma has grown, rising from 41% to 56% between 1992 and 2001. It soared from 65% to 96% for Chinese doctorate-holders and from 72% to 86% for Indians. The stay rate after completion of studies varies considerably depending on the country of origin and the discipline. However, in most cases it does not diminish significantly over time and is partly dependent on the level of

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economic development in the home country, even though there does not seem to be a systematic pattern. For China, India, Iran, Israel, eastern European countries, Greece, Argentina and also New Zealand and the United Kingdom, the stay rates in the United States five years after the doctorate was obtained are greater than 50% (Finn, 2003).

Given these high stay rates, there is reason to fear that cross-border education may increase the brain drain as much as it promotes capacity building in developing countries. Although 85% of international students world wide were studying in the OECD area in 2004, most of them (66%) came from non-OECD countries. This is a very sensitive issue, for the permanent migration of highly skilled people can have a cost as well as benefits for the sending country. On the cost side, the sending country loses the human capital (and productivity) of these highly skilled people, and, if their education was financed with public funds, the cost of the public investment in their primary, secondary and (sometimes) tertiary education. On the benefits side, sending countries may find that their highly skilled diaspora contributes to their economy through their investments, remittances and the links that they provide between the receiving and the sending country in terms of trade, innovation and knowledge, etc. Naturally, the distinction between temporary and permanent emigration is crucial, for if skilled nationals return home with their knowledge and international experience, it re-establishes the positive dynamic of exchange of skills and capacity building for the home country. Thanks to the migration database recently established at the OECD, there is now an unprecedented amount of information on the magnitude of the brain drain. It mainly affects African and Caribbean countries: over 70% of Jamaican and Guyanese nationals holding higher diplomas are expatriates in an OECD country. On the other hand, Indian and Chinese nationals, despite their high stay rates in the United States after they finish their studies, each account for less than 3% of the expatriates holding a higher degree in OECD countries, as is also the case for Brazil, Indonesia and Thailand (*cf.* Map II.1 and Table II.5 in OECD, 2005: *Trends in International Migration*). That said, even for countries suffering from a brain drain, self-reliance is not an alternative, for participating in international exchanges in higher education remains their best option, while trying to minimise the cost of the brain drain.

Trade and development assistance

Commercial cross-border education can also have mixed effects on developing countries. Some of them, particularly emerging countries, may see this commercial provision as a windfall, since commercial services are the only way for them to obtain higher education provision to the extent desired. Such countries may have a middle class and sufficient national resources to finance their participation in for-profit cross-border higher education.

On the other hand, what would happen to the poorest countries if trade replaced aid? In Australia and the United Kingdom, for example – two countries that have adopted the revenue-generating approach – aid to developing countries for post-secondary education fell drastically between 1995 and 2001. Australian aid of this type fell from 246 million USD to 13 million USD, while UK aid fell from 40 million USD to 4 million USD, while at the same time their commercial provision of education services was expanding. However, the provision of foreign higher education programmes in poor countries is very limited because few people can afford the fees. And will student mobility not become even more restricted to the most affluent – but not necessarily the most talented – classes in developing countries if international students must pay tuition fees that cover the full cost of their education?

5.2. The impact of cross-border education on national education policies

How is domestic higher education affected by the growth of cross-border education and how should it adapt to increasingly larger numbers of students? In 2004, international students accounted for more than 10% of students in four OECD countries, reaching a maximum of 17% in Australia. This being the case, and if the number of foreign students continues to increase, what will be the impact on national policies regarding equity, quality, financing and language policy?

Access and equity

Students from low-income backgrounds are less likely to travel abroad to study, not least because the costs normally fall to students and their families. In the United States, this lower participation in international student mobility also holds true for students from minority backgrounds. Although the situation is more complex and better balanced with regard to gender equality, men are strongly overrepresented among international students from Asia, who accounted for nearly half (45%) of international students in the OECD area in 2004. This imbalance reflects the higher participation of male students in higher education in Asian countries, as well as, possibly, a tendency for Asian families to invest more in education for boys than for girls.

Today, countries generally limit their national equity policies to their own nationals and consider that the composition of foreign students lies outside their responsibility and/or control. If equality in access to tertiary education is achieved in the home countries of international students, then that may also solve problems in access to higher education abroad. In the meantime, if the numbers of foreign students continue to grow, it will become increasingly difficult to ignore them in national equity policies.

Where there are commercial incentives for institutions, the growth of cross-border education could lead to the displacement of domestic students by international students. For this reason, this growth needs to be carefully monitored by governments and educational institutions.

Quality

As mentioned, both receiving and providing countries have a common interest in strengthening quality of provision. However the growth of cross-border higher education poses a real challenge. In fact, very few quality assurance systems cover cross-border higher education, whether this consists of large numbers of international students (in certain institutions or in the higher education system) or of programme and institution mobility. Both programme and institution mobility can carry quality risks to a greater or lesser extent, for example depending on the form taken (franchise, twinning arrangements, e-learning, etc.). Furthermore, educational quality is not necessarily identical in the country of origin and abroad. The challenge is to regulate the quality of these new forms of activities without discouraging education institutions from engaging in them. To meet this challenge, UNESCO and the OECD have jointly developed "Guidelines for Quality Provision in Cross-border Higher Education".[6]

The sheer variety and complexity of higher education systems world wide leaves room for low-quality and even rogue providers (diploma mills) and rogue accreditation and quality assurance agencies (accreditation mills). Not only do they give worthless degrees, but they facilitate fraud – that is the selling (or buying) of fake degrees by students.

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While these practices are still limited in scale, they damage the collective perception of cross-border higher education and if they continued to spread might lower the credibility of degrees and qualifications. Consequently, the growth of cross-border education poses a real challenge to national processes for the recognition of international degrees.

Financing

Independently of fees, the growth of cross-border higher education can confront countries with new choices regarding the financing of higher education. In countries which host many foreign institutions or programmes, one issue is whether public subsidies should be extended to domestic students taking part in these programmes, which could both add to supply and make participation more equitable. Countries with public institutions engaging in commercial activities abroad will have to address the issue of whether it is really logical for them not to cover some of the financial risks involved in their cross-border activities, since when these are successful, the publicly financed segment of institutions and domestic students benefit from these activities (and from the profits generated).

Another question is whether the international activities of public institutions should be authorised or promoted. Countries that choose to do so should realise that this is not without risks for the future, for the cross-border education "market" may or may not be sustainable. In the medium term, the total market will undoubtedly grow, but developing countries such as India, an English-speaking country, might compete with OECD countries in this field. What is more, if the countries where demand is high effectively build their capacities and meet their unsatisfied demand, the demand for cross-border education could shift radically.

Language

Finally, cross-border education poses a challenge for the language (and cultural) policy of certain countries. Since English has become the language most commonly used in international exchanges and most widely learned as a second language, English-speaking countries have a definite comparative advantage over others: it is no coincidence that the United States, the United Kingdom, Australia and Canada alone attract over half of the total number of foreign students in the OECD area (44% in 2004, including nearly 70% of foreign students of Asian origin). Larger countries such as Japan, Germany and France are also more attractive than small countries with languages that are less widely spoken and have smaller labour markets.[7] To improve their attractiveness and compete with English-speaking countries, countries are increasingly offering programmes in English. However, this involves an additional cost for them, without providing any real competitive advantage over language-training in rival institutions in English-speaking countries. Although provision in English is important to increase these countries' participation in cross-border education (if only to give foreign students time to learn the local language once they arrive), the growing use of English as the language of instruction nevertheless raises questions for them (EAIE, 2005). Is it really desirable for a country to provide its higher education in a foreign language, and if so, to what extent should this be done?

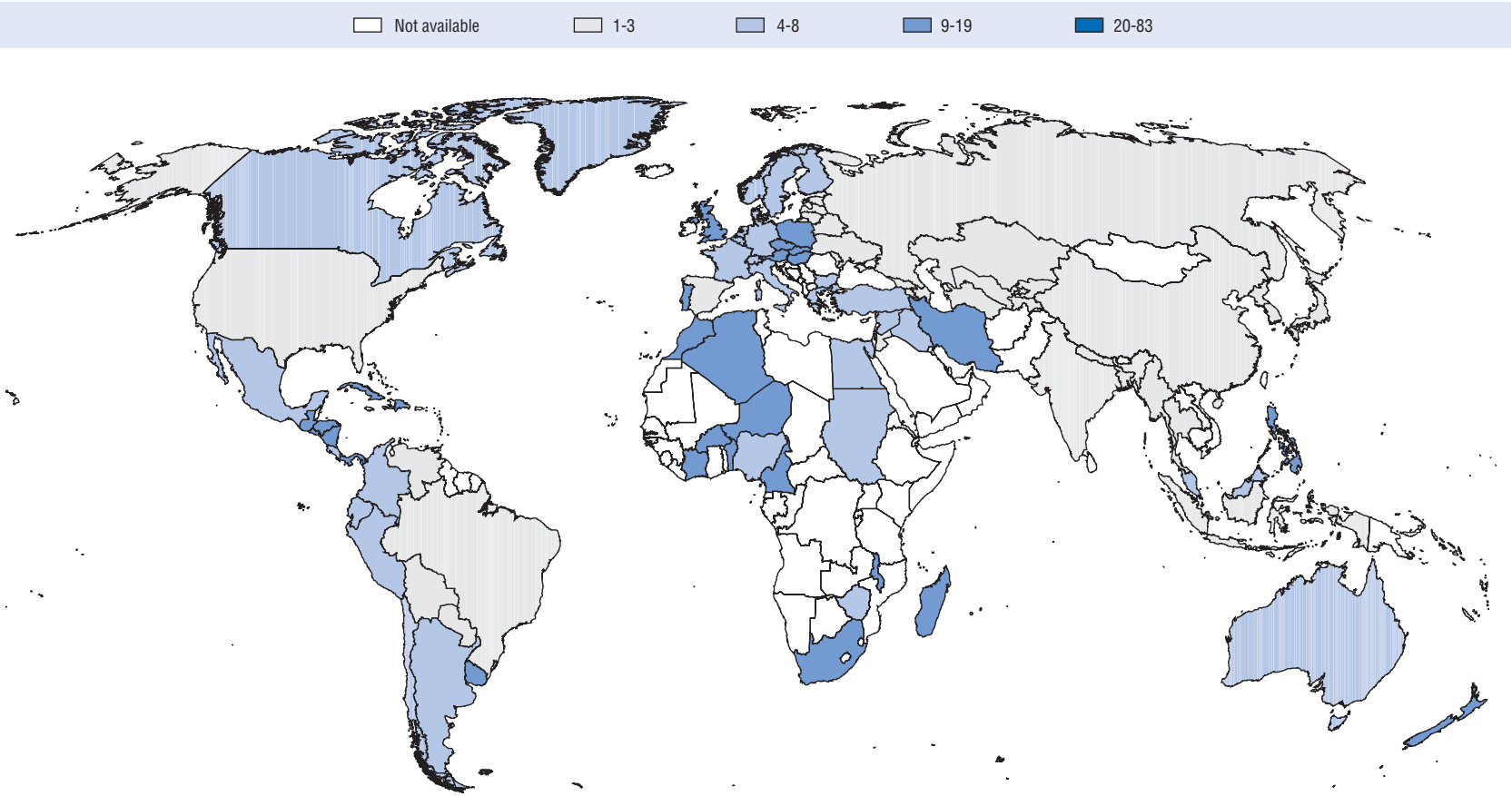
With regard to programme and institution mobility, the language aspect can also raise problems for host countries, which must ensure that cross-border education really meets their domestic needs. Asking foreign institutions to teach in the local language, as once was the case in Malaysia, is a barrier to entry for foreign institutions and programmes. At the same time, countries must ensure that foreign programmes fit in with the cultural reality of the host country or else they may increase the risk of a brain drain.

6. Conclusion

Cross-border higher education provides countries with real educational, cultural, policy and economic opportunities. To take advantage of these, countries need to define an approach to cross-border education adapted to their situation and objectives, in a perspective that goes beyond the field of education alone. Typically, a sound cross-border education policy should be formulated at the intergovernmental level, co-ordinating cross-border higher education policy with linked economic and social policies. Cross-border education policy also requires policy instruments that lie outside the direct responsibility of the field of education, including visa and trade policies. For this reason, it is crucial to ensure co-ordination in these different fields.

In the light of countries' current practices, four main approaches to cross-border higher education have been identified. Contrary to what is generally believed, a well-designed cross-border education policy does not necessarily consist of exporting education services. As several Asian and Middle Eastern countries have shown, importing educational services can be just as beneficial as exporting them. Not all these approaches are equally within the reach of all countries, and each raises its own problems. How can cross-border higher education equitably benefit both developed and developing countries? Although it can help the latter to build their economic and educational capacities, it could also lead to a brain drain and reduced assistance to post-secondary education. And what is the impact of cross-border education on national higher education systems and countries' education policies in the fields of access, quality and public financing? What position should be adopted in non-English speaking countries regarding English as the language of instruction? These are all questions that countries must take into consideration in defining their cross-border higher education policy, whatever it may ultimately be.

Figure 2.1. **Percentage of expatriates to OECD countries among all highly skilled born in the country**



Source: Trends in International Migration, 2004 Edition (OECD, 2005).

Notes

1. This figure includes all international student expenditures in the host country, not just tuition fees. It is an update of the estimate by Larsen *et al.* (2002).
2. A country imports education services when it has students or academics abroad, or plays host to foreign programmes and institutions operating in a commercial manner; it exports education services when it receives international students and academics or when its national programmes and institutions are available abroad under commercial arrangements.
3. Additional information on this issue appeared in the editorial by Maura Harty, Assistant Secretary of State for Consular Affairs, published in the *Chronicle of Higher Education*, Vol. 51, Issue 7, p. B10 (October 8, 2004), which is also on the Web site of the Department of State. It states that the US State department "… has greatly improved the visa process with the goal of balancing… 'secure borders' and 'open doors'. In no other area have we worked as hard to achieve a balance as with students, scientists, researchers, and exchange visitors". Available at: *http://travel.state.gov/news/info/press/press_1511.html*.
4. A complete and detailed answer is given in OECD (2004a).
5. The stay rate does not indicate whether foreign students stayed permanently in the United States, but how many foreign doctorate-holders from a specific year were still in the United States several years later. Some of them may leave the country and then return. For example, the stay rate for the class of 1991 was 58% in 2001, but it would be 81.5% if the rate were to show the proportion of persons who had worked in the United States for at least one year during the 1992-2001 period (Finn, 2003).
6. Available at *www.oecd.org/edu/internationalisation/guidelines*.
7. In addition to the language and cross-border education policy implemented, it is important to point out that a country's attractiveness also depends on its image abroad, which is determined by its climate, the historic, geographic and cultural ties between countries, the presence of diasporas from the student's home country in the receiving country, its geo-political influence and international visibility, etc. Here again, all countries do not have the same assets in this regard.

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Chapter 3

The Teaching Workforce: Meeting Aspirations and Enhancing Motivation

Summary

Positive attitudes among teachers are a key priority for policy-makers given evidence that teaching performance is perhaps the main driver of student learning. Teacher motivation is also important for promoting school reform. This chapter investigates what matters to teachers and how best to motivate them. Research on work motivation is used to shed light on how both "intrinsic" and "extrinsic" motivation can promote work outcomes such as performance, satisfaction, and well-being. The analysis stresses that motivation underpins the success of both teachers' work and the introduction of any renewal in schools. The central message is that teachers' actions need to be self-motivated, resulting from their acceptance of and identification with the values and objectives of practices and regulations in schools.

Although pay is important, teacher policy needs to address a lot more than pay. Teachers place a lot of emphasis on the quality of their relations with students and colleagues, on feeling supported by school leaders, on good working conditions, and on opportunities to develop their skills. Teacher evaluation for improvement purposes could provide many opportunities for teachers' work to be recognised and celebrated and help both teachers and schools to identify professional development priorities.

This chapter proposes four ways of improving teachers' performance, satisfaction and well-being: *i)* promoting the intrinsic motivation of teachers; *ii)* fostering the self-motivation of teachers; *iii)* making a balanced use of extrinsic rewards; and *iv)* meeting the needs of teachers for good working conditions. These imply bringing greater challenge and variety to teaching, ensuring opportunities for professional growth, offering constructive performance feedback, involving teachers in decision making and helping build a strong sense of professional identification and worth.

The teaching career would also benefit from greater diversification, which would help meet school needs and also provide more opportunities and recognition for teachers. Greater emphasis on school leadership would help address the need for teachers to feel valued and supported in their work. In addition, well-trained professional and administrative staff can help reduce the burden on teachers; better facilities for staff preparation and planning would help build collegiality; and more flexible working conditions, especially for more experienced teachers, would prevent career-burnout and retain important skills in schools.

The Teaching Workforce: Meeting Aspirations and Enhancing Motivation

1. Introduction

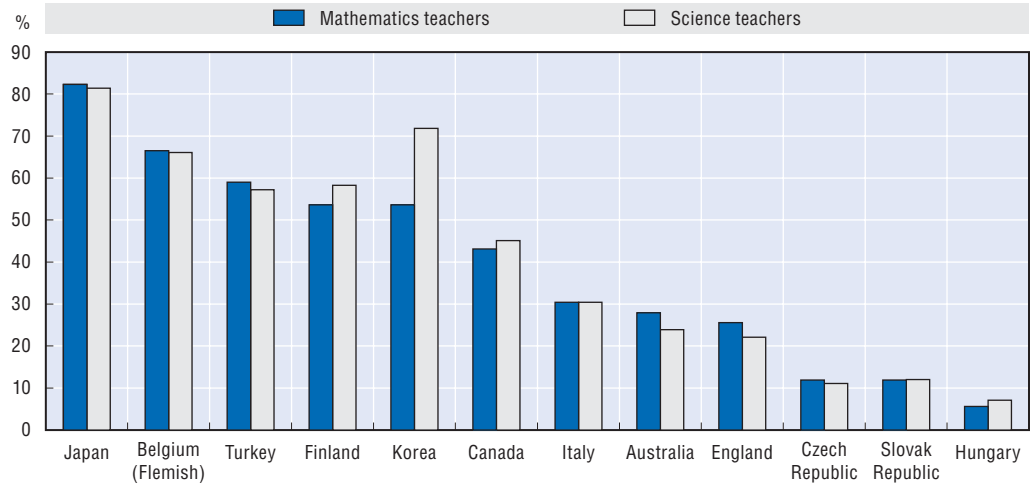
All countries are seeking to improve their schools, and to respond better to higher social and economic expectations. As the most significant resource in schools, teachers are central to school improvement efforts. Improving the efficiency and equity of schooling depends, in large measure, on ensuring that teachers are highly skilled, well resourced, and motivated to perform at their best. There has been substantial research and policy development on teacher education and skill development, and resourcing in schools. There has been much less work on teacher motivation, in particular the role of policy in ensuring that teachers work in an environment which facilitates success and that effective teachers wish to continue in teaching.

Meeting the aspirations and enhancing the motivation of teachers is a key priority for policy-makers given the evidence that indicates that raising teaching performance is perhaps the policy direction most likely to lead to substantial gains in student learning (OECD, 2005). Teacher motivation is also important for promoting school reform given that it is to a great extent the motivated teacher who ensures the successful implementation of reforms in schools. A motivated teacher is not only one who feels satisfied in school but is also one who is determined to strive for excellence and professional growth.

There are often concerns that teachers are not sufficiently valued and supported in their work and in some countries they are leaving the profession in high numbers (OECD, 2005). This is illustrated by Figure 3.1 which documents the perception of teachers of the extent to which society appreciates their work. In most of the OECD countries represented in the sample, over 50% of 1999 8th grade mathematics and science teachers believed that society did not appreciate their work. Similarly, as documented in Figure 3.2, a significant proportion of 8th grade mathematics and science teachers revealed in 1999 that they would change to another career if they had the opportunity. Teachers who leave the profession often report that the factors which attracted them to teaching – working with students and colleagues, professional autonomy, and opportunities for personal and intellectual growth –were increasingly difficult to achieve in the day-to-day realities of the job.

This chapter investigates what matters to teachers and how best to motivate them for sustained and improved performance. It draws partly on the research literature on work motivation in the field of organisational behaviour. Work motivation in general has been well-researched, and a substantial body of experimental and field evidence is available. This research sheds light on how both "intrinsic" and "extrinsic" motivation can promote work outcomes such as performance, satisfaction, and well-being. The application of this research to teaching as a profession is scarce. Consequently this chapter, in most instances, is based on the findings on work motivation in general.[1] This chapter also builds on the recently completed OECD project *Attracting, Developing and Retaining Effective Teachers*, in which 25 countries took part (OECD, 2005).

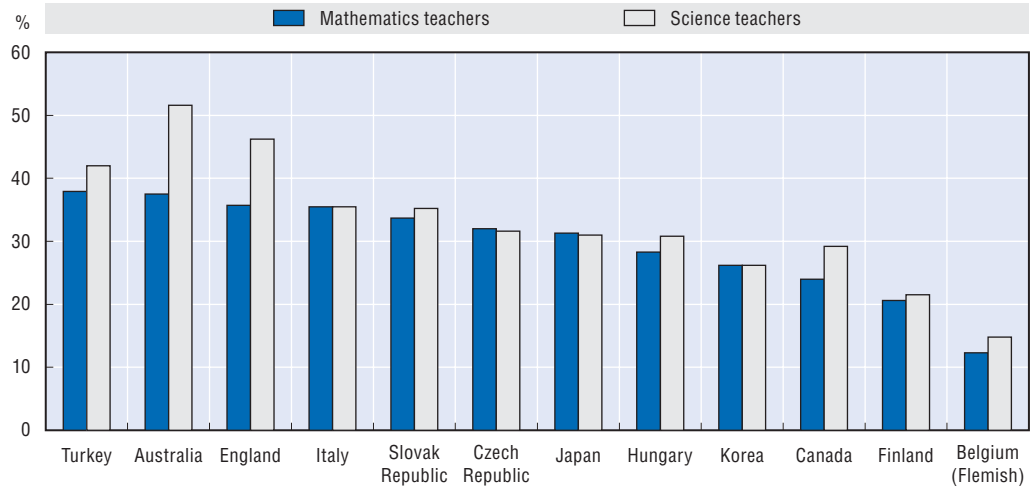
Figure 3.1. **Percentage of 8th grade mathematics and science teachers who believe society appreciates their work, 1999**



Note: Countries are ranked in descending order of the percentage of 8th grade mathematics teachers who believe society appreciates their work. The figures reflect the percentage of teachers who reported "yes" to the question "Do you think that society appreciates your work?".

Source: Trends in International Mathematics and Science Study, TIMSS 1999.

