



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 20.4.2005
SEC(2005) 518

COMMISSION STAFF WORKING PAPER

Annex to the :

COMMUNICATION FROM THE COMMISSION

**Mobilising the brainpower of Europe:
enabling universities to make their full contribution to the Lisbon Strategy**

European Higher Education in a Worldwide Perspective

{COM(2005)152 final}

EUROPEAN HIGHER EDUCATION IN A WORLDWIDE PERSPECTIVE

I. INTRODUCTION

- 1. The scope of the analysis and methodology**

II. THE IMPORTANCE OF HIGHER EDUCATION FOR THE LISBON OBJECTIVES

- 1. Educational attainment levels and employment**
- 2. Higher education and economic performance**
- 3. Higher education and competitiveness**

III. A WORLDWIDE COMPARATIVE ANALYSIS BASED ON SELECTED INDICATORS: WHAT IS THE PERFORMANCE OF HIGHER EDUCATION IN EUROPE?

- 1. Relatively few young people in the EU enrol in higher education but enrolment is growing strongly**
- 2. The proportion of the population in the EU that has graduated from higher education is relatively low - but the average duration of education in certain Member States is relatively long**
- 3. The EU produces more mathematics, science and technology graduates than the USA but has fewer researchers in the labour market**
- 4. The European Union produces a considerably higher number of PhDs than its major competitors**
- 5. The proportion of foreign students enrolled in higher education institutions in the EU is higher than in the USA or Japan**
- 6. Total investment in higher education in the EU is below the level of key competitors**
- 7. Preparing young people for participation in higher education**

**IV. MAKING EDUCATION AND TRAINING SYSTEMS A WORLD WIDE
QUALITY REFERENCE – THE CENTRAL ROLE OF HIGHER EDUCATION**

- 1. Improving access to higher education**
- 2. Improving higher education attainment levels**
- 3. Increasing total investment in higher education**

V. CONCLUSIONS

STATISTICAL ANNEX

EUROPEAN HIGHER EDUCATION IN A WORLDWIDE PERSPECTIVE

“In advanced economies such as the EU, knowledge, meaning R&D, innovation and education, is a key driver of productivity growth. Knowledge is a critical factor with which Europe can ensure competitiveness in a global world where others compete with cheap labour or primary resources”.

*Mid-Term Review of the Lisbon Strategy, 2005*¹

I. INTRODUCTION

1. The European Council set a strategic goal for the European Union at its Spring Summit in Lisbon in 2000 – to become, by 2010, *“the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs and greater social cohesion.”*²
2. Recognising the pivotal role of education and training in reaching this goal, the Lisbon Council invited Ministers of Education to reflect on the concrete future objectives of education systems in the Union. As a result, the Education Council adopted the report on the concrete future objectives of the education and training systems in 2001,³ comprising three strategic objectives:
 - *the improvement of quality and effectiveness*
 - *facilitating the access of all to education and training*
 - *opening up to the wider world*
3. These objectives were further explored in the “Education & Training 2010” programme,⁴ endorsed by the Barcelona European Council in 2002 where the Heads of State and Government also added a concrete goal for European education and training systems: to become “a world reference for quality by 2010.”
4. This staff working paper complements the Communication *“Mobilising the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy”*⁵. However, not all areas covered in the two papers are the same, as a result of data availability constraints.
5. The paper benchmarks the performance of higher education systems⁶ in Europe against those of its main global competitors by using selected indicators to identify

¹ Communication to the Spring European Council: Working together for growth and jobs. A new start for the Lisbon Strategy. Communication from President Barroso in agreement with Vice-President Verheugen, 2005.

² Presidency Conclusions, Lisbon European Council, 23/24 March 2000, par. 5.

³ Report from the Education Council to the European Council adopted by the Education Council on 12 February 2001.

⁴ Detailed work programme on the follow-up of the objectives of education and training systems in Europe, jointly adopted by the Council and Commission on 14 February 2002. (OJ of the European Communities C 142 of 14.6.2002).

⁵ Commission Communication *“Mobilising the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy”* (COM(2005....)).

⁶ In this paper, the term “higher education system” covers all higher education institutions, irrespective of their name, status and mission in the individual countries.

relative strengths and weaknesses in European education systems.⁷ It focuses on higher education within the broader perspective of a European educational systems because, as underscored by the Communication of the Commission to the Spring European Council “the Union must ensure that universities can compete with the best in the world through the completion of the European Higher Education Area”⁸ i.e. become a world reference for quality.

1. Scope of the analysis and methodology

6. When analysing the performance of European higher education in a world-wide perspective this paper applies “average performance levels” based on the weighted averages of Member States (EU25), which is used as a proxy for the average situation of individuals in a common European space of education and training. As additional information on performance of educational systems in the Union, EU3 figures are used to show the weighted average of the three best performing EU countries, within the various areas (tables in the Annex inform on performance of individual countries). Nevertheless, EU averages obscure national and regional variations in terms of specific economic, social, cultural, institutional and educational contexts which however are beyond the scope of the paper.
7. Indicators, whether quantitative or qualitative, cannot fully reflect the complexity of quality in education. However, they help to identify variations in performance levels and can form the basis for the examination of the underlying reasons for these variations. Statistical comparison also helps to identify countries and world regions which perform particularly well and whose good practice and expertise can be analysed and eventually shared with others. Exchange of experiences and good practice are inherent elements in the Open Method of Coordination and the Lisbon follow-up. This paper shows that in the area of higher education the EU can learn from the performance of countries across the world.
8. The main data sources used in the working paper are the UOE international data collections (joint UNESCO, OECD and Eurostat enquiry). These data are recognised as valid and largely comparable across countries. In a number of key areas for measuring quality and performance of educational systems indicators are presently missing and new indicators will have to be developed. This has been analysed in the Commission Staff Working Paper, “New Indicators on Education and Training.”⁹
9. Countries which are included in this comparative analysis of higher education in Europe in a worldwide perspective are mainly selected because they are considered as present or future competitors in the global economy or because they represent some of the world’s highest performing higher education systems. The scope of the country coverage is therefore not to include all world regions. The analysis is based on data, where available, on the following countries: the USA, Canada, Japan, South Korea,

⁷ A more detailed analysis of the performance of European education and training systems within the frame of the follow –up of the Lisbon objectives please see: Commission Staff Working Paper “Progress towards the Lisbon Objectives in Education and Training (SEC(2005)...)

⁸ Communication to the Spring European Council, 2005.

⁹ Commission Staff Working Paper, “*New Indicators on Education and Training.*”, November 2004 (SEC (2004) 1524)

Australia, New Zealand, China, Russia, India and Mexico.¹⁰ Some European, non-EU countries, have been included because they perform particularly well in the field, i.e. Norway and Switzerland.

II. THE IMPORTANCE OF HIGHER EDUCATION FOR THE LISBON OBJECTIVES

“Higher education is more than the capstone of the traditional education pyramid; it is a critical pillar of human development worldwide. In today’s lifelong learning framework, higher education provides not only the high-level skills necessary for every labour market but also the training essential for teachers, doctors, nurses, civil servants, engineers, humanists, entrepreneurs, scientists, social scientists, and myriad personnel. It is these trained individuals who develop the capacity and analytical skills that drive local economies, support civil society, teach children, lead effective governments, and make important decisions which affect entire societies.”

An Agenda for a growing Europe, *André Sapir (2003)*¹¹

10. As secondary education was crucial to the post-war economy, so higher education has become essential for the development of the knowledge society, which demands increasing levels of supply of highly-educated, highly-skilled people. The economic performance (competitiveness, GDP per capita) and the functioning of the labour market (employment rates, participation in lifelong learning, salary levels) in a given country are closely linked to higher education attainment levels.

1. Educational attainment levels and employment

11. The employment rate of holders of a tertiary education is significantly higher than for people achieving only lower levels of education (see figure 1). For people with tertiary education the employment rate is above 75% in all countries considered -the rate varies between 76 % (Turkey) and 91% (Switzerland). In the EU the employment rate of people with tertiary education is 85%. On the other hand, the employment rate of people with less than upper secondary education is significantly lower and varies between 50 % (Turkey) to 68 % (South Korea and Switzerland). In the EU the employment rate of people with less than upper secondary education is 54%. Almost all the countries in the comparison perform better than the EU as concerns the employment rate of people with low qualifications.
12. Employment rates are 19 percentage points higher in the EU for those with upper secondary education level than for people with only lower-secondary level.¹² This should represent a significant motivation for young people in Europe of enrolling in upper secondary education, although an aggregate level the impact the impact is likely to be smaller. Similar high premiums from education for the individual can be found in Canada, Australia and New Zealand. Only in South Korea the difference of

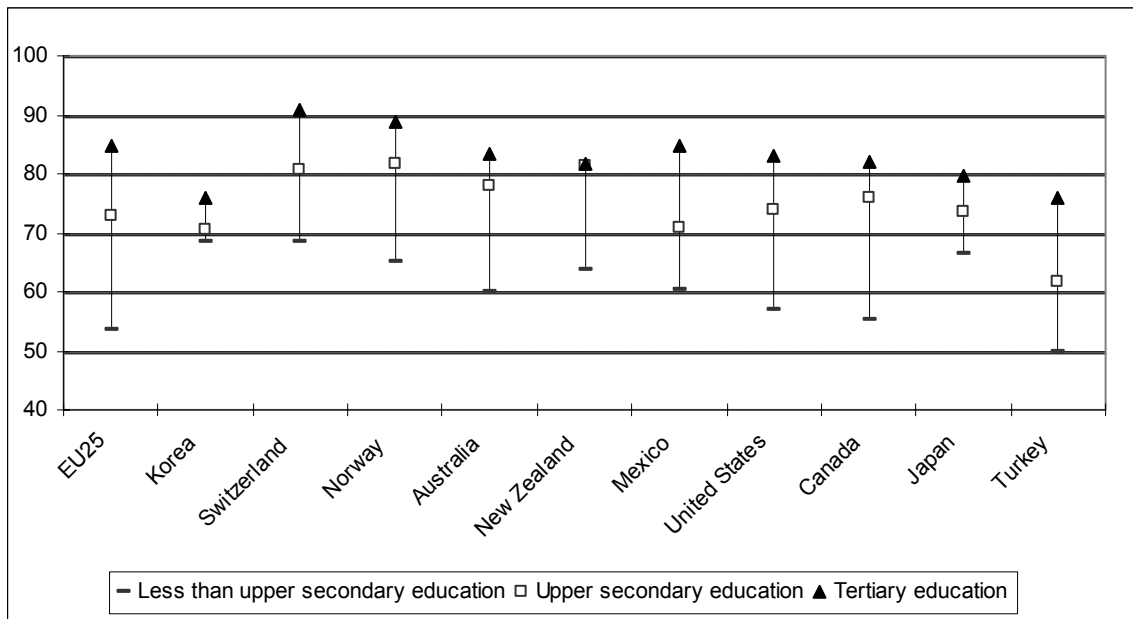
¹⁰ To ensure a reliable regression analysis additional countries are considered in figure 3 and figure 4.

