

Comparative Indicators of Education in the United States and Other G-8 Countries: 2009

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SUMMARY

Introduction

This report describes how the education system in the United States compares with education systems in the other Group of Eight (G-8) countries—Canada, France, Germany, Italy, Japan, the Russian Federation, the United Kingdom—that are among the world's most economically developed countries and among the United States' largest economic partners. *Comparative Indicators of Education in the United States and Other G-8 Countries: 2009* draws on the most current information about education from four primary sources: the Indicators of National Education Systems (INES) at the Organization for Economic Cooperation and Development (OECD); the Progress in International Reading Literacy Study (PIRLS); the Program for International Student Assessment (PISA); and the Trends in International Mathematics and Science Study (TIMSS). Begun in 2002, the series is published on a biennial basis.

It should be noted that most of the indicators in this report do not contain data for the complete set of G-8 countries. This is the result of a G-8 country not reporting data or not participating in a study. Also, the United Kingdom participated as one country in PISA, but in PIRLS and TIMSS England and Scotland participated as individual systems. Similarly, Canada participated as separate provinces in PIRLS 2006. Indicators that use PIRLS and TIMSS as data sources report England and Scotland separately. Indicators that use PIRLS data present results for the participating Canadian provinces in appendix tables (see appendix B). Thus, in indicators using PIRLS data and discussed in the summary that follows, the "participating" G-8 countries include England, France, Germany, Italy, the Russian Federation, Scotland, and the United States. In indicators using TIMSS data, "participating" G-8 countries include England, Germany, Italy, Japan, the Russian Federation, Scotland, and the United States at fourth grade, and England, Italy, Japan, the Russian Federation, Scotland, and the United States at eighth grade.¹ In indicators using INES data, the "reporting" G-8 countries vary somewhat; these are shown in each indicator and noted in the summary.

The main findings of this report are summarized below. These highlights are organized around the five major sections of the report—population and school enrollment; academic performance;

context for learning; expenditure for education; and education returns: educational attainment and income.

Population and School Enrollment

School-age population

In 2008, the population of 5- to 29-year-olds (roughly the population most likely to be enrolled in education) represented 34 percent of the total population in the United States. In the other G-8 countries, the corresponding percentages ranged from 25 percent in Italy to 33 percent in the Russian Federation. From 1998 to 2008, the United States had the largest net percentage gain in population size of 5- to 29-year-olds (6 percent) among the G-8 countries (indicator 1).

Enrollment in formal education

In 2006, all or almost all 3- and 4-year-old children were enrolled in preprimary or primary education in France and Italy.² In Germany, the United Kingdom, and Japan, at least 80 percent of 3- and 4-year-olds were enrolled; in the United States, 48 percent were enrolled. Compulsory education ends at age 18 in Germany; age 17 in the United States; age 16 in Canada, France, and the United Kingdom; and age 15 in Italy, Japan, and the Russian Federation (indicator 2).³

Foreign students in postsecondary education

In 2006, G-8 countries hosted close to two-thirds of all foreign students in higher education.⁴ The United States received the largest percentage of these foreign students (20 percent), followed by the United Kingdom (11 percent), Germany (9 percent), and France (9 percent) (indicator 3).

Academic Performance

Reading

On the PIRLS 2006 assessment, fourth-graders in the Russian Federation outperformed their peers in all other participating

¹ Germany participated in TIMSS 2007 at fourth grade, but not eighth grade.

² Internationally, education levels are defined according to the International Standard Classification of Education (ISCED97). "Preprimary education" refers to ISCED97 level 0. This is defined as the initial stage of organized instruction, designed primarily to introduce very young children to a school-type environment. Education programs at ISCED97 level 0 can either be center or school based. Preschool and kindergarten programs in the United States fall into level 0. "Primary education" refers to ISCED97 level 1. This level of education usually lasts 4 to 6 years, and typically begins between ages 5 and 7. At ISCED97 level 1, students begin to study basic subjects, such as reading, writing, and mathematics. In the United States, elementary school (grades 1 through 6) is classified as level 1. For more information on the ISCED97 levels, see appendix A.

³ In some countries, the ending age of compulsory education is an average. For example, in the United States this age varies across states, ranging from 16 to 18; the modal age in the United States is 16.

⁴ As used in this report, "higher education" refers to ISCED97 levels 5A (academic higher education below the doctoral level), 5B (vocational higher education), and 6 (academic higher education at the doctoral level) (except where specific data exclusions are noted).

G-8 countries⁵ in terms of average scores in reading literacy. U.S. fourth-graders scored higher on average in reading literacy than their peers in Scotland and France, but lower than their peers in Italy and the Russian Federation. Twelve percent of U.S. fourth-graders reached the advanced international benchmark, the highest of the benchmarks set by PIRLS to describe the range of student performance (indicator 4). Average scores of fourth-grade females in reading literacy were higher than the average scores of fourth-grade males in all participating G-8 countries. Among countries with the largest score differences between males and females were Scotland (with a difference of 22 points), England (with a difference of 19 points), and the Russian Federation (with a difference of 15 points). In the United States, females outperformed males by 10 points (indicator 5).

Mathematics

On the TIMSS 2007 assessment, students in Japan outperformed students in the other participating G-8 countries in mathematics,⁶ with higher percentages of Japanese fourth- and eighth-graders reaching each of the four international benchmarks set by TIMSS to describe the range of student performance. For example, the advanced benchmark (the highest TIMSS benchmark) was reached by 26 percent of Japan's eighth-graders in mathematics, compared with percentages ranging from 3 percent in Italy to 8 percent in the Russian Federation and England. In the United States, 6 percent of eighth-graders reached the advanced benchmark (indicator 6). In Italy, Germany, Scotland, and the United States, fourth-grade males scored higher, on average, than fourth-grade females in mathematics; however, no measurable differences related to sex were detected among eighth-graders (indicator 7).

Science

On the TIMSS 2007 fourth-grade science assessment, students in Japan scored higher, on average, than their peers in Scotland, Germany, Italy, and the United States, but not measurably different from their peers in England and the Russian Federation. At eighth grade, students in Japan had a higher average score in science and generally had larger percentages of students reaching each of the four international benchmarks compared to their G-8 peers (indicator 8). In Germany and Italy, fourth-grade males scored higher, on average, than fourth-grade females in science; in the United States and Italy, eighth-grade males outperformed females (indicator 9).

On the PISA 2006 assessment, 15-year-old students in Canada and Japan scored higher, on average, than their peers in all other G-8 countries on the combined science literacy scale. The United States scored lower, on average, than their peers in the United Kingdom, Germany, Japan, and Canada on the combined science literacy scale and on each of the three science literacy subscales: identifying scientific issues, explaining phenomena scientifically, and using scientific evidence. U.S. students outperformed their peers in Italy and the Russian Federation on the identifying scientific issues subscale and in Italy on the using scientific evidence subscale (indicator 10). About one-quarter of 15-year-old students in the

United States scored at or below the lowest proficiency level on the PISA 2006 combined science literacy scale, a larger percentage of students than in the United Kingdom, Germany, Japan, and Canada (indicator 11).

Although parent occupational status was generally higher for U.S. 15-year-old students compared to their G-8 peers, U.S. students from families with low occupational status were outperformed by students from families with low occupational status in the United Kingdom, Germany, Canada, and Japan in science literacy (indicator 12).