Figure 3.2. **Percentage of 8th grade mathematics and science teachers who stated that they would change to another career if they had the opportunity, 1999**



Note: Countries are ranked in descending order of the percentage of 8th grade mathematics teachers who stated that they would change to another career if they had the opportunity.

Source: Trends in International Mathematics and Science Study, TIMSS 1999.

The research and experiences reviewed provide useful insights about how teachers may become more motivated to excel in schools, develop skills, seek new challenges, and assist in school reform. Four main priorities emerge: shaping the profession in ways that capitalise on teachers' intrinsic motivation; ensuring that teachers' actions are "self-motivated" (resulting from their identification with the values of practices in schools); introducing rewards to acknowledge competence and recognise the work of teachers; and providing working conditions and levels of compensation to sustain teachers' motivation.

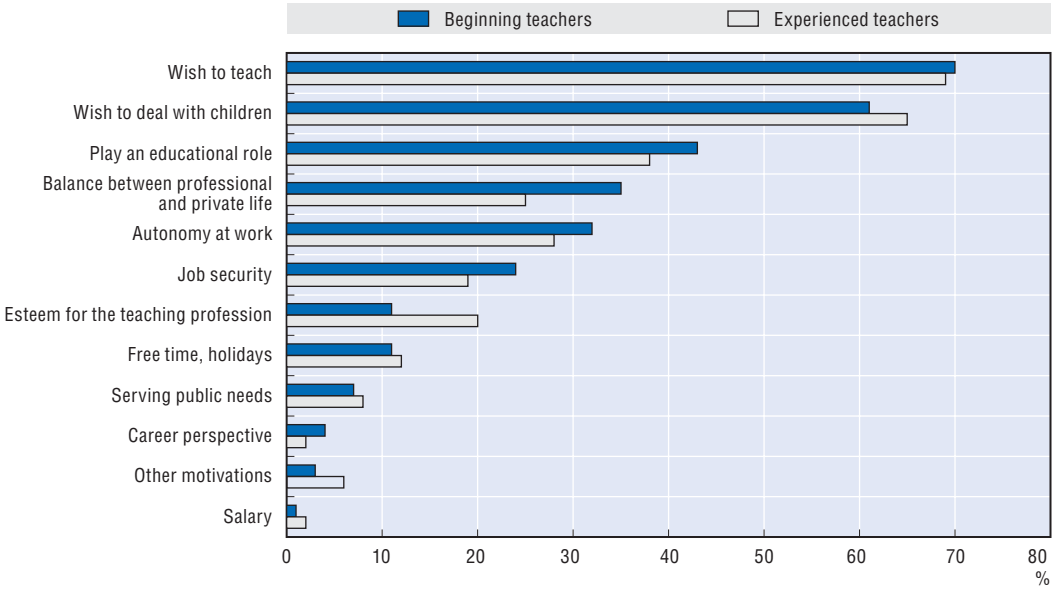
Section 2 looks at what teachers identify as their aspirations in teaching and examines their sources of satisfaction and dissatisfaction to draw a profile of teachers' motivation. Section 3 uses evidence from the work motivation literature to discuss teacher policy directions that enhance the motivation of teachers to perform at high levels of performance. A summary and conclusions are provided in Section 4.

2. Aspirations of teachers and satisfaction in teaching

2.1. Aspirations of teachers

In looking at reasons bringing people into teaching, it is helpful to distinguish between the intrinsic appeal of a job, and other "extrinsic" factors such as pay and working conditions. People often report that they became teachers because of the intrinsic appeal of the job. In France, among both beginning and experienced teachers, the three most important reasons given were "wish to teach" (around 70% for both groups named this among the three main reasons), "wish to deal with children" (around 60%), and "play an educational role" (around 40%). Extrinsic factors were ranked much lower, such as "job security" (about 20% for both groups), "free time, holidays" (10%) and "salary" (1 to 2%) (see Figure 3.3).

Figure 3.3. **Main reasons for becoming a teacher, primary teachers, France, 2000**

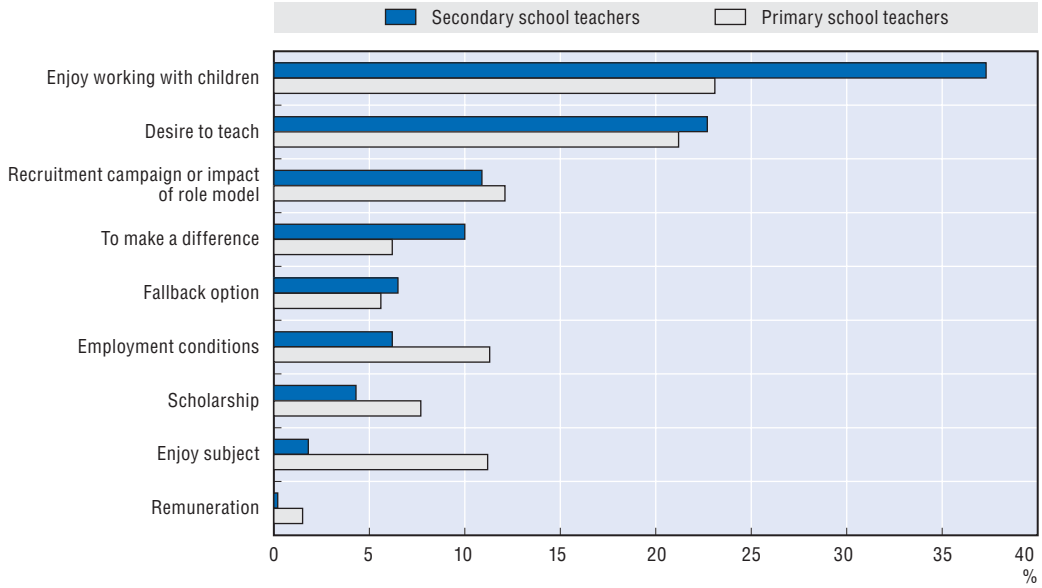


Note: Figures are based on a survey of 858 primary school teachers in France. Figures reflect the percentage of surveyed teachers who mention each possibility among the three main reasons for becoming a teacher. As a result figures add up to more than 100% for each category of teachers.

Source: Ministère de l'Éducation nationale, France (2001).

Broadly similar patterns emerge for Australian teachers (see Figure 3.4). Among primary teachers the two most important reasons were "enjoy working with children" (37% named this as the most important), and "desire to teach" (23%). These two factors were also the most important for secondary teachers, but to a lesser extent (23% and 21%, respectively). For between 11 and 12% of both types of teachers, "recruitment campaign or impact of role model" was the most important motivation. The desire to "make a difference" was the most important motivation for 10% of primary teachers, but was less

Figure 3.4. **Most important motivations for becoming a teacher, by level of education, Australia, 2002**



Note: Figures are based on a survey of 2 500 teachers from government and non-government schools, in metropolitan and non-metropolitan Australia, and from primary and secondary schools.

Source: Ministerial Council on Education, Employment, Training and Youth Affairs (2003).

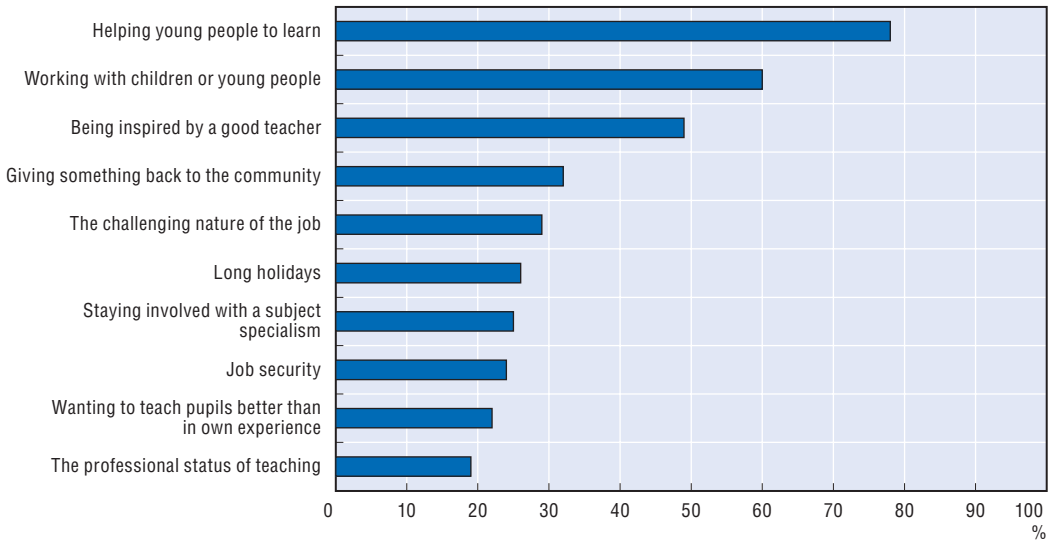
significant (6%) for secondary teachers. As with French teachers, few Australian teachers cited extrinsic factors (employment conditions, scholarship, remuneration) as the most important reason for becoming a teacher, although secondary teachers were more likely to do so than primary teachers. Secondary teachers were also more likely (12%) to rate "enjoy subject" as their main motivation than were primary teachers (2%).

A similar picture emerges from analysing the factors that attract student teachers to initial teacher education. Figure 3.5 illustrates this for student teachers in England. While the two top factors ("helping young people to learn" and "working with children or young people") confirm the importance of intrinsic factors, the third most important factor ("being inspired by a good teacher") draws attention to the impact of teachers as role models in a way similar to the Australian study. Focusing on first year university college students in Norway with different inclinations to choosing teaching as a career, Kyriacou *et al.* (2002) provide evidence for a model of career choice based on a match between students' perceptions of the relevant job factors and whether these factors are offered in teaching. They find that as one moves from the "definitely not considering teaching" group towards the "seriously considering teaching" group, there was an increasingly greater match between factors rated as important when choosing a career and factors which were rated as being offered by teaching as a career (*e.g.*"a job where I can use my university subject", "a career that provides intellectual challenge", "a job where I will contribute to society", "a job that can be easily combined with parenthood", "a job where I can care for others" and "working with children").

In some countries there is concern that some teachers are not sufficiently motivated to become teachers. Enrolment in teacher education programmes is often a second or third choice. For example, over fifty per cent of science teachers did not have teaching as their first career choice in Australia, England, Finland, Italy and Turkey when they first enrolled in university (see Figure 3.6).

Figure 3.5. **Factors attracting student teachers to initial teacher education, England, 2004**

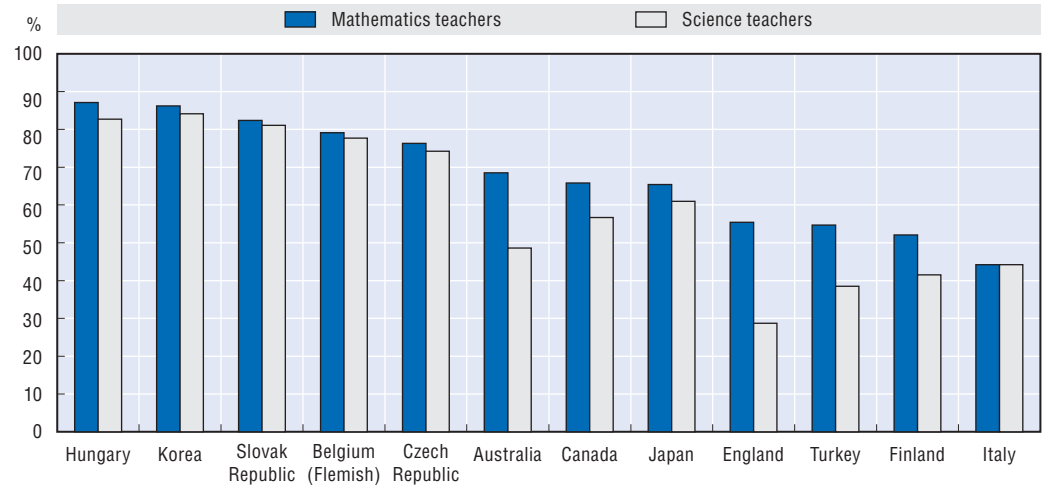
Percentage of student teachers strongly attracted to the following factors as an influence to undertaking an initial teacher education programme



Note: Figures are based on a survey of 4 393 student teachers (to teach in both primary and secondary schools) who were due to complete their initial teacher education in England in 2004. Respondents were asked the extent to which a range of factors (26 in total) may have been influential in attracting them to initial teacher education. The ten factors to which the highest numbers of survey respondents stated they were strongly attracted are shown above.

Source: Hobson *et al.* (2004).

Figure 3.6. **Percentage of 8th grade mathematics and science teachers who stated that teaching was their first choice as a career when beginning university, 1999**



Note: Countries are ranked in descending order of the percentage of 8th grade mathematics teachers who stated that teaching was their first choice as a career when beginning university.

Source: Trends in International Mathematics and Science Study, TIMSS 1999.

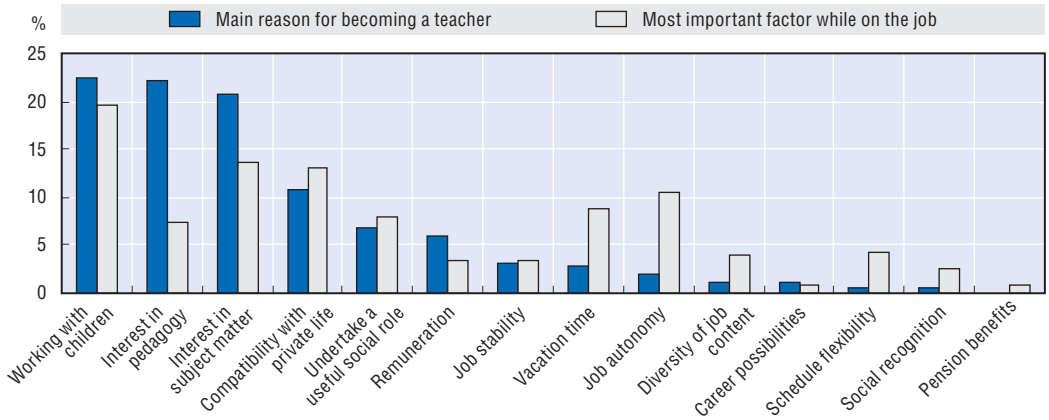
2.2. Reasons for satisfaction and dissatisfaction

Once teachers are embarked on their careers, the intrinsic rewards remain important but other factors assume increasing weight. Compared to those starting in teaching as a career, experienced teachers put greater weight on their personal circumstances, and

identify factors that hinder job satisfaction such as a lack of recognition, inadequate working conditions, and few career prospects.

For example, Figure 3.7 uses a survey of secondary teachers in the French Community of Belgium to contrast their views on the "main reason for becoming a teacher" with the "most important factor while on the job" for current job satisfaction. Intrinsic aspects, namely "working with children" and "interest in subject matter", are dominant factors at both stages of the career, but considerably less so once the teacher is working (*e.g.* about 22% of teachers cite "interest in pedagogy" as the main reason for becoming a teacher while only 7% of the same group cite it as the most important factor while on the job). Those factors more closely related to teachers' personal circumstances become more important once the teacher is on the job. This is the case for "compatibility with private life" (13% of teachers cite it as the most important factor while on the job, while 11% do so as the main reason for becoming a teacher), "vacation time" (9% against 3%), and "schedule flexibility" (4% against 1%). Notably, Figure 3.7 shows that the factors cited least as the "most important factor while on the job" are related to recognition and career opportunities. They include "social recognition" (about 3%), "remuneration" (3%), "pension benefits" (1%) and "career possibilities" (1%).

Figure 3.7. **Main reason for becoming a teacher and main source of current job satisfaction, secondary teachers in the private Catholic grant-aided sector, French Community of Belgium, 1999**

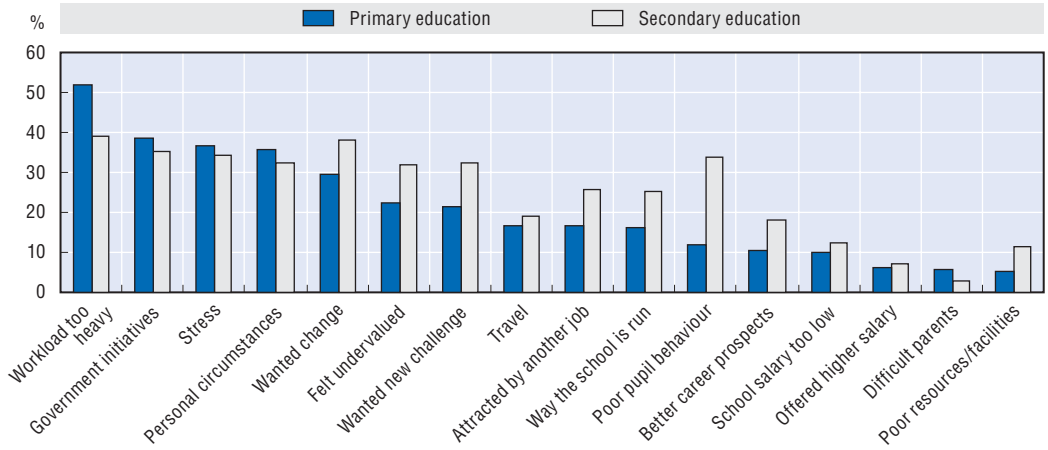


Note: Figures are based on a survey of 3 600 secondary teachers from the private Catholic grant-aided sector in the French Community of Belgium.

Source: Maroy (2002).

The reasons that teachers give for leaving the profession (other than retirement) confirm the pivotal role of working conditions. Figure 3.8 shows that, in England, strenuous working conditions head the list of reasons surveyed teachers give for leaving: "workload too heavy" (among the reasons to leave for 52% of primary teachers and 39% of secondary teachers), "government initiatives" (39% and 35%), "stress" (37% and 34%), and "poor pupil behaviour" (34% in secondary schools). The survey also reveals that career-related factors such as "attracted by another job", "better career prospects", "school salary too low", and "offered higher salary" are of lesser importance. A substantial number of teachers indicate that feeling "undervalued" (22% in primary schools and 32% in secondary schools) has contributed to the decision to leave teaching. Personal circumstances were cited as important by around one-third of the teachers. An interesting pattern which emerges is

Figure 3.8. **Reasons given by teachers for leaving the profession, England, Summer 2002**



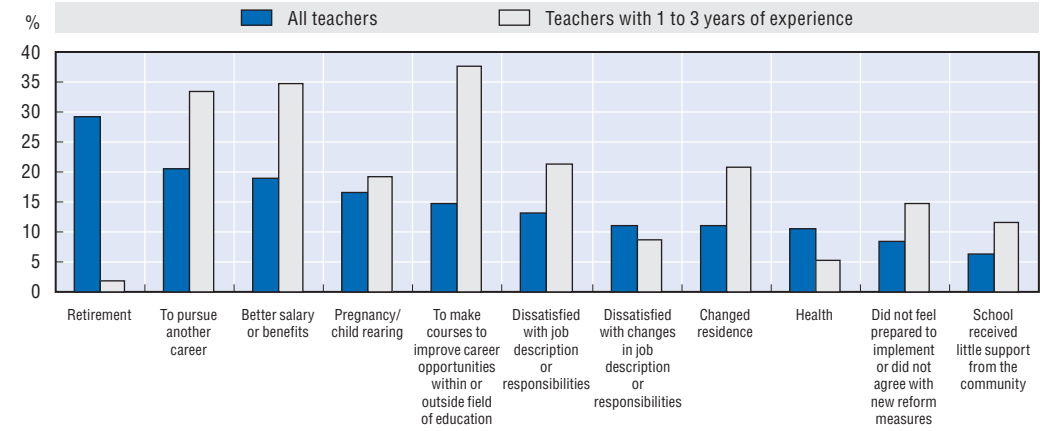
Note: Based on a survey of teachers leaving schools in England during the calendar year 2002 (sample size of 480 teachers for primary education and 530 teachers for secondary education). Retirement or maternity are not considered. Respondents could indicate more than one reason and so figures add up to more than 100%.

Source: Smithers and Robinson (2003).

that secondary teachers give greater weight to career-related factors (*e.g.* "attracted by another job", "better career prospects", "salary too low", "offered higher salary") than do primary teachers, while the latter tend to give greater emphasis to working conditions (*e.g.*"workload too heavy", "government initiatives", "stress").

Figure 3.9 distinguishes among the reasons given by new teachers (one to three years experience) and other teachers for leaving the profession in the United States. Career-related factors such as "to pursue another career", "better salary or benefits" and further study are rated as the top reasons for leaving (excluding retirement) for both groups of teachers, and generally have a greater weight than in the Belgian and English surveys. Personal circumstances (such as "pregnancy or child rearing") emerge as the second most important group, while reasons related to working conditions (such as "dissatisfied with

Figure 3.9. **Percentage of public school teacher *leavers* who rated various reasons as very important or extremely important in their decision to leave the teaching profession, United States, 2000/01**



Source: Luekens *et al.* (2004).

job responsibilities" and "did not agree with new reform measures") are of lesser importance for the United States survey group, although still significant, especially for beginning teachers. A study by the National Center for Education Statistics (1997) based on a comprehensive database of over 40 000 teachers in the United States found that workplace conditions constitute a distinguishing factor between the most satisfied and the least satisfied teachers: "The most satisfied teachers worked in a more supportive, safe, autonomous environment than the least satisfied teachers".

In a study of the sources of job satisfaction in science secondary schools in Chile (Hean and Garrett, 2001), teachers associated most often their satisfaction with interactions with students, relationships held within the school and opportunities to contribute to the development of society, future generations or the individual. Identified sources of dissatisfaction were poor salary, excessive workload, student characteristics, resources and infrastructure.

2.3. Profile of teachers' motivation

In summary, therefore, the intrinsic rewards of teaching play a dominant role in motivating teachers. There is evidence that teachers enter teaching to help young people learn, that their most gratifying reward is accomplishing this goal, and that work-related factors most important to teachers are those that allow them to practise their profession successfully (Frase, 1992). This is in agreement with some studies that suggest that the for-profit or not-for-profit character of the institution is correlated with the degree of intrinsic motivation of employees. Segal *et al.* (1994) found that employees and managers of non-profit firms are more intrinsically motivated than those in profit-oriented firms.

The data also seem to indicate that extrinsic factors become more important once the teacher is on the job. However, the importance of extrinsic factors is likely to appear understated in teacher surveys as a result of the tendency for respondents to provide "socially-desirable" answers and because the surveys' focus is generally on job satisfaction and not job performance, for which extrinsic factors are possibly more influential. Third, a number of factors such as low pay, working conditions, lack of recognition and few career prospects may induce discouragement and prevent motivation from developing.

The review by Johnson *et al.* (2005) supports the view that teachers' decisions to remain in their schools and in teaching are influenced by a combination of the intrinsic and extrinsic rewards that they receive in their work. However, the review brings to light the importance of the interaction between intrinsic and extrinsic rewards. For example, pay can take on increased importance when other working conditions make it difficult to perform well.