¹¹ See *An agenda for a growing Europe – making the EU Economic System Deliver*. André Sapir, July 2003.

¹² See *EU Economy Review 2003*, hp. 3, pp.126-7, for a discussion of influences on employment levels.

employment rates between those with an upper secondary education and those without is insignificant.

Figure 1: Education levels and employment rate (25-64), 2002



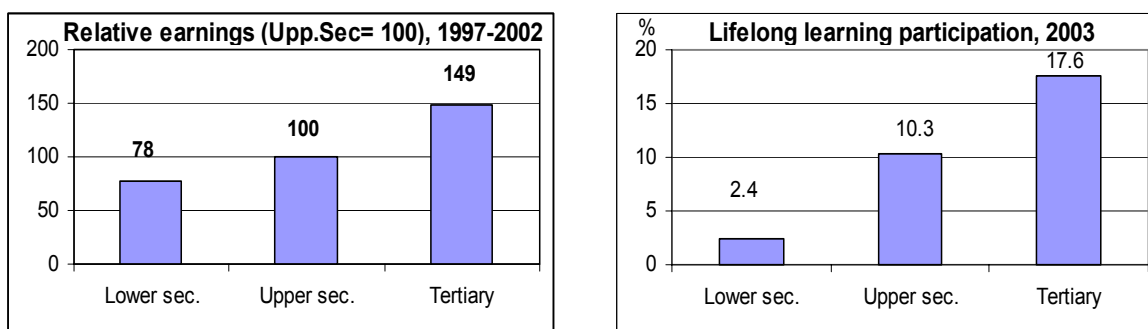
Source: DG Education and Culture. Data: Eurostat (LFS), OECD (Education at a Glance)

13. More importantly for the direct concern of the analysis in this paper; in the EU there is also a significant difference in employment rates between those with higher education and those with only upper secondary education giving incentives for people to complete tertiary education. The difference in the employment rate of people with tertiary education and lower secondary education is nearly 31 percentage points in the EU (only Turkey and Mexico have a greater gap), while the gap is less pronounced in the USA (26%) and much smaller in Japan (13%). In the EU, the difference in employment rates and labour force participation is especially marked in older age groups: 45% of 60-64-year-olds with higher education are still active on the labour market in the EU (2003), compared to 21% of those with lower secondary education.
14. There is also a clear link between educational attainment and unemployment rates. The unemployment rate of the active population in the EU in 2003 was four percentage points lower for people with higher education level than for the population as a whole and 7.5 percentage points lower than for those with less than lower secondary education. In the new Member States there is an even larger difference in unemployment rates between skilled and unskilled workers than in the EU-countries. Furthermore, average earnings increase with education level, being almost twice as high for those with higher education than for those with only lower-secondary attainment.¹³ Finally participation in lifelong learning also increases with education level: the lifelong learning participation rate in the EU is more than seven times higher

¹³ Relative earnings data in figure 2 have been calculated using employment weights and data available for 14 EU countries for 1997-2002 from OECD, Education at a Glance 2004, page 175

for people with higher education than for those with lower-secondary as the highest level attained (Figure 2).

Figure 2: Education levels, earnings and lifelong learning participation of population 25-64 in the EU25



Source: DG Education and Culture. Data: OECD (EAG, see footnote 13), Eurostat Labour Force Survey

15. Consequently, investments in education and training are key instruments, along with other policies to improve the functioning of the labour market, for raising the employment rate and promoting social inclusion¹⁴ and for achieving the Lisbon goals of an employment rate of 70% by 2010¹⁵. It is therefore central for the Lisbon objectives to achieve the “reference level of European average performance” adopted by the Council on 5 May 2003: which stipulates that by 2010, at least 85 % of 22-year-olds in the European Union should have completed upper secondary education. The benefit of achieving the goal is spelled out by the strong positive relation between the achievement of upper secondary education and employment rate. Achieving this goal would also significantly increase the proportion of young people that have access to higher education.

2. Higher education and economic performance

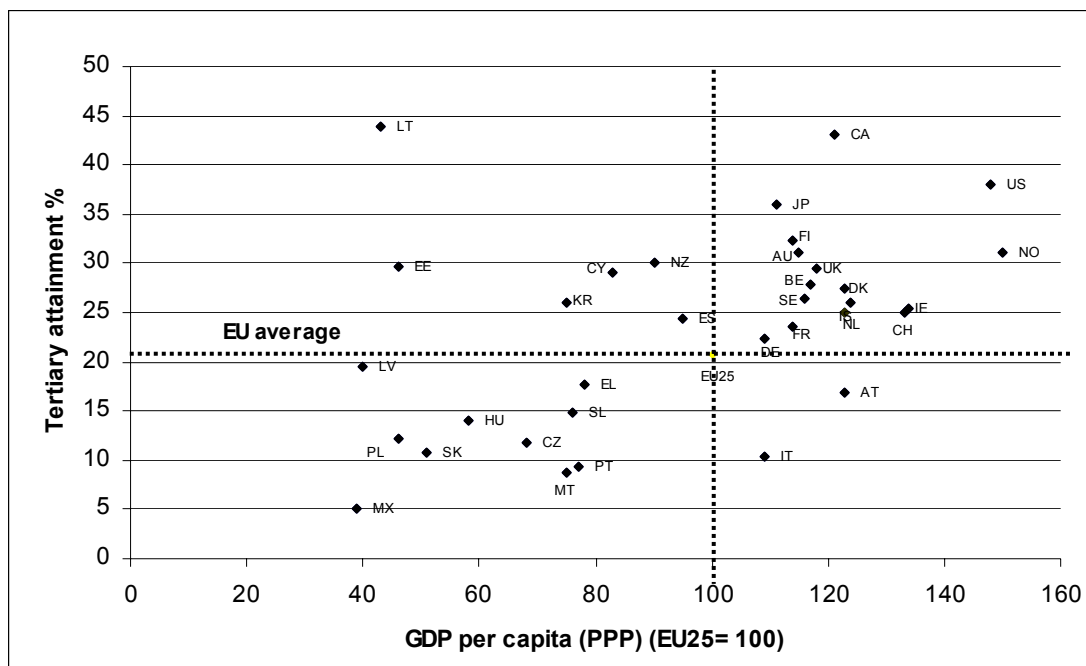
16. Higher education attainment rates are positively related to economic performance of a country, (Figure 3). Of the non-EU countries considered, Canada has the highest tertiary education completion rate of those aged 25-64 (43%), followed by the United States at 38% and Japan at 36%. These countries also rank high in terms of GDP per capita. In the EU, the average higher education attainment is 21%, which corresponds to a somewhat lower average GDP per capita.

¹⁴ The link between Social Inclusion and Education and Training was in fact stressed in the Conclusions of the Lisbon European Council of 23/24 March 2000 paragraph 32. It is stressed that the new knowledge-based society “brings a risk of an ever-widening gap between those who have access to the new knowledge, and those who are excluded”. The Conclusion continues by stating “to avoid this risk and maximise this new potential (red. of the knowledge-based economy) efforts must be made to improve skills, promote wider access to knowledge and opportunity and fight unemployment: the best safeguard against social exclusion is a job”.

¹⁵ Presidency Conclusions, Lisbon European Council 23/24 March 2000 paragraph 30.

17. Of note is the performance of the new Member States with presently relatively low higher education attainment levels (with the exception of Lithuania, Estonia and Cyprus) and low levels of GDP per capita. The new Member States with relatively high tertiary attainment levels also show relatively low GDP levels, partly because some of them are former transition economies where the economic catching up process is still ongoing.

Figure 3: Economic performance and higher education attainment levels of the adult education (25 – 64 years old) (2002)



Source: DG Education and Culture; Data: Eurostat Labour Force Survey for EU. OECD (Education at a Glance, 2004) for other countries. See Annex for a list of country codes.

18. The relationship between higher education attainment levels and economic performance has the nature of a ‘virtuous circle,’ in which greater national wealth allows higher levels of investment in education and an increase in educational attainment in turn increases productivity and generates wealth. A study carried out for the European Commission in 2002 estimated that an increase by one year in the average education level of the labour force might add as much as 0.3 to 0.5 percentage points to the annual EU GDP growth rate.¹⁶

3. Higher education and competitiveness

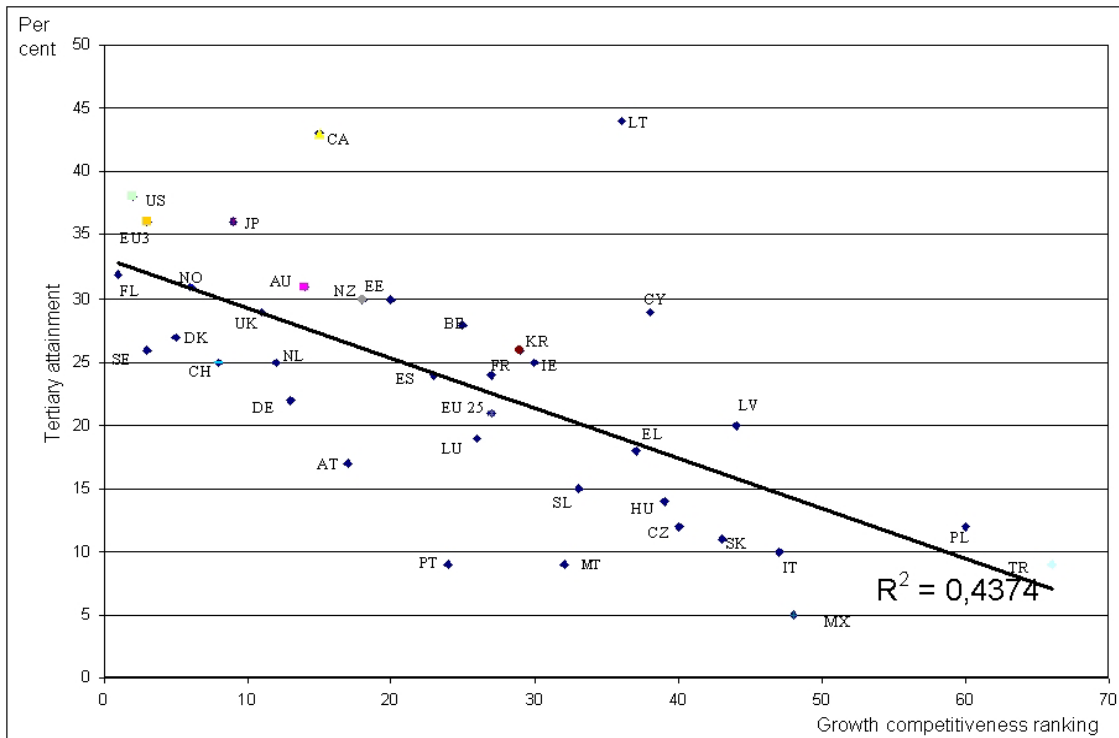
19. There is also a positive relation between competitiveness rankings and tertiary completion rates (Figure 4, countries closest to the vertical axis rank highest in terms of competitiveness).¹⁷ Canada’s leading position in tertiary completion rates does not,

¹⁶ De La Fuente and Ciccone, ‘Human capital in a global knowledge based economy’, Final report for DG Employment and Social Affairs, European Commission, 2002

¹⁷ Competitiveness is measured inter alia by the World Economic Forum and published annually in the Global Competitiveness Report. <http://www.weforum.org/site/homepublic.nsf/Content/Global+Competitiveness+Programme%5CGlobal+Competitiveness+Report>
The “Growth Competitiveness index” in the report is based on three broad categories of variables linked to “innovation” which drive economic growth in the medium and long term: the level of technology in

however, give it the premier position in the competitiveness league table, produced by the World Economic Forum, it ranks 15th,¹⁸ since there are other determinants of competitiveness where the country ranks less well.