In PISA, students reported if they were *native* (born in the country of assessment with at least one of their parents born in the same country), or had an immigrant background within two generations. Students not reporting native also reported if they were *second generation* (born in the country of assessment but with parents born in another country), or *first generation* (born in another country and with parents born in another country). In all of the G-8 countries except the Russian Federation, 15-year-old second- and first-generation students scored lower on the PISA 2006 combined science literacy scale compared to their native peers (indicator 13).

Context for Learning

Reading instruction

There are three indicators pertaining to reading instruction (indicators 14-16) that use teacher-reported data from PIRLS.

In 2006, fourth-grade teachers' reports of the average number of hours spent on reading instruction each week generally varied widely both across countries and within countries (indicator 14). In three G-8 countries (England, Germany, and Italy), the highest percentages of fourth-graders had teachers who reported spending 3 hours or less on reading instruction per week. In two G-8 countries (France and the Russian Federation), teachers most frequently cited spending over 3 hours but not more than 6 hours on reading instruction. The United States was the only participating G-8 country in which the majority of fourth-graders had teachers who reported spending more than 6 hours on reading instruction per week (68 percent) (indicator 14).

In 2006, one of the most common strategies for assisting students having difficulty reading was to ask parents to help their child with reading. A second strategy commonly used was working with students individually. When asked about access to remedial reading specialists, 34 percent of fourth-graders in the United States and 24 percent of fourth-graders in England had teachers who reported always having a remedial reading specialist available. Less than 10 percent of fourth-graders in France, Germany, and Italy had teachers who reported always having a remedial reading specialist available. England had the lowest percentage of fourth-graders whose teachers never had access to a remedial reading specialist (16 percent), while Italy had the highest (95 percent). In the United States, 29 percent of fourth-graders had teachers who reported never having access to a remedial reading specialist (indicator 15).

⁵ England, France, Germany, Italy, the Russian Federation, Scotland, and the United States participated in PIRLS 2006. Canada also participated, but as separate provinces (Alberta, British Columbia, Nova Scotia, Ontario, and Quebec). PIRLS 2006 data for Canadian provinces are included in appendix B.

⁶ England, Germany (fourth grade only), Italy, Japan, the Russian Federation, Scotland, and the United States participated in TIMSS 2007.

Among the G-8 countries, the only measurable difference from 2001 to 2006 in the percentage of fourth-graders with teachers reporting their age as 50 years or older was in the United States, where it was 12 percentage points lower in 2006 compared to 2001. The reported average years of teaching experience declined by 3 years in France, Germany, and the United States during this time period. In 2006, teachers of fourth-graders in England and the United States reported an average of 12 years of teaching experience (at all grades). This was lower than in all other participating G-8 countries, where teaching experience ranged from an average of 15 years in France to 22 years in Italy and the Russian Federation (indicator 16).

Teachers' working time

In 2006, teachers in the United States at the primary, lower secondary, and upper secondary levels were contracted to teach 1,080 hours during the school year.⁷ Teachers in the United States were contracted to teach more hours than their peers in the other reporting G-8 countries (France, Germany, Italy, the Russian Federation, and Scotland). However, U.S. teachers worked less total hours than their peers in Japan and Germany when working time was defined not only as time spent on teaching but also as time spent on other work-related activities (indicator 17).

Teacher professional development in mathematics and science

There are indicators pertaining to teacher professional development in mathematics (indicator 18) and science (indicator 19) that use teacher-reported data from TIMSS.

In 2007, the percentage of students whose teachers reported participating in professional development in mathematics content in the previous 2 years ranged from 22 percent in Italy to 66 percent in the Russian Federation at fourth grade and 16 percent in Italy to 84 percent in the Russian Federation at eighth grade; in the United States, the percentages were 60 percent at fourth grade and 81 percent at eighth grade. The percentage of students whose teachers reported participating in professional development in mathematics assessment ranged from 14 percent in Italy to 55 percent in the Russian Federation at fourth grade and 17 percent in Italy to 71 percent in Scotland at eighth grade; in the United States, the percentages were 47 percent at fourth grade and 69 percent at eighth grade (indicator 18).

The percentage of students whose teachers reported participating in professional development in science content in the previous 2 years ranged from 16 percent in Italy to 58 percent in the Russian Federation at fourth grade and 24 percent in Italy to 82 percent in the United States at eighth grade. The percentage of students whose teachers reported participating in professional development in science on improving students' critical thinking or problem-solving skills ranged from 11 percent in Japan to 47 percent in Scotland

at fourth grade and 10 percent in Italy to 73 percent in the United States at eighth grade. Compared to their participating G-8 peers, the United States had a greater percentage of eighth-graders whose science teachers reported participating in these two areas of professional development (indicator 19).

School principals' uses of summative achievement data

Results from PISA indicate that in 2006, at least 90 percent of 15-year-old students in the United States and the United Kingdom had principals who reported that school achievement data were posted publicly (e.g., in the media). This compares to 75 percent of students in the Russian Federation, 64 percent in Canada, and 33 percent in Italy. In Germany and Japan, 14 and 11 percent of students, respectively, had principals who reported that school achievement data were posted publicly. A greater percentage of 15-year-olds in the United States than in all other reporting G-8 countries had principals who reported that school achievement data were used in decisions about instructional resource allocation to the school; in the United States, 79 percent of students had principals who reported this use. At least 90 percent of students in Canada, the United Kingdom, the United States, and the Russian Federation had principals who reported that school achievement data were tracked over time by an administrative authority (such as a district, state, or national education agency (indicator 20).

Frequency of behavior problems

Results from TIMSS indicate that in 2007, the percentage of eighth-graders in schools whose principals reported at least a weekly occurrence of a classroom disturbance ranged from 8 percent in Japan to 60 percent in Scotland, with the United States at 55 percent. The percentage of eighth-graders in schools whose principals reported at least a weekly occurrence of intimidation or verbal abuse of other students ranged from 1 percent in the Russian Federation to 39 percent in the United States, with the U.S. percentage higher than in all other participating G-8 countries (indicator 21).

Expenditure for Education

Public school teachers' starting salaries

Of the G-8 countries reporting data in 2006 (England, France, Germany, Italy, Japan, Scotland, and the United States), Germany reported the highest average starting salary of public school teachers at both the primary and upper secondary levels, followed by the United States. In most G-8 countries in 2006 (Germany being the exception), public school teachers at the beginning of their careers earned less than the average Gross Domestic Product (GDP) per capita in their respective countries (indicator 22).

⁷ "Lower secondary education" refers to ISCED97 level 2. At this level of education, students continue to learn the basic subjects taught in level 1, but this level is typically more subject specific than level 1 and may be taught by specialized teachers. ISCED97 level 2 usually lasts between 2 and 6 years, and begins around the age of 11. Middle school and junior high (grades 7 through 9) in the United States are classified as level 2. "Upper secondary education" refers to ISCED97 level 3. At this level of education, student coursework is generally subject specific and often taught by specialized teachers. Students often enter upper secondary education at the age of 15 or 16 and attend anywhere from 2 to 5 years. ISCED97 level 3 can prepare students for university, further schooling, or the labor force. Senior high school (grades 10 through 12) is considered level 3 in the United States.

Expenditure for education

All reporting G-8 countries in 2005 (Italy, France, Japan, Germany, the United Kingdom, and the United States) spent more money per student at the higher education level than at the combined primary and secondary education levels. More money in total was spent in 2005 at the combined primary and secondary education levels than at the higher education level, where the student enrollment is much lower. The United States spent \$24,400 per student at the higher education level and \$9,800 per student at the combined primary and secondary education levels, with both amounts higher than the figures in all other reporting G-8 countries. In total dollars as a percentage of GDP, the United States spent 2.9 percent of its GDP on higher education and 3.8 percent of its GDP on primary and secondary education. Overall, the United States spent a higher percentage of its GDP on education (6.7 percent) than all other G-8 countries (indicator 23).