This profile suggests that policies to meet the aspirations and enhance the motivation of teachers for performing at their best need to capitalise on intrinsic factors, make appropriate use of extrinsic motivators, and ensure that teachers have good working conditions so that their motivation is maintained.

3. Meeting the aspirations and enhancing the motivation of teachers

This section proposes some strategies to support the motivation of teachers to perform at their best. Four approaches are proposed: *i)* promoting the intrinsic motivation of teachers; *ii)* fostering the "self-motivation" of teachers; *iii)* making a balanced use of extrinsic rewards; and *iv)* meeting the needs of teachers.[2]

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3.1. Promoting the intrinsic motivation of teachers

Intrinsic motivation, which refers to doing something because it is inherently interesting and enjoyable, has long been emphasised in the organisational literature. Not surprisingly there is extensive evidence that it positively affects work outcomes such as performance, job satisfaction, trust, and well-being (Sansone and Harackiewicz, 2000). As seen in the previous section and as consistently emphasised by research evidence, working with children, intellectual fulfilment and making a contribution to society are major factors why people choose to become teachers (Spear *et al.*, 2000, Edmonds *et al.*, 2002 and Thornton *et al.*, 2002).

Meeting teachers' aspirations therefore is, to a great extent, about satisfying their intrinsic motivation. The challenge is to change the job of teaching in ways that capitalise on teachers' intrinsic motivation. This section proposes some policy directions which raise the appeal of teaching as an activity by providing excitement, challenge, variety, and possibilities for professional growth. Other policy directions which are likely to foster intrinsic motivation such as the ones focussed on recognition, support and performance feedback are proposed in Section 3.2.

Transforming teaching into a knowledge-rich profession

In a number of respects, reforms which are in train, or required in teaching, to increase the level of professionalism should help to improve motivation, and might be tailored to this end alongside other objectives. In today's knowledge-based societies, teaching remains largely unchanged as other forms of work have been dramatically transformed. Many other professionals commence their working lives with a sense that they are entering a role that has been shaped by past research and that will be transformed during their working lives by future research. That is an excitement that teaching has not yet offered. However in the teaching profession, there are indications that the resources allocated to professional development amount to only a very small proportion of total expenditure on schools. For example, five days is the common requirement among those countries that specify a minimum amount of teacher participation in professional development activities per year (OECD, 2005). This would be roughly equivalent to less than 2% of total expenditure on schools.

It is essential to provide opportunities for teachers to maintain a research role alongside their teaching role, with teachers engaging more actively with new knowledge, and with professional development focused on the evidence base for improved practice. A good example is action research, a systematic inquiry by practitioners to improve teaching and learning. The products of the inquiry are made public, adding to the knowledge base of teaching and learning, and open to critique by peers. Teachers are in the role of researcher, either studying their own methods of instruction and assessment, examining the cognitive processes of learning or participating in the process of curriculum research and development. Reflective practice encourages teachers to use personal histories, dialogue journals and small and large-group discussions to reflect upon and improve their practice. The use of peer reflective groups and coaching encourages teachers to challenge existing theories and their own preconceived views of teaching, offering ways for teachers to share their expertise and experience more systematically. There is growing interest in ways to build cumulative knowledge across the profession, for example by strengthening connections between research and practice and encouraging schools to develop as learning organisations. This is likely to raise the intellectual excitement teaching can generate and therefore increase the intrinsic motivation of teachers.

Providing more opportunities for career variety and diversification

In most countries opportunities for promotion and new responsibilities are generally limited for teachers who want to stay in the classroom. Promotions generally involve teachers spending less time in classrooms, and therefore diminish one of the major sources of job satisfaction. On average, in 2001, only about 5% of the staff working in upper secondary schools were classified as management personnel, and only 4% were classified as professional support personnel (OECD, 2005). The teaching career could benefit from diversification, which would help meet school needs and also provide more opportunities and recognition for teachers, including those who wish to remain focused on classroom teaching. This is likely to facilitate the satisfaction of the needs for competence and autonomy which were identified by Deci and Ryan (1985) as the factors which enhance the most intrinsic motivation.

The recognition that schools and teachers need to take on a greater range of tasks and responsibilities calls for the creation of roles such as mentor of beginning and trainee teachers, co-ordinator of in-service training, and school project co-ordinator. Such roles could be for fixed periods to enable a wider group of teachers to take part and gain experience. This would also enrich the career experience of teachers by providing a diversity of challenges likely to be beneficial to intrinsic motivation.

On the other hand, in order for teachers to build a career that reflects their developing skills, performance and responsibilities, a performance- and competency-based professional career ladder has attractions. This would strengthen teachers' feelings of competence. Roles associated with extra responsibility include departmental head, team leader, and curriculum and/or personnel development manager. A professional career ladder would be a marked departure from the current model of a teacher's career in most countries, which involves a steady, largely automatic progression for nearly everyone over a very long time scale.

Other policies need to be individually tailored. For instance, school systems need to be proactive in ensuring that schools provide attractive working environments for older teachers. There is likely to be little benefit if older teachers continue working for extended periods because they feel they have to, but many older teachers may want to continue making a contribution. Therefore, programmes aiming at preventing career burn-out and retaining important skills in schools would be beneficial. The elements could include professional development activities tailored to meet the needs of older teachers, reduced classroom teaching hours and reduced hours overall, and new tasks including curriculum development, advising other schools and mentoring beginning teachers.

Integrating professional development throughout the career

Professional growth is a key element for sustaining intrinsic motivation throughout the career. Ensuring it implies that much more attention needs to be focused on supporting teachers in the early stages of their career, and in providing the incentives and resources for ongoing professional development.

Three broad strategies are evident among countries and it would be desirable for a comprehensive approach to include elements of each. The first is entitlement-based, and generally results from collective bargaining agreements that stipulate that teachers are entitled to certain amounts of released time and/or financial support to undertake recognised professional development activities. The second is more incentive-based, linking professional development to needs identified through a teacher appraisal process, and/or recognising participation in professional development as a requirement for taking on new roles. The third

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broad strategy is more school-based, and links individual teacher development with school improvement needs. Effective professional development is ongoing, includes training, practice and feedback, and provides adequate time and follow-up support. Successful programmes involve teachers in learning activities that are similar to ones they will use with their students, and encourage the development of teachers' learning communities.

Professional growth is also promoted by opportunities throughout the career to gain experience outside schools through sabbatical leave, extended leave without pay, and job exchanges with industry. Increasing the mobility of teachers between schools, and between teaching and other occupations, broadens the spread of new ideas and approaches, and results in teachers having more opportunities for diverse career experiences.

3.2. Fostering the self-motivation of teachers

Teachers need to be motivated not only for intrinsically interesting and enjoyable activities but also for all those tasks which, while potentially uninspiring or requiring discipline, are important to promote student learning. In some circumstances intrinsic motivation does not always promote desirable outcomes (Frey, 1997). Intrinsically motivated workers may well be more satisfied at the workplace but not necessarily more productive as a result of concentrating on those tasks which are interesting to themselves in detriment to those which are tedious and monotonous but which are, nonetheless, important for job effectiveness.

This consideration makes the examination of the nature and processes of extrinsic motivation particularly relevant.[3] In this respect, self-determination theory (SDT) is particularly useful. Its originality lies in the differentiation of extrinsic motivation into types which depend on the extent to which an external practice or regulation has been internalised (Box 3.1 provides a description of the theory). Internalisation refers to "taking in" a practice or a regulation and the value that underlies it. The more individuals accept and identify with school arrangements and practices, the more their actions will be self-motivated (or autonomously motivated). This section explores strategies to facilitate the internalisation of extrinsic motivation and strengthen the autonomous motivation of individuals. Intrinsic motivation seems to lead to better performance on tasks that are interesting while autonomous motivation leads to better performance on tasks that are less interesting but that are important and require determination (Koestner and Losier, 2002).

In order to foster teachers' motivation for less-intrinsically interesting tasks, it is imperative to find ways for teachers to identify with the goals and values of external factors which aim at improving student learning. This section proposes some policy directions to address this priority. It concentrates on the areas of school leadership, evaluation and recognition, and the building of a group identity.

Improving leadership and school climate

The research literature provides support for the proposition that autonomy support at the workplace promotes intrinsic motivation and internalisation of extrinsic motivation and leads to positive work outcomes (Baard *et al.*, 2004; Black and Deci, 2000; Deci *et al.*, 1989; Gagné *et al.*, 2000; Ilardi *et al.*, 1993; Kasser *et al.*, 1992; Sheldon and Elliot, 1998; Williams and Deci, 1996). Typically, in these studies, autonomy support is associated with having one's views acknowledged and opportunities for self-initiative, being offered choice and relevant information in a non-controlling way, and benefiting from a meaningful rationale for undertaking tasks.

Box 3.1. **Self-determination theory and the motivation continuum***

Self-determination theory (SDT) provides a framework to distinguish between different types of work motivation. Its crucial aspect is the proposition that extrinsic motivation can vary in the degree to which it is autonomous versus controlled (the self-determination continuum). According to SDT, extrinsic motivation can result purely from external regulation or from various degrees of the internalisation of a regulation:

- *External regulation* motivates behaviour on the basis of contingencies external to the person. When externally regulated, people act with the intention of obtaining a desired consequence or avoiding an undesired one, and do not internalise the regulation.
- *Internalisation* of a regulation is defined as people taking in values, attitudes, or regulatory structures, such that the external regulation of a behaviour is transformed into an internal regulation and thus no longer requires the presence of an external contingency. SDT posits a controlled-to-autonomous continuum to describe the degree to which an external regulation has been internalised. The more fully it has been internalised, the more autonomous will be the subsequent, extrinsically motivated behaviour. According to SDT, internalisation is an overarching term that refers to three different processes:
  - *Introjected regulation*, leading to moderately controlled motivation, is a regulation that has been taken in by the person but has not been accepted as his or her own. With this type of regulation, it is as if the regulation were controlling the person. Examples of introjected regulation include contingent self-esteem, which pressures people to behave in order to feel worthy, and ego involvement, which pressures people to behave in order to strengthen their fragile egos.
  - With *identified regulation*, people feel greater freedom and volition because the behaviour is more congruent with their personal goals and identities. They perceive the cause of their behaviour to reflect an aspect of themselves.
  - With *integrated regulation*, people have a full sense that the behaviour is an integral part of who they are, that it emanates from their sense of self and is thus self-determined. It is the fullest type of internalisation, allowing extrinsic motivation to be truly autonomous or volitional and involves the integration of an identification with other aspects of oneself – that is, with other identifications, interests and values.

Intrinsically motivated behaviour, which is propelled by people's interest in the activity itself, is prototypically autonomous. Integrated or identified regulation do not, however, become intrinsic motivation but are still considered extrinsic motivation (albeit an autonomous form of it) because the motivation is characterised not by the person being interested in the activity but rather by the activity being instrumentally important for personal goals.

* This box is based on the description provided in Gagné and Deci (2005).

As an example, Deci *et al.* (1994) found that a meaningful rationale for undertaking an uninteresting task as well as reflecting people's feelings of finding an important activity uninteresting facilitated integration of the values of the associated regulations. They also found that an emphasis on choice rather than control led to greater internalisation. Further, the field experiment by Deci *et al.* (1989) revealed that training managers to maximise subordinates' opportunities to take initiative and acknowledge their perspectives led subordinates to become more trusting of the organisation and to display more positive work-related attitudes. For the teaching profession, a study by Blase and

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Blase (1994) shows that when principals effectively used shared governance strategies and participatory management, teachers felt motivated and their sense of ownership and empowerment increased.

School principals and other leaders are the key influence in providing support to teachers. They can help to foster a stimulating and supportive school culture, as well as help to buffer teachers against mounting and sometimes contradictory external pressures (Mulford, 2003). Skilled leaders can help foster a sense of ownership and purpose in the way that teachers approach their job, provide professional autonomy to teachers and help teachers achieve job satisfaction and continue to develop professionally.

School leadership is therefore a priority. This involves improved training, selection and evaluation processes for school leaders, upgraded support services, and the provision of more attractive compensation packages. A key requirement is that principals and other school leaders be trained and supported in conducting teacher evaluations and linking this to professional development planning. Training of school leaders should emphasise shared leadership strategies, participatory management, openness to teachers' initiatives and the ability to acknowledge teachers' views. Given the range of responsibilities that principals have, it is important that there be a leadership team in each school to share the load and ensure effective delivery. This would enable the principal to focus on educational leadership for improving learning and teaching of students and staff, rather than concentrating mainly on administrative tasks.

Evaluating and recognising effective teaching

A number of studies have also highlighted the importance of feedback on performance to the internalisation of extrinsic motivation (Deci *et al.*, 1975; Deci *et al.*, 1989; Ryan, 1982). Frase and Sorenson (1992), in a survey of San Diego School District teachers, found feedback to be the factor most strongly related to job satisfaction. Similarly, Frase (1992) identifies recognition and feedback as important motivators for teachers and calls for the use of evaluation as a vehicle for teachers' professional growth and improvement.

When teachers receive no or little feedback it risks sending an implicit message that their work is not important. Regular appraisal should be considered as an integrated, routine part of professional life. There needs to be a stronger emphasis on teacher evaluation for improvement purposes (*i.e.* formative evaluation). This can be low-key and low-cost, and include self-evaluation, informal peer evaluation, classroom observation, and structured conversations and regular feedback by the principal and experienced peers. Designed mainly to enhance classroom practice, such appraisal would provide regular opportunities for teachers' work to be recognised and celebrated, and help both teachers and schools to identify professional development priorities.

It is important for individual teacher appraisal to occur within a framework provided by profession-wide agreed statements of teachers' responsibilities and standards of professional performance. Principals and other senior colleagues need to be trained in evaluation processes (and to be regularly evaluated themselves), and schools need to have the resources to meet identified needs in teachers' professional development. Evaluation frameworks and tools would assist principals and other senior staff, and also help teachers to better prepare for assessment – and to benefit from it.

A key part of any general strategy must involve reminding teachers that they are highly skilled professionals doing important work. This can be reinforced with general

campaigns in the media to enhance the image of the profession by highlighting its importance for the nation as well as its sophistication and complexity, and the intellectual excitement it can generate.

Building a group identity among teachers

There is also evidence that the need for identification with a group is key to internalisation of values and regulations as it fosters feelings of relatedness. This is the basis for a recent theory of work motivation proposed by Ellemers *et al.* (2004) which suggests that individuals' strong identification with a group facilitates their motivation in accord with the group's goals and in turn facilitates the group's performance. This led some authors (van Knippenberg and van Schie, 2000 and Wall *et al.*, 1986) to suggest that structuring work to allow interdependence among employees and identification with work groups, as well as being respectful and concerned about each employee, may have a positive effect on self-motivation and work outcomes.

Providing schools with more responsibility for teacher personnel management (teacher selection, working conditions and development) is critical for building a school identity. School leaders would actively seek out the teachers that better fit the particular needs of their schools. It would also be important for teacher selection to be organised with a more direct interaction between schools and candidates through personal interviews and visits to schools. This is likely to improve the match between applicants and school needs and help shape a school identity with which teachers identify.

School leaders can also foster group identity by introducing shared leadership and encouraging collegiality. Opportunities for team work, facilities which encourage teachers' presence in schools, and a culture of sharing and peer reviews would also contribute for developing teachers' sense of belongingness. In addition, the creation of institutions such as Teaching Councils would help strengthen the professional identity of teachers, raise the status of the profession and complement the role of the unions in bringing teachers together.

3.3. Making a balanced use of extrinsic rewards

This section continues the discussion on the nature and processes of extrinsic motivation by focussing on the role of extrinsic rewards. These appear to be potentially effective for raising motivation for unexciting and routine tasks and, if introduced with the appropriate context, should also raise motivation for inherently interesting activities (Grolnick and Ryan, 1987; Komaki, 1982; McGraw, 1978). Supervisors cannot always rely on the intrinsic motivation of individuals to encourage job performance. This is so because many of the tasks that supervisors want employees to perform are not inherently appealing, and an essential strategy to foster job performance includes promoting more active and non-controlling forms of extrinsic motivation.

However, extrinsic rewards can, under certain conditions, undermine intrinsic motivation and can thus be detrimental for job performance and satisfaction (Deci *et al.*, 1999). The challenge for policy is therefore to carefully introduce extrinsic rewards for raising motivation for certain tasks in such a way that intrinsic motivation is not undermined. This section proposes some policy approaches to address this challenge. It concentrates on the diversification of rewards, their closer linkage to acknowledged performance, their introduction in a flexible manner and the equitable treatment of individual teachers.

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Diversifying rewards with a focus on intrinsic domains

Research shows that extrinsic motivators can be successfully introduced in many circumstances. Several studies have provided evidence that incentives can promote effort and performance (Gibbons, 1997; Lazear, 2000; Cameron *et al.*, 2001), including in teaching (Harvey-Beavis, 2003; Santiago, 2004). Given the dominance of intrinsic factors in motivating teachers, one promising strategy is to grant rewards in areas likely to foster the intrinsic motivation of teachers.

Teachers' extrinsic rewards are generally limited to salaries, allowances, leave benefits and future pension benefits. Rewards could be diversified to include time allowances, sabbatical periods, fee support for post-graduate courses, or opportunities for ongoing professional development activities as ways of recognising the work of teachers. These rewards create extra possibilities for professional growth, with potential benefits for intrinsic motivation. In addition, the level of teachers' compensation is typically associated only with qualifications, school sector and years of experience. It could prove useful to more closely relate incentive structures to the given responsibilities teachers take on in schools (*e.g.* middle management, department head), providing a more transparent means to acknowledge the contribution of teachers.

Linking rewards to performance to acknowledge effective performance

According to Frey (1997), extrinsic rewards undermine intrinsic motivation when the external intervention is perceived by individuals to be controlling. By contrast, when the intervention is understood to provide positive feedback, intrinsic work motivation is unaffected or may even rise. When the reward is contingent on performance, extra risk exists that intrinsic motivation is undermined by rewards. For instance, Deckop and Cirka (2000) found that the introduction of merit-pay programmes in a non-profit organisation led to decreased feelings of autonomy and intrinsic motivation. However, the effect depends on the context and the way rewards are being applied. For example, the interpersonal climate within which rewards are administered has a significant influence on the rewards' effects. Ryan *et al.* (1983) found that participants who received performance-contingent rewards administered in an autonomy-supportive climate evidenced higher intrinsic motivation than a control group that received no rewards and no feedback, while those who received performance-contingent rewards administered in a controlling climate evidenced lower intrinsic motivation than the same control group.

Hence, linking rewards to performance needs to be introduced in a supportive climate in such a way that it is perceived to provide positive feedback. Although the principal focus of formative assessment is on teacher improvement, it can also provide a basis for rewarding teachers for exemplary performance. For example, outstanding performance and contributions could enable teachers to progress two salary steps at once. It could also be acknowledged with non-monetary rewards such as the ones mentioned above (*e.g.* sabbatical periods, opportunities for school-based research).

Building a closer linkage between evaluation and reward, though, needs to ensure that the measures used to assess teacher performance are broadly based to reflect school objectives, and take account of the school and classroom contexts in which teachers are working. Evaluation procedures need to be agreed with the teaching profession along the lines described in Section 3.2. It may be more effective in some contexts to focus on group recognition and rewards at the school or grade level rather than individual teacher rewards

(Lavy, 2002). Research on the relationship between teacher performance and reward is difficult and there are few reliable studies (Harvey-Beavis, 2003). The limited evidence suggests that there are some benefits from group-based performance pay programmes, but less so from individual performance pay programmes.

Making reward mechanisms more flexible

Extrinsic rewards are often effective in raising motivation in non-intrinsic domains. An example is provided by compensating teachers for working in schools in more difficult or remote areas. Some systems use administrative rules that require teachers to spend designated periods of time in particular types of schools before they are eligible for promotion or more favoured locations; others require teachers to change schools periodically. Given that there could be concerns about motivation of teachers being required to work in certain locations rather than choosing to do so, the incentive structure needs to be used in a more flexible manner. For instance, substantial salary allowances for teaching in difficult areas and transportation assistance for teachers in remote areas could compensate teachers for working in more difficult conditions, raising their motivation and ensuring that all schools are staffed with teachers of similar quality. Also worthy of attention are non-salary strategies, such as lower class contact times or smaller classes, for schools in socially difficult areas or which have particular educational needs.

Ensuring an equitable treatment of individual teachers

There is evidence that rewards must be perceived as equitable in order not to be detrimental to motivation (Adams, 1963).[4] An example is the extent of differentiation made between the individuals. As described by Frey (1997), the more uniform the provision of external rewards, the more negatively affected are those individuals who have above-average work morale. They feel that their contribution is not recognised by supervisors and therefore might adjust their intrinsic motivation downwards.

In most countries teachers with similar qualifications and experience who are working at a given level of schooling (primary, upper secondary and so on) are paid according to a single salary scale regardless of the working conditions they face or whether they carry additional responsibilities. This raises concerns about the potential inequitable treatment of teachers. Moving to a different concept of equity of teachers' compensation, there could be benefits to introducing differential compensation to account for the specific conditions teachers face and the additional tasks for which they are responsible. This can be achieved, as suggested earlier, by offering special allowances or aligning compensation with roles played in school.

Systems in which teachers' rewards are related to reviewed performance need to ensure that such schemes are perceived as fair by teachers and are endorsed by the teaching profession. Priority should be given to the development of fair and reliable indicators, clear assessment criteria, and training programmes for evaluators, while ensuring that assessment measures take account of the contexts in which teachers are working.

3.4. Meeting the needs of teachers

In order for motivation to develop and persist, a number of needs must be met. Dissatisfaction occurs when given factors such as pay, working conditions (*e.g.* class size, workload, student discipline, availability of teaching materials), job security, and school climate are perceived by teachers as provided at inappropriate levels. These are called "hygiene factors" in the motivation theory of Herzberg (1966), which defines them as the

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factors which do not necessarily lead to higher motivational levels but may induce discouragement and prevent motivation from occurring. Herzberg distinguishes between the "motivator factors" (the intrinsic factors such as growth, achievement, responsibility and recognition) which are the primary cause of satisfaction, and the hygiene factors which are the sources of potential unhappiness on the job. As shown in Section 2.2, teachers often identify these factors as leading them to leave teaching.[5]

It is essential that teacher policy ensures that teachers are provided with appropriate working conditions so that their motivation in schools is not undermined. The following policy priorities address this concern.