Figure 4: Tertiary attainment levels and growth competitiveness ranking
Relationship between growth competitiveness rankings in the Global Competitiveness report 2004-05 and tertiary completion rates of population aged 25 to 64 (2002).



Source: DG Education and Culture.

Data: World Economic Forum, Global Competitiveness Report 2004-05 and OECD (EAG), 2002.
EU3: The three leading Member States in competitiveness: Finland, Sweden and Denmark
EU25: All 25 EU Member States

20. In the 2004-05 Global Competitiveness Report Finland, which is among the EU countries with the highest tertiary attainment level, topped the ranking for the third time during the last four years. The World Economic Forum concludes that this high ranking is mainly due to the fact that the country is extremely well managed at the macroeconomic level, and scores very high in those measures which assess the quality of its public institutions, including the education sector. The United States, the OECD country with the second highest tertiary attainment rate, is ranked second, with overall technological supremacy, and especially high scores for such indicators as companies' spending on R&D, the creativity of its scientific community, personal computer and internet penetration rates. In 2004 Sweden ranked third place. There are thus two EU countries among the top three.
21. Taken as a whole the EU lags behind key global competitors the United States and Japan both in tertiary attainment and in competitiveness ranking. Only three EU

the economy, the quality of public institutions and the macroeconomic conditions related to growth. The report suggests that the Knowledge Economy is in fact an innovation driven economy based on high levels of "social learning". World Economic Forum, Global Competitiveness Report 2004-2005.

18

The X-axis shows growth competitiveness ranking. The closer the country is to the Y-axis the higher the ranking in terms of growth competitiveness.

countries (Finland, Sweden, Denmark), and none of the larger Member States are among the top ten. Tertiary attainment levels in the three countries are 1/3 above EU average, however, still clearly below leading OECD countries. In terms of old and new Member States of the EU, there is a clear divide in terms of both tertiary completion rates and competitiveness rankings (despite the exceptional performance of Lithuania on tertiary completion rates).

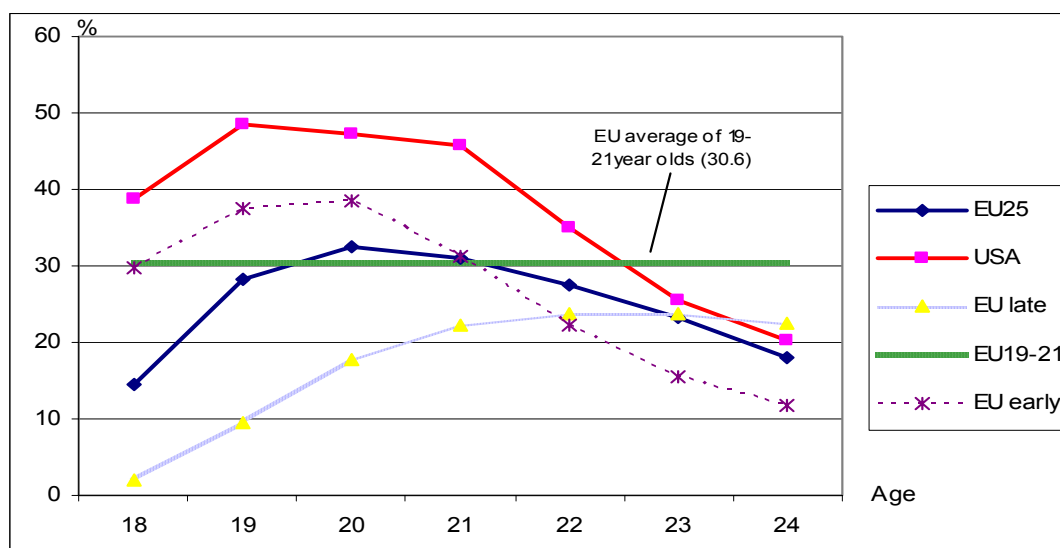
III A WORLDWIDE COMPARATIVE ANALYSIS BASED ON SELECTED INDICATORS: WHAT IS THE PERFORMANCE OF HIGHER EDUCATION IN EUROPE?

- 1. Relatively few young people in the EU enrol in higher education but enrolment is growing strongly**
22. Entry and participation rates in higher education are an indication of the degree to which a population is acquiring the knowledge and high-level skills necessary for the knowledge-based economy. In comparison with its most important competitors, higher education institutions in the EU attract a lower proportion of secondary school leavers, implying that higher education in Europe is still not an attractive option for a significant part of pupils having completed upper secondary education.
23. However, the EU is catching up. The number of higher education students increased in the EU in the period 1997 to 2002 by 16% or on average by 3.1% per year, compared to an annual growth of 2.2% in the USA and only 0.1% in Japan. The number of students enrolled in higher education increased especially in the New Member States, with Poland showing the fastest growth of all OECD countries. The growth in the number of students reflects higher enrolment rates rather than a growth of student age population.
24. When analysing entry rates into higher education it is useful to differ between research and labour market oriented programmes. At current first time net entry rates, every second young person in the OECD countries would enter research oriented higher education programmes during his/her lifetime, while 1/6 would enter labour market oriented programmes¹⁹. Australia shows the highest calculated entry rate for research oriented programmes of all OECD countries (77 %), but some EU Member States also show entry rates of 70 % or more (Sweden, Finland, Poland), and thus higher entry rates than the USA and Japan. The relative low entry rates to research oriented programmes in EU countries like Belgium, UK and France and outside the EU in Japan and Korea are related to the availability of a relatively strong sector of labour market oriented higher education.
25. About 25% of young people aged 18-24 years were enrolled in higher education in EU 25 in 2002, a much lower share than in the USA (37.7%). In the USA, tertiary students start to study on average at an earlier age than in Europe. Almost 40% of 18-year-olds in the US participate in higher education, compared to about 15% in the EU (see figure 5). The EU average, however, masks wide differences between enrolment

¹⁹ See OECD, Education at a Glance 2004, table C2.1, page 288

patterns among Member States: in the Nordic countries and Germany, students enrol at a relatively late age²⁰ (with peak enrolment at the age of 23), whereas in the UK, Ireland, Belgium, Spain, France and Greece, more than a quarter of students enter university at the age of 18, with peak enrolment between 19 and 20.

Figure 5: Students in higher education as a percentage of 18-24-year-olds (2002)
Enrolment as a percentage of corresponding age group.



Source: DG Education and Culture. Data : OECD (UOE).

EU late: Weighted average for four EU countries in which students begin studies relatively late compared to EU average (Denmark, Germany, Finland, Sweden)

EU early: Weighted average for four EU countries in which students begin studies relatively early (Belgium, Greece, Ireland, UK)

26. Improving the rate of participation in higher education of talented young people from socially disadvantage social groups is a challenge in most countries. Furthermore, it is necessary not only to reach new categories of students, but also, to make them succeed. At present, too many enrolled students leave the European universities without an academic degree. According to OECD data survival rates in higher education in the 13 EU countries for which data was available amounted to only 66% in 2000, compared to an OECD average of 70% and a rate of 66% in the US, 79% in Korea and 94% in Japan.²¹ The high survival rates in East Asia are also related to specific attitudes towards education.²² Survival rates in Europe vary widely between

²⁰ Looking at a broader age group- students aged 20-29 as a percentage of the population of 20 to 29 years old, shows that for Finland, Sweden and Denmark (39.5 %, 33.6 % and 31.4 % respectively) where students start to study at a later stage of their life ²⁰shows higher rates of enrolment than for the USA (25.2 %) and Korea (26.5 %), although Australia still belongs to the leading group (32.9%). Source: OECD, net enrolment rates expressed as percentage are calculated by OECD by dividing the number of students of a particular age group enrolled in all levels of education by the size of the population of that age group.

²¹ Survival rates are calculated on the basis of the number of graduates divided by the number of new entrants at the typical age of entrance.

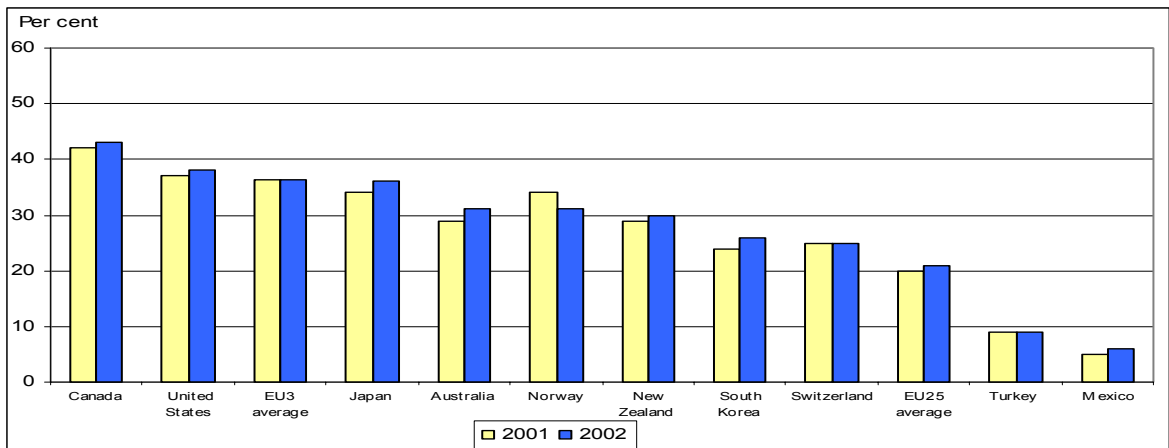
²² Education being among the most important values acknowledged by Asian families, an attitude favouring high private investment in education in terms of time and financial resources and a strong appreciation of formal degrees.

countries with highest rates in Ireland (85%) and the UK (83%) and relatively low rates in Sweden (48%) and Italy (42%).

2. The proportion of the population in the EU that has graduated from higher education is relatively low- but the average duration of education in certain Member States is relatively long

27. The active population of the EU (25-64 years) has lower levels of higher education attainment than its main competitors in the global economy (Figure 6). The average level of higher education attainment among the active population in the EU is 21%, only half the corresponding proportion in Canada (43%) and also significantly lower than in the US (38%) and Japan (36%). Even the three leading EU countries in the field (Lithuania, Finland and Estonia) with on average 36 % are performing at somewhat lower levels than the best OECD countries.

Figure 6: Percentage of population aged 25 to 64 with at least higher education, EU averages and non-EU countries, 2001, 2002.



Source: DG Education and Culture. Data: Eurostat Labour Force Survey for EU and CC-countries; OECD (EAG) 2004 for other countries.