Education Returns: Educational Attainment and Income

In 2006, the Russian Federation had the largest percentage of adults ages 25 to 64 who had completed higher education (54 percent), followed by Canada (47 percent); Italy had the smallest percentage (13 percent).⁸ In the United States, 39 percent of adults ages 25 to 64 had completed higher education. Among 25- to 34-year-olds, greater percentages of females than males had completed higher

education in every G-8 country except Germany, where there was no measurable difference (indicator 24). A greater percentage of first university degrees⁹ were awarded in the combined field of social sciences, business, and law than in any other field in all G-8 countries. In science, mathematics, and engineering-related fields, the United States awarded among the lowest percentages of first university degrees of all the G-8 countries. The United States was the only G-8 country to award more first university degrees in the arts and humanities than in science, mathematics, and engineering (indicator 25).

In 2006, the United Kingdom had higher employment rates than all other reporting G-8 countries (Canada, France, Germany, Italy, Japan, and the United States) at three main levels of educational attainment. In all reporting G-8 countries, higher employment rates were associated with higher levels of educational attainment. The gap in employment rates between adults ages 25 to 64 whose highest educational attainment was lower secondary education or below and those who had completed academic higher education ranged from 23 percentage points in the United Kingdom and France to 31 percentage points in Germany. In all reporting G-8 countries, males had higher employment rates than did females with a comparable amount of education (indicator 26). Among U.S. 25- to 64-year-olds whose highest level of attainment was lower secondary education or below, 42 percent earned half the U.S. median income or less in 2006. This percentage was higher than in all other reporting G-8 countries (indicator 27).

⁸ In the Russian Federation, the reference year is 2003 rather than 2006.

⁹ Programs that prepare students for advanced research and highly qualified professions are called first university degree programs and are classified under ISCED97 level 5A. First university degree programs vary in duration in different countries in different programs of study. In the United States, the first university degree corresponds to a bachelor's degree; it excludes associate's degrees.

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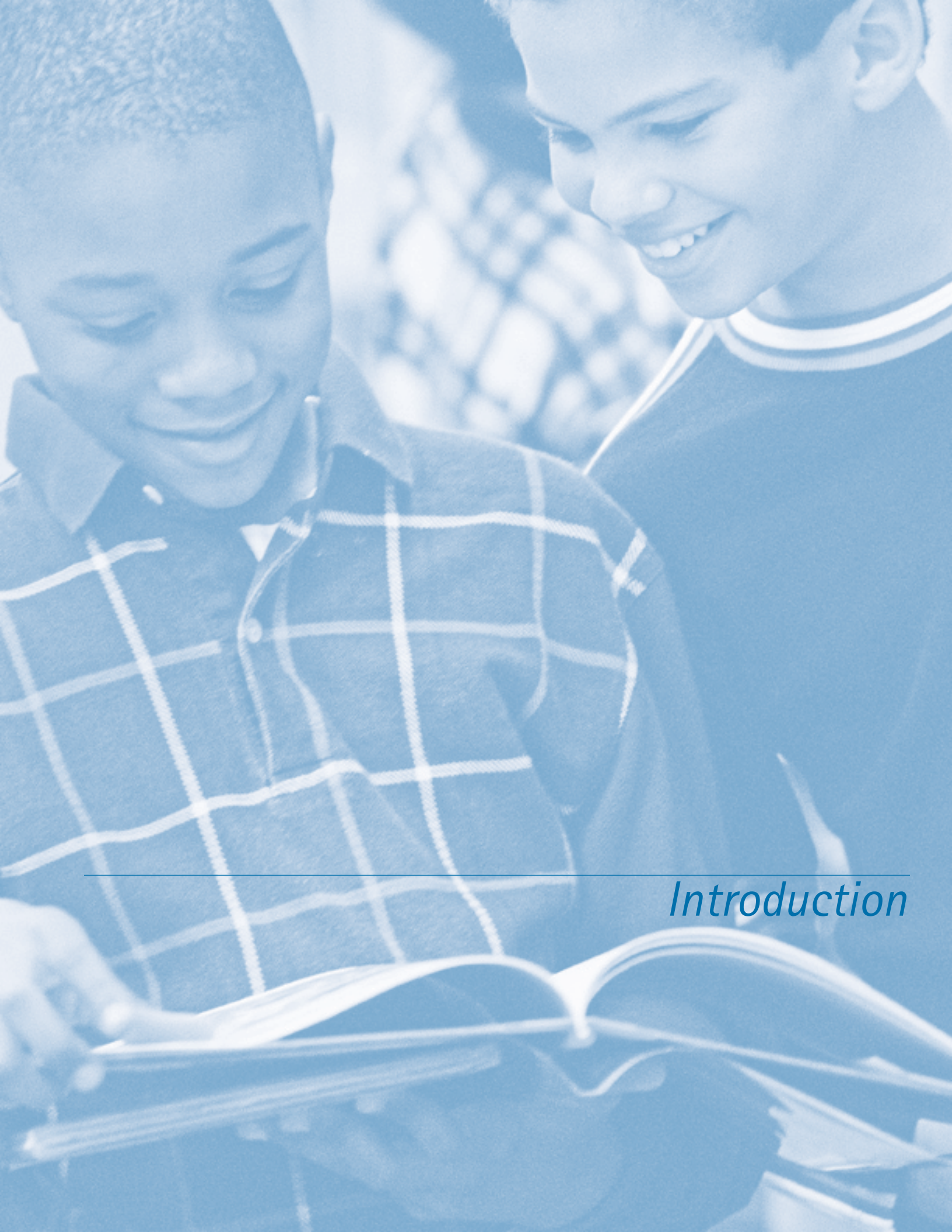
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Introduction

INTRODUCTION

With the long-term growth in the trade of goods and services in the global economy, policymakers have turned to international comparisons to assess how well national systems of education are performing. These comparisons shed light on a host of issues, including access to education, equity of resources, and outcomes such as educational attainment and performance on standardized tests. They provide the opportunity to compare different aspects of countries' education systems, assess these systems' performance, and identify potential strategies to improve student achievement and system outputs.

Since the 1960s, the United States has participated actively in international projects that are designed to provide key information about the performance of the U.S. education system relative to education systems in other countries. These projects include the Indicators of National Education Systems (INES) at the Organization for Economic Cooperation and Development (OECD); the Progress in International Reading Literacy Study (PIRLS); the Program for International Student Assessment (PISA); and the Trends in International Mathematics and Science Study (TIMSS). This report, *Comparative Indicators of Education in the United States and Other G-8 Countries: 2009*, draws on the most current information available from most of these projects at the time the report was being produced (in the summer and fall of 2008) to present a set of education indicators that describes how the U.S. education system compares with education systems in other economically developed countries. Updated information from these various projects will be incorporated in subsequent reports.

Although the international education projects cited above involve many countries worldwide, the comparisons in this report focus on the Group of Eight (G-8) countries: Canada, France, Germany, Italy, Japan, the Russian Federation, the United Kingdom, and the United States. These are among the most industrialized countries in the world. The G-8 countries were selected as a comparison group because of the similarities in their economic development and because the other G-8 countries are among the major economic partners of the United States. The leaders of these countries meet regularly to discuss economic and other policy issues.

What's New in 2009?

