



Education at a Glance 2005

No media or wire transmission before 5:00 a.m. US EDT, 13 September 2005

OECD Briefing Note for United States

Questions can be directed to:

Barry McGaw
Director
Directorate for Education, OECD
Tel: +33 1 4524 9210; +33 6 1424 2994; email: Barry.McGaw@OECD.org

Andreas Schleicher
Head of the Indicators and Analysis Division
OECD Directorate for Education
Tel: +33 1 4524 9366, email Andreas.Schleicher@OECD.org

COMPETING IN THE KNOWLEDGE ECONOMY

Europe has set itself the target of overtaking the United States by 2010...

When the European Union Heads of State met at a summit in Lisbon in 2000 they set the goal of Europe becoming 'the most competitive and dynamic knowledge-based economy in the world' by 2010. (See http://europa.eu.int/comm/education/policies/2010/et_2010_en.html.) The development of modern 'knowledge economies' reflects a move from an economy based on land, labor and capital to one in which the main component of production is information and knowledge. The most effective economies are those with the largest production of information and knowledge and in which they are easily accessible to the greatest number of individuals and enterprises.

For Europe, the competition is the US, which Europe clearly recognizes to be currently in the first place to which it aspires.

...but judges it did not get far in the first five years.

Europe is not doing too well in catching up, as a mid-term review by a high-level working group chaired by the former Dutch Prime Minister, Wim Kok, concluded in its report, *Facing the challenge - the Lisbon strategy for growth and employment*, published in late 2004.

The United States continues to do well as a knowledge economy...

OECD data confirm the strength of the United States in the knowledge economy, though it does not dominate on all measures and some of its strength is a function of its size. In addition, its advantage



is often seen when data are expressed per worker rather than per hour worked since, particularly in European countries, the number of hours worked per worker is less than in the **United States**.

In per capita wealth, the **United States** (with GDP per capita of US\$37 600) is second only to Luxembourg (with a GDP per capita of US\$52,153 based on a population of less than half a million, an economy dominated by banking and a large contribution from cross-border workers to the economy). The **United States** leads the G7 (Canada, France, Germany, Italy, Japan, UK, US) with all of the others between \$US26 000 and \$US30 000. (Source: OECD in Figures- 2004 edition)

In GDP per hour worked, the **United States** was 7th amongst OECD countries in 2004 (Source: OECD Labour Productivity Database, July 2005).

In 2004, the **United States** had growth of 3.2% in this measure of labor productivity which is above the OECD average. The **United States** is ranked equal 7th amongst OECD countries in growth in GDP per hour worked (Source: OECD Economic Outlook No. 77).

In gross domestic expenditure on research and development, expressed as a percentage of GDP, the **United States** at 2.6% in 2003 was behind Sweden (4.0%), Finland (3.5%), Japan (3.2%), and Iceland (3.0%) and equal with Korea but, because of the size of its economy, the **United States** accounted for 42% of all research and development expenditure in the OECD area, well ahead of the combined EU25 at 31% and Japan at 17%. (*OECD Main Science and Technology Indicators 2005/1*, Tables 1 and 2)

The level of expenditure is, of course, only a measure of inputs. In education, level of expenditure is related only weakly to the quality of outcomes and to the distribution of educational achievements across the population so it is worth examining research and development outputs as well as expenditure.

Patents are one measure of inventive performance and can provide insight into innovative activities across countries. In 2001, the **United States** had the highest share of patent families (patents to protect the same invention in Europe, Japan and the United States) in the world, with over one third, slightly ahead of the EU25 in total and Japan. On a per capita basis, however, the **United States** is well behind Switzerland, Finland, Japan, Sweden and Germany, reflecting differences in size, industry structure and patenting practices. Between 1991 and 2000, the share of all countries outside the United States, EU25 and Japan rose from 5.6% to 7.3% and that trend can be expected to continue as other countries become more fully integrated into global innovation structures. (*OECD Science, Technology and Industry Outlook 2004*, p.40)

...with a further check available early next month with updated OECD data.