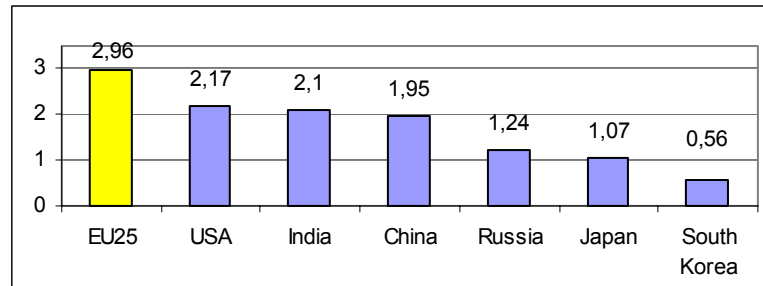
EU averages and non-EU countries are grouped separately and then ranked in descending order by the percentages that have attained higher education.

EU3: The three best performing member countries (Finland, Estonia, Lithuania), EU25: All the member countries

28. As the absolute number of young people in the EU is declining, the total number of higher education graduates in the EU is likely to stagnate in the long term, despite an increase in participation and graduation rates. In 2001 3.0 million students graduated from higher education in the EU, compared to 2.2 million in the USA, and around 2 million in India and China, and slightly over one million in Japan and in Russia (Figure 7). Women represented 58% of all graduates in the EU in 2001, compared to 57% in the USA and 49% in Japan. While the number of graduates will probably fall in Japan and Russia in the future as a result of demographic trends, the USA and China (which plans to increase the higher education participation rate from 10% to

15% of an age cohort by 2010) could overtake the EU within the next ten years if participation and graduation rates are not increased in the EU²³.

Figure 7: Number of higher education graduates by region (millions), 2001



Source: DG Education and Culture. Data: UNESCO, Eurostat

29. The availability of short and medium-length programmes – associated principally with the differentiated BA/MA/PhD model common outside Europe and being gradually phased in across Europe as part of the Bologna process – increase tertiary graduation rate as students will graduate already with a BA after a few years of study. In the countries with the highest tertiary graduation rates the majority of students complete programmes of three to four years. Conversely, in Austria, the Czech Republic, Germany, Italy and the Slovak Republic, where graduation rates are below the EU average, the majority of students complete longer programmes (of at least five years’ duration).²⁴ Therefore in some European countries (including the Netherlands, Germany and Denmark) individuals receive on average more formal education –above 13 years of average years of schooling (including higher education), than students in non-EU countries like Canada, USA and Japan with higher tertiary attainment levels²⁵. The introduction of BA level of graduates will not only increase graduation rates for these levels of study but would probably also attract more students into higher education because bachelor degree courses would be more widely available.

3. The EU produces more maths, science and technology graduates than the USA but has fewer researchers in the labour market

30. A sufficient supply of scientific specialists will be critical for Europe’s competitiveness in the global economy. Europe produces significantly more graduates in mathematics, science and technology than the USA and Japan. And the number of

²³ Graduation rates are influenced by a number of factors such as: conditions of access to higher education; labour market demand as well as wage and tax structures; guidance and quality assurance systems in higher education, which affect students’ welfare and motivation levels and hence drop-out rates; and degree and qualification structures.

²⁴ See also OECD, *Education at a Glance* (2004), chapter A.

²⁵ See also OECD, *Education at a Glance* (2004), table A.1.1. The calculation of the average number of years in formal education is based upon the weighted theoretical duration of schooling to achieve a given level of education, according to the current duration of educational programmes as reported in the UOE data collection.

graduates in these fields in the EU is further increasing (by about 30,000 or over 4% in 2003). However, with a growth of over 30% per year China overtook the EU in 2003.

Advanced graduates in Europe use their competencies and skills in a wide variety of economic sectors, but it seems that their research potential remains relatively under-utilised. In 2001 some 1.8 million full-time equivalent (FTE) personnel were employed in R&D in the EU, of whom about one million were considered researchers.²⁶ The EU has about 60% more active researchers in the labour market than Japan, but about 15% fewer than the US (Figure 8). This situation is partly due to differences in the functioning of the labour market but also to the ‘brain drain’ from Europe to the US: about 400,000 Europeans with a scientific and technical education are currently living in America, of whom about 120,000 are employed as researchers.

31. The relatively high number of MST graduates compared to research posts in Europe could also imply that employers could select candidates from a comparatively large pool of graduates, and that the pool of researchers could be renewed more quickly. In addition, other economic sectors like manufacturing and ICT services could benefit from a surplus of MST graduates with transferable skills.

Figure 8: Number of graduates (ISCED 5 and 6) in mathematics, science and technology and number of researchers (in 1000) in 2001

Region	Tertiary graduates 2001	MST graduates		Growth per year in 2001-03 (%)	Researchers 2001	Number of researchers per 1000 labour force 2003
		2001	2003			
EU25	2956	681	740	+4.2	1084	5.5
USA	2174	380	431	+6.5	1261	9.0
Japan	1068	233	230	-0.6	675	9.7
China	1948	464	810	+32.1	743	1.0
Russia	1240	n.a.	225*	n.a.	422	5.9*

Source: DG EAC, Data source: Eurostat, DG RTD, OECD, Statistical Yearbook of China, Goskomstatof Russia,

* = data for 2002

32. The EU target of increasing investment in research and development to 3% of GDP by 2010 should have a positive effect on the number of researchers in the EU labour market.²⁷ The establishment of a genuine European Research Area could also improve the situation, by creating an environment conducive to the mobility of researchers, for example through better recognition of the researcher’s profession in Europe.²⁸ In March 2005 the European Commission adopted a European Charter for researchers and a code of conduct for the recruitment of researchers that aims at increasing the attractiveness of research careers and improve mobility and working conditions of researchers across Europe.²⁹

²⁶ The proportion of R&D personnel employed as researchers varies from 40-75%, according to Member State and to industry or academic research activity.

²⁷ COM (2003) 226 final (30 April 2003)

²⁸ COM (2001) 331 final of 20 June 2001 and SEC (2003) 146 final of 4 February 2003

²⁹ Commission Recommendation of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (2005/251/EC). Official Journal of 22.3.2005, L75/67.

4. The European Union produces a considerably higher number of new PhDs than its major competitors

33. Almost twice as many PhDs each year graduate from European universities compared to the USA (see figure 9). However, the USA makes greater efforts to attract PhD students and holders from other countries and seems to be successful in that. Foreign students in the USA represent 47 % of all doctoral degrees in M&S and 49 % in engineering in 1999, a much higher share than in the total student population. Currently nearly 10% of the 1.45 million PhD holders in the US are from the EU, while the EU has a total of about 1.5 million PhD holders. As regards PhDs in maths, science and technology the USA produces about 25 000 per year, compared to over 30 000 in Europe and about 20 000 in Asia. However Asia shows the fastest growth.³⁰

Figure 9: ISCED 6 graduates (new PhDs) (2002)

Region	Total number	ISCED 6 graduates (new PhDs) per 1000 inhabitants aged 25-34	New PhDs per 1000 students enrolled in ISCED 5-6
EU 25	85 000	1.3	5.2
USA	44 200	1.1	2.8
Japan	13 600	1.4	3.4
China	12 900 (2001)	0.1	1.0

Source: DG Education and Culture, Data: Eurostat, OECD

5. The proportion of foreign students (including intra-EU mobility) enrolled in higher education institutions in the EU is higher than in the USA or Japan

34. Globalisation and the challenges of the modern knowledge-based economy have induced an increasing competition for the best brains. To counterbalance the effects of the out-sourcing of labour-intensive industries to low-income countries, countries compete in attracting the best talents to get a competitive advantage in the knowledge-based economy. The attractiveness of higher education institutions plays a key role in this strategy, since many of those who spend time abroad as mobile students tend to contribute their skills and knowledge to the labour market of their host-country. Top European talents making their research careers at universities in the USA may have contributed to the creation of virtuous circle of knowledge accumulation in the USA. Mindful of these concerns, EU Ministers of Education have already set the objective of transforming the EU into “the most-favoured destination of students, scholars and researchers from other world regions”.³¹

³⁰ Data source: Council of Graduate Students (USA)

³¹ Detailed Work Programme on the follow-up of the objectives of education and training systems in European, adopted by the Education Council and the Commission on 14 February 2002.

35. At the same time it is widely recognised that mobility has the potential to increase the professional and personal competence of the labour force and that mobility has a positive impact on learning, including language skills, and that it contributes to understanding other cultures, an asset in an increasingly global economy. Consequently, it is official policy of many countries to encourage the mobility of nationals. Moreover, student mobility is clearly a high EU policy priority. A considerable part of overall student mobility within Europe is supported through Community programmes such as Erasmus, which has funded more than one million students since its inception in 1987/88. The current phase of the scheme has the ambitious target of achieving an Erasmus mobility rate of 10% of all students before its close in 2006,³² while the proposal for the subsequent phase (running until 2011), if approved by the European Parliament and the Council, will further increase mobility levels. Its target is three million students to have studied abroad with an Erasmus grant by 2011, implying that 375,000 students will be participating in the final year of the programme. By launching the Erasmus Mundus programme the EU has also started to promote mobility with third countries.
36. However, presently data is not of sufficient quality for a detailed analysis of this complex issue.³³ The common data collection of UNESCO, OECD and EUROSTAT (UOE enquiry) bases its definition of foreign students on citizenship. This, however, is not necessarily the same as mobile students. Firstly, many tertiary students with foreign citizenship are not really (physically) mobile students, since they may have lived all their life in the country where they are studying.³⁴ Consequently, a country with a liberal naturalization policy may have a lower percentage of ‘foreigners’ enrolled in its institutions than a country with rigid naturalisation policy. Secondly, a growing number of families live outside the country of which they are citizens. Therefore, some student with home citizenship should be considered in-coming and thus mobile students.³⁵ Consequently, the analysis below can not be conclusive in terms of determining the relative attractiveness of education and training systems in different world regions.
37. In 2002 1.9 million students were enrolled outside their country of origin worldwide, of which 1.78 million (or 94%) were studying in the OECD area and 0.9 million in the EU. The United States received most foreign students (in absolute terms) with 30% of the total. However, the UK (12%), Germany (12%), France (9%), Spain (2%), Belgium (2%), Italy (2%), Austria (2%), Sweden (2%), the Netherlands (1%) and other EU countries (3%) account for a combined EU figure of 47%. Australia is in

³² Specified in the Socrates decision n°253/200/EC of the European Parliament and of the Council of 24 Jan 2000: “the Commission's aim, in line with the European Parliament's wish, is to attain a participation rate {...} of around 10 % of students in the mobility activities under the Erasmus action.”