This report is the fourth in a series of reports published by the National Center for Education Statistics (NCES) that describes how the education system in the United States compares with education systems in the other G-8 countries. It is the first of these reports to include data from all three international assessments of students in which the United States regularly participates—PIRLS, PISA, and TIMSS. The indicators use 2006 data from PIRLS and PISA and 2007 data from TIMSS. Many of the indicators in this report are updates of previous indicators that used data from earlier cycles, such as TIMSS 1999 and PIRLS 2001. There are also a few new

PIRLS indicators—one presenting data using the PIRLS international performance benchmarks, another reporting the amount of time spent on reading instruction at school, and another highlighting trends in teacher preparation and experience.

The PISA indicators, in particular, offer a unique contribution to the series of *Comparative Indicators* reports. PISA is a system of international assessments that measures 15-year-old students' performance in reading literacy, mathematics literacy, and science literacy every 3 years. Although all three of these subject areas are assessed in each PISA data collection effort, one is assessed in depth (i.e., is considered the major subject area) on a rotating basis. The major subject area in 2000 (when PISA was initiated) was reading literacy; in 2003, it was mathematics literacy. Thus, prior *Comparative Indicators* reports have focused on 15-year-old students' reading and mathematics performance. The current report features indicators pertaining to students' science performance, as assessed in the most recent (2006) study.

The 2008 edition of *Education at a Glance*, which presents international education data compiled by OECD, was used largely to update several indicators that have been presented previously. However, this resource was also used to produce a new indicator in this report: teachers' working time.

Education Levels Used for the Indicators

Many of the indicators in this report refer to at least one of the following education levels: preprimary education, primary education, secondary education, and higher education. A brief overview of the education levels is presented here to provide the reader with a frame of reference while reading the indicators (see appendix A for more detailed descriptions). To ensure comparability in the indicators across countries, each country restructured its national education data to correspond with the definitions of education levels that were developed in the 1997 revision of the International Standard Classification of Education (ISCED97) (United Nations Educational, Scientific and Cultural Organization [UNESCO] 1997). The following descriptions highlight the key features of (1) education programs from preprimary through secondary education and (2) higher education programs.

Preprimary education includes programs of education for children at least 3 years of age that involve organized, center-based instructional activities; in most countries, preprimary education is not compulsory. Primary education includes programs that are designed to give students a sound basic education in reading, writing, and mathematics, along with an elementary understanding of other subjects, such as history, geography, science, art, and music. In the international classification, primary education usually begins at the start of compulsory education (around age 6) and lasts for 6 years. Secondary education encompasses two stages: lower secondary education and upper secondary

education. Lower secondary education includes programs that are designed to complete basic education; the standard duration in the international classification is 3 years. Upper secondary education is designed to provide students with more in-depth knowledge of academic or vocational subjects and to prepare them for higher level academic or vocational studies or entry into the labor market. The standard duration of upper secondary education in the international classification is 3 years.

Higher education includes tertiary programs¹ that fall into three main categories:

- *Academic higher education below the doctoral level.* These largely theory-based programs are intended to provide sufficient qualifications to gain entry into advanced research programs and professions with high skill requirements. To be classified as such, a degree program must last at least 3 years and is typically preceded by at least 13 years of formal schooling. In the United States, bachelor's, master's, and first professional degree programs are classified at this level.
- *Vocational higher education.* These programs provide a higher level of career and technical education and are designed to prepare students for the labor market. In the international classification, these programs last 2 to 4 years. In the United States, associate's degree programs are classified at this level.
- *Doctoral level of academic higher education.* These programs usually require the completion of a research thesis or dissertation.

The international classification also includes an education level that straddles the boundary between upper secondary and higher education: postsecondary nontertiary education. These programs of study—which are primarily vocational in nature—are generally taken after the completion of upper secondary education. They are often not significantly more advanced than upper secondary programs, but they serve to broaden the knowledge of participants who have already completed upper secondary education. In the United States, these programs are often in the form of occupationally specific vocational certificate programs, such as 1-year certification programs offered at technical institutes or community colleges.²

Mapping G-8 Countries' Education Systems to the ISCED97

Matching the education levels of individual countries to the ISCED97 classification can be challenging, because the particulars of individual countries seldom fit ISCED97 perfectly. Using ISCED97 classifications as a starting point, NCES worked with education professionals in other G-8 countries to create a general overview of each country's education system. As an aid to the reader, schematics of how the ISCED97 applies to each of the G-8 countries are provided in appendix A, accompanied by text describing each system in greater detail.

Organization of the Report

The report begins with a summary section that highlights key findings; it then presents 27 indicators that compare different aspects of the education system in the United States to education systems in other G-8 countries. The indicators are organized into the following sections:

- population and school enrollment;
- academic performance, with subsections for reading, mathematics, and science;
- context for learning;
- expenditure for education; and
- education returns: educational attainment and income.

The first section, *population and school enrollment*, presents indicators that suggest the potential demand for education in countries as measured by the size and growth of their school-age population and current levels of enrollment in formal education. The section concludes with an indicator that examines the extent to which foreign students are enrolled in higher education across the G-8 countries.

The next section, *academic performance*, has indicators grouped by subject area into three subsections: reading, mathematics, and science. The indicators present findings on student performance in the G-8 countries, including achievement differences across key demographic variables such as sex, parent occupational status, and immigrant status.

The third section highlights a range of key policy-relevant issues pertaining to the *context for learning* across the G-8 countries. For example, using data as reported by school teachers, there are indicators pertaining to the amount of time devoted to reading instruction, strategies used to assist students who have fallen behind in reading, trends in teacher preparation and experience, teachers' working time, and teacher professional development in mathematics and science. This section also presents the reports of school principals on the uses of summative achievement data and the frequency of student behavior problems.

The fourth section provides a comparative look at *expenditure for education*, including breakdowns by expenditure as a percentage of a country's gross domestic product (GDP) and an indicator on public school teacher salaries in primary and secondary education.

The final section, *education returns: educational attainment and income*, focuses on educational attainment, employment rates, and earnings (including breakdowns by sex and field of study).

Each indicator is presented in a two-page format. The first page presents key findings that highlight how the United States compares with its G-8 peers (with data available) on the issue examined in the indicator. The key findings are followed by a section that defines

¹ In the international classification, more advanced postsecondary education (such as attending a 4-year college or university) is referred to as "tertiary education." In the current report, the term "higher education" is used because this term is more familiar to American readers.

² In data showing annual education expenditure (indicator 23), postsecondary nontertiary education data are included under secondary education and/or higher education for one or more countries as specified in the figures. In data showing the percentage distribution of the population by highest level of education completed (indicator 24), employment rates (indicator 26), and the distribution of the population by education and income (indicator 27), postsecondary nontertiary education data are included under upper secondary education for all G-8 countries reporting data.

the terms used in the indicator and describes key features of the methodology used to produce it. The second page presents graphical depictions of the data that support the key findings. These tables and/or figures also include the specific data source for the indicator and more detailed notes on interpreting the data.

Data Sources

There are four main sources of data for this report:

- *INES data.* Data from the INES project come from tables in *Education at a Glance: OECD Indicators 2008* or from OECD's online Education Database. These data are derived from annual data collections carried out by OECD, with member countries' data coming from a variety of national data sources, including administrative data collections, school surveys, household surveys, and national financial reports. Most of the indicator data for the United States come from the Current Population Survey (CPS) of the U.S. Census Bureau, the NCES Common Core of Data (CCD), the NCES Integrated Postsecondary Education Data System (IPEDS), and the NCES Schools and Staffing Survey (SASS).
- *PIRLS 2006 data.* PIRLS is conducted by the International Association for the Evaluation of Educational Achievement (IEA) and is an assessment of fourth-graders in reading literacy.
- *PISA 2006 data.* PISA is conducted by OECD and is an assessment of 15-year-old students, with a major focus in 2006 on science literacy.
- *TIMSS 2007 data.* TIMSS is conducted by IEA and is an assessment of fourth- and eighth-graders in mathematics and science.