Improving teaching's salary competitiveness

Although the data are somewhat limited, the general picture is that teachers' salaries relative to those in broadly comparable occupations have declined in most countries since the early 1990s (OECD, 2005). Although other aspects of teachers' employment conditions, such as vacations, relative job security and pensions, are often more generous than in other occupations, teachers' total compensation package is probably less competitive than it once was. It is therefore important to ensure that teachers' purchasing power does not further erode. Improving teaching's general salary competitiveness is also likely to improve its appeal to males and members of minority groups who are currently under-represented in the profession.

Providing flexible employment conditions

In today's societies it is becoming increasingly difficult to reconcile a professional career with other activities. Teaching will improve its competitiveness as a career choice if it is able to provide flexible conditions of employment. Employers are increasingly recognising the need to provide workers with a good work-life balance and opportunities to combine work with family responsibilities and other activities. Increasing the opportunities for part-time teaching could increase its appeal, as could opportunities to take leaves of absence while keeping acquired benefits or to gain experience outside schools through sabbatical leaves.

Improving working conditions

Teachers' workload has traditionally been conceived in terms of classroom teaching hours. Yet class teaching time is actually only one aspect of a complex job profile. The lack of explicit recognition of the wide variety of tasks that teaching actually entails can create stress through uncertainty about who is responsible for what, and add to workload because adequate resources are not always made available. The breadth and complexity of teachers' roles and responsibilities need to be explicitly recognised in job profiles.

On occasions the lack of support staff and adequate school facilities means that teachers are over-worked. Teachers often lack their own offices or work areas, and do not have access to information technology or to facilities to ensure that collaborative work is productive. Schools are complex organisations, and many different tasks are involved in delivering quality education. Well-trained professional and administrative staff can help to reduce the burden on teachers and free them to concentrate on the tasks of teaching and learning, and helping young people to develop, for which teachers are specially trained and from which they derive great job satisfaction. Better facilities at schools for staff preparation and planning would also help considerably in building collegiality and in programme provision.

Improving entrance conditions for new teachers

Policies to encourage more people to enter teaching are unlikely to pay off if high-quality candidates find it hard to gain teaching posts. The best candidates, who are likely to have good job prospects outside teaching, may not be willing to wait in a lengthy queue or to endure a succession of short-term teaching assignments in difficult schools. Well-structured and resourced programmes of induction for new teachers are critical in these cases. Reducing the weight given to seniority in ranking applicants for teaching vacancies will also help reduce the risk of new teachers being disproportionately assigned to difficult schools.

4. Conclusion

Education policy-makers, school leaders and the teaching profession face the challenge of motivating teachers to high levels of performance. This chapter proposes possible policy directions to respond to this challenge. The analysis stresses that motivation underpins the success of both teachers' work and the introduction of any renewal in schools. The central message that emerges is that policy needs to ensure that teachers' actions are self-motivated, resulting from their acceptance of and identification with the values and objectives of practices and regulations in schools.

This chapter proposes four main directions to improve teachers' performance, satisfaction and well-being: *i)* promoting the intrinsic motivation of teachers; *ii)* fostering the self-motivation of teachers; *iii)* making a balanced use of extrinsic rewards; and *iv)* meeting the needs of teachers for good working conditions. These imply bringing greater challenge and variety to teaching, ensuring opportunities for professional growth, offering constructive performance feedback, involving teachers in decision making and helping build a strong sense of professional identification and worth. This approach will only be successful, however, if policy ensures that teacher motivation is not damaged by poor working conditions.

Although attractive compensation packages are important in improving teaching's appeal, teacher policy needs to address a lot more than pay. Teachers place a lot of emphasis on the quality of their relations with students and colleagues, on feeling supported by school leaders, on good working conditions, and on opportunities to develop their skills. There needs to be a stronger emphasis on teacher evaluation for improvement purposes which would provide opportunities for teachers' work to be recognised and celebrated and help both teachers and schools to identify professional development priorities.

The analysis also suggests that the teaching career can benefit from greater diversification, which would help meet school needs and also provide more opportunities and recognition for teachers. Greater emphasis on school leadership would help address the need for teachers to feel valued and supported in their work. In addition, well-trained professional and administrative staff can help reduce the burden on teachers; better facilities for staff preparation and planning would help build collegiality; and more flexible working conditions, especially for more experienced teachers, would prevent career-burnout and retain important skills in schools.

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Notes

1. Northwest Regional Educational Laboratory (2001) draws implications for the teaching profession from the work motivation research literature.
2. Many of the approaches proposed in this section are already in place or currently being implemented in a number of countries. Country initiatives are documented in OECD (2005).
3. Extrinsic motivation, in contrast to intrinsic motivation, requires a connection between the activity and some separable consequences, so that satisfaction comes not from the activity itself but rather from the consequences to which the activity leads, such as praise, status or money (Gagné and Deci, 2005).
4. Equity theory (Adams, 1963) establishes that individuals lose motivation if they do not perceive that they are justly compensated for their efforts and accomplishments and in relation to the rewards and efforts of others. If employees perceive that an inequity exists, they are likely to adapt their behaviour – by trying to improve their level of rewards or by reducing the amount or quality of their work – to bring the situation into better balance.
5. For an account of the effect of these factors on teacher supply behaviour, see Santiago (2004).

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Chapter 4

Improving Learning through Formative Assessment

Summary

This chapter examines how formative assessment – frequent, interactive assessments of student understanding and progress to identify learning needs and shape teaching – can help countries realise both quality and equity in educational outcomes. Between 2002 and 2004, the OECD examined formative assessment policy and practice in exemplary classrooms in lower secondary schools in eight systems (Australia [Queensland], three Canadian provinces, Denmark, England, Finland, Italy, New Zealand and Scotland). *Formative Assessment: Improving Learning in Secondary Classrooms* (OECD, 2005) also included reviews of English-, French- and German-language literature on formative assessment.

Each of the case study countries has made important strides in advancing the practice of formative assessment. They are motivated by quantitative and qualitative evidence that teaching which incorporates formative assessment has helped to raise levels of student achievement, and has better enabled teachers to meet the needs of increasingly diverse student populations, helping to improve the equity of student outcomes.

While each of the countries participating in the study has policies to promote the wider practice of formative assessment, policy can do more. Countries that use a mix of approaches and make important investments in promoting change and building capacity are likely to push changes much further.

There is *legislation* promoting and supporting the practice of formative assessment and establishing it as a priority. There are efforts to encourage *the use of summative data for formative purposes*. *Guidelines* on effective teaching and formative assessment have been embedded in the national curriculum and other materials. The *provision of tools and exemplars* supports effective formative assessment. Investments in *special initiatives and innovative programmes* incorporate formative assessment approaches. There is also *teacher professional development* for formative assessment. All education systems will need to strengthen the policy mix and to make deeper investments if they are to promote real changes in teaching and assessment throughout education systems.

Countries will also need to better align macro- and micro-level policy approaches. At the most basic level, alignment means that education stakeholders ensure that policies do not compete with each other. At a more sophisticated level, the elements of formative and summative assessment reinforce each other. More consistent use of formative assessment throughout education systems may help stakeholders address the barriers to its wider practice in classrooms.

Improving Learning through Formative Assessment

1. Introduction

In all OECD countries, high-quality and high-equity educational outcomes are considered key to social and economic mobility and to supporting a modern economy. These complementary goals of high-quality and high-equity underpin OECD education research and policy reviews. This chapter examines how formative assessment – frequent, interactive assessments of student understanding and progress to identify learning needs and shape teaching – can help countries progress toward these goals by helping all students succeed to higher standards.

In recent years, as policy and research strive to better understand and support classroom practice, formative assessment has become a prominent issue in education reform. Between 2002 and 2004, the OECD examined policy and practice in exemplary classrooms in lower secondary schools in eight systems (Australia [Queensland], three Canadian provinces, Denmark, England, Finland, Italy, New Zealand and Scotland). The study focussed on lower secondary schooling because barriers tend to be felt most acutely at that level, compared with primary and upper secondary cycles. *Formative Assessment: Improving Learning in Secondary Classrooms* (OECD 2005) also included reviews of English-, French- and German-language literature on formative assessment.

This chapter draws upon findings from the OECD study. It describes policy foundations for promoting formative assessment and suggests policy principles to address barriers and encourage wider use. Teachers in the OECD case study schools integrated formative assessment into their teaching practice, systematically using assessment to track student understanding and adjust teaching. The chapter describes the elements of formative assessment identified in these schools and supported in international empirical research. In response to concerns that formative assessment may be too resource-intensive and time-consuming, the chapter describes how teachers in case study schools addressed large classes, extensive curriculum requirements, challenging students and other logistical issues. The chapter also describes how school leaders supported change and innovation.

System-wide changes in teaching and assessment require strong policy leadership and support, and the case study systems have developed a range of approaches to promoting the practice of formative assessment. The chapter describes the range of policies, and suggests ways to further strengthen policy and address barriers. It concludes with a discussion of research needs in the field.

2. Why formative assessment?

Education policy across OECD countries is increasingly premised on the idea that schools should help *all* children to meet high academic standards, rather than to identify and support students identified as the "best and the brightest". Schools may be held

accountable for results as measured on high-visibility examinations, school inspections, evaluations, and/or self-monitoring.

All the national and regional governments participating in the OECD study promote formative assessment as a means to meeting the goals of lifelong learning. They are motivated by quantitative and qualitative evidence that teaching which incorporates formative assessment has helped to raise levels of student achievement, and has better enabled teachers to meet the needs of increasingly diverse student populations, helping to close gaps in equity of student outcomes.

In their influential review of the English-language literature on formative assessment, Black and Wiliam (1998) concluded that the gains in achievement associated with formative assessment were "... among the largest ever reported for educational interventions". Several studies cited in the review also show that formative methods may be especially effective in helping underachieving students to succeed. While there is a need for further research in this area, with special attention to race, class, and gender, it is also worth noting that several of the OECD case study schools with large percentages of "disadvantaged" students had moved from "failing" to exemplary status over the past several years. Case study schools featuring programmes specifically targeted to the needs of underachieving students also yielded positive results.

3. Formative assessment and evaluation to improve the performance of systems

While the results of formative assessment in research and practice in exemplary schools are encouraging, there are still major barriers to wider practice, including:

- Perceived tensions between formative assessments and highly visible summative tests designed to hold schools accountable for student achievement (teachers often teach to these summative tests and examinations).
- A lack of coherence between the range of different evaluations and assessments undertaken at the policy, school and classroom levels.
- Fears that formative assessment is too resource-intensive and time-consuming to be practical.

The principles of formative assessment may be applied at both school and policy levels to identify areas for improvement and to promote effective and constructive cultures of evaluation throughout education systems. More consistent use of formative assessment throughout education systems may help stakeholders address barriers to its wider practice in classrooms.

Note that, for the purposes of this study, the term *assessment* is used to refer to judgments of student performance, while *evaluation* refers to judgements of programme or organisational effectiveness. In all cases, the use of data to inform teacher planning of future classroom activities or to inform and adapt policies at the national level might be considered secondary levels of formative assessment. (See Allal and Mottier Lopez in OECD [2005], for the distinction between primary use of formative assessment which directly benefits the students assessed and secondary uses which foster broader transformations of instruction.)

Ideally, information gathered in assessments and evaluations should be used to shape strategies for improvement at each level of the education system. At the classroom level, teachers gather information on student understanding and adjust teaching to meet

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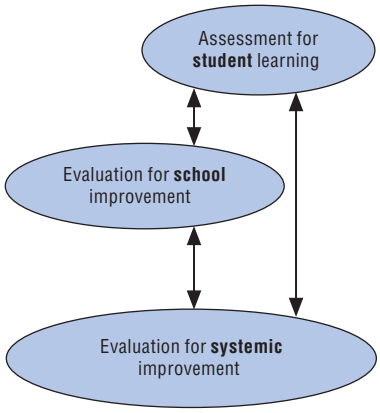
identified learning needs. At the school level, school leaders use information to identify areas of strength and weakness across the school and to develop strategies for improvement. At the policy level, officials use information gathered through national or regional tests, or by monitoring school performance, to guide investments in training and support for schools and teachers or to set broad priorities for education.

Policies that link a range of well-aligned and thoughtfully developed assessments at the classroom, school and system levels will provide stakeholders with a better idea of how well they are achieving objectives. Policy and school leaders and teachers will have a solid basis on which to make improvements, and will broaden teaching as well as policy repertoires.

Figure 4.1. **Co-ordinating assessment and evaluation**



4. Formative assessment in practice

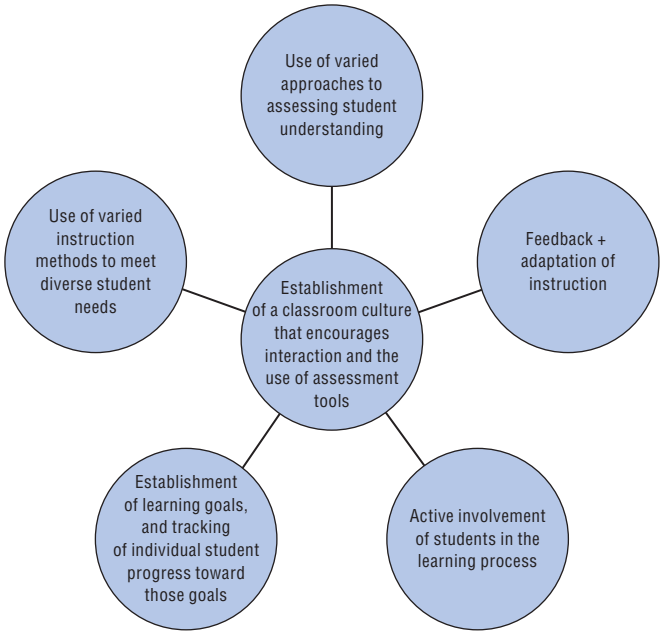
Many teachers already incorporate aspects of formative assessment in their practice, regularly interacting with students and adjusting teaching to meet identified student needs. But, as teachers in several of the OECD case study schools acknowledged, prior to establishing formative assessment as an overall framework for teaching, their own use of formative methods had been somewhat haphazard.

It should be noted that the case study countries do not all use the technical term, "formative assessment", nor do they share a common definition. The cases were therefore chosen using a broad set of criteria, to include schools and classrooms where teachers were using co-ordinated teaching and assessment strategies to respond to student predispositions, learning styles, skills, interests, and/or motivations, and to help all students learn to high standards.

The key elements that emerged from the case studies and related research are:

1. Establishment of a classroom culture that encourages interaction and the use of assessment tools.
2. Establishment of learning goals, and tracking of individual student progress toward those goals.
3. Use of varied instruction methods to meet diverse student needs.
4. Use of varied approaches to assessing student understanding.
5. Feedback on student performance and adaptation of instruction to meet identified needs.
6. Active involvement of students in the learning process.

Figure 4.2. **The six key elements of formative assessment**



Source: OECD, 2005.

The case study findings are consistent with elements identified in English- and French-language literature reviews included in the OECD study on formative assessment (OECD, 2005; also see Black and Wiliam, 1998).

What is most striking about the case study findings is that in all cases, teachers had incorporated each of the six elements into regular practice. While teachers may have emphasised different elements (for example, some teachers placed greater emphasis on providing students with feedback while other teachers were more focused on providing students with a variety of learning opportunities), they used each of these elements to shape teaching and assessment. Teachers thus created a framework, language and tools, using the elements of formative assessment to shape their approach to teaching and learning.

Across the case study schools, teachers referred to research as they built their facility with formative assessment. They paid particular attention to how they were using formative approaches and the impact of new methods on student learning. Formative approaches spurred teachers' interest in exploring learning theories in more depth, and in experimenting with new teaching methods. Many said they had made fundamental changes in their approaches to teaching – in their interactions with students, the way they set up learning situations and guided students toward learning goals, even in the way they thought about student success.

4.1. Element 1: Establishment of a classroom culture that encourages interaction and the use of assessment tools

Teachers in the OECD study have changed the culture of their classrooms, placing emphasis on building self-confidence and helping students to feel safe taking risks and making mistakes. Teachers interact frequently with individual students or small groups and involve students in the assessment process, providing them with tools to judge the quality of their own work.

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Teachers who understand their own cultural preconceptions and allow students to express their own identities and cultures in classrooms may be better able to meet a diversity of learning needs. For example, in response to school disparities in levels of student achievement, the New Zealand Ministry of Education has developed *Te Kauhua* and *Te Kotahitanga*, two professional development and research programmes for teachers of Maori students in mainstream education. Involvement in these programmes has allowed teachers at Waitakere College in Auckland, New Zealand, to participate in conferences with parents from the Maori community, and to hear parent views and perceptions of relationships between teachers and students and the role of culture.

While the *Te Kauhua* and *Te Kotahitanga* programmes were designed to meet the needs of a specific group, their principles are generally relevant to educators, particularly as classrooms in many OECD countries are increasingly diverse. (See, for example, Shields, Bishop and Mazawi's exploration of common issues in education for Navajo, Maori and Bedouin communities [Shields *et al*., 2004].)

4.2. Element 2: Establishment of learning goals and tracking of individual student progress

Typically, teachers using formative assessment make the learning process more transparent by establishing and communicating learning goals, tracking student progress and, in some cases, adjusting goals to better meet student needs.

Several OECD countries have established general standards for student achievement to provide equivalent education across regions and within schools. National or regional standards are often quite broad, so teachers in several of the case study schools worked together to define the standards in more detail, developing and sharing criteria with colleagues and students and designing new internal systems to track individual student progress.

While it is not a universal practice, the majority of teachers interviewed for the OECD case studies regularly share learning goals, criteria and standards with students. They may also engage students in a discussion of what the criteria for a quality piece of work should include, and may provide examples of exemplary work. This makes the learning process much more transparent; students do not need to guess what they need to do to perform well.

Teachers using formative assessment focus attention on the task and on progress toward learning goals, rather than on the student's ability *per se*. Several studies show the value of this approach, noting that low achievers tend to attribute failure to low ability, rather than lack of effort. Children develop ideas about their abilities and possibilities early in life (see Skaalvik, 1990; Siero and van Oudenhoven, 1995; Vispoel and Austin, 1995; Black and Wiliam, 1998). Teachers using formative assessment can help students develop a collection of skills and strategies for learning that they can master over time, building their skills for "learning to learn".

Teachers often find that comments are more effective than marks for improving student performance and helping all students to reach high standards. It is not always easy, however, to drop or decrease the frequency of marks. Sometimes students and their parents prefer to know how they are doing relative to other students.

Teachers in several of the case study schools keep graphs and tables to track students' acquisition of knowledge and their ability to comprehend, analyse, synthesise, and express themselves. At the Testoni Fioravanti school in Bologna, Italy, teachers keep booklets on each student's progress. During class council discussions, they are able to compare their

assessments of how students are doing with other teachers. These discussions among teachers and their use of tracking tools help them ensure that they are treating students equitably. Teachers also help students to track their own progress over time and to build self-confidence.

In the schools visited in Italy, teachers had mixed reactions to the idea of sharing criteria for performance with their students. Some teachers fear that establishing criteria might stifle students' creativity, that if students are given a set of criteria, they might adhere strictly to them and not develop their own ideas. Teachers in England and New Zealand also had mixed reactions on whether they should provide students with exemplars, fearing that students might stick too closely to the model without exploring ideas for themselves. Several teachers agreed that it is acceptable to share exemplary work products so long as students do not have too much time with them.

4.3. Element 3: Use of varied instruction methods

To meet a range of student needs, teachers ensure that lessons include different approaches to explaining new concepts, provide options for classroom work, and encourage students who have grasped a new concept to help their peers.

Variety is also stimulating. Students at Our Lady's College in Brisbane, Queensland, Australia, suggested that lessons with a variety of activities help them to learn – as long as teachers stick to the point. The students also reported that teachers give more time to those who need help, but that "brainy" people are still given time and made to think.

The Tikkakoski School in rural Finland provides several optional courses which students say they appreciate. Teachers at this school can fast-track students who are doing very well or provide extra help for students who need it. Students with severe difficulties in a subject get extra help. (It is important to note that in the case study schools where students were provided with options for advanced or remedial work, these were merely options for extra study; students were not streamed, and worked in heterogeneous settings the majority of their time at school.)

4.4. Element 4: Use of varied approaches to assessing student understanding

Teachers use a mix of approaches to assess student understanding. They may use diagnostic assessment when students first enter the school or at specified times during the school term. During classroom interactions, they most often use sophisticated questioning techniques. Questions regarding causality, such as open-ended "why" questions, often reveal student misconceptions. At Lord Williams's School in Oxfordshire County, England, teachers in the science department discovered that a very good task to uncover students' misconceptions was to pose a question about causality in a process they are just learning about. Teachers found, for example, that when asked what would happen if chlorophyll stopped working, students commonly thought that all the world would be dark.

Varied approaches to assessing student understanding may also involve gathering a range of teacher viewpoints and opinions on individual student performance in order to avoid bias. Teachers may vary in their interpretation and application of the same performance criteria, either among themselves or with different students or classes (Kellaghan and Madaus, 2003). They may also develop impressions regarding students early in the year based on incomplete information or stereotypes. Teachers are often more likely to give higher marks to students who are more like themselves. Alternatively,

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teachers may make negative judgements of students from different cultural backgrounds, or with different communication styles. Teachers' personalities and characteristics, or their varying expectations of different students, may also influence student performance (Airasian and Abrams, 2003). To avoid such biases, teachers at the Statens Pædagogiske Forsøgscenter School (SPF) in Copenhagen, Denmark, discuss the interpretation of student results in teams. These teachers noted that the quality of their assessments has improved and they are able to bring potential biases to light.

4.5. *Element 5: Feedback and adaptation of instruction*

Feedback is vital to formative assessment, but not all feedback is effective. Good feedback should be tied to explicit criteria regarding expectations for student performance, making the learning process more transparent, and modelling "learning to learn" skills for students. Feedback needs to be timely and specific, including suggestions for ways to improve performance. It can help teachers decide how to best adapt teaching to meet individual student needs.

In their review of the English-language literature on formative assessment, Black and Wiliam (1998) identified a number of studies supporting this approach. For example, "ego-involving" feedback (even in the form of praise), rather than feedback on the task at hand, appears to have a negative impact on performance (Boulet *et al.*, 1990). Black and Wiliam note that the results of these controlled studies are consistent with literature showing that praise can actually have a negative effect for low-achievers (Black and Wiliam, p. 13), Students also obtain better results when they are working toward process goals rather than product goals (Schunk, 1996). Grades may actually undermine the positive help of specific feedback on tasks (Butler, 1995).

Teachers at Rosehill College in Auckland, New Zealand noted that they plan lessons carefully in order to create time to talk with students individually during the lesson, making time to provide spontaneous feedback, which they find is often best. Rosehill teachers also commented that, rather than giving students direct feedback, they often suggested that students research information in their textbook, look for information on the Internet or look at exemplars produced by their peers.