³³ As of 2005 in order to improve the quality of data on the physical mobility of students, the UOE data will be collected on the basis of a new definition of mobile student, namely defined according to their country of prior education

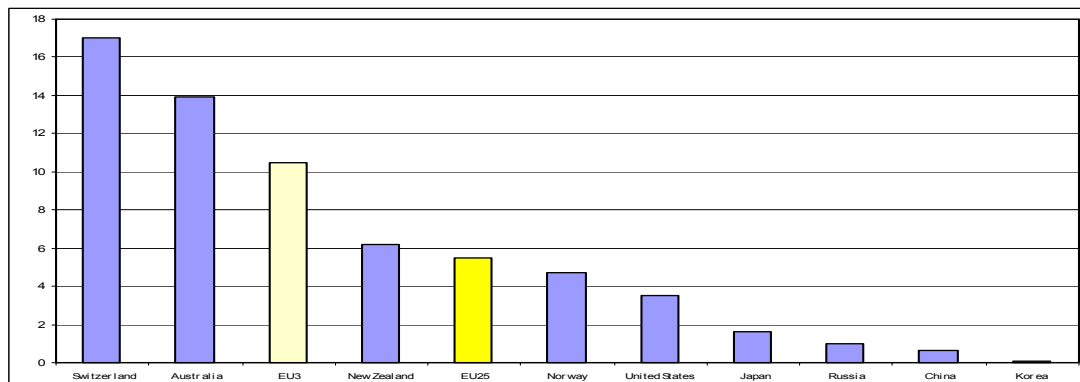
³⁴ In “Statistics on Student Mobility within the EU” (Kassel University October 2002) it has been estimated that non-mobile students with foreign citizenship make up between 18% and 50% of all students with foreign citizenship.

³⁵ The study mentioned above has estimated that the proportion of students with home citizenship among mobile students ranges from 5% to almost 17%.

fourth place with 10%. Altogether, these countries host nearly 81% of all foreign students.³⁶

38. The three EU countries with the highest proportion of foreign students in their tertiary institutions are Austria, UK and Belgium, where on average 11% of the students are students with foreign citizenship (Figure 10). The average proportion of foreign students in EU countries was 5.5 % in 2001/2000. The proportion of foreign students in the EU is clearly higher than in the US and Japan. However, 37% of foreign students in the EU come from other EU countries; therefore, the EU, considered as a unit, has about as high a proportion of foreign students as the US.

Figure 10: Percentage of students in higher education who are foreign citizens, 2001.



Source: DG Education and Culture. Data: Eurostat, OECD (*Education at a Glance*, 2004)
 EU25: All Member States except Greece and Luxembourg
 EU3: The 3 best performing Member States (Austria, Belgium and UK)

39. The number and proportion of foreign students is increasing quickly in Australia, but has stagnated in recent years in the USA, while European countries have been more successful in attracting students from other continents.³⁷ In particular the number of Chinese students in Europe is increasing rapidly.³⁸ Comparatively large increases in the proportion of foreign students were also experienced in countries which have begun to offer more courses in English, principally Iceland, Norway and Sweden, where the numbers of foreign students have increased by 50-70% between 1998 and 2002.
40. Data on long-term student mobility (students staying at least one academic year) show that in 2002 about 56,000 EU students studied in the USA in comparison to about 24,000 US citizens which studied in the European Union. Students from Europe represented about 10 % of total foreign enrolment in the USA, while US students studying at least one academic year represented about 3% of foreign students in Europe.

³⁶ See OECD, *Education at a Glance*, 2004, p. 296.

³⁷ The intake of foreign students in the US may have stagnated as a result of national security measures taken after 11 September 2001, in particular the tightening of visa regulations.

³⁸ According to the Statistical Yearbook of China, the number of Chinese students going abroad increased by 49% in 2002, while the number going to Britain increased by 70% in the same year and quadrupled compared to 1999. After this strong expansion latest figures show a decline in the number of Chinese students in Britain more recently.

41. However, the vast majority of American students who studied abroad in 2003 did so for one semester or less. Short term student mobility represented over 90% of US students going abroad, with 9% in very short programs (eight weeks or less) usually held between semesters, while only 7% studied abroad for a full academic year.³⁹ If the short term mobile students are included, the number of US students in Europe, amounted to 94,000 in 2002, thus representing 10 % of foreign enrolment in the EU.
42. The highest numbers of EU students studying in the USA come from Germany, UK, France, Spain, Sweden, Italy and Greece. The European students tend to prefer research oriented studies (Master, doctoral and research studies) and are heavily concentrating in a few geographic areas of the USA. As regards all international students in the USA the most popular fields of study are business and management (20% of all international students in 2002), engineering (15%) and mathematics and ICT (13%) Male students (57% of foreign students in 2002) outnumber female students but gender balance is improving⁴⁰.
43. The United Kingdom is the leading destination for US students followed by Italy Spain and France (figure 11). The four top destinations for US students are thus EU countries. In the recent past there has been a notable increase in the number of US students going to Italy and Spain (mainly for short language studies) and to Eastern Europe, particularly to the Czech Republic and Hungary. The leading fields of study of US students studying abroad in 2003 were business and management (18%), social science (21%), humanities (13%), fine or applied arts (9%), and foreign languages (8%) with only few students in maths, science and technology.

Figure 11: US students studying abroad (in 1000)

Duration	1 semester and less		2 semesters and more		
	Destination	Total, 2002	Growth 2002, %	Total, 2002	Growth 2002,%
UK		30.1	-0.5	12.3	4.3
Spain		17.2	7.2	0.5	14.4
Italy		17.2	6.5	0.2	11.8
France		12.3	3.1	2.5	4.2
Germany		4.9	-5.1	3.4	-3.5
Australia		9.5	17.2	n.a.	n.a.

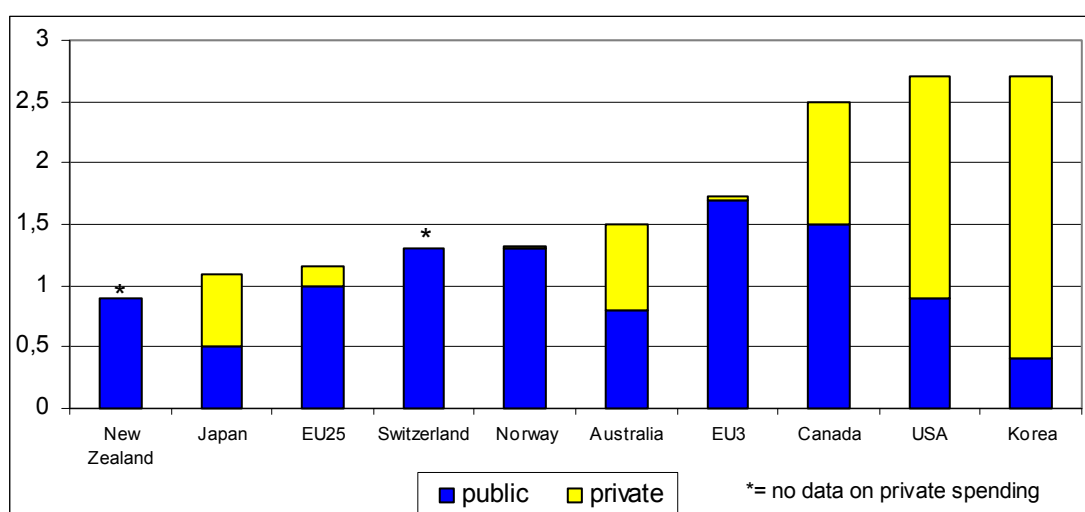
Source: DG Education and Culture, Data: Open Doors, Eurostat

³⁹ Open Doors 2004: American Students Studying Abroad (<http://opendoors.iienetwork.org/>)
⁴⁰ Open Doors 2002

6. Total investment in higher education in the EU is below the level of key competitors

44. Despite low birth rates in the 1980s, the number of higher education students in Europe is still increasing as a result of a growth in enrolment rates. Maintaining the current spending levels per student would thus require additional investment. Independent of student trends the comparisons with other world regions shows that spending on higher education in Europe is currently relatively low. An improvement of quality and the achievement of excellence in higher education requires the availability of an adequate level of resources to finance top class research facilities and keeping highly qualified researchers and tutors.
45. Total investment in higher education in the EU is about 1.1% of GDP, which is on a par with Japan, but below the levels of key competitors such as Australia (1.5%), Canada (2.5%), the US (2.7%), and Korea (2.7%). The three best performing EU countries (Denmark, Finland, Sweden) invest in total 1.7-1.8% of GDP in higher education – still clearly below the levels of the best performing OECD countries (Figure 12). To close the spending gap on the USA the EU would have to spend an additional 150 billion Euro per year⁴¹.

Figure 12: Total investment in tertiary education as a percentage of GDP, 2001



Source: DG Education and Culture. Data: OECD (Education at a Glance, 2004)
 EU averages and non-EU countries are ranked in descending order by spending as a % of GDP
 EU3= Denmark, Finland, Sweden (3 best performing EU countries)

46. Public investment in higher education in the EU25 amounted to 1.0% of GDP in 2001. It was thus on the same level as in the USA, twice as high as in Japan and slightly above the OECD average of 0.9%. The EU contains the three OECD (and probably world) leaders in terms of public investment in higher education as a percentage of GDP: Denmark (1.8%), Finland (1.7%) and Sweden (1.5%). Outside the EU only Canada (1.5%), Norway and Switzerland (1.3% each) come close to these levels.

⁴¹ Calculated taking into consideration the different population size of the US and Europe.

47. However, private investment in higher education in the EU amounts to less than 0.2 % of GDP, compared to a weighted OECD average of 0.9%.⁴² Private investment in higher education in the US is more than ten times higher (1.8% of GDP), and in Japan about four times higher (0.6%) than in the EU. Even in the three leading EU countries – Spain, the Netherlands and the UK (0.3% each) – private investment in higher education is only one third of the OECD average. The OECD country with the highest private spending on higher education is Korea (2.3%). The differences in the level of private investment are a result of differences in tuition fees (most EU countries do not have tuition fees), in the share of private institutions, in philanthropic funding and in the level of funding provided by enterprises. Recent data for the US estimate that average yearly fees for students in public universities in 2004 have reached more than 3.800 euros. In the private university sector in the US average tuitions fees are significantly higher and estimated to be more than 15.000 euros yearly.⁴³ If similar levels of public university tuition fees for students were to be introduced in European universities, not withstanding the social impact of such change, the “private investment” of enrolled students in higher education would equal more than 62 billion euros per year. This should be compared with the present (2001) public investment in higher education in the EU25 of about 110 billion euros.
48. Differences between countries in levels of total investment per student are also large. In 2001 the EU25 spent on average 8,600 Euro per tertiary student,⁴⁴ which is only slightly lower than in Japan; in the USA, however, investment per tertiary student is at over 20,000 EUR, more than twice the EU level.⁴⁵ Five EU countries (Belgium, Denmark, the Netherlands, Austria and Sweden) are investing more than 10,000 EUR per student at higher level, with the highest level reached by Sweden (14,000 EUR). Lithuania and Latvia had the lowest levels of investment among the current EU Member States, at around 3,000 EUR per year.
49. Within the Lisbon Strategy the Barcelona European Council launched in March 2002 to increase European investment in R&D as a % of GDP. It was recommended that spending on R&D in the EU should approach 3% by 2010 and that two thirds (2%) should come from the private sector. This has also implications for higher education funding since universities are expected to be beneficiaries of parts of the additional funding.
50. Available data suggest that research spending in the EU, much of which is invested in universities, increased in recent years, but that faster progress is needed to reach the 3% goal. The EU has reduced the gap to the USA, since 2000, but spending as a % of GDP is increasing more quickly in Japan and in China. It is also growing steeply in India, where it currently amounts to 0.8% of GDP.