Data for indicator 1, on school-age population, are from the International Data Base (IDB) of the U.S. Census Bureau.

Throughout this report, student data are often presented. Some indicators show

- the mean scores of students (e.g., indicators 5 and 10),
- the percentage of students meeting certain criteria, such as the percentage of students reaching established achievement benchmarks (e.g., indicators 6 and 11), or
- the percentage of students with particular characteristics, such as the percentage of students by immigrant status (indicator 13).

Other indicators also use the student as the unit of analysis, but the data are reported from other sources. These include

- school principals, such as the percentage of students whose principals reported that they used summative achievement data in various ways (indicator 20) or
- teachers, such as the percentage of students whose teachers reported participating in various professional development activities (indicators 18 and 19).

In several other indicators, the unit of analysis is not the student. For example, the unit of analysis may be

- the teacher, as in public school teachers' salaries (indicator 22) or
- postsecondary degrees, as in first university degrees by field of study (indicator 25).

When interpreting the data presented in this report, it is important for readers to be aware of limitations based on the source of information and problems that may exist in verifying comparability in reporting.

Except for indicator 22, which explicitly states that the data pertain to public school teachers only, the indicators in this report include data from both public and private schools.

Availability of Country Data

It should be noted that many of the indicators in this report do not contain data for the complete set of G-8 countries. That is, specific countries are sometimes not included or are only partially included in an indicator. This is the result of source data not being reported, or specific countries or jurisdictions within a country not participating in a particular survey. For example, Japan did not participate in PIRLS 2006, France did not participate in TIMSS 2007, and Germany did not participate in TIMSS 2007 at the eighth grade; therefore, these countries do not appear in indicators using these data. Two other countries that warrant special mention include Canada and the United Kingdom.

Canada participated as a unified country in PISA 2006, and in this report, data for Canada are shown and discussed in the PISA indicators. However, in PIRLS 2006, Canada participated as separate provinces. In this report, results for the Canadian provinces are not reported in the PIRLS indicators; rather, they can be found in the appendix tables (see appendix B). In TIMSS 2007, some Canadian provinces took part in the study as benchmarking participants. These findings do not appear in this report, but they can be found in the international reports published by IEA (Mullis, Martin, and Foy 2008; Martin, Mullis, and Foy 2008).

The United Kingdom, which includes England, Northern Ireland, Scotland, and Wales, participated in PISA 2006. However, in PIRLS 2006 and TIMSS 2007, only England and Scotland participated, and they participated as separate jurisdictions. Northern Ireland and Wales did not participate in PIRLS 2006 or TIMSS 2007. In this report, the PISA indicators include data for the United Kingdom, and the PIRLS and TIMSS indicators include data for England and Scotland shown separately.

Thus, as discussed in indicators using PIRLS data, the participating G-8 countries include England, France, Germany, Italy, the Russian Federation, Scotland, and the United States. In indicators using TIMSS data, participating G-8 countries include England, Germany, Italy, Japan, the Russian Federation, Scotland, and the United States at fourth grade, and England, Italy, Japan, the Russian Federation, Scotland, and the United States at eighth grade.³ In indicators using INES data, the reporting G-8 countries vary somewhat; these are shown in each indicator.

While every effort was made to use the most up-to-date data available across the G-8 countries (usually from 2006 or 2007), data from earlier years were sometimes used if more recent data were not available. To make this clear to the reader, these occurrences are noted in relevant tables and figures.

³ Germany participated in TIMSS 2007 at the fourth grade, but not the eighth grade.

Data Quality and Response Rates

PIRLS, PISA, and TIMSS have established technical standards of data quality including participation and response rate standards that countries must meet in order to be included in the comparative results. Response rate standards were set using composites of response rates at the school, classroom, student, and teacher levels, and response rates were calculated with and without the inclusion of substitute schools that were selected to replace schools refusing to participate.⁴ These standards are described in detail in the technical reports (Martin, Mullis, and Kennedy 2007; OECD 2009; Olson, Martin, and Mullis 2008).

Consistent with NCES statistical standards, item response rates less than 85 percent are footnoted in the tables and figures of this report, as well as instances where reporting standards are not met because of too few observations to provide reliable estimates.

Statistical Testing

Ten of the indicators presented in this report (indicators 1, 2, 3, 17, and 22-27) are derived either from administrative records that are based on universe collections or from national sample surveys for which standard errors were not available. Consequently, for these indicators, no tests of statistical significance were conducted to establish whether observed differences from the U.S. average were statistically significant. However, for the 17 other indicators derived from PIRLS, PISA, or TIMSS data (indicators 4-16 and 18-21), standard *t* tests were calculated for comparisons of estimates within or between countries (e.g., to test whether a U.S. estimate

is statistically different from other G-8 countries' estimates). Differences were reported if they were found to be statistically significant at the .05 level, using two-tailed tests of significance for comparisons of independent samples.

Other International Indicator Publications

Prior to this report, NCES produced three earlier reports—in 2006, 2004, and 2002—describing how the education system in the United States compares with education systems in the other G-8 countries. The 2006 report can be found at <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007006>. The 2004 report can be found at <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005021>. The 2002 report can be found at <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003026>. General information about the International Activities Program at NCES, including work on international comparisons in education, can be found at <http://nces.ed.gov/surveys/international>.

⁴ International requirements state that each country must make every effort to obtain cooperation from the sampled schools, but the requirements also recognize that this is not always possible. Thus, it is allowable to use substitute schools as a means to avoid sample size loss associated with school nonresponse. To do this, each sampled school was assigned two substitute schools in the sampling frame. Substitutes for noncooperating sampled schools were identified by assigning as substitute schools the schools that immediately preceded and followed the sampled school on the frame. The sampling frame was sorted by the stratification variables and by a measure of size to ensure that any sampled school's substitute had similar characteristics.



INDICATORS PART I

Population and School Enrollment

SCHOOL-AGE POPULATION

G-8 Countries Included: Canada, France, Germany, Italy, Japan, Russian Federation, United Kingdom, United States

From 1998 to 2008, the United States had the largest net percentage gain in population size of 5- to 29-year-olds (6 percent) among the G-8 countries.

In 2008, the total population across the G-8 countries ranged from 33.2 million in Canada to 303.8 million in the United States, and the population of 5- to 29-year-olds (roughly the population most likely to be enrolled in education) ranged from 10.4 million in Canada to 104.2 million in the United States (table 1). The population of 5- to 29-year-olds represented 34 percent of the total population in the United States (table 2). In the other G-8 countries, the corresponding percentages ranged from 25 percent in Italy to 33 percent in the Russian Federation.

From 1998 to 2008, the United States had the largest net percentage gain in population size of 5- to 29-year-olds (6 percent) among the G-8 countries (figure 1). The population of 5- to 29-year-olds declined in every other G-8 country except for Canada, with decreases from 1998 to 2008 ranging from 1 percent in the United Kingdom to 18 percent in Japan. In Canada, growth of this population was essentially flat (0.4 percent).

The subpopulation of 5- to 19-year-olds (which generally includes individuals of primary- and secondary-school age) represented 20 percent of the total population in the United States in 2008 (table 2). The U.S. percentage was higher than the percentages in

all other G-8 countries, which ranged from 14 percent in Italy and Japan to 18 percent in France, the United Kingdom, and Canada.