4.6. *Element 6: Active involvement of students*

One very important goal of formative assessment is the development of students' own "learning to learn" skills. The student who has an awareness of how he or she learns is better able to set goals, develop a variety of learning strategies, and control and evaluate his or her own learning process. As evidence of this, the OECD's Programme for International Student Assessment (PISA) found in 2000 that:

> "… Within each country, students who use… [metacognitive and control strategies] more frequently tend to perform better on the combined PISA reading literacy scale than those who do not (although whether the learning strategies cause the better results cannot be established). … Schools may need to give more explicit attention to allowing students to manage and control their learning in order to help them all to develop effective strategies, not only to support their learning at school but also to help them with the tools to manage their learning later in life" (OECD, 2001, p. 110).

Such teaching approaches may be particularly important for children who do not have extra support for learning at home (OECD, 2003; Bransford *et al.*, 1999).

To help students learn to evaluate and revise their own work, teachers at Rosehill College try to model the steps involved in evaluation and revision, encouraging students to be specific about what their own work shows, and then to improve the work. Teachers also often break overall learning goals into smaller steps. In other words, the teachers "scaffold" learning.

Peer assessment is important too and often helps build students' self-assessment skills. Teachers at several of the schools commented, however, that students need careful coaching and practice if they are to provide useful assessments for their peers. Over time, students learn how to comment on the things they like in their peers' work, as well as offering constructive criticism. Students also develop a better sense of what they are looking for in their peers' work in order to assess quality and pay much greater attention to criteria.

At the John Ogilvie High School in Hamilton, Scotland, teachers introduce criteria they have established to new students at the beginning of the school year, along with appropriate evaluative statements for oral presentations and extended writing. Early in the year, teachers often find that student presentations are relatively poor, but that peer-assessment using the criteria works very well to help students improve their work.

A culture of peer tutoring is clearly visible at the Xavier School in Deer Lake, Newfoundland and Labrador, Canada. In a grade 9 English class observed at the Xavier School, students read each other's research pieces in turn, using the checklist and a rubric outlining criteria to improve the quality of written texts with regards to expression, structure, grammar and spelling. (Rubrics are scoring tools that list criteria for a good-quality piece of work, usually on a point scale.) Most students visibly enjoy working with rubrics. As one student commented, "You can see what you did wrong and how you can fix it. It also makes it a lot easier to set aims for yourself".

5. Addressing classroom barriers

The concept of formative assessment often resonates with teachers, but many protest that it is just not possible to put these ideas into regular practice – that there are too many barriers. Secondary school teachers, in particular, may be quick to protest that it is not so easy to use formative assessment with large classes. Nor is it possible to slow the pace of instruction, particularly when trying to guide a class through important and extensive curriculum requirements. Teachers also say that it is difficult to use formative assessment with students they consider as more challenging.

Teachers in the case study schools worked closely with colleagues, experimenting with a variety of approaches to addressing logistical barriers to formative assessment before finding those that worked best for them and their students. Teachers found ways to use formative assessment with larger classes, to balance extensive curriculum requirements, and to work with those students they considered more challenging. Their efforts paid off in improved interactions with students and better student work. They also found that they were making more fundamental changes in how they thought about their students' abilities, as well as about teaching and learning.

5.1. Class size

At the John Ogilvie High School in Hamilton, Scotland, teachers use the technique of "divided classes" in order to gain more time with individual students or with small groups of students. For example, in a mathematics class observed for the case study, the teacher

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kept one-half of the class busy with independent learning in the computer lab, while working through new concepts with the other half of the class. The teacher then repeated this procedure.

A significant number of teachers at Forres Academy in north-eastern Scotland have been using co-operative learning techniques since the mid-1990s. The co-operative learning has enabled them to spend more time with individual students or with small groups of students. In classrooms featuring co-operative learning, students are encouraged to develop skills for peer-assessment, conflict resolution, leadership and teamwork. They also learn to accept others. Students are able to build cognitive and social skills simultaneously.

School leaders and teachers at the Sacred Heart School in Regina, Saskatchewan, Canada, created mixed-age classes to encourage peer mentoring, and to put older students' energies to positive use (thereby addressing discipline problems). Teachers are able to direct their energies differently as older students take on mentoring roles. The mixed classes also mean that teachers need to pay more attention to providing variety in learning, teaching and assessment in order to meet the different levels and needs of students in the classes. All students appeared to benefit from the wider array of choices.

5.2. Prioritising curriculum requirements

Teachers in lower secondary schools are faced with extensive curriculum requirements. In several of the case study schools, teachers prioritise curriculum requirements – deciding which concepts are most important to developing students' understanding of the subject. The teachers ensure that students have a good facility with a new concept before moving on. In some cases, this means that some curriculum items are missed, but teachers say that they are more confident that students are retaining information and learning the subject matter in greater depth.

5.3. Changing attitudes about students' abilities

In addition to logistical barriers of classroom management, teachers may find it difficult to take on formative assessment because it means significant change. Formative assessment requires teachers to change the way they interact with students, what they think about when they plan lessons, their attentiveness to students' learning differences, and even the way they think about student abilities. In some of the schools visited, teachers started using formative assessment with their best students and, with practice, realised that it would be useful and practical with weaker students as well. Other teachers said that they pay greater attention to underachieving students when using formative assessment approaches than they might have before.

Teachers at Seven Kings High School in London, England noted that they have changed lesson planning to focus on what they want students to learn in the class and what classroom set-up will create the best conditions for learning. They no longer focus simply on planning classroom activities. They interact with students more, placing emphasis on dialogue, checking for understanding, and giving students more control over their own learning processes. Teachers at Seven Kings remarked that using formative assessment approaches and techniques has made them feel differently about how students can "get from one place to another" in their learning.

6. School leaders' strategies for initiating, sustaining and deepening changes

School leaders in the case study schools played essential roles in creating conditions that allowed teachers to make significant, sustained changes in teaching and assessment. They emphasised the importance of keeping the focus on teaching and learning as the best route to influencing classroom change. Several, particularly those in previously low-performing schools, said that the process of change had been quite incremental, that it had taken several years before they reached a "tipping point" where the majority of teachers were interacting regularly and sharing ideas about quality teaching and student assessment. Their leadership has been essential to bringing staff together to discuss school priorities and in keeping issues of lower priority from distracting teachers from their main work. They have also created high expectations for teacher performance and, in turn, have been asked to meet teachers' expectations for training and support.

6.1. Building school-wide cultures of evaluation

School-wide cultures of assessment and evaluation are essential to deep change. Teachers who share a language of assessment, and track what they have learned about what works and why, are able to push innovations further and pass on their knowledge more easily. Formative assessment facilitates this process by focusing and giving discipline to the teachers' discussions on teaching and learning and by using data generated at classroom and school levels to inform improvements.

In essence, teachers and schools using school and teacher self-evaluation as a way to shape future planning are using knowledge management techniques. The codification of knowledge is key to this process. A 2004 OECD report on knowledge and innovation in schools explains this concept:

> "Knowledge-based activities emerge when people, supported by information and communication technologies, interact in concerted efforts to co-produce (*i.e.* create and exchange) new knowledge. Typically, this involves three main elements: a significant number of a community's members combine to produce and reproduce new knowledge (diffuse sources of innovation); the community creates a 'public' space for exchanging and circulating the knowledge; new information and communication technologies are intensively used to codify and transmit the new knowledge" (OECD, 2004, p. 20).

6.2. Creating opportunities for peer support and observation among teachers

When they are making fundamental changes to their teaching practice, teachers benefit from observation and feedback. The support of peers and school leaders or – at a minimum of professional networks – is essential to making deep and sustained changes in approaches to teaching. Teachers in several of the case study schools said that working together on student assessment has helped them to develop more collegial cultures and deepened their understanding of those elements most important to formative assessment. In several of the case study schools, teachers regularly participate in training opportunities on formative assessment as a group, or take opportunities to observe each other.

7. National and regional policy frameworks

Teachers face many competing pressures on a daily basis. Without support and special opportunities to test innovative approaches, it is difficult for them to adopt new approaches to teaching, including the set of practices involved in formative assessment.

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Clearly, teachers need support from colleagues and school leaders as they make changes to their practice. But transformation of teaching and assessment approaches across education systems also requires strong policy leadership, serious investments in training and professional development and in innovative programmes, and appropriate incentives for schools and teachers.

Each of the case study countries has made important strides in advancing the practice of formative assessment.* Countries that use a mix of approaches and make important investments in promoting change and building capacity are likely to push changes much further. The primary policy approaches are:

- *Legislation* promoting and supporting the practice of formative assessment and establishing it as a priority (Denmark and Italy).
- *The use of summative data for formative purposes* (Canada, Denmark, Finland, Italy and New Zealand).
- *Guidelines* on effective teaching and formative assessment embedded in national curriculum and other materials (England, New Zealand, Scotland and Queensland, Australia).
- *Provision of tools and exemplars* to support effective formative assessment (Newfoundland and Labrador, Canada and New Zealand).
- Investments in *special initiatives and innovative programmes* incorporating formative approaches (Italy and New Zealand).
- Investment in *teacher professional development* on formative assessment (New Zealand and Queensland, Australia).

7.1. Legislation promoting the practice of formative assessment

Legislation promoting regular practice of formative assessment ensures that the approach has high visibility and articulates the purposes of assessment. The Act governing the Danish *Folkeskoler* system, for example, requires schools to make comprehensive and versatile assessments of the "benefits of schooling", and to share these with parents and pupils. Assessments are to be integrated into teaching, should serve as the basis for guidance that teachers give to individual students and should shape teaching methods, with students as active participants.

* The UK (England and Scotland) have informed us of new developments in formative assessment policy since the time of the OECD study. England reports that it is tackling issues of consistency, impact and improvement through: the development of new "Whole School Training" materials to support Assessment for Learning in specific subject areas; new training materials, guidance and exemplars to support teachers and teacher assistants; and the development of a new pupil achievement tracker. England is also placing greater emphasis on the use of data to shape improvements, including school self-evaluation for school improvement, target-setting, and tracking of schools' "value-added" for individual student achievement. A majority of English schools have chosen Assessment for Learning as a school focus and receive 1 000 GBP and five days' consultancy to support work in this area. In Scotland, formative assessment is now being promoted widely by all Scottish education authorities, as part of a tripartite national assessment policy that includes also "sharing standards" for teachers' summative assessments and the use of a revised survey of attainment to gather data on national standards. "Learning and Teaching Scotland" has introduced a "Toolkit" on its Web site, providing the key principles for formative assessment, and exemplars of practice in varying local circumstances. The concept of "personal learning planning" is also now promoted as a means to develop students' reflection about learning and progress in a range of ways, including during classwork.

7.2. Encouraging the use of summative data for formative purposes

Assessments and evaluations on student and school performance are of little consequence if the data are not used. At the school level, this means strengthening evaluation cultures. At the policy level, this means better linking of assessment and evaluation at the classroom, school and system levels.

The use of data for planning of *future* classroom activities (or at the policy level, for adjustment of policies) might be considered as a secondary level of formative assessment (see Allal and Mottier Lopez in OECD, 2005). These approaches link evaluation for systemic and school improvement and assessment for student learning.

Several OECD countries support school-based evaluation either as the primary (or only) form of school-level evaluation, or as a complement to external testing, inspections and evaluation. School leaders and teachers are likely to need training in order to use data addressing concerns of school management. When schools are able to make useful connections between what is happening in the classroom and at the school level, school staff are better able to understand the implications of data for the classroom, as well as longer-term strategic concerns facing schools. Policy can take important steps to strengthen evaluation cultures in schools by addressing barriers and better linking assessment and evaluation at systemic, school and classroom levels.

Denmark and Finland have placed primary emphasis on the importance of school and student self-evaluation. In 1999, the Danish Ministry's Quality in the *Folkeskole* programme published a number of self-evaluation tools on the Web for schools to use at their discretion. Schools are encouraged to use these tools to assess their own performance. In addition to looking at students' performance, teachers are encouraged to evaluate the breadth and content of their own teaching. The Danish Ministry has been exploring ways to encourage more rigorous assessment, including the development of benchmarks and the introduction of standards for student achievement.

In Finland, the main idea behind school and student self-evaluation is that it is more important to focus on school development through self-assessment than through comparisons among schools or among students. In 1993, Finland's National Board of Education launched a project to develop school self-evaluation models for different types of educational institutions. The Finnish Ministry of Education also monitors the extent to which objectives set out in statutes, education policy decisions and national core curricula are achieved, for development of policy and core curricula and for use in teaching.

In Canada, all provinces and territories participate in a national programme to assess student achievement in mathematics, reading and writing, and science on a four-year cycle. Each province and territory receives its own results as well as an analysis by sub-test. Provinces and territories may then conduct their own analyses to shape teaching practices. The three Canadian provinces participating in the OECD study (Newfoundland and Labrador, Saskatchewan, and Québec) encourage and support schools in using school-level data in school planning.

7.3. Guidelines on effective teaching and assessment practices embedded in national curriculum and other materials

Several countries have introduced new curriculum guidelines that incorporate advice on integrating formative assessment into lessons on a systematic basis. England, Scotland and Queensland, Australia, provide valuable examples of this approach.

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In 2000, the Department for Education and Skills (DfES) in England introduced the Assessment for Learning (AfL) programme, targeting pilots to Key Stage 3 schools – that is, lower secondary schools. AfL provides teachers, school leaders, local education authorities and other stakeholders with guidance and resources on the principles of good classroom assessment, as supported in research. DfES promises also to provide a repertoire of teaching strategies and tools from which schools and teachers may choose, based on student needs and school goals and priorities.

Scotland has introduced a similar national development programme, called Assessment is for Learning (AifL). AifL builds on national guidelines on assessment for 5-to-14-year-old students, which were first published in 1990. The guidelines encourage teachers to think systematically about assessment as an integrated part of learning and teaching. They advise that summative judgments should be made only occasionally and should be based on a large amount of class work. In English language and mathematics, when it is clear that a student shows full command of the subject for his or her level, the teacher may choose to select a National Assessment from an electronic bank available on line to confirm their judgement. Teachers administer a National Assessment test when they consider it appropriate; there should be no "test day" for all students at the same time. AifL is designed to enable teachers to develop their own thinking and formative assessment practices, based on awareness of research and theoretical principles, good practice in their own schools and elsewhere and networks of support involving colleagues and central government, executive agencies, local education authority and university staff.

Almost all of the assessment in Queensland schools for all grade levels (primary to year 12) is school-based (*i.e.* teacher designed and managed). This applies even for the end-of-school certificate awarded on the basis of study in years 11 and 12. There have been no external examinations in Queensland since 1972. For the end-of-school certificate, a system of moderation based on panels of expert teachers provides advice to schools on the quality of their assessment procedures and the quality of their judgments of performance standards. Over the two years leading to the certificate, assessment is continuous and formative. In these years, schools have highly developed feedback processes, including rubrics for providing students with feedback on the standards of their performance on the assessment tasks.

In Queensland, student results are based on portfolios that students have worked on and improved over time. Students therefore have an incentive to learn from feedback, and their final results depend on the latest evidence of their performance across all course requirements.

7.4. Provision of tools and teaching resources to support formative assessment

Teachers also benefit from having access to exemplars and tools that help them to incorporate into their practice information gathered during the teaching process. Several of the national governments in the case study countries provide tools, such as rubrics and forms to track student progress, exemplars, and guidelines to help teachers examine the substance of their lessons.

To improve the quality of assessments in schools, the Department of Education in Newfoundland and Labrador, Canada, disseminates rubrics for use in primary, elementary, and intermediate schools. Rubrics provide specific guidelines and criteria for evaluating student work. For example, a rubric for an essay might tell students that their work will be judged on

organisation, purpose, detail, vocabulary and "mechanics" (spelling, punctuation, grammar). A good rubric also describes levels of quality for each of the criteria, usually on a point scale. At the same time, they are not so prescriptive as to suppress student creativity or independent thinking. Developing effective rubrics takes time but, in the long run, the rubrics save time because they force teachers to reflect carefully on learning objectives and criteria.

The New Zealand Ministry of Education has also supported the development of a number of tools for formative assessment. These include Assessment Tools for Teaching and Learning (asTTle) for assessing literacy and numeracy from years 5 to 10, in English and *te reo Maori* (*i.e.*, the Maori Language), and national curriculum exemplars for students in years 1-10. These tools are key components of the government's literacy and numeracy assessment strategies. Teachers use the tools to evaluate the impact of teaching on student achievement and, when necessary, to adjust teaching to better meet student needs. The national exemplars include annotated work samples, sample teacher-student dialogues and written comments showing how teachers might assess the student work in a formative manner, and in a way that is sensitive to different learning and communication styles. They are available in print form and on line. Many are also supported by video clips.

7.5. Special initiatives and innovative programmes

Several schools included in the case study countries participated in pilot or other special projects before deciding to adopt formative assessment teaching methods. Certainly, their participation in special projects signals that these schools are more open to innovation and change. This is likely one of the reasons why they have come to the attention of researchers. Their participation in these projects also helped to prepare the ground for further change.

As participants in special projects, teachers have, in many cases, received additional professional development opportunities, and have occasionally benefited from additional resources. For example, teachers involved in *Te Kotahitanga* at Waitakere College in Auckland, New Zealand have had a half-time, on-site facilitator. The facilitator works with experts on Maori education at the University of Waikato, brings readings and relevant research to teachers involved in the programme, observes classes and shares practical ideas on how to address challenges in the classroom. The facilitator is also formative in her own interactions with the teachers. The programme represents a significant expenditure on the part of the Ministry, and policy makers have implemented a variety of professional development models in schools participating in the *Te Kotahitanga* and *Te Kauhua* in order to determine the optimal level of investment.

Innovation can be encouraged on an everyday basis (not solely on centrally sponsored projects) by fostering confident teachers and promoting peer support and co-operation with researchers. In several of the case study schools, school leaders encouraged teachers to "scaffold" their use of formative assessment methods, working first with their higher achieving students and building their own evidence that the methods are effective. Only after teachers had had a chance to develop confidence with these new approaches did school leaders encourage teachers to start using the methods with underachieving students. Leaders also anticipated the "implementation dip" (when new programmes are taken on, student results often go down before they improve) (Fullan, 2001).

Policy should also ensure that pilot projects are not scaled up until their impact has been fully evaluated and implementation challenges are well understood. While there is a risk that energy for special projects will diminish over time, schools that develop cultures of evaluation and regularly refer to data are more likely to sustain those approaches that work.

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7.6. Investment in teacher training and professional development on formative assessment

In the majority of OECD countries, national education ministries or departments have influence on the curriculum for initial teacher training and standards for teacher certification. This is an ideal opportunity to provide teacher trainees with the knowledge and skills necessary for student assessment, and the ability to respond to identified student learning needs with a broad repertoire of approaches and techniques. Effective training in formative assessment requires more than just adjustments to the teacher training curriculum. When possible, policy should encourage the practice of formative assessment in schools of education. University professors should model formative assessment techniques in their own teaching, and sponsoring schools should provide student teachers with opportunities to test the methods they are learning about during student teaching.

Formative assessment requires deep changes in overall approaches to teaching and assessment, as well as the development of new habits and integration of new techniques. Teachers already in the workforce need opportunities to participate in professional development programmes and test out new methods. However, as effective professional development can be expensive, policy officials may need to analyse the impact of investments in different schools with an eye toward developing effective and cost-efficient professional development strategies. Policy can provide guidance to individual schools as to how professional development funds (often a combination of national and school level investments) are best spent.

In 1998, the New Zealand Ministry of Education introduced the "Assess to Learn" professional development programme, which encourages teachers to review current assessment practices and to incorporate recently developed national assessment tools into their practice in formative ways. This is intended to support implementation of new curriculum statements or programmes that meet the goals of the Ministry (such as the Ministry's literacy and numeracy programme, and the new National Certificate Examination Award). Apart from these special programmes, however, the Ministry does not require teachers to update their skills on a regular basis.

Other countries and regions support professional development through a variety of in-service workshops, strong professional networks and professional subject-based organisations.

8. Investments in further research

While there is evidence that formative assessment methods have a significant impact on student learning, there is a need for further research. Future research may address:

The impact of formative assessment on general student achievement: While there is convincing evidence that formative assessment is indeed highly effective in raising levels of student achievement (see Black and Wiliam, 1998; Natriello, 1987; Crooks, 1988), the research should be expanded and strengthened. Further research in this area may include both quantitative and qualitative studies of formative methods, drawing upon a breadth of international educational experiences.

The relative impact of formative assessment methods for underachieving students: Several studies show that formative assessment has an even stronger impact for underachieving students. Selected studies focus on teaching which stresses the

importance of effort over ability, or of task-centred feedback (as opposed to ego-involving feedback). These studies show relatively stronger improvements for previously underachieving students. Further research may have significant implications for teachers working with larger groups of underachieving students or in "failing" schools.

Effective formative approaches for students based on gender, ethnicity, socio-economic status, or age: As noted earlier in this study, there is a need for more refined knowledge of what works for students in different socio-economic or demographic groups. Research in this area may explore the differential impact of methods on diverse learners. For example, research may explore the circumstances under which different students thrive on competition, or in more co-operative situations. Research may also explore the extent to which principles of teaching that work well for a defined group, such as the Maori Mainstream Programme (*Te Kotahitanga*), transfer to other groups of students. Studies in this area may prove extremely important in addressing the long-term challenges of closing equity gaps in student achievement.

The expansion of teacher repertoires to meet identified student needs: If teaching is limited, the quality of student assessment will also be limited. Teachers need a healthy repertoire of approaches to setting up learning situations and responding to student learning needs. Teachers and researchers may form a healthy partnership for research in this area. Formative assessment requires greater transparency in teaching and learning and is also quite iterative. The approach is ideal for researchers who want to explore the process of teaching and learning in normal classroom settings.

The challenges of deepening and broadening practice of effective formative assessment approaches and techniques: The OECD study asserts that formative assessment methods are more than a passing fad. Still, there are important challenges to deepening and broadening practice of effective formative assessment methods and techniques. Researchers should pay careful attention to the success of various dissemination and implementation strategies. Policy, in the formative spirit, can draw upon this knowledge to adapt and improve strategies and deepen impact.

9. Conclusion

The OECD study set out to examine promising practices in formative assessment across several OECD countries. The case studies and international literature reviews informing this analysis show that formative assessment is much more than a set of best practices. Teachers use the elements of formative assessment as an overall approach to teaching and learning, changing the culture of their classrooms. They point to improvements in the quality of teaching and learning, as well as in relationships with students and parents.

Yet formative assessment is not widely practiced. While each of the countries participating in the study has policies to promote the wider practice of formative assessment, policy can do more. To promote real changes in teaching and assessment throughout education systems, all countries will need to strengthen the mix of policies and to make deeper investments. A greater range of strategies in the policy mix will help support more consistent messages on the importance of formative assessment, more strategic investment of resources and a change in culture at all levels of the education system.