⁴² Source: OECD, *Education at a Glance* 2004. Data is lacking or incomplete for several Member States, based on available data the Eu figure can be estimated at 0.17%..

⁴³ The Guardian, October 21, 2004.

⁴⁴ All figures in purchasing power parities (PPP)

⁴⁵ The high level of funding of higher education in the USA is one of the reasons US institutions top international university ranking lists. It also helps to explain the ‘brain drain’ of academics to the US.

Figure 13: Research spending 2000-2003

Region	Research spending as a % of GDP		Research spending in 2003 in billion	
	2000	2003	EUR	EUR PPS (2000)
EU25	1.88	1.97	186	174
USA	2.70	2.76	269	237
Japan	2.99	3.12	132	91
China	1.00	1.30	16.5	n.d.

Source: DG Education and Culture, Data: DG Research

7. Preparing young people for participation in higher education

51. The quality and efficiency of higher education is central for the success of the Lisbon strategy and has been the crux of initiatives to establish a European higher education area. However, since access to higher education are highly dependent upon successful participation at earlier stages of education, efforts to improve the quality of higher level education will clearly be in vain if standards at school level are neglected. In this light, upper-secondary completion rates and key competency levels at the end of lower-secondary education are important indicators of the degree to which pupils have been prepared for further education after initial schooling.
52. Completion of upper-secondary education is also increasingly important, not just for entry into the labour market, but also for the access it allows to higher education and for paving the way to participation in Lifelong Learning activities. This is why one of the five European benchmarks requires that, by 2010, 85% of 22-year-olds in the EU should have completed upper-secondary education.⁴⁶ In 2002 the EU average was 76.6% (2004: 76.4%). The three leading Member States (the Czech Republic, Estonia and Slovakia, 2002) are on the same level as the leading OECD countries in terms of the proportion of the population aged 25 to 64 with at least upper-secondary education. The EU25 average (67.7%) is, however, still lower than levels in the leading non-EU OECD countries (see Annex Table 2).

IV MAKING EDUCATION AND TRAINING SYSTEMS IN EUROPE A WORLDWIDE QUALITY REFERENCE - THE CENTRAL ROLE OF HIGHER EDUCATION

53. The Council (Education) has adopted five ambitious “reference levels of European average performance” or “European benchmarks” for 2010 in the field of education and training.⁴⁷ Achieving these benchmarks would significantly increase the overall

⁴⁶ Council Conclusions of 5 May 2003 - Official Journal of the European Union C 134/4 (7.6.2003)
⁴⁷ Council Conclusions on “*Reference Levels of European Average Performance in Education and Training (Benchmarks)*”, Adopted 5/6 May 2003. These five benchmarks are in the field of: Early school leavers; graduates in Mathematics, science and technology; completion of upper secondary education; low-achieving 15yearas old in reading literacy; and participation in lifelong learning.

educational level of the European population. However, they alone will not ensure that European education and training systems become a “world quality reference.” As this paper has demonstrated the field of higher education in the EU, where no European benchmarks have been adopted, deserves special attention and efforts. Higher education, with its importance for labour-force participation, economic competitiveness and growth, is crucial to the success of the Lisbon strategy for 2010.⁴⁸

54. The comparative analysis of higher education has shown that the EU is a world quality reference as concerns total number of PhD graduates as well as number of graduates in mathematics, science and technology. It also performs well as regards public investment in higher education.
55. However, the analysis also shows that the EU needs to improve access to higher education, to increase higher education attainment levels, and increase total investment in higher education

1. Improving access to higher education

56. Access to higher education is highly dependent upon successful participation at earlier stages of education. Efforts to improve the quality of higher level education will clearly be in vain if standards at school level are deficient. Therefore upper-secondary completion rates and key competency levels at the end of lower-secondary education are important indicators of the degree to which pupils have been prepared and motivated for higher education after initial schooling.
57. In 2004 in EU 25 only 76.4% of the young population (20-24) had completed upper secondary education. The present average has not improved since 2000. Eight EU countries are at present achieving completion rates beyond the European benchmark of 85% (Slovakia and the Czech Republic even have rates above 90%), however achieving a completion rate of 85% at upper-secondary level by 2010, poses a significant challenge for the majority of Member States. To reach the levels of enrolment in higher education of young people (aged 18-24 years old) that are registered in the most performing country in the field (i.e. the US), European higher education institutions would have to increase enrolment by 50% (i.e. from 25% to 38%). Consequently, measures to encourage the earlier enrolment of young people in higher education are necessary.

⁴⁸ See the Communication from the Commission: “The role of universities in the Europe of knowledge.” COM (2003) 58 F (5 Feb.2003). The strategic importance of higher education in the knowledge-based economy is also emphasised in the report: “An agenda for a Growing Europe – Making the EU Economic System Deliver”. Report of an Independent High-Level Study Group established on the initiative of the president of the European Commission. Chairman André Sapir (July 2003).

2. Improving higher education attainment levels

58. It will require considerable efforts to increase the higher education attainment levels of the adult population in the EU to levels of main competitors, although enrolment trends already go in the right direction. Even the three leading EU countries- Lithuania, Finland and Estonia- are performing at somewhat lower levels than Canada, US and Japan when it comes to higher education attainment levels of the adult population. Higher education attainment in the working age population (25-64) in the EU is only about half as high as in Canada and the US. The implementation of the differentiated BA/MA/PhD model as part of the Bologna process will increase tertiary graduation rates as more students are attracted into higher education because bachelor courses will be more widely available and because the probability of graduating increases with the availability of shorter courses. Nevertheless additional measures, including labour market policies, are needed to increase the incentives for achieving higher tertiary attainment rates in Europe.

3. Increasing total investment in higher education

59. Levels of total investment in higher education in the EU are clearly lower than in many other developed regions such as the North America, Australia and Korea, and over time this will inevitably lead to a decline in relative standards. While public investment in higher education in the EU is at the same level or even slightly higher than in key competitor countries, levels of private investment are clearly lower. A major effort will be needed to locate the necessary public and private financial resources to bring the EU countries closer to the standards of key competitors.

STATISTICAL ANNEX

Technical note

The main data sources used in this Communication are the UOE international data collections (UNESCO, OECD, Eurostat). In a number of relevant areas indicators are missing because of a lack of internationally comparable data.

The European averages (EU25) used in this Communication and presented in the Annex are based on the weighted averages of current Member States. EU3 figures show the weighted average of the three best performing EU Member States.

In the absence of comparable data, the weighted average for countries with available data is given in lieu. In cases where the data gaps were significant, or where data was not fully comparable, EU25 and EU3 figures have not been calculated.

Country abbreviations

BE	Belgium	BG	Bulgaria
CZ	Czech Republic	HR	Croatia
DK	Denmark	RO	Romania
DE	Germany	TR	Turkey
EE	Estonia		
EL	Greece		
ES	Spain		
FR	France		
IE	Ireland	IS	Iceland
IT	Italy	NO	Norway
CY	Cyprus	CH	Switzerland
LV	Latvia		
LT	Lithuania		
LU	Luxembourg		
HU	Hungary		
MT	Malta	AU	Australia
NL	Netherlands	CA	Canada
AT	Austria	JP	Japan
PL	Poland	MX	Mexico
PT	Portugal	NZ	New Zealand
SL	Slovenia	KR	South Korea
SK	Slovakia	US	United States
FI	Finland		
SE	Sweden		
UK	UK		

Table 1: Education levels, economic performance and competitiveness ranking

Percentage of the population 25-64 which has completed tertiary education, GDP per capita (US Dollars PPP) and growth competitiveness ranking

	Tertiary completion (%) (ISCED 5A/B and 6)		GDP per capita (PPP) OECD average = 100		Growth competitiveness ranking	
	2001	2002	2001	2002	2003	2004
Belgium	27.8	27.9	112	112	27	25
Czech Republic	11.6	11.8	64	65	39	40
Denmark	26.5	27.4	120	118	4	5
Germany	23.5	22.3	105	105	13	13
Estonia	29.8	29.6	(:)	44	22	20
Greece	17.1	17.6	70	75	35	37
Spain	23.5	24.4	88	91	23	23
France	22.6	23.5	109	109	26	27
Ireland	23.6	25.4	123	129	30	30
Italy	10.0	10.4	104	105	41	47
Cyprus	26.8	29.1	(:)	80	(:)	38
Latvia	18.1	19.6	(:)	38	37	44
Lithuania	45.0	44.0	(:)	41	40	36
Luxembourg	18.1	18.6	203	205	21	26
Hungary	14.0	14.1	54	56	33	39
Malta	(:)	8.8	(:)	72	19	32
Netherlands	24.0	24.9	118	118	12	12
Austria	14.5	16.9	118	118	17	17
Poland	11.7	12.2	44	44	45	60
Portugal	9.2	9.4	73	74	25	24
Slovenia	14.1	14.8	(:)	73	31	33
Slovakia	10.7	10.8	47	49	43	43
Finland	32.5	32.4	109	109	1	1
Sweden	25.5	26.4	111	111	3	3
UK	28.6	29.4	110	113	15	11
EU3 average	36.4	36.0	(:)	122	2.7	3
EU25 average	20.4	20.7	(:)	96	25	27
Bulgaria	21.3	21.1	(:)	28	64	59
Croatia	(:)	(:)	(:)	42	53	61
Romania	10.0	10.0	(:)	28	75	63
Turkey ^b	9	9	25	26	65	66
Iceland	23.8	26	119	115	8	10
Norway	33.8	31	151	144	9	6
Switzerland	25.0	25	124	128	7	8
Australia	29	31	108	110	10	14
Canada	42	43	117	116	16	15
Japan	34	36	109	107	11	9
Mexico	5	5	37	37	47	48
New Zealand	29	30	86	86	14	18
South Korea	24	26	70	72	18	29
United States	37	38	143	142	2	2

Source: EU: Eurostat. Others: OECD (Education at a Glance 2002, 2004); World Economic Forum, 2003-2004 (GCI).

a. Purchasing Power Parities. OECD=100.

b. Country still using SNA 1968.

2001: PPP for Europe calculated by Eurostat. Non-European countries are OECD estimates.

2002: PPP for all countries are final benchmark results for latest joint Eurostat-OECD comparison.

EU3 (tertiary completion): Lithuania, Finland, Estonia (2001, 2002).