The United States was the only G-8 country to experience a net percentage gain in subpopulation size of 5- to 19-year-olds from 1998 to 2008 (3 percent) (figure 1). The population of 5- to 19-year-olds declined in all other G-8 countries, with decreases from 1998 to 2008 ranging from 1 percent in France to 32 percent in the Russian Federation.

The subpopulation of 20- to 29-year-olds (which generally includes individuals of postsecondary education age) represented 14 percent of the total population in the United States in 2008, below the percentage in the Russian Federation (17 percent) (table 2). The percentages in the other G-8 countries were slightly lower than in the United States, ranging from 11 percent in Italy to 13 percent in Canada, the United Kingdom, and France.

The Russian Federation had the largest net percentage gain in subpopulation size of 20- to 29-year-olds, an increase of 14 percent from 1998 to 2008 (figure 1). The United States had the second largest net percentage gain in subpopulation size (11 percent). Among the other G-8 countries, Canada and the United Kingdom experienced a net percentage gain from 1998 to 2008 (7 and 1 percent, respectively), while the other G-8 countries experienced declines over this period, ranging from 5 percent in France to 28 percent in Italy.

Definitions and Methodology

In each country, the percentage of the population of 5- to 29-year-olds in 1998 and 2008 is calculated by dividing the population of 5- to 29-year-olds by the total population. The percentage change in the population of 5- to 29-year-olds is calculated by subtracting the population of 5- to 29-year-olds in 1998 from this population in 2008 and dividing by the 1998 population of 5- to 29-year-olds.

These calculations are applied in the same way to the age groups 5 to 19 and 20 to 29. The age group (e.g., 5 to 29) as a percentage of the total population may have declined from 1998 to 2008 even though the size of the age group may have increased. This is because of a higher rate of increase of the total population compared to the rate of increase for the specific population age group.

Table 1. Population ages 5 to 29, 5 to 19, and 20 to 29, by country: 1998 and 2008
(in millions)

Age group and year	Canada	France	Germany	Italy	Japan	Russian Federation	United Kingdom ¹	United States
Total population (all ages)								
1998	30.6	60.5	82.0	57.6	126.2	147.8	59.0	276.1
2008	33.2	64.1	82.4	58.1	127.3	140.7	60.9	303.8
Population ages 5 to 29								
1998	10.4	20.5	23.9	17.5	40.1	54.0	19.3	98.3
2008	10.4	20.0	22.2	14.5	32.9	46.1	19.1	104.2
Population ages 5 to 19								
1998	6.2	11.9	13.6	8.8	21.0	33.4	11.4	60.2
2008	6.0	11.8	12.5	8.2	18.2	22.7	11.1	61.9
Population ages 20 to 29								
1998	4.2	8.6	10.2	8.7	19.1	20.6	7.9	38.1
2008	4.5	8.2	9.7	6.3	14.8	23.5	8.0	42.3

¹The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Commerce, U.S. Census Bureau. (2008). International Data Base (IDB), Table 94: Midyear Population, by Age and Sex, 1998 and 2008.

Table 2. Percentage of population ages 5 to 29, 5 to 19, and 20 to 29, by country: 1998 and 2008

Age group and year	Canada	France	Germany	Italy	Japan	Russian Federation	United Kingdom ¹	United States
Population ages 5 to 29								
1998	34.0	33.9	29.1	30.4	31.7	36.5	32.7	35.6
2008	31.4	31.2	26.9	24.9	25.9	32.8	31.3	34.3
Population ages 5 to 19								
1998	20.3	19.7	16.6	15.2	16.6	22.6	19.2	21.8
2008	17.9	18.4	15.2	14.1	14.3	16.1	18.2	20.4
Population ages 20 to 29								
1998	13.7	14.2	12.5	15.2	15.1	14.0	13.4	13.8
2008	13.4	12.8	11.7	10.8	11.6	16.7	13.2	13.9

¹The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Commerce, U.S. Census Bureau. (2008). International Data Base (IDB), Table 94: Midyear Population, by Age and Sex, 1998 and 2008.

Figure 1. Percentage change in population ages 5 to 29, 5 to 19, and 20 to 29, by country: 1998 to 2008



¹The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

SOURCE: U.S. Department of Commerce, U.S. Census Bureau. (2008). International Data Base (IDB), Table 94: Midyear Population, by Age and Sex, 1998 and 2008.

ENROLLMENT IN FORMAL EDUCATION

G-8 Countries Included: France, Germany, Italy, Japan, Russian Federation, United Kingdom, United States

While the United States and the other reporting G-8 countries generally had nearly universal school participation of children ages 5–14, enrollment rates varied across countries at other age ranges.

In 2006, all or almost all 3- and 4-year-old children were enrolled in preprimary or primary education programs in France and Italy (table 3). In Germany, the United Kingdom, and Japan, at least 80 percent of 3- and 4-year-olds were enrolled in preprimary or primary education programs; in the United States, 48 percent were enrolled. Beginning at age 6 in the United States and at age 7 in the Russian Federation, at least 90 percent of the population was enrolled in formal education (figure 2).

In 2006, the United States and most other reporting G-8 countries had nearly universal school participation of children ages 5–14—the age range that typically corresponds with primary and lower secondary education (table 3). In the Russian Federation, 82 percent of 5- to 14-year-olds were enrolled in formal education programs; all other G-8 countries were at 98 percent participation or higher.

The United States had an enrollment rate of 78 percent in 2006 for youth ages 15–19—the age range that corresponds most closely with upper secondary education. The U.S. rate was lower than the rates in Italy (81 percent), France (86 percent), and Germany (89 percent), but higher than the rates in the Russian Federation (74 percent) and the United Kingdom (70 percent).

Compulsory education ends at age 18 in Germany, age 17 in the United States, age 16 in France and the United Kingdom, and age 15 in Italy, Japan, and the Russian Federation (figure 2).⁵ While participation rates were at 90 percent or higher through the end of compulsory education in Italy, the Russian Federation, France, and Japan, they fell below this level in Germany, the United Kingdom, and the United States.

Enrollment rates for 20- to 29-year olds—the age range that corresponds most closely to the typical age of enrollment in higher education—were less than 30 percent among the six G-8 countries reporting data (table 3). The United States had an enrollment rate of 23 percent for this age range. The U.S. rate was lower than the rate in Germany (28 percent), but higher than the rates in Italy and France (both at 20 percent), the Russian Federation (19 percent), and the United Kingdom (17 percent).

Definitions and Methodology

The percentage of the population at given ages enrolled in education is called an "enrollment rate." In this indicator, the term "enrollment rate" refers to the "net enrollment rate" and is defined as the number of students in a particular age group enrolled in education divided by the population of that same age group.

The reference year is 2006 for population and enrollment data in all countries except the Russian Federation, which has a reference year of 2005. Enrollment rates may exceed 100 percent for some countries and some age categories largely because of different reference dates for school enrollment and population data.

Enrollments include all full-time and part-time students in public and private institutions. Enrollment in preprimary education programs (generally the 3- to 4-year-old age group) includes only children in preschool, nursery, or center-based daycare programs and excludes children in daycare operated in homes.

The ending age of compulsory education is the age at which individuals are no longer legally required to participate in formal education.

⁵ In some countries, the ending age of compulsory education is an average. For example, in the United States this age varies across states, ranging from 16 to 18; the modal age in the United States is 16.