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Countries will also need to better align macro- and micro-level policy approaches. At the most basic level, alignment means that education stakeholders ensure that policies do not compete with each other. At a more sophisticated level, the elements of formative and summative assessment reinforce each other. More consistent use of formative assessment throughout education systems may help stakeholders address the barriers to its wider practice in classrooms.

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Chapter 5

Gender Differences in Student Engagement with Mathematics

Summary

Great advances have been made in gender equality in education. In all OECD countries, younger women today are far more likely to have an upper secondary or tertiary qualification than women a generation ago. University-level graduation rates for women now equal or exceed those for men in two-thirds of the OECD countries. However, women remain persistently under-represented in areas such as mathematics and science. This chapter suggests that action in this area needs to be targeted at youth and, indeed, children.

While gender differences in student *performance* tend to be modest, there are marked differences between males and females in their *interest in* and *enjoyment of* mathematics, as well as in their self-related beliefs, emotions and learning strategies related to mathematics. Fifteen-year-old girls tend to report less confidence in their mathematical ability, and greater feelings of anxiety, helplessness and stress in mathematics classes than boys.

Learning depends on motivation and confidence as well as cognitive skills. So education systems that have raised the performance of girls in mathematics and science also need to foster strong stronger interest by girls in these subjects. There are good grounds for this: high-quality learning is time- and effort-intensive. It involves control of the learning process as well as the explicit checking of relations between previously acquired knowledge and new information, the formulation of hypotheses about possible connections and the testing of these hypotheses against the background of the new material. Learners will only put in the effort if they have a strong interest in a subject or if there is an external reward for performing well. Thus, students need to be willing to learn how to learn. From the perspective of teaching, this implies that effective ways of learning – including goal setting, strategy selection and the control and evaluation of the learning process – can and should be fostered by the educational setting and by teachers, for males and females alike. Motivation and self-confidence are therefore indispensable to outcomes that will foster lifelong learning.

Overall, the results suggest that education systems need to address aspects of attitudes and learning behaviours in relation to mathematics, particularly for females, and to consider this as a goal that is as central to the mission of education systems as cognitive instruction. This has implications for both the initial training and the professional development of teachers.

Gender Differences in Student Engagement with Mathematics

1. Introduction

Education policy-makers have given considerable priority to issues of gender equality and significant progress has been made in reducing the gender gap in formal educational qualifications. In all OECD countries, younger women today are far more likely to have an upper secondary or tertiary qualification than women a generation ago. Furthermore, university-level graduation rates for women now equal or exceed those for men in two-thirds of the OECD countries.

However, progress has been uneven across fields of study and occupation and in areas such as mathematics and science, gender differences in tertiary qualifications remain persistently high. Much therefore remains to be done to close the gender gap. This chapter suggests that action in this area needs to be targeted at youth and, indeed, children.

The most striking finding of the analysis presented in this chapter is that while 15-year-old girls display a performance in mathematics only slightly lower than boys, the same girls consistently report much less interest in and enjoyment of mathematics, lower self-related beliefs and much higher levels of helplessness and stress in mathematics classes. This finding is highly relevant for policy makers, as it reveals inequalities between the genders in the effectiveness with which schools and societies promote motivation and interest and – to an even greater extent – help students overcome anxiety towards different subject areas. The fact that these differentials differ widely across countries suggests that such gender differences can be overcome, at least in large part.

At age 15, many students are approaching major transitions from education to work, or to further education. Not only their performance at school, but also perhaps even more importantly, their motivation and attitudes towards mathematics can have a significant influence on their further educational and occupational pathways. Although two different populations are involved when comparing results in today's schools and today's labour-market performance of men and women, the analysis suggests that gender differences in student attitudes may well be predictive of gender differences appearing later in the educational and occupational careers of males and females. These, in turn, can have an impact not only on individual salary prospects, but also on the broader effectiveness with which human capital is developed and utilised in OECD economies and societies.

This chapter explores these issues in four parts:

1. First, it describes the educational progress of women over past generations, as measured by tertiary educational attainment, with a focus on mathematics and science-related fields. Gender patterns in educational attainment are linked to labour-market outcomes, including employment status and earning differentials.

2. Next, the chapter looks at how these gender patterns are reflected in the current output of educational institutions, with today's graduate patterns used as a predictor of the qualification of the future labour force.
3. The third section then examines how differences in graduation patterns across fields of study and educational pathways are mirrored in learning outcomes in mathematics at school.
4. Building on an analysis that suggests that gender differences in attitudes and motivation are much stronger predictors than performance differences alone of subsequent educational pathways, the final section of the chapter provides a detailed profile of gender differences in attitudes and approaches to learning. It also examines potential policy levers designed to encourage girls and young women to see mathematics and science-related fields as promising study and career pathways.

2. The educational progress of women over past generations

In most OECD countries, adult men have reached higher average levels of educational attainment than women. Historically, women did not have sufficient opportunities and/or incentives to reach the same level of education as men, and fewer women went on to pursue upper secondary and tertiary education.

However, younger women have closed the gap and even overtaken men in many countries. On average, only 9% of women in the age group 55-to-64 years attained a university-level qualification, while 14% of men did (see Figure 5.1). In contrast, 21% of women in the age group 25-to-34 years, who completed their studies in the 1990s, attained a university-level qualification, compared with 19% of men. A look at graduation patterns in today's universities shows further that in all countries other than Japan, Switzerland, Turkey and Korea, women are now in the majority and in Sweden, Poland, New Zealand, Hungary, Finland, Norway, Iceland, Denmark and Portugal, the proportion of women among graduates ranges between 62 and 68%.

The labour-market and financial incentives for attaining tertiary qualifications continue to remain high for both men and women, despite the rapid growth in the numbers with tertiary qualifications. This can be seen when a comparison is made between, on the one hand, the returns to tertiary education for individuals (in terms of higher average earnings, lower risks of unemployment and the public subsidies they receive during their studies) and, on the other hand, the costs that individuals incur when studying (in terms of the tuition fees they need to pay, lost earnings during their studies or higher tax rates later in life). In all countries with comparable data, the private rate of return (which weighs the individual financial investments in education with the financial returns for those who acquired tertiary degrees immediately following school) is higher than real interest rates, and often significantly so. The private rate of return for females is around 8% in Belgium, France, Italy, the Netherlands and Sweden, about 10% in Switzerland and the United States, 13% in Norway and 15% in Finland (see Figure 5.2). For males, the private rate of return tends to be even higher.

Despite rising tertiary education levels, the labour-market value of qualifications has been sustained. Among the countries in which the proportion of 25-to-64 year-olds with tertiary qualifications increased by more than 5 percentage points since 1995 – Australia, Austria, Belgium, Canada, Denmark, France, Iceland, Ireland, Japan, Korea, Spain and the United Kingdom – most have seen falling unemployment and rising earnings benefits among tertiary graduates over the last years. In Australia, Canada, Germany, Hungary,

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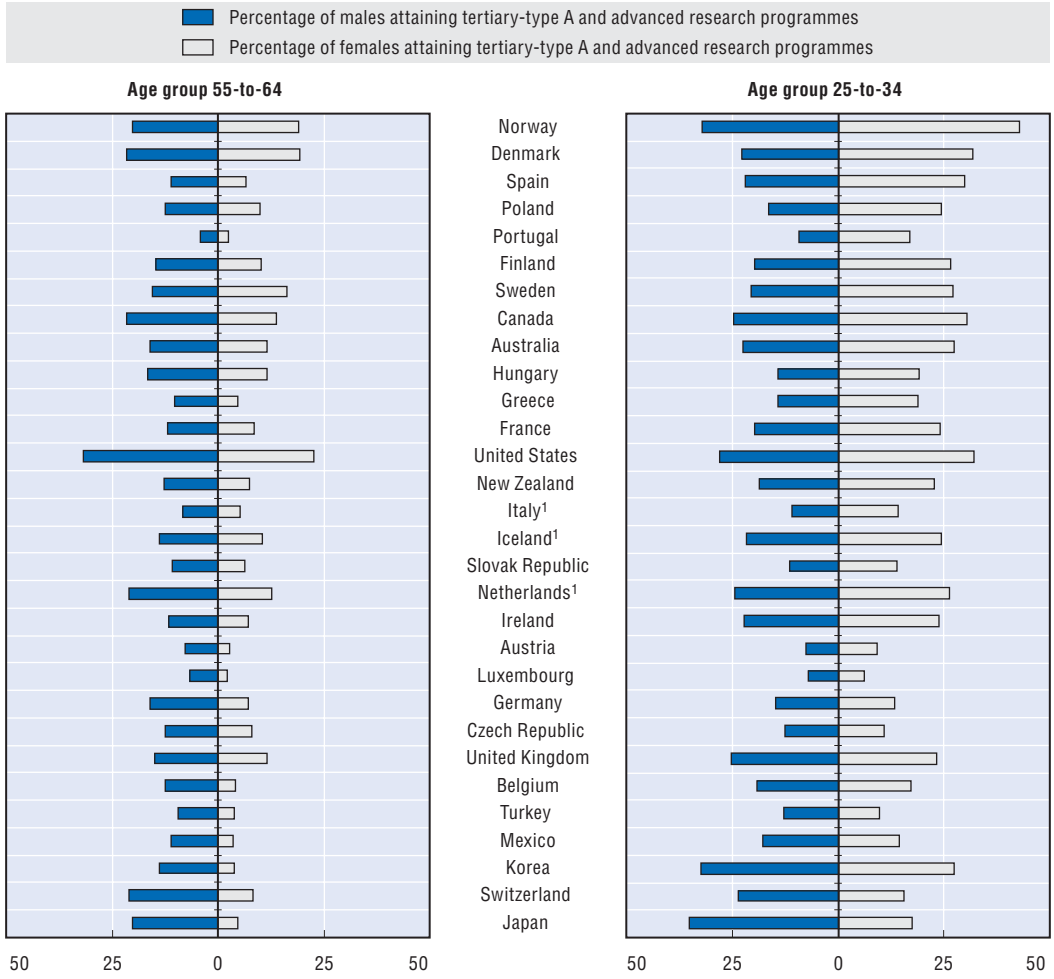
Figure 5.1. **The gender gap in tertiary qualifications across two generations**

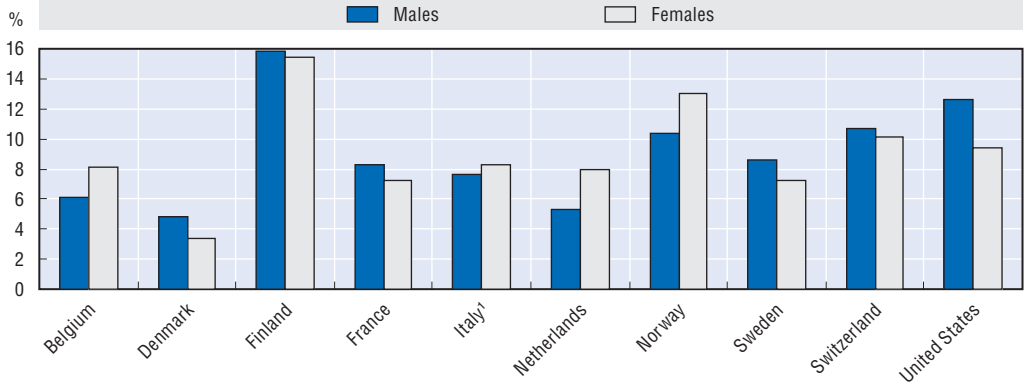


Countries are ranked in descending order of the difference between the percentage of females and the percentage of males who have attained tertiary-type A and advanced research programmes in the age group 25-to-34.

1. Year of reference 2002.

Source: Education at a Glance: OECD Indicators 2005, Tables A1.3b and A1.3c (OECD, 2005).

Figure 5.2. **Private rate of return to investment in tertiary education for individuals**



1. For reasons of reliability, data on earnings for 15-to-24-year-olds in tertiary education were not used. Consequently life income streams are calculated from the data for 25-to-64-year-olds.

Source: Education at a Glance: OECD Indicators 2005, Chart A9.1 (OECD, 2005).

Ireland and the United Kingdom the earnings benefit of tertiary education increased by between 6 and 20 percentage points between 1997 and 2003 and, among the 15 countries with comparable data, only three saw a decline in the earnings benefits of tertiary education over upper secondary education: New Zealand (–15 percentage points), Norway (–3 percentage points) and Spain (–20 percentage points).

Notably, tertiary education enhances earnings relative to upper secondary education more for females than for males in Australia, Ireland, Korea, the Netherlands, Norway, Switzerland and the United Kingdom while the reverse is true in the remaining countries, with the exception of Belgium where, relative to upper secondary education, the earnings of males and females are equally enhanced by tertiary education. Nevertheless, although post-compulsory education confers earnings advantages on all groups, women continue to earn less than men with similar qualifications. When all levels of education are taken together (*i.e.* total earnings are divided by the total number of income earners, by gender) the earnings of females between the ages of 30 and 44 range from 50% of those of males in Switzerland to 86% of those of males in both Hungary and Luxembourg. The gap in earnings between males and females may be explained by many factors, including differences in the amount of time that males and females spend in the labour force, and the relatively high incidence of part-time work among females. To some extent at least, it is also due to different choices of fields of study and occupations and that aspect is therefore examined in the next section.

3. Current output of high-level qualifications

Changing opportunities in the job market, relative earnings in different occupations and sectors, and admission policies and practices of tertiary education institutions may affect which fields students choose to study. However, setting aside gender stereotypes and preconceptions, there is no intrinsic reason why these patterns should vary across the genders. Nevertheless, despite the rapid progress in the educational attainment of women, large gender differences remain across the different fields of study. For example, the share of women among university-level science graduates ranges from around 15% in Japan, Switzerland and the Netherlands to 40% or more in New Zealand, Spain, Portugal, Italy, Ireland, Mexico, Turkey and Canada.

It is noteworthy that countries with a similar relative share of women among science graduates differ markedly in the absolute number of young women in scientific occupations. For example, in both Korea and the United States, the share of women among science graduates is, at around 36%, comparatively high. However, Figure 5.3 shows that, in Korea, there are 3 459 female science graduates per 100 000 25-to-34-year-olds in employment, while in the United States the comparable figure is 1 002. At the other end of the scale, in both Finland and Germany the share of women among science graduates is, at around 27%, comparatively low. However, in Finland, there are 1 370 female science graduates per 100 000 25-to-34-year-olds in employment, while in Germany the comparable figure is 557. This underlines that countries differ markedly in their success in attracting women to science-related occupations, even if in all countries women tend to be somewhat underrepresented.

A broader look at graduation patterns across fields of study shows that in the humanities, arts, education, health and welfare, more than two-thirds of university-level graduates are women, while on average in OECD countries, in mathematics and computer science the comparable figure is less than one third; in engineering, manufacturing and construction it is less than one fifth. But again, there are major differences among

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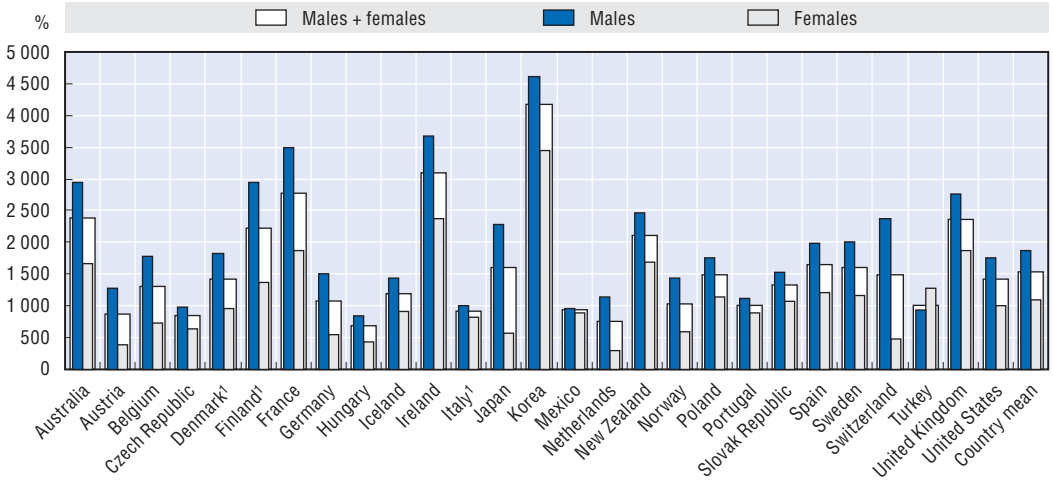
Figure 5.3. **Male and female science graduates**

Per 100 000 persons in the employed 25-to-34-years of age



Note: Science fields include life sciences; physical sciences, mathematics and statistics; computing; engineering and engineering trades, manufacturing and processing, architecture and building.

1. Year of reference 2002.

Source: Education at a Glance: OECD Indicators 2005, Table A3.2 (OECD, 2005).

countries (OECD, 2005): in Australia, Denmark, France, Iceland, New Zealand, Spain, the United Kingdom and the United States, the proportion of females obtaining a first tertiary-type A qualification in mathematics and computer science is less than one third, while in Finland, Korea, Italy, Mexico, Portugal and Sweden it is between 40 and 52%. These patterns have not significantly changed over recent years. In the field of mathematics and computer science, for example, only Finland and Sweden have seen marked increases in the share of female graduates since 1998.

This suggests that gender differences in occupational choices are not merely a reflection of historical patterns, but remain reflected in today's output of educational institutions. The fact that such differentials vary so widely across countries suggests that these are outcomes that can be shaped by national contexts, policies and practices and raises questions about the effective use of human capital. They naturally lead to questions relating to the extent to which educational experiences of individuals preceding entry to universities and the job market shape such outcomes. This is examined in the next section.

4. Gender differences in student performance in school

Many countries have launched initiatives to improve the attractiveness of mathematics and science-related university studies, but to what extent do choices of educational and career pathways relate to prior performance and educational experiences much earlier in life? The crucial question is at what stage in the educational process such gender patterns emerge, and how they manifest themselves, as this determines the appropriate stage of policy intervention.

OECD's 2003 Programme for International Student Assessment (PISA) gave particular attention to student performance in mathematics at age 15, when students are on the threshold of transition to further education or work. This section examines the performance results by gender, while the next section looks at the more general attitudes of male and female students towards mathematics.

In mathematics in 2003, boys only slightly outperformed girls in most OECD countries, and the differences were too small to explain the comparatively large gender differences in educational and career pathways observed later on (and in science, gender differences in performance tend to be smaller still).[1] Iceland is the only OECD country where females consistently outperform males in mathematics. In Australia, Austria, Belgium, Japan, the Netherlands, Norway and Poland, gender differences are not statistically significant. For the other countries with visible differences, the advantage of males varies. In Canada, Denmark, Greece, Ireland, Korea, Luxembourg, New Zealand, Portugal and the Slovak Republic, males outperform females in all four mathematics content areas that were compared in PISA 2003 – in some of these cases by notable amounts. In contrast, in Austria, Belgium, Japan, the Netherlands and the United States, males outperform females only in certain mathematical content areas.

It is noteworthy that the stronger performance of boys on average is mainly attributable to the fact that more boys performed at the highest level. At the lowest performance levels, which signal students being at risk, few differences emerge. While there is a higher percentage of boys than girls at the lowest reading performance levels, in mathematics the percentage of low-performing boys and girls seems to be similar. At this lowest level, those not reaching PISA mathematics Level 2, are those who fail to demonstrate consistently that they have baseline mathematical skills, such as the capacity to use direct inference to recognise the mathematical elements of a situation, to use a single representation to help explore and understand a situation, or to use basic algorithms, formulae and procedures, and the capacity to make literal interpretations and apply direct reasoning. So the prevention of school failure in mathematics concerns boys and girls in equal measure.

One issue that needs to be taken into account when interpreting the observed gender differences is that males and females, in many countries at least, make different choices in terms of the schools, tracks and educational programmes they attend. Figure 5.4 compares the observed gender difference for all students with estimates of gender differences observed within schools and estimates of gender differences once various programme and school characteristics have been accounted for. In most countries, the gender differences are larger within schools than they are overall. On the mathematics scale for example, males have an observed advantage of 9 score points in Germany, and 8 in Belgium and Hungary, but within schools the average gap increases to 31 points in Germany and 26 points in Belgium and Hungary. In these countries, this is a reflection of the fact that females attend the higher performing, academically oriented tracks and schools more often than males. If the programme and school characteristics measured by PISA are taken into account,[2] then the estimated gender differences increase even further in many countries. This leads to an underestimation of the gender differences that are observed within schools. In other words, in these countries more females attend schools and tracks with higher average performance but, within these schools and tracks, males tend to outperform them. The advantage of males over females within schools and programmes is overshadowed to some extent by the tendency of females to attend higher performing school programmes and tracks. From a policy perspective – and for teachers in classrooms – gender differences in mathematics performance, therefore, warrant continued attention, even where such differences are not visible in the average scores of males and females when examined across the entire education system.