EU3 (GDP): Luxembourg, Ireland, Netherlands (2004)

EU3 (GCI) : Finland, Sweden, Denmark (2003, 2004)

Table 2: Employment and unemployment rates and education levels
Employment rates by level of educational attainment, among population aged 25-64, 2002

	Employment rate 2002			Unemployment rate 2002		
	With less than upper secondary education	With upper secondary education	With tertiary education	With less than upper secondary education	With upper secondary education	With tertiary education
Belgium	48.2	74.7	83.6	9.8	5.6	3.1
Czech Republic	45.9	76.2	87.3	17.9	5.5	1.6
Denmark	60.8	81.2	86.9	6.1	3.4	3.6
Germany	50.9	70.6	83.1	15.0	8.7	4.3
Estonia	48.1	72.6	80.2	14.7 ^u	10.0	4.8 ^u
Greece	55.9	65.7	81.2	7.3	9.6	6.3
Spain	55.7	71.7	80.9	11.1	9.4	7.4
France*	56.8	76.1	83.5	11.3	6.5	5.0
Ireland	56.9	77.2	86.6	5.9	2.9	1.9
Italy	50.5	72.4	82.3	9.0	6.4	5.3
Cyprus	64.0	77.8	88.0	3.4	3.2	1.9
Latvia	48.3	71.1	81.8	19.7	12.0	6.2
Lithuania	42.0	72.6	83.6	17.0	14.2	5.8
Luxembourg	59.3	73.6	85.2	3.8	1.2 ^u	1.8 ^u
Hungary	36.7	71.7	82.1	10.4	4.3	1.5
Malta	50.0	79.8	86.6	5.7	1.7	0.4
Netherlands	60.7	79.8	86.7	2.9	1.9	1.7
Austria	54.5	75.3	86.9	5.9	3.1	1.6
Poland	38.5	62.7	83.5	25.5	17.6	5.6
Portugal	73.4	81.9	89.7	4.0	4.3	3.3
Slovenia	57.5	74.7	86.7	7.8	5.0	2.2 ^u
Slovakia	28.6	70.0	86.9	42.5	14.3	3.1
Finland	58.7	75.5	85.6	11.0	8.5	4.0
Sweden	68.3	82.1	87.6	5.3	4.3	2.6
United Kingdom	54.2	80.7	87.9	8.1	3.7	2.4
EU25 average	53.7	73.0	84.3	10.3	7.9	4.2
Bulgaria	37.1	64.1	76.3	27.6	15.8	7.7
Croatia	(:)	(:)	(:)	(:)	(:)	(:)
Romania	56.4	69.8	82.9	5.0	8.0	3.4
Turkey	49.8	61.6	76.1	8.8	8.6	7.3
Iceland	86.2	89.0	95.4	3.1	2.4	(:)
Norway	65.0	81.8	88.8	2.9	2.7	2.3
Switzerland	68.4	80.8	90.7	4.6	2.4	2.2
Australia	60.0	77.8	83.5	7.5	4.3	3.3
Canada	55.3	75.9	82.0	11.0	6.7	5.1
Japan	66.6	73.6	79.7	6.6	5.3	3.9
Mexico	60.3	70.9	52.9	2.9	1.5	1.7
New Zealand	63.7	81.3	81.6	5.6	3.3	3.4
South Korea	68.4	70.5	76.1	2.1	2.8	3.0
United States	57.0	74.0	83.2	10.2	5.7	3.0

Source: EU, CC (except Turkey), EEA: Eurostat. Others: OECD, Employment Outlook 2004 and Education at a Glance (2004)

*France: 1st quarter figure.

: Unreliable or uncertain data

Table 3: Education attainment levels and average years of education

Percentage of population aged 25-64 who have attained at least upper-secondary/ tertiary education and average years of education (2001, 2002).

	At least upper-secondary education		At least tertiary education (ISCED 5A/B and advanced research programmes)		Average years of schooling
	2001	2002	2001	2002	2002
Belgium	59.2	60.3	27.8	27.9	11.2
Czech Republic	86.3	87.8	11.6	11.8	12.4
Denmark	80.2	80.0	26.5	27.4	13.3
Germany	82.5	83.0	23.5	22.3	13.4
Estonia	86.0	87.5	29.8	29.6	(:)
Greece	51.6	52.7	17.1	17.6	10.5
Spain	40.0	41.6	23.5	24.4	10.3
France	63.2	64.1	22.6	23.5	10.9
Ireland	59.0	60.3	23.6	25.4	12.7
Italy	43.2	44.3	10.0	10.4	9.4
Cyprus	64.5	66.5	26.8	29.1	(:)
Latvia	79.1	82.6	18.1	19.6	(:)
Lithuania	84.4	84.8	45.0	44.0	(:)
Luxembourg	59.2	61.6	18.1	18.6	12.9
Hungary	70.1	71.4	14.0	14.1	11.5
Malta	(:)	18.3	(:)	8.8	(:)
Netherlands	66.9	67.6	24.0	24.9	13.5
Austria	77.3	78.2	14.5	16.9	11.3
Poland	80.0	80.8	11.7	12.2	11.9
Portugal	19.9	20.6	9.2	9.4	8.0
Slovenia	75.4	76.8	14.1	14.8	(:)
Slovakia	84.9	85.8	10.7	10.8	12.5
Finland	73.5	74.7	32.5	32.4	12.4
Sweden	80.5	81.4	25.5	26.4	12.4
United Kingdom	81.1	81.7	28.6	29.4	12.7
EU3 average	85.7	87.2	36.4	36.0	(:)
EU25 average	66.8	67.7	20.4	20.7	11.6
Bulgaria	71.1	71.5	21.3	21.1	(:)
Croatia	(:)	(:)	(:)	(:)	(:)
Romania	70.5	71.1	10.0	10.0	(:)
Turkey	24	25	9	9	9.6
Iceland	63.1	65.1	23.8	26.0	13.4
Norway	85.7	85.7	33.8	31.0	13.8
Switzerland	87.4	86.8	25.0	25.0	12.8
Australia	59	61	29	31	13.1
Canada	82	83	42	43	12.9
Japan	83	84	34	36	12.6
Mexico	12	13	5	6	7.4
New Zealand	75	76	29	30	10.6
South Korea	70	71	24	26	11.7
United States	87	87	37	38	12.7

Source: EU, CC (except Turkey): Eurostat (LFS, 2nd quarter); Others: OECD (Education at a Glance, 2004).

EU3 (at least upper-secondary education): Czech Republic, Estonia, Slovakia (2000, 2001)

EU3 (at least tertiary education): Lithuania, Finland, Estonia (2001, 2002), UK: A definition of upper-secondary school completion has not been agreed.

Average years of schooling: The calculation of the average number of years in formal education is based upon the weighted theoretical duration of schooling to achieve a given level of education, according to the current duration of educational programmes as reported in the UOE data collection. For additional notes see Annex 3 www.oecd.org/edu/eaq2004.

Table 4: Tertiary enrolment rates (2002)

Percentage of population enrolled in ISCED 5 and 6 by age cohort.

	Net enrolment rates by age								Gross enrolment ratio
	18	19	20	21	22	23	24	18-24	
Belgium	35.9	46.1	46.5	39.5	30.0	19.7	13.1	32.9	58 (01)
Czech Rep.	4.4	20.3	28.3	25.4	22.3	18.7	13.7	18.9	34
Denmark	0.2	3.1	12.0	22.1	28.5	31.1	30.5	19.1	59 (01)
Germany	2.5	9.0	16.7	20.0	21.1	21.2	20.3	15.9	48
Estonia	19.6	35.3	38.9	36.3	28.4	22.2	18.9	(:)	60 (01)
Greece	46.2	47.4	50.7	41.5	33.6	23.9	20.2	37.2	61 (01)
Spain	27.5	35.3	39.1	37.9	33.0	27.5	21.0	31.3	59
France	26.6	38.2	40.3	36.1	30.4	23.3	16.2	30.4	54 (01)
Ireland	35.8	41.0	38.4	31.4	20.2	12.1	8.5	25.8	47 (01)
Italy	3.8	31.0	31.9	29.6	26.9	24.0	20.0	24.0	50 (01)
Cyprus	11.8	26.5	21.9	19.6	13.1	9.3	6.9	(:)	22 (01)
Latvia	22.2	33.7	35.5	34.0	28.6	23.4	18.1	(:)	64 (01)
Lithuania	19.9	43.4	44.5	38.4	29.9	24.1	17.4	(:)	59 (01)
Luxembourg	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	10 (01)
Hungary	11.9	26.0	28.7	27.8	25.1	19.6	15.3	22.0	44
Malta	17.9	20.4	19.0	17.1	9.8	5.0	3.6	(:)	25 (01)
Netherlands	18.4	27.5	32.6	33.3	30.1	24.6	18.5	26.5	55 (01)
Austria	5.7	14.2	19.9	21.4	20.5	19.1	17.0	16.8	57 (01)
Poland	0.7	30.2	38.4	39.1	36.7	32.8	21.9	28.3	58
Portugal	16.6	25.1	29.0	30.4	28.8	24.0	17.8	24.2	50 (01)
Slovenia	4.6	40.0	45.5	44.6	39.9	34.8	24.5	(:)	61 (01)
Slovakia	13.8	23.3	23.9	23.1	21.7	15.2	9.4	18.7	32
Finland	0.4	15.8	30.5	40.5	44.8	41.9	36.9	29.8	85 (01)
Sweden	0.4	12.3	23.8	30.4	32.2	30.9	27.3	22.6	76
UK	25.1	33.9	34.5	27.5	18.5	12.9	9.8	23.0	59 (01)
EU25 total	14.6	28.2	32.4	31.0	27.5	23.2	18.1	(:)	52 (01)
Bulgaria	10.6	23.5	26.9	27.6	25.4	20.2	14.1	(:)	40 (01)
Croatia	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	36
Romania	17.1	27.2	25.5	22.8	19.9	14.9	10.4	(:)	27 (01)
Turkey	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	25
Iceland	0.1	0.9	15.0	23.3	28.7	26.3	23.5	16.9	48
Norway	0.4	12.0	25.3	30.1	30.3	29.5	26.1	22.1	70 (01)
Switzerland	1.6	6.6	13.5	18.6	20.1	20.1	18.2	14.1	42 (01)
Australia	29.7	36.8	38.2	33.8	26.4	20.7	16.7	29.1	65
New Zealand	23.5	31.7	34.6	30.1	23.4	17.7	13.7	25.3	69
China	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	13
South Korea	48.9	64.3	59.8	52.6	45.4	33.8	26.6	47.6	82
Japan	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	49
Mexico	12.5	16.3	16.4	14.3	11.2	7.5	5.8	12.1	21
Russia	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	70
United States	38.8	48.6	47.2	45.8	35.1	25.6	20.3	39.0	81
Canada	(:)	(:)	(:)	(:)	(:)	(:)	(:)	(:)	59 (01)

Source: Eurostat, OECD

Notes: Data on enrolment by age in ISCED 5+6 is missing in LU and JP. In DE, SI and RO enrolments in ISCED 6 are not included.

(01) = data for 2001

Gross enrolment ratio: (data from UNESCO Global Education Digest): Number of students enrolled in higher education, expressed as a percentage of the population in the theoretical age group for higher education.