Updated information will be available with the publication of the *OECD Science, Technology and Industry Scoreboard* in early October 2005.



IS EDUCATION A KEY TO THE KNOWLEDGE ECONOMY?

Europe looks to educational reform as one driver in enhancing its knowledge economy...

When the European leaders set the goal for Europe of becoming the number one knowledge economy, they declared that what was needed was 'not only a radical transformation of the European economy, but also a challenging programme for the modernisation of social welfare and education systems'. In 2002 they added that, by 2010, Europe should be the world leader in terms of the quality of its education and training systems.

...and it is certainly clear that education confers benefits – on the economy and society...

Social rates of return provide a measure of the benefits to society of additional education. At the tertiary level – when the individual completes this level of attainment as part of his or her initial education – the social internal rates of return in the **United States** are 12.4% for males and 9.2% for females, higher than in all the other nine countries for which data are available. (Table A9.10, p.143)

Analysis repeated from *Education at a Glance 2003* examines the driving factors of economic growth and shows that rising productivity accounted for at least half of the GDP per capita growth in almost all OECD countries with available data and, in Austria, Denmark, Finland, Germany, Greece, Italy, Korea, Luxembourg, Sweden and the United Kingdom rising productivity accounted for almost all of the GDP per capita growth. The **United States** was 11th out of 26 countries on this measure of increased productivity. (Chart A10.1, p.148)

Labor productivity can be increased in several ways and the educational attainment of the working population plays a pivotal role in this equation, not just through increasing the effectiveness of the inputs but as a determinant of the rate of technological progress. In the **United States**, the contribution of increased educational attainment to growth in labor productivity from 1990 to 2000 ranked 6th of the 15 countries studied, placing it behind Portugal, the United Kingdom, Italy, France and Finland in this respect. (Chart A10.2, p.150)

Studies of the macro-economic returns to education estimate that increasing the average level of attainment by one year, raises the level of output per capita by between 3 per cent and 6 per cent. (Indicator A10, p.144)

Many analyses indicate a positive causal relationship between higher educational attainment and better mental and physical health, with the mechanisms operating through income and employment, behavioral and psycho-social effects. (Indicator A10, p. 144)

...and on individuals.

University graduates (tertiary type A) aged 25 to 64 in the **United States** earn, on average, 91% more than those who have completed only upper secondary education. This earnings premium is higher than in all other OECD countries for which data are available except Hungary where the premium is 135%. (Table A9.1a, p.130)



Those aged 25 to 64 in the **United States** without upper secondary education earn, on average, 30% less than those who have completed upper secondary education. This gap is greater than in all countries except the United Kingdom where, at 31%, it is essentially the same. (Table A9.1a, p.130)

The average earnings benefits of additional education are, thus, greater in the **United States** than in virtually all other OECD countries.

Within these earnings, however, there is an issue of gender equity. Females aged 30 to 44 years in the **United States** with university (tertiary type-A) education earn, on average, 62% of the earnings of similarly qualified males, a rate that is lower than in all but Germany, New Zealand and Switzerland among the 19 OECD countries for which data are available. (Table A9.1b, p.131)

Examination of the distribution of earnings within each education level further illustrates the rewards that can be gained through achieving the next level of education. Some 30% of university graduates in the **United States** earn more than double the national median earnings, whilst only 8% of those qualified to the level below tertiary level achieve such earnings. (Table A9.4a, pp.135-136)

Those with higher levels of education are also less likely to be unemployed than those with lower levels of education. (Table A8.4a, pp.113-114)

The most complete analysis of the benefits of attaining the next level of education involves the determination of the net benefit by taking account of the benefits (higher average earnings, lower risk of unemployment and the public subsidies received during the studies) and the costs that individuals incur when studying (tuition fees, lost earnings during the studies and higher tax rates later in life). The magnitude of the net benefit will be influenced by factors not measured directly such as the extent of salary dispersion and the relationship of this dispersion to differences in level of education as well as by the progressivity of income taxation.