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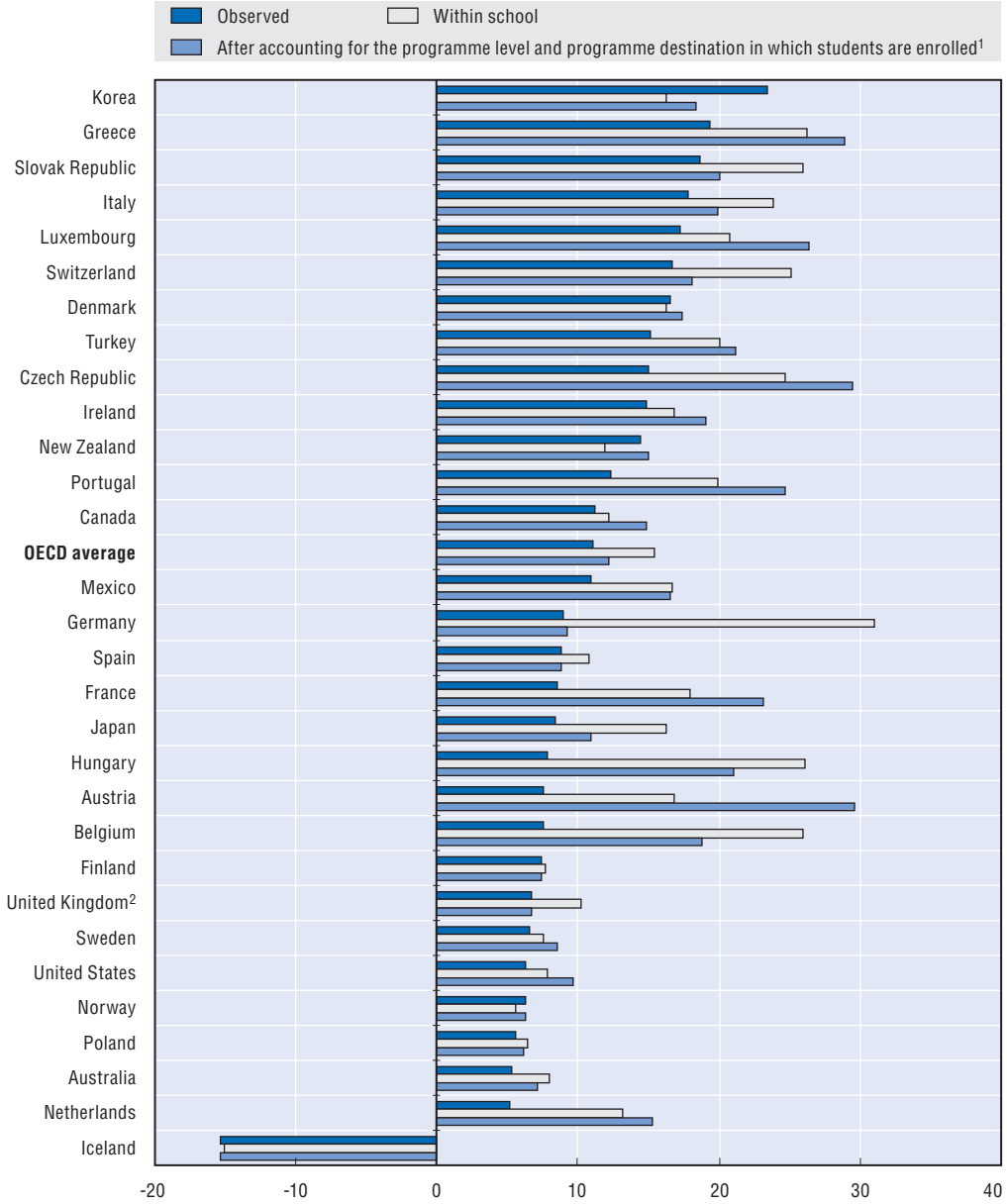
Figure 5.4. **Gender differences in the mathematics performance of 15-year-olds**



Countries are ranked in descending order of observed gender difference in mathematics performance.

1. Programme level indicates whether the student is in on the lower (ISCED Level 2) or upper (ISCED Level 3) secondary programme. Programme designation indicates the destination of the study programme: A, B or C.
2. Response rate too low to ensure comparability.

Source: Learning for Tomorrow's World: First Results from PISA 2003, Table 2.5d (OECD, 2004).

At the same time, some countries do appear to provide a learning environment that benefits both genders equally, either as a direct result of educational efforts or because of a more favourable societal context or both. The wide variation in gender gaps among countries suggests that these observed gaps are not the inevitable outcomes of differences between young males and females and that effective policies and practices can overcome differences between males and females in interests, learning styles and even in underlying capacities.

The question remains to what extent the observed gender differences in performance are the result of: *a)* the broader societal and cultural context; *b)* educational policies and practices as they apply to both boys and girls; or *c)* any differences in the way boys and girls are treated in school systems.

A comparison of such patterns at different grade levels in school can shed some light on this. In 1994-95, the Third International Mathematics and Science Study (TIMSS) of the International Association for the Evaluation of Educational Achievement (IEA) examined the performance of students in mathematics and science at both 4th and 8th grade levels.[3] This comparison shows that gender disparities in mathematics at the 4th-grade level tend to be small to moderate: on average, boys score 4 points higher than girls on a scale for which a standard deviation is about 100 points. In the majority of countries, boys do score higher, with differences ranging from 1 point in Iceland to 15 points in Korea and the Netherlands. However, the difference in achievement is statistically significant only for Japan, Korea and the Netherlands. In three countries (Greece, Ireland and New Zealand), girls score higher than boys by up to 10 points, but none of these differences is statistically significant. In the United Kingdom (Scotland), there is no difference between the average scores of boys and those of girls. In science, the gap in achievement between the genders tended to be somewhat larger. On average, boys score 11 points higher than girls in science. Boys score higher in all countries except Iceland, with differences ranging from 3 points in Portugal to 26 points in the Netherlands. For nine countries, the difference in achievement between boys and girls is statistically significant (Australia, Austria, the Czech Republic, Hungary, Iceland, Japan, Korea, the Netherlands and the United States). In New Zealand, the gap favours girls (by 8 points), but the difference is not statistically significant.

Are these gender differences predictive for 8th-graders, who in 1994/5 were roughly the cohort that corresponds to the university students portrayed in preceding parts of this chapter? A comparison of the gender gap at both the 4th and 8th grades can provide some insight. On average, the advantage of boys in both mathematics and science increases from the 4th to the 8th grade. However, this pattern varies across countries. For example, in science, Portugal and Scotland have much larger gender gaps favouring boys in the 8th grade than in the 4th grade. In New Zealand, there is an advantage for girls at the 4th-grade level in mathematics and a small advantage in science, but a significant advantage for boys in both subjects at the 8th-grade level. Greece and Ireland (in mathematics) also exhibit substantial changes in their relative standing with respect to gender differences between the 4th and 8th grades. However, there are other countries which successfully contain this tendency. In Australia and Canada, 4th-grade boys are at an advantage in mathematics, whereas in the 8th grade this tendency is reversed. Also, the Netherlands changes its relative standing considerably in favour of girls over the four grades. In science, changes in rank order towards smaller gender gaps can be observed in Australia, Austria, Iceland, Japan, the Netherlands and the United States.

Taken together, the results show that gender differences in mathematics performance do already exist early in school and suggest that action in this area needs to be targeted at youth and, indeed, children. The results also suggest that such gender differences tend to grow as students progress in the education system. The fact that no systematic gender difference could be observed in the PISA assessment of problem-solving competencies, which examined the kind of analytical reasoning competencies on which mathematics builds but without contextualising these in the mathematical nomenclature, suggests that the observed gender differences relate to the ways in which mathematics is taught in schools, rather than to the

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cognitive potential of girls in the field of mathematics. Even so, the observed gender differences remain small compared to the large observed differences in the choices of study pathways after school that were examined in the preceding section. This suggests that policy efforts need to extend beyond student performance in mathematics alone.

5. Gender differences in mathematics-related motivation and engagement

While the previous section has shown that gender differences in student performance in mathematics are modest and, in science, even negligible in most countries, results from PISA show that there are marked differences between males and females in their interest in and enjoyment of mathematics as well as in their self-related beliefs, emotions and learning strategies related to mathematics.

Such differences are of profound importance to lifelong learning. Research shows that these attitudinal factors influence enrolment in tracks and programmes orientated towards mathematics and that these, in turn, shape students' post-secondary education and career choices. Moreover, while teachers can manage much of students' learning in school, learning is enhanced if students can manage it themselves. Once they leave school, people have to manage most of their own learning based on what they have already learned.

A comprehensive assessment of how well a country is performing in education, as well as of gender differences in student learning outcomes, must therefore also look at these cognitive, affective and attitudinal aspects in addition to academic performance. To this end, PISA 2003 established a broader profile of what students are like as learners at age 15, one that includes students' learning strategies and some of the non-cognitive outcomes of schooling that are important for lifelong learning: their motivation, their engagement and their beliefs about their own capacities. Since the focus of PISA 2003 was on mathematics, most of these issues were analysed in the context of mathematics as well.[4] The remainder of this chapter analyses these results with a focus on gender differences. It seeks to provide a better understanding of how various aspects of students' attitudes to learning and their learning behaviour differ among male and female students, how these aspects relate to each other and to student performance, and how these relationships differ across countries. To this end, the section analyses in turn:[5]

- *Students' engagement with mathematics and school.* This is related both to their own interest and enjoyment and to external incentives. Subject motivation is often regarded as the driving force behind learning, but the analysis extends the picture to students' more general attitudes towards school.
- *Students' beliefs about themselves.* This includes students' views about their own competence and learning characteristics in mathematics, as well as attitudinal aspects, which have both been shown to have a considerable impact on the way they set goals, the strategies they use and their performance.
- *Students' anxiety in mathematics,* which is common among students in many countries and is known to affect performance.
- *Students' learning strategies.* This considers what strategies students use during learning. Also of interest is how these strategies relate to motivational factors and students' self-related beliefs as well as to students' performance in mathematics.

Figure 5.5 summarises the information on gender differences for student attitudes, anxiety, strategies and cognitions related to mathematics and relates the results to the observed performance differences in mathematics. All results are expressed as effect sizes,

Figure 5.5. **A summary picture of gender differences at school**

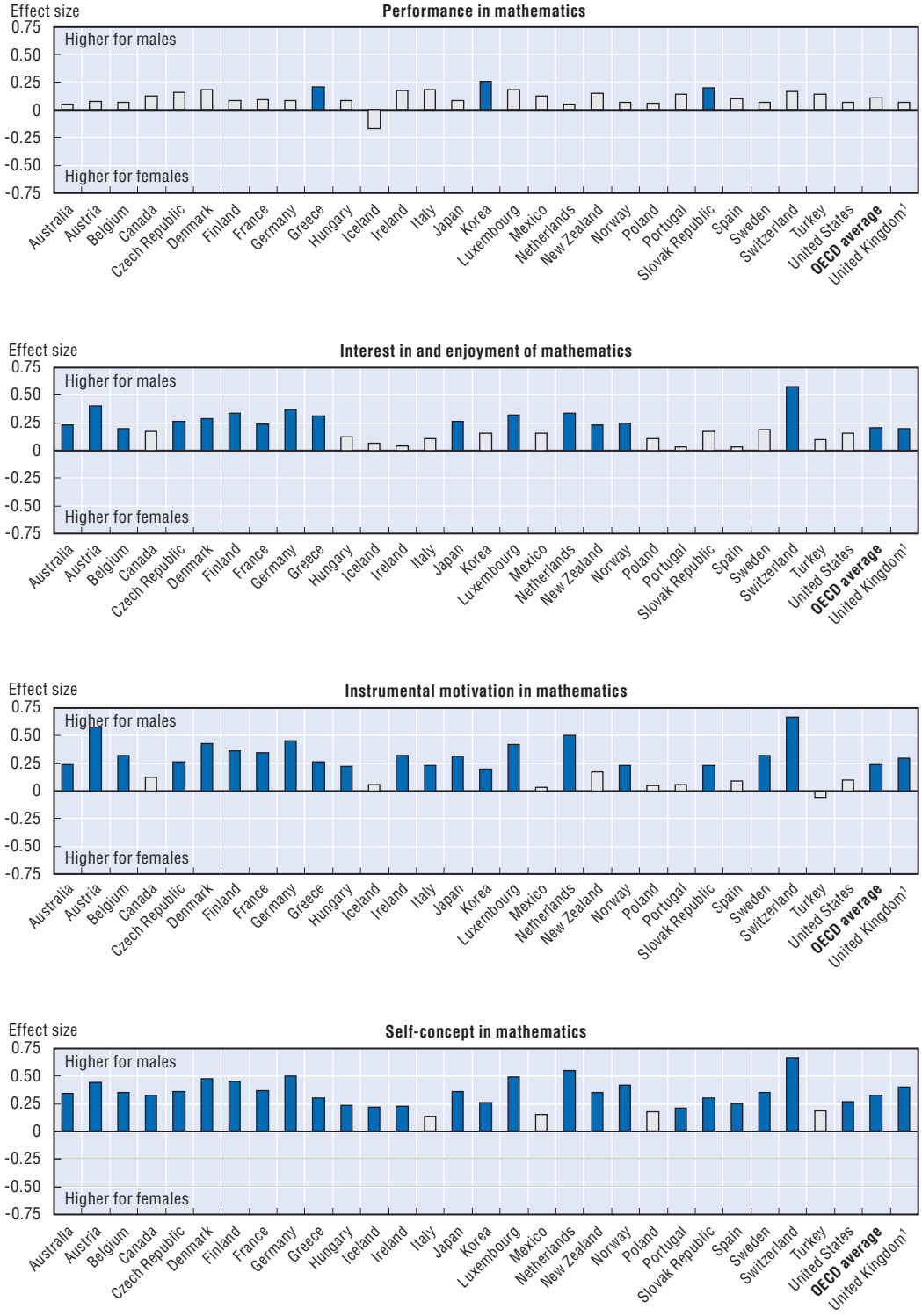
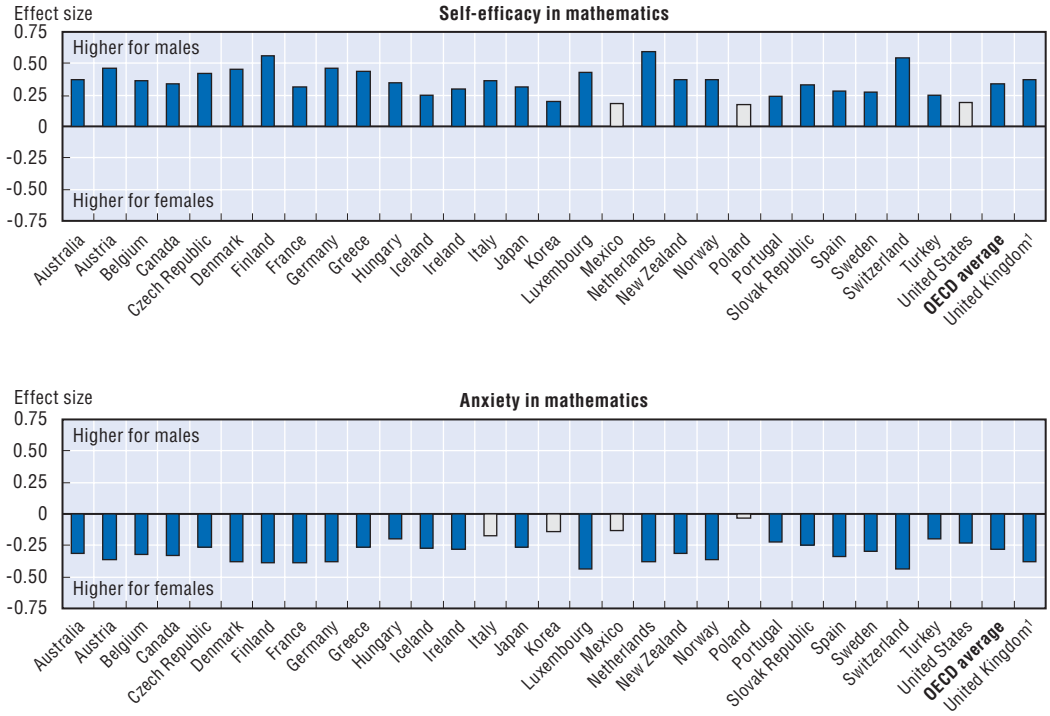


Figure 5.5. **A summary picture of gender differences at school** *(cont.)*



Note: Effect sizes equal or greater than 0.2 are indicated in dark blue (see Box 3.1).
1. Response rate too low to ensure comparability.

Source: Learning for Tomorrow's World: First Results from PISA 2003, Table 3.16 (OECD, 2004).

so that results can be compared across the different measures and across countries, with an effect size of 0.20 used as a criterion to establish differences that warrant attention by policy makers (see Box 5.1).

Box 5.1. **Comparing the magnitude of differences across countries**

Sometimes it is useful to compare differences in an index between groups, such as males and females, across countries. A problem that may occur in such instances is that the distribution of the index varies across countries. One way to resolve this is to calculate an *effect size* that accounts for differences in the distributions. An effect size measures the difference between, for example, the interest in mathematics of male and female students in a given country, relative to the average variation in interest in mathematics scores among male and female students in the country.

An effect size also allows a comparison of differences across measures that differ in their metric. For example, it is possible to compare effect sizes between the PISA indices and the PISA test scores.

In accordance with common practices, effect sizes less than 0.20 are considered small, effect sizes in the order of 0.50 are considered medium, and effect sizes greater than 0.80 are considered large. Many comparisons in this chapter consider differences only if the effect sizes are equal to or great than 0.20, even if smaller differences are still statistically significant.

5.1. The engagement of males and females in learning in mathematics

Motivation and engagement can be regarded as the driving forces of learning. They can also affect students' quality of life during their adolescence and can influence whether they will successfully pursue further educational or labour market opportunities. In particular, given the importance of mathematics for students' future lives, education systems need to ensure that students have both the interest and the motivation to continue learning in this area beyond school. Interest in and enjoyment of particular subjects, or *intrinsic motivation*, affect both the degree and continuity of engagement in learning and the depth of understanding reached. This tends to be independent of students' general motivation to learn (see also the last section of this chapter). For example, a student who is interested in mathematics and therefore tends to study diligently may or may not show a high level of general learning motivation, and vice versa. Hence, an analysis of the pattern of students' interest in mathematics is important. Such an analysis can reveal significant strengths and weaknesses in attempts by education systems to promote motivation to learn in various subjects among different sub-groups of students.

In PISA 2000, which focussed on reading, students, and particularly female students, felt generally positive about reading. In contrast, students in PISA 2003 (as well as in PISA 2000) expressed less enthusiasm for mathematics. For example, while on average across OECD countries, about half of the students report being interested in the things they learn in mathematics, only 38% agree or strongly agree with the statement that they do mathematics because they enjoy it. Less than one-third report looking forward to their mathematics lessons. In fact, in countries such as Belgium, Finland, France, Korea, Iceland, Italy, Latvia, the Netherlands, Portugal and Spain, fewer than half as many students who report an interest in the things they learn in mathematics say that they look forward to their mathematics lessons.

It is well established that intrinsic motivation tends to be lower at later stages of schooling and students seem often to lose interest in and enjoyment of mathematics after primary education. Data from TIMSS show, for example, that there tends to be a much higher percentage of students with positive attitudes towards mathematics at the 4th grade level than among 8th graders (OECD, 1997). This may be partly an effect of increasing differentiation of students' interests and their investment of time as they grow older. However, to what extent is lower interest in mathematics an inevitable outcome, and to what extent a consequence of the ways in which schooling takes place and mathematics is taught? And to what extent do these patterns vary across the genders? The subsequent examination of country differences in these patterns can shed some light on these issues.

While the preceding section showed that differences in the mathematics performance of males and females in at least two of the four mathematics scales tend to be small or moderate, with the exception of Iceland, Ireland, Portugal and Spain, males express significantly higher interest in and enjoyment of mathematics than females, and particularly so in Austria, Germany and Switzerland. As an example, on average across OECD countries, 37% of males compared with 25% of females, agree or strongly agree with the statement that they enjoy reading about mathematics. As an even more extreme example, in Switzerland, 33% of males compared with just 13% of females report enjoying reading about mathematics.

Among countries with high overall levels of student interest and enjoyment in mathematics, there are both countries with large gender differences, such as Denmark or Switzerland, as well as countries with small gender differences, such as Mexico, Portugal

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and Turkey. Similarly, among countries with overall low levels of interest and enjoyment in mathematics, there are some with large gender differences, such as Austria, Finland and Luxembourg, as well as countries with small gender differences, such as Hungary. This suggests that these gender differences do not just mirror broader patterns of student interest but relate to the ways in which males and females perceive mathematics and mathematics instruction.

PISA reports the interest in and enjoyment of mathematics of 15-year-olds on an index constructed so that the average score across OECD countries is 0 and two-thirds score between 1 and –1. A positive value on the index indicates that students report interest in and enjoyment of mathematics higher than the OECD average. A negative value indicates an interest lower than the OECD average. The index is useful to summarise differences among countries and the genders in interest and enjoyment in mathematics

When gender differences on the PISA index of interest in and enjoyment of mathematics are converted into effect sizes, 16 of the 30 OECD countries participating in PISA show effect sizes equal to or greater than 0.20, which can be interpreted as relevant to educational policy (see Box 5.1 and Figure 5.5). Compared to that, gender differences in mathematics performance tend to be small and effect sizes of 0.20 only exist in Greece, Korea, and the Slovak Republic.

This is of concern for policy as these data reveal inequalities between the genders in the effectiveness with which schools and societies promote motivation and interest in mathematics.

Research in PISA pointed out, however, that it is often difficult to interpret the meaning of absolute values on the index of interest in and enjoyment of mathematics across countries and cultures, particularly as these measures are based on self-reports from the students themselves. Nevertheless, even if absolute index values are difficult to compare across countries, it is reasonable to compare how closely student interest in and enjoyment of mathematics relate to student performance within each country. The results from PISA 2003 do not necessarily show that countries with "more interested" students achieve, on average, better mathematics results (in fact, students in one of the best performing countries, Japan, report the lowest interest in and enjoyment of mathematics), but the results do show that, within each country, students with greater interest in and enjoyment of mathematics tend to achieve better results than those with less interest in and enjoyment of mathematics. For example, in Japan, one of the countries with the lowest levels of student interest in mathematics, and Denmark, one of the countries with the highest levels of student interest, one unit on the index of interest and enjoyment corresponds to an increase of 28 score points on the PISA scale (OECD average 12 score points).

The causal nature of this relationship may well be complex and is difficult to discern. Interest in the subject and performance may be mutually reinforcing and may also be affected by other factors, such as the social backgrounds of students and their schools. Indeed, as shown in *Learning for Tomorrow's World* (OECD, 2004), the relationship between intrinsic motivation and student performance in mathematics diminishes considerably when other learner characteristics are accounted for. However, whatever the nature of this relationship, a positive disposition towards mathematics remains an important educational goal in its own right, not least because it will underpin learning in mathematics throughout life.

Beyond a general interest in mathematics, how do 15-year-old males and females assess the relevance of mathematics to their own life and what role does such external motivation play with regard to their mathematics performance? Overall, among OECD countries, 75% of 15-year-olds agree or strongly agree with the statement that making an effort in mathematics is worth it because it will help them in the work that they want to do later on. Seventy-eight per cent of 15-year-olds agree or strongly agree that learning mathematics is important because it will help them with the subjects that they want to study further on in school. Sixty-six per cent of them agree or strongly agree that mathematics is an important subject because they need it for what they want to study later on. And 70% agree or strongly agree that they will learn many things in mathematics that will help them get a job.

Nevertheless, significant proportions of students disagree or even disagree strongly with such statements. There is also considerable cross-country variation in self-reported instrumental motivation. Only half of the students in Japan and Luxembourg agree or strongly agree that making an effort in mathematics is worth it, because it will help them in the work they want to do. Similarly, the percentage of students that agree or strongly agree that they will learn many things in mathematics that will help them get a job is only around 46% in Japan and Korea and also less than 60% in Austria, Belgium and Luxembourg (it is 70% on average across the OECD). While the difficulties of comparing student responses on this index across cultures are acknowledged, the magnitude of these observed differences warrants attention.