Table 5: Graduates and researchers

	Number of graduates (x 1000)			Number of maths, science and technology graduates (x 1000)				Number of researchers (x 1000)
	2000	2001	2002	2000	2001	2002	2003	2001
Belgium	68.2	70.2	73.0	12.9	13.2	13.7	(:)	30.2
Czech Rep.	38.4	43.6	43.7	9.4	9.6	10.1	10.7	15.0
Denmark	39.0	39.3	(:)	8.5	8.7	(:)	(:)	18.9
Germany	302.1	296.7	293.9	80.0	76.6	76.7	80.3	259.6
Estonia	7.1	7.6	7.8	1.3	1.4	1.3	1.7	2.7
Greece	(:)	(:)	(:)	(:)	(:)	(:)	(:)	14.7
Spain	260.2	277.9	291.5	65.1	74.3	79.3	(:)	80.1
France	508.2	532.1	(:)	154.8	158.6	(:)	171.4	172.1
Ireland	42.0	45.9	45.0	14.5	14.0	13.0	15.7	8.5
Italy	202.3	218.1	(:)	46.6	48.4	56.6	(:)	66.1
Cyprus	2.8	2.9	(:)	0.34	0.37	0.30	(:)	0.3
Latvia	15.3	20.4	18.9	2.4	2.5	2.6	2.8	3.5
Lithuania	25.2	27.5	29.8	6.6	7.0	6.9	7.7	8.1
Luxembourg	0.7	(:)	(:)	(:)	(:)	(:)	(:)	(:)
Hungary	59.9	57.9	62.3	7.2	5.8	7.8	7.6	14.7
Malta	2.0	1.9	(:)	0.19	0.16	0.18	(:)	(:)
Netherlands	79.4	81.6	85.8	12.5	12.7	13.6	14.6	42.1
Austria	25.0	27.1	18.9	7.5	7.4	8.0	8.3	18.7
Poland	(:)	431.1	459.7	39.2	44.8	49.8	55.2	56.9
Portugal	54.3	61.1	64.1	10.1	10.4	11.7	13.0	17.6
Slovenia	11.5	12.0	14.3	2.6	2.4	2.8	2.6	4.5
Slovakia	22.7	26.2	28.2	4.7	6.7	7.1	7.7	9.6
Finland	36.1	36.9	(:)	10.1	10.9	11.1	(:)	36.9
Sweden	42.4	42.7	45.5	13.0	13.7	14.5	15.1	46.0
UK	504.1	551.7	(:)	140.6	150.9	150.9	(:)	157.7
EU25 total	2348.2	2912	(:)	650.2	680.7	710.0	740.0	1084.7
Bulgaria	46.7	47.5	50.6	8.1	9.1	13.4	9.6	9.2
Croatia	(:)	(:)	(:)	(:)	(:)	(:)	3.4	(:)
Romania	68.0	76.2		17.1	18.4	20.4	30.6	19.7
Turkey	190.1	241.5	233.6	57.1	61.5	65.9	69.6	23.1
Iceland	1.7	2.1	2.1	0.35	0.39	0.40	(:)	1.9
Norway²	30.0	31.5	29.7	4.8	5.2	4.6	5.4	19.8
Switzerland	(:)	56	(:)	(:)	13.3	(:)	(:)	25.8
Australia	(:)	169	(:)	(:)	33	(:)	(:)	(:)
New Zealand	(:)	44	(:)	(:)	7.7	(:)	(:)	(:)
China	1 721.5	1948	(:)	(:)	465	591	830	743
South Korea	466.3	563	(:)	(:)	231	(:)	(:)	(:)
Japan	1 081.4	1067.9	(:)	234.8	233.4	232.9	229.7	675.9
Mexico	298.1	312	(:)	(:)	77	(:)	(:)	(:)
Russia	1 164.5	1240	(:)	(:)	(:)	225	(:)	(:)
United States	2151.0	2174.1	2238.4	348.5	369.4	389.6	430.7	1261.2
Canada	197.9	225	(:)	(:)	48	(:)	(:)	(:)

Source: Eurostat, OECD

Data on MST graduates

BE: Data for Flemish Community exclude second qualifications in non-university tertiary education,

EE Data exclude Master degrees (ISCED 5A)

CY, LU Data exclude tertiary students graduating abroad.

RO Data exclude second qualifications and advanced research programmes (ISCED level 6).

Table 6: Number of ISCED 6 graduates (new PhDs)

Country	2001	2002
Belgium	1317	1413
Czech Republic	1066	1327
Denmark	732	(:)
Germany	24796	23838
Estonia	149	188
Greece	875	1154
Spain	6453	6905
France	10404	(:)
Ireland	572	520
Italy	3977	4456
Cyprus	3	2
Latvia	37	52
Lithuania	261	387
Luxembourg	(:)	(:)
Hungary	793	983
Malta	11	8
Netherlands	2533	2556
Austria	1871	2125
Poland	4400	4400
Portugal	2792	2991
Slovenia	298	318
Slovakia	532	734
Finland	1328	1751
Sweden	3388	3517
UK	14147	14237
EU25 total	82 735	85 000 e
Bulgaria	376	385
Croatia	(:)	(:)
Romania	(:)	(:)
Turkey	(:)	2472
Iceland	3	5
Norway	768	740
Switzerland	(:)	2800
Australia	(:)	(:)
Canada	(:)	(:)
Japan	13179	13642
New Zealand	(:)	(:)
South Korea	(:)	(:)
United States	40 744	44160
China	(:)	(:)

Source: Eurostat

e= estimation

Table 7: Foreign students

Percentage of students with foreign citizenship in tertiary institutions of host country, EU, CC and non-EU countries (2001, 2002).

Host country	Foreign students as a percentage of all students	
	2001	2002
Belgium	10.6	11.0
Czech Republic	3.0	3.4
Denmark	6.6	7.4
Germany	9.6	10.1
Estonia	1.0	0.7
Greece	(:)	1.6
Spain	2.2	2.4
France	7.3	8.2
Ireland	4.9	5.2
Italy	1.6	1.5
Cyprus	20.7	22.0
Latvia	7.7	3.0
Lithuania	0.5	0.5
Luxembourg	(:)	(:)
Hungary	3.4	3.4
Malta	4.6	4.6
Netherlands	3.3	3.7
Austria	12.0	12.7
Poland	0.4	0.4
Portugal	3.7	3.6
Slovenia	0.9	1.0
Slovakia	1.2	1.1
Finland	2.2	2.4
Sweden	7.3	7.5
UK	10.9	10.1
EU25 average	5.3	5.5
Bulgaria	3.3	3.5
Croatia	(:)	(:)
Romania	2.2	1.8
Turkey	1.0	1.0
Iceland	4.1	4.1
Norway ²	4.7	4.8
Switzerland	17.0	17.2
Australia	13.9	17.7
Canada	(:)	(:)
Japan	1.6	1.9
New Zealand	6.2	9.5
South Korea	0.1	0.2
United States	3.5	3.7
China	(:)	0.6 (2003)

Source: Eurostat and OECD (EAG)

DE, RO, SI: Students in advanced research programmes (ISCED 6) excluded.

Table 8: Expenditure on higher education

Expenditure on higher education from public and private sources, relative to GDP, and total expenditure per student in public and private institutions in Euro PPS (2000, 2001).

	Public ¹		Private ²		Total expenditure per tertiary student (Euro PPS, in 1000)	
	2000	2001	2000	2001	2000	2001
Belgium	1.2	1.2	0.1	0.2	9.8	10.7
Czech Republic	0.8	0.8	0.1	0.1	4.7	5.2
Denmark ³	1.5	1.8	0.0	(:)	11.9	13.6
Germany	1.0	1.0	0.1	0.1	9.6	9.7
Estonia	(:)	(:)	(:)	(:)	(:)	5.1 ⁵
Greece ³	0.9	1.1	(:)	(:)	3.2 ⁵	4.0 ⁵
Spain	0.9	1.0	0.3	0.3	6.2	6.9
France	1.0	1.0	0.1	0.1	7.9	8.1
Ireland	1.2	1.1	0.3	0.2	10.1	9.1
Italy	0.7	0.8	0.1	0.2	(:)	7.6
Cyprus	(:)	(:)	(:)	(:)	8.6	9.2
Latvia	(:)	(:)	(:)	(:)	3.0	3.0
Lithuania	(:)	(:)	(:)	(:)	2.4	3.1
Luxembourg	(:)	(:)	(:)	(:)	(:)	(:)
Hungary	0.9	0.9	0.3	0.3	5.1 ⁵	7.0 ⁵
Malta	(:)	(:)	(:)	(:)	6.3	6.1
Netherlands	1.0	1.0	0.2	0.3	11.4	12.0
Austria	1.2	1.2	0.0	(:)	8.7	10.1
Poland ³	0.8	1.1	(:)	(:)	2.8 ⁵	3.9 ⁵
Portugal ³	1.0	1.0	0.1	0.1	4.5	4.8
Slovenia	(:)	(:)	(:)	(:)	(:)	8.7
Slovakia ³	0.7	0.8	0.1	0.1	4.4	4.9
Finland	1.7	1.7	0.0	(:)	10.0	8.6
Sweden	1.5	1.5	0.2	0.2	14.3	14.0
UK	0.7	0.8	0.3	0.3	9.0	9.7
EU3 average	1.6	1.6	0.3	0.3	(:)	(:)
EU25 average	0.9	1.0	0.1	0.2	8.4	8.6
Bulgaria	(:)	(:)	(:)	(:)	(:)	3.2
Croatia	(:)	(:)	(:)	(:)	(:)	(:)
Romania	(:)	(:)	(:)	(:)	2.1 ⁵	3.4 ⁵
Turkey ³	1.0	1.0	(:)	(:)	4.2 ⁵	3.6 ⁵
Iceland ³	0.8	0.9	0.0	(:)	7.4	7.2
Norway [*]	1.2	1.3	0.8	(:)	11.6	12.2
Switzerland	1.2	1.3	(:)	(:)	(:)	18.7 ⁵
Australia	0.8	0.8	0.7	0.7	(:)	(:)
Canada ⁴	1.6	1.5	1.0	1.0	(:)	(:)
Japan	0.5	0.5	0.6	0.6	10.0	10.3
Mexico	0.8	0.7	0.2	0.3	(:)	(:)
New Zealand	0.9	0.9	(:)	(:)	(:)	(:)
Russia	0.5	0.5	(:)	(:)	(:)	(:)
South Korea	0.6	0.4	1.9	2.3	(:)	(:)
United States ⁴	0.9	0.9	1.8	1.8	21.2	20.1

Source: Eurostat, OECD (EAG, 2003, 2004) /UNESCO (WEI).

The data show the budget (resources) available at the level of higher education institutions and not the expenditure on educational core activities performed in higher education institutions. The extent to which the resources of higher education institutions include budgets spent on ancillary services such as meals or dormitories or R&D activities varies between countries, which limits the comparability of data.

EU3 (highest public expenditure, % GDP): Finland, Sweden, Denmark (2000, 2001), EU3 (highest private expenditure % GDP): UK, Hungary, Spain (2000, 2001)

1. Including public subsidies to households attributable for educational institutions and direct expenditure on educational institutions from international sources.

2. Net of public subsidies attributable for education institutions.

3. Public subsidies to households not included in public but in private expenditure.

4. Post-secondary non-tertiary included in tertiary education. 5. Annual expenditure on public educational institutions per student only.