Data for these calculations are available for only ten OECD countries. For someone continuing directly from secondary to tertiary education in their youth, the net benefit (the private rate of return) in the **United States** is 12.6% for males and 9.4% for females. Only Finland (15.8%) has a higher rate for males, while Finland (15.4%), Norway (13.0%) and Switzerland (10.1%) have higher rates for females. The net benefits in these European countries are less affected by costs since tuition costs are low. (Table A9.6, p.141)

HOW DOES THE US COMPARE WITH OTHER OECD COUNTRIES IN EDUCATION?

The United States compares well in educational attainment, though the gap is closing.

Amongst 55 to 64 year-olds in the **United States** in 2003, 85% had completed upper secondary education. That is an indication of what things were like in the period roughly 40 to 50 years ago and no other OECD country matched this rate. The rate of completion of upper secondary education among 25 to 34 year-olds in 2003, indicating the way things were roughly 10 to 20 years ago, was 87% in the **United States**, placing it in 9th position. The rate in the United States had not declined in the intervening period; it had essentially not grown while those in eight other countries had grown past it. (Table A1.2a, p.36)



A similar trend is evident in the tertiary education attainment rates though, in this case, the **United States** remains slightly closer to the top. The rate of 35% among 55-64 year-olds in 2003 indicates that the **United States** had the highest tertiary education attainment in the period 35 to 45 years ago, though only just ahead of Canada with 34%. No other country was above 27%. The **United States'** rate of 39% for 25-34 year olds reveals only a small growth over the intervening 30 years during which Canada (53%), Japan (52%), Korea (47%) have all grown well clear while Finland, Norway and Sweden at 40%, Belgium (39%) and Spain (38%) essentially match the **United States**. In rank, the **United States** has slipped from 1st to equal 7th. (Table A1.3a, p.37)

The United States is, however, well below the best in terms of student achievement...

In the 2003 OECD Programme for International Student assessment (PISA), the performance in mathematics of 15-year old students in the United States was well below the OECD mean, ranking the **United States** in a tie for 21st place with Poland, Hungary and Spain and ahead of only Portugal, Italy, Greece, Turkey and Mexico. The **United States** trailed many European countries. Finland, Korea, and the Netherlands were the highest performers, achieving statistically similar average scores that are higher than the average scores in all other OECD countries. (Chart A4.3, p.64)

Student performance in problem solving was equally low for the **United States**. The mean score achieved by 15-year-old students in PISA 2003 ranked the **United States** in tie for 23rd place with Spain, Portugal and Italy and ahead of only Greece, Turkey and Mexico. It was again well behind the highest performing countries, Finland, Japan and Korea. (Chart A5.3, p.78)

...though there is some evidence of improvement.

Among the 12 OECD countries that took part in the IEA Trends in International Mathematics and Science Study (TIMSS) in 1995 and 2003, the **United States** and Korea were the only countries to record a statistically significant improvement in the mathematics performance of their 8th grade students over the eight-year period. The mean score scores of students increased by 12 points in the **United States** and 8 points in Korea. (Chart A7.1 but see the qualification in the text in the first full paragraph on p.94)

Similar improvements in science performance amongst 8th grade students in the **United States** were also recorded over the period. (Chart A7.1, again to be read with the qualification on p.94)

ARE THERE IMPLICATIONS FOR THE US KNOWLEDGE ECONOMY?

How can the US have such a strong knowledge economy without a stronger education system?

Europe hopes to catch the **United States'** knowledge economy by, among other things, improving its education system. Yet many European countries have caught up, and even passed, the **United States** in educational attainment and most are ahead of the **United States** in the quality of the learning achieved by their students, at least at the age of 15.

Perhaps education does not matter...

One possibility is that Europeans will need to look elsewhere to make their gains on the grounds that the quantity and quality of education does not matter. There is counter evidence in the estimates of



social returns cited above and in the shifts in the labor market in countries like the US where new jobs tend to require higher levels of education than the jobs that are disappearing.