As in the case of interest in and enjoyment of mathematics, countries can be compared on an index that summarises the different questions about instrumental motivation in mathematics (see Figure 5.5). As with intrinsic motivation, girls have substantially less instrumental motivation in mathematics than boys in all countries where the differences are statistically significant. Although the results show that the relationship between performance and instrumental motivation is much weaker than with intrinsic motivation (*i.e.*, interest in and enjoyment of mathematics), instrumental or extrinsic motivation has been found to be an important predictor for course selection, career choice and performance. It follows that any lesser instrumental motivation among women could be responsible in part for women having less interest in pursuing studies in mathematics and computing.

Figure 5.6a contrasts the proportion of females graduating from tertiary-type A programmes in mathematics or computing with gender differences in instrumental motivation while Figure 5.6b does the same with regard to gender differences in student mathematics performance. The figure shows that in the OECD countries where the difference in instrumental motivation between males and females is largest – namely Austria, Germany, the Netherlands and Switzerland – the share of women graduating from tertiary-type A programmes in mathematics or computing is also below the OECD average, and in some of these countries it is significantly below this benchmark. In fact, the gender difference in instrumental motivation in mathematics accounts for 41% of the cross-country variation of the percentage of tertiary mathematics and computing qualifications awarded to women, a much larger proportion than is accounted for by performance differences. There is obviously no direct connection between the 15-year-olds assessed by PISA and the older age cohorts leaving university studies. Nevertheless, to the extent that the motivational patterns revealed by PISA were similar also in the past, this suggests that gender differences in instrumental motivation among students in school may, combined with other influences, be predictive of the future study and career choice of males and females.

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Figure 5.6a. **Gender differences (instrumental motivation) and future educational choices**

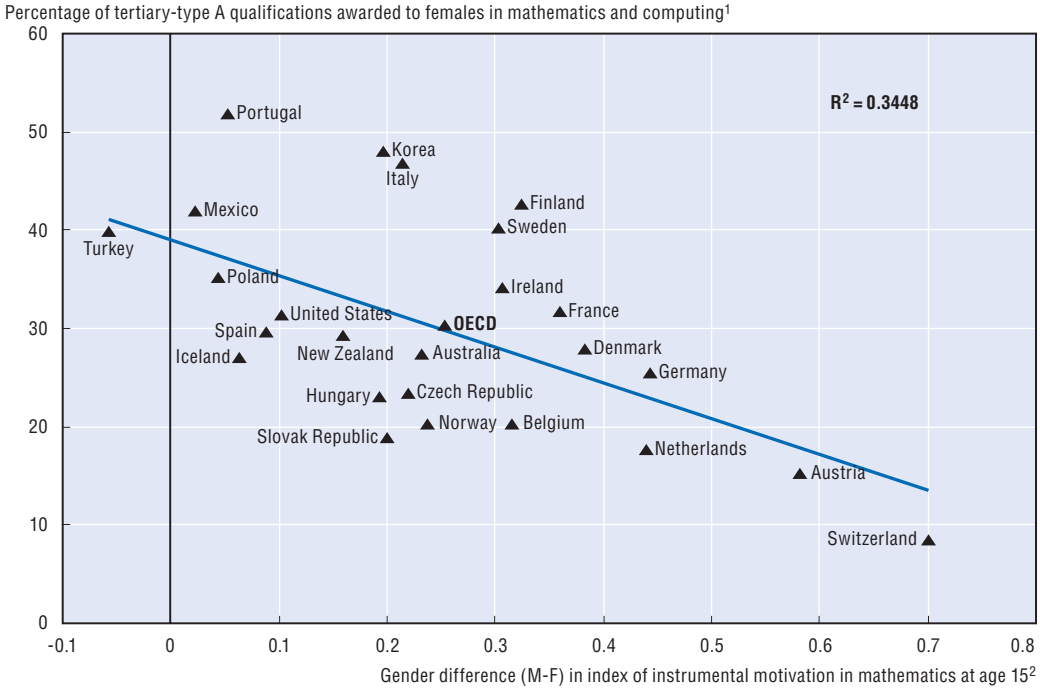
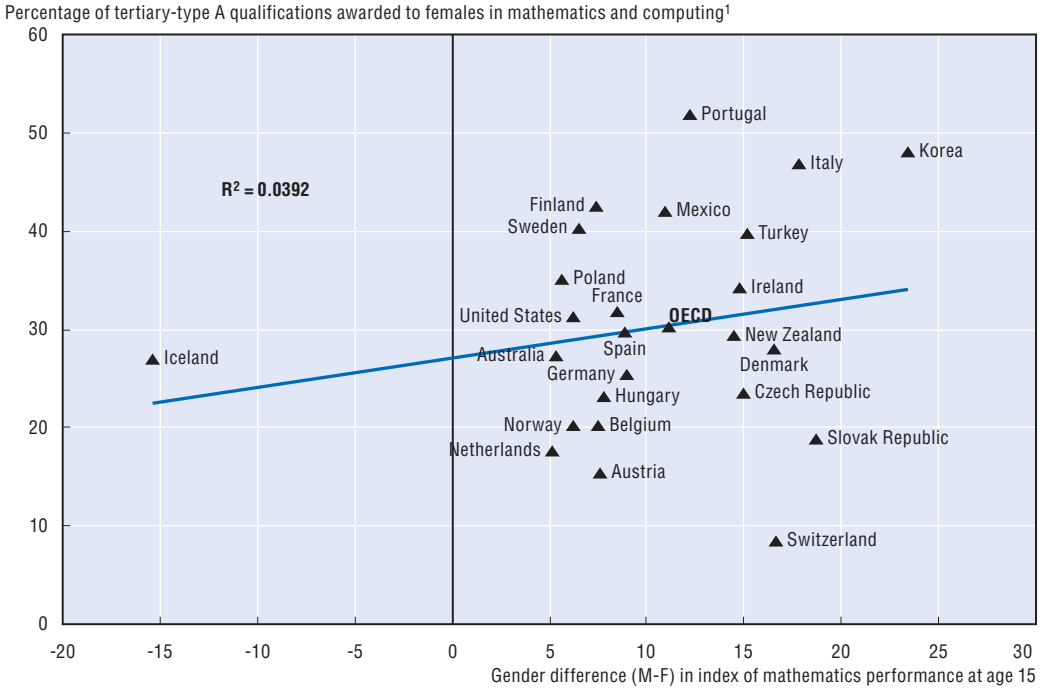


Figure 5.6b. **Gender differences (mathematics performance) and future educational choices**



1. Percentage of females graduated in mathematics and computing for tertiary-type A and advanced research programmes.
2. The greater the gender difference, the less females are motivated compared to males.

Source: Learning for Tomorrow's World: First Result from PISA 2003, Tables 2.5c and 3.2a (OECD, 2004) and *Education at a Glance: OECD Indicators 2005*, Table A3.3 (OECD, 2005).

While the choices that the 15-year-olds assessed in PISA 2003 will make in their future lives cannot be known, PISA also asked 15-year-olds what education level they expect to attain and found that in most countries, levels of instrumental motivation are higher among students aspiring to at least completing educational programmes that provide access to tertiary education. This relationship is stronger still if the students expect to complete a tertiary programme, and the pattern tends to be stronger among females than among males, even if it is not universal.

Together, these results suggest that the challenge for education systems lies more in fostering strong attitudes towards mathematics among female students than in raising their performance alone. It seems apparent that without the development of positive attitudes and skills, students will not be well prepared to acquire the new knowledge and skills necessary for successful adaptation to changing circumstances.

5.2. The beliefs of males and females about their mathematics competencies

Autonomous learning requires both a critical and a realistic judgement of the difficulty of a task as well as the ability to invest enough energy to accomplish it. Learners form views about their own competences and learning characteristics. These views have been shown to have considerable impact on the way they set goals, the strategies they use and their performance. Moreover, belief in one's own abilities has been shown to be highly relevant to successful learning. It can also affect other factors such as well-being and personality development, factors that are especially important for students from less advantaged backgrounds. Two ways of defining these beliefs are in terms of students' beliefs in their own academic abilities (self-concept) and of how much students believe in their own ability to handle tasks effectively and overcome difficulties (self-efficacy). A third dimension relates to emotional factors, such as feelings of helplessness and emotional stress when dealing with mathematics. All three dimensions were investigated by PISA and are examined in the following with a view towards gender differences (see Figure 5.5).

When 15-year-olds were asked about their views of their mathematical abilities, the picture that emerges is less positive than students' self-concept in reading, which was examined in PISA 2000 (OECD, 2001). On average across OECD countries, 67% of students disagree or strongly disagree with the statement that in their mathematics class, they understand even the most difficult work. Countries vary with respect to the response patterns. For example, for the aforementioned question, percentages disagreeing or strongly disagreeing range from around 84% or more in Japan and Korea to 57% or less in Canada, Mexico, Sweden and the United States. Similarly, on average across OECD countries, roughly half of the students disagree or strongly disagree that they learn mathematics quickly. But while in Japan and Korea more than 62% of students disagree or strongly disagree, the proportion is only around 40% of students in Denmark and Sweden (but note that results are reported in terms of students' agreement with the respective statements rather than disagreement, as in this text).

For most of these questions, comparatively large gender differences are apparent. For example, while on average across OECD countries, 36% of males agree or strongly agree that they are simply not good at mathematics, the average for females is 47%. In Italy, Japan, Korea, Norway, Poland, Portugal, Spain and Turkey, the figure rises to between 50 and 70% of females.

Summarising the different questions about students' self-concept in mathematics on an index shows that students in Canada, Denmark, Germany, Mexico, New Zealand, and the United States have the greatest confidence in their mathematics abilities. Students in

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Japan and Korea have the lowest self-concept. In almost all countries, there is considerable variation between males and females and in all countries males tend to show significantly higher levels of self-concept in mathematics than females. This is particularly so in Denmark, Germany, Luxembourg, the Netherlands and Switzerland.

There is a moderately strong association between individual students' performance and their self-concept in mathematics, but it is perhaps even more important that the data reveal a similarly strong association at school levels. This suggests that schools in which students tend to have a strong self-concept in mathematics also tend to have high levels of mathematics performance.

At one level, it is not surprising that students who perform well in PISA also tend to have high opinions of their own abilities. However, self-concept must be seen as much more than simply a mirror of student performance. Rather, it can have a decisive influence on the learning process. Whether students choose to pursue a particular learning goal is dependent on their appraisal of their abilities and potential in a subject area, and on their confidence in being able to achieve this goal even in the face of difficulties. The latter aspect of self-related beliefs is the subject of the following section.

In addition to being confident of their abilities, successful learners also believe that investment in learning can make a difference and help them to overcome difficulties – that is, they have a strong sense of their own efficacy. By contrast, students who lack confidence in their ability to learn what they judge to be important and to overcome difficulties are exposed to failure, not only at school, but also in their adult lives. Self-efficacy goes beyond how good students think they are in subjects such as mathematics. It is more concerned with the kind of confidence that is needed for them to successfully master specific learning tasks. It is therefore not simply a reflection of a student's abilities and performance, but has also been shown to enhance learning activity, which in turn improves student performance.

Summarising students' confidence in overcoming difficulties in particular mathematics tasks on an index shows that students in Greece, Japan, Korea and Mexico express the least self-efficacy in mathematics whereas students in Canada, Hungary, the Slovak Republic, Switzerland and the United States express comparatively stronger degrees of self-efficacy. However, within each country there is considerable variation, with the top quarter of students in most countries expressing strong confidence in handling specific tasks related to mathematics. Variation is particularly large in Canada, Iceland, Luxembourg, Norway, Switzerland, Turkey and the United States as shown by the difference between the mean index for the top and the bottom quarters.

Among the variables analysed in this chapter, self-efficacy is one in which gender differences appear particularly strong and the analysis also shows that students' self-efficacy in mathematics is even more closely related to student performance on the PISA 2003 mathematics assessment than self-concept in mathematics. In fact, self-efficacy is one of the strongest predictors of student performance, explaining, on average across OECD countries, 23% of the variance in mathematics performance. Even when accounting for other learner characteristics, such as anxiety in mathematics, interest in and enjoyment of mathematics or the use of control strategies, sizeable effects sizes remain for virtually all countries.

The association between mathematics efficacy and mathematics performance is not only strong at the student level. In most countries, there is also a clear tendency for students in lower performing schools to have less confidence in their abilities to overcome difficulties.

In fact, across the OECD, 23% of the mathematics performance differences among schools can be explained by the average levels of students' self-efficacy in mathematics at school. This indicates that further research, perhaps with longitudinal studies, is warranted to identify the school and student factors associated with high efficacy, and to investigate whether interventions designed to increase efficacy also increase achievement.

5.3. The anxiety of males and females in mathematics

Some students' less favourable disposition towards mathematics may be a consequence of earlier failures. Indeed, a considerable proportion of 15-year-olds in PISA report feelings of helplessness and emotional stress when dealing with mathematics. On average among OECD countries, half of 15-year-old males and more than 60% of females report that they often worry that they will find mathematics classes difficult and that they will get poor marks. On the other hand, fewer than 30% of students across the OECD agree or strongly agree with statements indicating that they get very nervous doing mathematics problems, get very tense when they have to do mathematics homework or feel helpless when doing a mathematics problem.

There is considerable cross-country variation in the degree to which students feel anxiety when dealing with mathematics, with students in France, Italy, Japan, Korea, Mexico, Spain, and Turkey reporting feeling most concerned and students in Denmark, Finland, the Netherlands and Sweden least concerned. For example, more than two-thirds of the students in Greece, Italy, Japan, Korea, Mexico and Portugal report that they often worry that it will be difficult for them in mathematics classes, whereas only about one-third of students in Denmark or Sweden fall into this category. Similarly, more than half of the students in France and Japan report that they get very tense when they have to do mathematics homework, but only 7% of students in Finland and the Netherlands report this. It is noteworthy that Finland and the Netherlands are also two of the top performing countries.

The significantly higher levels of anxiety in mathematics reported among females (apparent in all countries except Poland) are of particular concern for education policy, most notably in Austria, Canada, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Norway and Switzerland (see Figure 5.5).

As is to be expected, anxiety in mathematics is negatively related to student performance. A one-point increase on the PISA index of anxiety in mathematics corresponds, on average across OECD countries, to a 35-point drop in the mathematics score, which is just over half a proficiency level. Students in the bottom quarter of the index of anxiety in mathematics are half as likely to be among the bottom quarter of performers compared to the average student. This negative association remains even if other learner characteristics – such as students' interest in and enjoyment of mathematics, self-efficacy in mathematics and use of control strategies – are accounted for.

As was the case with self-efficacy, the association between anxiety in mathematics and mathematics performance is not only strong at student levels. In most countries, there is also a clear tendency for students in lower performing schools to report higher levels of anxiety in mathematics, with 7% of the performance variance among schools explained by the average levels of students' anxiety in mathematics at school.

The importance of further research in this area is underlined by the strong prevalence of anxiety in mathematics among 15-year-olds in general, and females in particular, coupled with the finding that in countries such as Denmark, Sweden and the Netherlands students

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report much lower levels of anxiety in mathematics (OECD, 2004). The positive experiences of the latter group of countries, which also perform well in mathematics overall, suggest that the issue can be managed successfully and raise questions about how these countries are addressing the issue through the organisation of schooling and instructional delivery.

6. Implications for policy

This chapter reveals that, while gender differences in student performance tend to be modest, there are marked differences between males and females in their interest in and enjoyment of mathematics, as well as in their self-related beliefs, emotions and learning strategies related to mathematics. Beyond the observed discrepancy between gender difference in actual performance (which are comparatively small) and gender differences in student intrinsic and extrinsic motivation (which tend to be much larger), a similar picture also emerges also when looking at students' mathematics-related self-efficacy beliefs, self-concepts and anxiety. Again, although females often do not perform at a level much lower than males, they tend to report lower mathematics-related self-efficacy than males in almost all countries. Finally, females experience significantly more feelings of anxiety, helplessness and stress in mathematics classes than males.

Taken together, the difference between males and females in performance in mathematics, on the one hand, and anxiety and attitudes towards the subject, on the other, are highly relevant for policy makers. Countries vary in how well they engage and motivate students in mathematics, and also vary in their ability to engage and motivate male and female students to a similar extent. This suggests that such differences are not solely the outcome of intrinsic differences between males and females and raises questions as to how the gender gap can be reduced and how to reach a high level of overall performance through the organisation of schooling and instructional delivery. At age 15, many students are approaching major transitions from education to work, or to further education. Their performance at school and, as the chapter suggests, perhaps even more importantly their motivation and attitudes towards mathematics, can have a significant influence on their further educational and occupational pathways. These, in turn, can have an impact not only on individual career and salary prospects, but also on the broader effectiveness with which human capital is developed and utilised in OECD economies and societies.

Students' motivation, their positive self-related beliefs as well as their emotions in subjects such as mathematics also affect their use of learning strategies. This underlines the importance for education systems that have often done reasonably well in raising the performance of females in mathematics and science to foster strong stronger dispositions among females towards these subjects. There are good grounds for this; high-quality learning is time and effort-intensive. It involves control of the learning process as well as the explicit checking of relations between previously acquired knowledge and new information, the formulation of hypotheses about possible connections and the testing of these hypotheses against the background of the new material. Learners are only willing to invest such effort if they have a strong interest in a subject or if there is a considerable benefit, in terms of high performance, with learners motivated by the external reward of performing well. Thus, students need to be willing to learn how to learn. From the perspective of teaching, this implies that effective ways of learning – including goal setting, strategy selection and the control and evaluation of the learning process – can and should be fostered by the educational setting and by teachers for males and females alike.

Research on ways of instructing students in learning strategies has shown that the development of learning expertise is dependent not only on the existence of a repertoire of cognitive and metacognitive information-processing abilities but also on the readiness of individuals to define their own goals, to be proactive, to interpret success and failure appropriately, to translate wishes into intentions and plans and to shield learning from competing intentions. The large gender differences on these dimensions that were observed in the preceding section point to further policy levers through which gender differences may be moderated. A repertoire of strategies, combined with other attributes that foster learning, develops gradually through the practices of teachers who model learning behaviour through intricate activities aimed at building a scaffolding structure of learning for the student and through analysis of the reasons for academic success and failure. During the process of becoming effective and self-regulated learners, students need assistance and feedback, not only on the results of their learning, but also on the learning process itself. In particular, the students with the weakest approaches to learning need professional assistance to become effective and self-regulated learners.

The links between students' self-related beliefs in mathematics and learning behaviours in mathematics suggest that motivation and self-confidence are indispensable to outcomes that will foster lifelong learning. The combined effect of motivation and self-confidence on control strategies suggests that teaching males and females how to learn autonomously is unlikely to work without strong motivation and self-confidence as a basis.

The finding that the profile of students' self-reported approaches to learning, as well as gender differences in these profiles, varies much more within schools than among schools also has policy implications, even if it does not imply that all schools are similar with regard to the learner characteristics of their intake. What it does highlight is the large variation in learner characteristics among students in each school. This underlines the importance for schools and teachers to be able to respond individually not only to differences in student abilities, but also in relation to gender differences as well as the characteristics of students as learners and their approaches to learning. It will not be sufficient to operate on the principle that "a rising tide raises all ships", since even in well-performing schools there are students who lack confidence and motivation and who are not inclined to set and monitor their own learning goals.

Overall, the results suggest that education systems need to invest in approaches that address aspects of attitudes and learning behaviours in relation to mathematics, particularly for females, and to consider this as a goal that is as central to the mission of education systems as cognitive instruction. This may have implications for the initial training of teachers, as well as for the continuous professional development of teachers.

Notes

1. When measured in terms of effect sizes (for an explanation of the concept and its interpretation see Box 5.1), gender differences on the mathematics scale are greater than 0.2 only in Greece and Korea. In all countries the effect sizes remain below the threshold of 0.3.
2. A list of the school factors and an explanation of the model used is given in *Learning for Tomorrow's World: First Results from PISA 2003* (OECD, 2004).
3. A similar comparison was also undertaken in 2003 and the results tend to be similar. However, the coverage of OECD countries in this comparison was too limited to allow for meaningful cross-country comparisons.

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4. Note that students views on mathematics relate to the subject as taught in school, not specifically to the PISA assessment.

5. When interpreting the analyses reported in this chapter, three caveats need to be borne in mind. First, constructs such as interest in and enjoyment of mathematics and the use of particular types of learning strategies are based on students' self-reports, and not on direct measures. To measure directly whether students actually adopt certain approaches to learning, one would need to examine their actions in specific situations. This requires in-depth interview and observation methods of a type that cannot be applied in a large-scale survey like PISA (Artelt, 2000; Boekaerts, 1999; Lehtinen, 1992). While PISA collects information on the extent to which students generally adopt various learning strategies that have been shown to be important for successful learning outcomes, such necessary preconditions for successful learning do not guarantee that a student will actually regulate his or her learning on specific occasions. However, by looking at such characteristics and at students' views on how they see themselves, one can obtain a good indication of whether a student is likely to regulate his or her own learning, and this is the approach taken by PISA. At the centre of this approach is the hypothesis that students who approach learning with confidence, with strong motivation and with a range of learning strategies at their disposal are more likely to be successful learners. This hypothesis has been borne out by research. Second, students across countries may vary with respect to how they perceive and respond to the questionnaire items on which the constructs are based. This is quite understandable since the survey asks students to make subjective assessments about things such as how hard they work, while at the same time, students perceive their attitudes and behaviour within a frame of reference shaped by their school and culture. It cannot be taken for granted, for example, that a student who says that he or she works hard has characteristics comparable to a student in another country who says the same. Cultural factors can influence profoundly the way in which such responses are given. This is emphasised by research showing that self-reported characteristics are vulnerable to problems of comparability across cultures (*e.g.*, Heine *et al.*, 1999; van de Vijver and Leung, 1997; Bempechat *et al.*, 2002) and has been confirmed by analyses of students' responses in PISA. Analyses of PISA 2000 data (OECD, 2003) as well as PISA 2003 data have shown that for some of the student characteristics measured in PISA, most notably their self-beliefs and their sense of belonging at school, valid cross-country comparisons can be made. In these cases, similar relationships between self-reported characteristics and student performance within and across countries indicate that the characteristics being measured are comparable across countries. In contrast, for other measures (most notably interest in mathematics, instrumental motivation, the use of elaboration and control strategies), cross-country comparisons are more difficult to make. Nevertheless, even where cross-country comparisons of student reports are problematic, it is often still possible to compare the distribution of a particular characteristic among students within different countries. Thus, for example, while the average level of instrumental motivation in two countries may not be comparable in absolute terms, the way in which student scores on a scale of instrumental motivation are distributed around each country's average can be compared in building up country profiles of approaches to learning. Differences among subgroups within countries as well as structural relationships between students' approaches to learning and their performance on the combined PISA mathematics test are therefore the main focus of the results presented here.

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