Table 3. Percentage of population ages 3 to 29 enrolled in formal education, by age group and country: 2006

Country	Students participating in formal education			
	3- to 4-year-olds ¹	5- to 14-year-olds	15- to 19-year-olds	20- to 29-year-olds
France	100	100	86	20
Germany	97	99	89	28
Italy	100	100	81	20
Japan	83	100	—	—
Russian Federation ²	—	82	74	19
United Kingdom ³	90	100	70	17
United States	48	98	78	23

— Not available.

¹ Data show students age 4 and under as a percentage of the population of 3- to 4-year-olds.

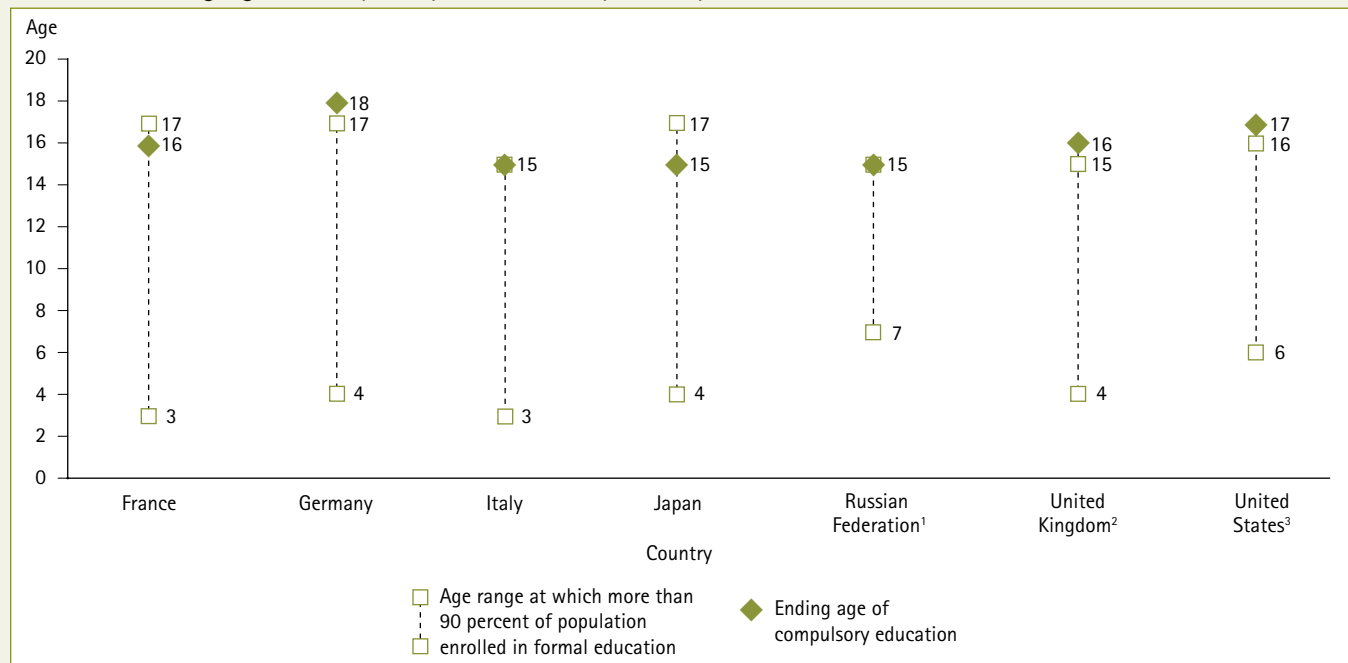
² Reference year is 2005 rather than 2006.

³ The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

NOTE: Reference year is 2006 for population and enrollment data in all countries except the Russian Federation, as noted above; however, reference dates may differ within that year. Thus, percentages shown in the table are approximations. As described in the source cited below, enrollment rates for some countries were reported as slightly exceeding 100 percent in one or more age ranges (e.g., see 5- to 14-year-olds) due to different reference dates for school enrollment and population data. Enrollment in formal education at the preprimary education level includes children in center-based programs and excludes children in home-based early childhood education.

SOURCE: Organization for Economic Cooperation and Development (OECD). (2008). *Education at a Glance: OECD Indicators 2008*, table C2.1. Paris: Author.

Figure 2. Range of ages at which more than 90 percent of the population is enrolled in formal education, and ending age of compulsory education, by country: 2006



¹ Reference year is 2005 rather than 2006.

² The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

³ The average ending age of compulsory education in the United States is 17. This age varies across states, ranging from 16 to 18; the modal age is 16 (*Digest of Education Statistics, 2007*, Table 157, U.S. Department of Education, National Center for Education Statistics, 2008).

NOTE: Reference year is 2006 for population and enrollment data in all countries except the Russian Federation, as noted above; however, reference dates may differ within that year. Enrollment in formal education at the preprimary education level includes children who attended center-based programs and excludes children in home-based early childhood education. The ending age of compulsory education is the age at which individuals are no longer required to participate in formal education. For example, an ending age of 18 indicates that all students under 18 are legally obliged to participate in formal education. Data for Canada are not available except that Canada reports an ending age of compulsory education of 16–18 in 2005 (data not shown in figure). There are differences within the education system of Canada due to responsibilities and oversight for education taking place at the regional or local level.

SOURCE: Organization for Economic Cooperation and Development (OECD). (2008). *Education at a Glance: OECD Indicators, 2008*, table C2.1. Paris: Author.

FOREIGN STUDENTS IN HIGHER EDUCATION

G-8 Countries Included: Canada, France, Germany, Italy, Japan, Russian Federation, United Kingdom, United States

Among the G-8 countries, the United States had the most foreign students (in absolute numbers) enrolled in higher education, but foreign students made up a larger percentage of enrollment in higher education in the United Kingdom, Canada, Germany, and France.

Over the past 3 decades, the number of foreign students (i.e., students enrolled outside their country of citizenship) in higher education has grown almost fivefold: from 0.6 million worldwide in 1975 to 2.9 million in 2006 (OECD 2008a). In 2006, G-8 countries (as countries of destination) hosted close to two-thirds of all foreign students in higher education (figure 3a). The United States received the largest percentage of these foreign students (20 percent), followed by the United Kingdom (11 percent), Germany (9 percent), and France (9 percent). Altogether, in 2006, these four G-8 countries accounted for almost one-half of all foreign students enrolled in higher education. The other G-8 countries each took

in between 2 and 5 percent of all foreign students enrolled in higher education.

In addition to the share of foreign students hosted by each G-8 country, another measure can be examined that takes into account the size of a country's higher education system: the percentage of a country's students enrolled in higher education who are foreign students. Among the G-8 countries, the United States had the largest number of foreign students enrolled in higher education (OECD 2008a). However, in comparison to the United States, foreign students made up a larger percentage of enrollments in higher education in the United Kingdom (18 percent), Canada (15 percent), Germany (11 percent), and France (11 percent) (figure 3b). In the United States, nonresidents made up 3 percent of the total enrollment in higher education.⁶ In the Russian Federation, foreign students made up 1 percent of the total enrollment in higher education, lower than in all other G-8 countries.