A further possibility is that advantages in the quantity and quality of education are not gained if they are not matched with a labor market that fits people to jobs on the basis of the appropriateness of their skills rather than their formal qualifications. If that is the case, the flexibility of the labor market in the **United States** may enable it to make better use of the products of its education system than other OECD countries with ostensibly better inputs to the labor market from their education systems.

...or perhaps the United States has a first-mover advantage which may be at risk...

The **United States** built a strong tertiary education sector long before other OECD countries, dating from the GI Bill under which many ex-military personnel returning from World War II were able to obtain a college degree. This could have given the **United States** a strong ‘first-mover’ advantage which could be at risk.

...with others closing the attainment gap and forging ahead in quality at school level...

Although the **United States** remains near the top of the OECD countries in tertiary education attainment, many countries have closed the gap and, in upper secondary education attainment, a growing number have moved ahead of it. In addition, as indicated in the PISA results for 15-year-olds, many other countries are building a higher-quality base in the knowledge and skills of their young people.

...and also producing more university graduates in science.

University science graduates produced per 100 000 persons employed aged 25 to 34 years in the **United States** was 1 069 in 2003, just below the OECD average of 1 157 and well behind the rates in a number of countries such as Australia (1 942), the United Kingdom (1 926) and France (1 900) and some with newly strong knowledge economies such as Finland (2 172), Korea (2 000) and Ireland (1 765). Japan at 1 140 has a rate around the OECD average but it is low because of marked gender differences, with a rate of 1 656 for males but only 372 for females. (Table A3.2, p.56)

IS KNOWLEDGE-ECONOMY STRENGTH DUE TO A STRONG ELITE?

There is no evidence of a strong elite at 15 years-of-age in the US...

In the PISA 2000, the **United States** achieved an overall result in reading literacy around the OECD average but did have a relatively large percentage of its 15-year-olds achieving at the highest level, suggesting the development of at least a high-performing elite. The overall result was pulled down by the relatively high proportion of poor performers.

This pattern was not reproduced in mathematics and problem solving in PISA 2003. The **United States**, as described above, ranked on average 21st and 23rd respectively in these two domains. The distribution of student performances in PISA 2003 reveals percentages performing at the highest level that are in line with the low average performances. In mathematics, some 10% of students in the **United States** achieved the highest proficiency levels (5 and 6), below the OECD average of 13% and well below Belgium, Canada, Finland, Japan, Korea, the Netherlands, New Zealand and



Switzerland where at least 20% of students reached this level (Table A4.1, p.68). A similar pattern is evident in problem solving. (Table A5.1, p.80). These results do not suggest that a strong elite is being developed by age 15.

...but it may come later through a high-quality university system, including foreign students...

The strength of the **United States'** education system may well lie in its higher education sector which is large, diverse and highly competitive.

While there are no direct assessments of the quality of higher education (equivalent to the PISA assessments of 15-year-olds), there are many indications of the high regard in which **United States'** higher education institutions are held. International rankings of the top institutions are invariably dominated by universities in the **United States**. Almost 30% of foreign students from throughout the world choose to study in the **United States**. While foreign students represents a smaller percentage of tertiary enrolment in the **United States**, at 3.5%, than in a number of other countries, that is due to the size of the US system overall. (Chart C3.2, p.254 and Table C3.1, p.267)

As far as fields of education are concerned, in each of Australia, Finland, Germany, Sweden and the **United States**, 30% or more of foreign students are enrolled in sciences or engineering. (Table C3.5, p.273)

...and through a high level of job-related continuing education and training of adults.

The **United States** (at 44%) is one of only five countries in which more than 40% of the labor force participates in some kind of non-formal job-related continuing education and training each year. The other four are Denmark (46%), Sweden (45%), Finland (44%) and Switzerland (45%). (Chart C6.1, p.310, Table C6.2, p.323)

In all countries, those with the highest levels of formal education are more likely to have access to informal, job-related education and training. The differences are marked in the **United States** where 61% of those with tertiary education participate each year while only 14% of those with less than upper secondary education do. The difference is even more marked in Switzerland but somewhat less so in Denmark, Sweden and Finland. (Chart C6.2a, p.313, Table C6.2, p.323)

Differences related to age are less marked than those related to level of formal education. In the **United States**, 40% or more of those in the labor market participate in job-related informal education in all four age brackets, 25-34 years, 35-44 years, 45-54 years and 55-64 years. (Chart C6.2b, p.314, Table C6.4, p.325)

UNITED STATES' EDUCATIONAL INPUTS ARE HIGH

Expenditure per student in the United States is high at all levels...

OECD countries as a whole spend annually US\$ 7 343 per student between primary and tertiary education. The figure for the **United States** is US\$11 152 and ranks 2nd among the OECD countries behind Switzerland. (Table B1.1, p.172)



The drivers of expenditure per student vary across countries: among the five countries with the highest expenditure per student, Switzerland and the **United States** are two of the countries with the highest teachers' salaries at secondary level of education (Chart D3.1a, p.356) whereas Austria, Denmark and Norway are among the countries with the lowest student to teaching staff ratio. (Table D2.2, p.353)

...especially at the tertiary level...

Expenditure per student at the secondary level at US\$ 9 098 in the **United States** is some 30% higher than the country average of US\$ 7 002. At the tertiary level, expenditure per student in the **United States** is almost double the country average at US\$ 20 545. (Table B1.1, p.172)

...where there is a large dependence on private sector funding.

In tertiary education the percentage of funding coming from private sources varies widely, from less than 4% in Denmark, Finland, Greece and Norway to more than 50% in Australia (51%), the **United States** (54.9%) and Japan (58%), and higher in Korea (85%). (Table B3.2b, p.198)

Teachers' working time is high..

Teachers' teaching hours in the **United States** are relatively high. (Note: The figures for the **United States** are estimated from a sample survey rather than administrative record and may slightly overstate the amount of teaching time.) The number of teaching hours per year in public primary schools in the **United States** is 1 139 hours, compared with the OECD average of 795 hours. For lower secondary education the average number of teaching hours in the **United States** is 1 127 compared with the average of 701 hours and for upper secondary, the United States figure is 1 121 compared with the average of 661 hours. (Table D4.1, p.381)

The composition of teaching time varies markedly. While primary teachers teach six weeks fewer per year in the United States than in Denmark, total teaching hours for primary teachers in the United States is over 75% higher than in Denmark because of differences in the hours of teaching per day: primary teachers in Denmark teach for around three hours per day, while their counterparts in the **United States** teach for around six hours per day. (Table D4.1, p.381)

SHOULD THE UNITED STATES WORRY ABOUT ITS EDUCATION SYSTEM?

There are causes for concern in the **United States'** education system. The advantage it had over other countries of much higher completion rates of upper secondary education and tertiary education has been eroded.

The higher education system in the **United States** remains strong, at least in its reputation which is all that is measured internationally and at least for its elite institutions. The **United States'** economy continues to derive a relative advantage in innovativeness from the research conducted in its universities.

The quality of the learning of 15-year-olds in the **United States**, particularly in mathematics and problem solving, are well below those of many European countries and also Japan, Korea, Australia



and New Zealand. With its relatively high expenditure and its relatively low student achievements at the school level, the **United States** education system is clearly inefficient.

These are matters that have not escaped notice in the **United States**. The Federal government's *No Child Left Behind* legislative initiative is a substantial and direct attempt to address the problems at the school level.

The international data in *Education at a Glance 2005* are not recent enough to reveal whether this initiative is bearing fruit. The most recent PISA data, for example, were gathered in 2003. The international data in *Education at a Glance 2005* do confirm the need for action to be taken to improve school-level education in the **United States**. Evidence on whether the initiative *No Child Left Behind* initiative is working should first appear in national data. International comparisons will, in turn, provide both external evidence of any improvement and an indication of how it compares with changes in other countries. The target is not stationary since all OECD countries are seeking to elevate the performance of their education systems..

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