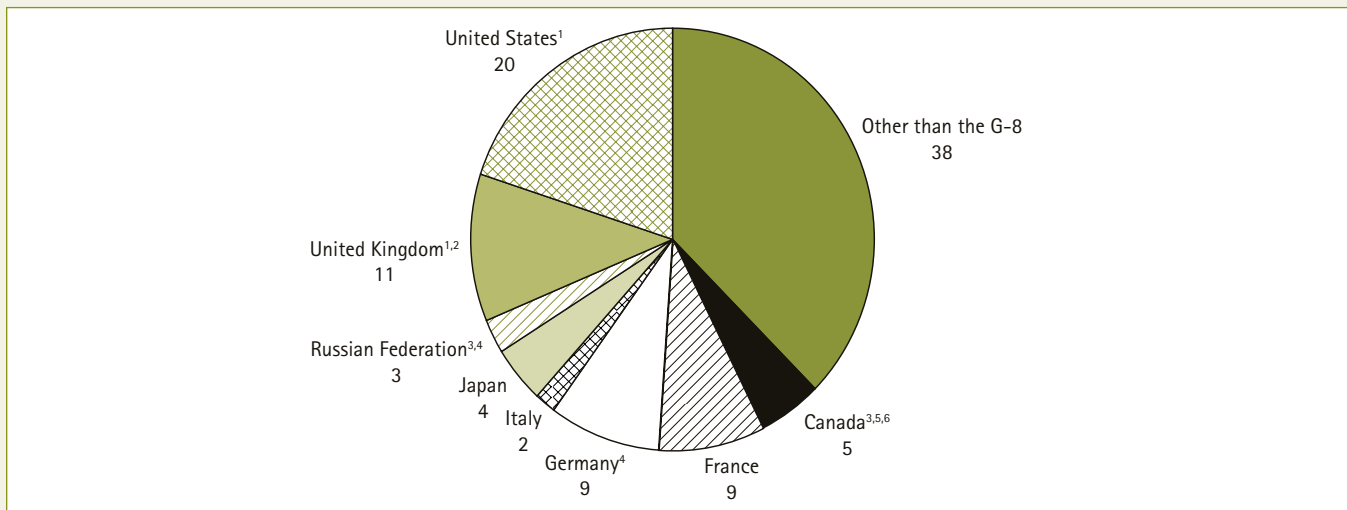
Definitions and Methodology

Foreign students are defined as noncitizens enrolled in education programs in a host country, and thus some permanent residents are included. International students are defined as students who enrolled in institutions in other countries, and thus do not include

permanent residents. As shown in the figures, education levels are defined according to the International Standard Classification of Education (ISCED97). For more information on the ISCED97 levels, see appendix A.

⁶ Unlike the other G-8 countries, the United States did not specifically report the percentage of higher education enrollment consisting of foreign students. It instead reported the percentage of higher education enrollment consisting of international students. International students are defined as students who have crossed borders expressly with the intention to study, and thus do not include permanent residents. This measure, then, is a somewhat underestimated proxy for the number of foreign students.

Figure 3a. Percentage distribution of foreign students enrolled in higher education programs, by host country: 2006



¹ Data are for international students defined on the basis of their country of residence.

² The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

³ Excludes private institutions.

⁴ Excludes advanced research programs.

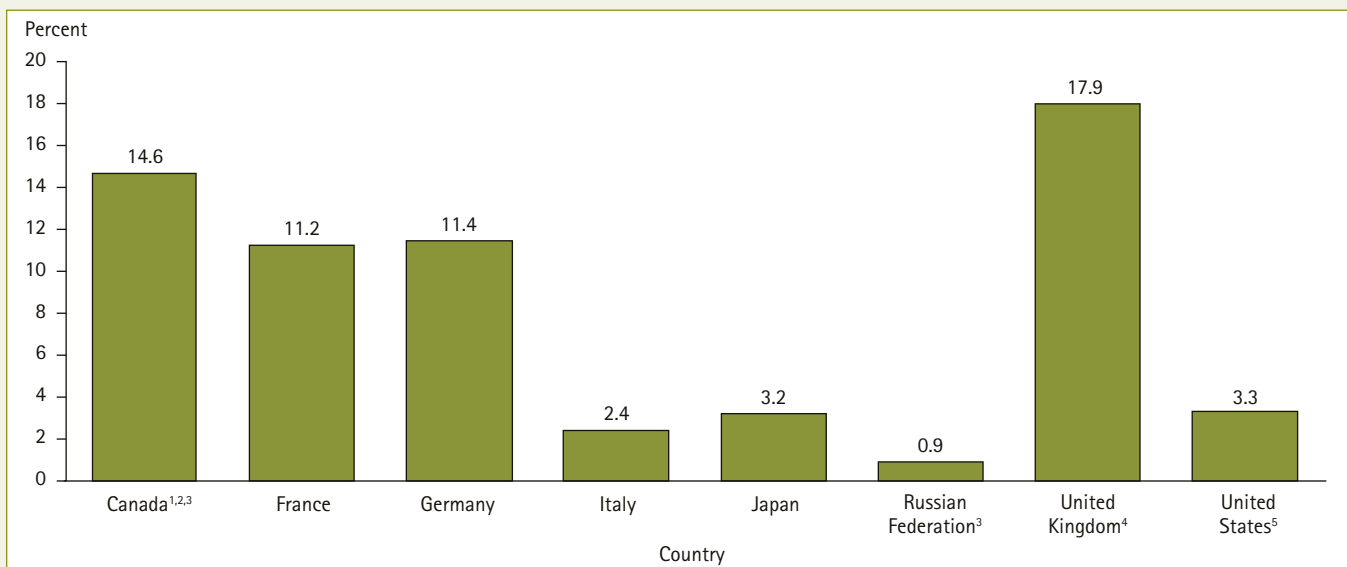
⁵ Excludes tertiary-type B programs.

⁶ Reference year is 2005 rather than 2006.

NOTE: Most countries report the enrollment of foreign students, who are defined as noncitizens enrolled in education programs in a host country (thus, some permanent residents are included). Some countries, including the United States, report the enrollment of international students, who are defined as students who have crossed borders expressly with the intention to study (thus, do not include permanent residents). Countries of origin include 30 OECD countries, 177 non-OECD countries, and some nonspecified countries. Education levels are defined according to the International Standard Classification of Education (ISCED97). Except where otherwise noted, data shown include ISCED97 levels 5A (academic higher education below the doctoral level), 5B (vocational higher education), and 6 (doctoral level of academic higher education). For more information on the ISCED97 levels, see appendix A in this report. Detail may not sum to totals because of rounding.

SOURCE: Organization for Economic Cooperation and Development (OECD). (2008). *Education at a Glance: OECD Indicators 2008*, chart C3.2 and web table C3.7. Paris: Author. Retrieved December 22, 2008, from <http://dx.doi.org/10.1787/402158641726>.

Figure 3b. Percentage of a country's students enrolled in higher education who are foreign students, by country: 2006



¹ Percentage in total tertiary underestimated because of the exclusion of certain programs.

² Reference year is 2005 rather than 2006.

³ Excludes private institutions.

⁴ The United Kingdom includes England, Northern Ireland, Scotland, and Wales.

⁵ The United States reports data on international students rather than foreign students. International students are defined as students who have crossed borders expressly with the intention to study (thus, do not include permanent residents).

NOTE: Foreign students are defined as noncitizens enrolled in education programs in a host country (thus, some permanent residents are included). Countries of origin include 30 OECD countries, 177 non-OECD countries, and some nonspecified countries. Education levels are defined according to the International Standard Classification of Education (ISCED97). Except where otherwise noted, data shown include ISCED97 levels 5A (academic higher education below the doctoral level), 5B (vocational higher education), and 6 (doctoral level of academic higher education). For more information on the ISCED97 levels, see appendix A in this report.

SOURCE: Organization for Economic Cooperation and Development (OECD). (2008). *Education at a Glance: OECD Indicators 2008*, table C3.1. Paris: Author.