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Foreword

Information and communication technology (ICT) is associated with unprecedented global flows of information, products, people, capital and ideas, connecting vast networks of individuals across geographic boundaries at negligible marginal cost. ICT is an important part of the policy agendas of OECD countries, with profound implications for education, both because ICT can facilitate new forms of learning and because it has become important for young people to master ICT in preparation for adult life. But how extensive is access to ICT in schools and informal settings and how is it used by students?

As part of the 2003 survey of the Organisation for Economic Co-operation and Development's (OECD) Programme for International Student Assessment (PISA), students were asked about their familiarity with ICT, principally about their computer use. The results show that almost all 15-year-old students in OECD countries have experience using computers, but the length of time for which students have been using computers differs greatly across countries. Since the PISA 2000 survey access to computers at home and at school has increased and the majority of students now have access to computers in both places. Access to computers at school is most universal, but students report using home computers more frequently.

This report sheds light on how students are using computers and shows that they use them for a wide range of functions and not just to play games. Only a minority of students reported frequent use of specific educational software, but one-half of the students surveyed reported frequent use of the Internet as a research tool and frequent use of word processing software, both of which have educational potential. The vast majority of students are confident in performing basic ICT tasks such as opening, deleting and saving files and students are generally confident about their Internet abilities. While fewer 15-year-olds are confident performing high-level tasks – such as creating a multi-media presentation or writing a computer program – unaided most think they could do so with some help.

This report complements both *Learning for Tomorrow's World – First Results from PISA 2003,* which focuses on knowledge and skills in mathematics, science and reading, and *Problem Solving for Tomorrow's World – First Measures of Cross-curricular Competencies from PISA 2003*, which profiles students' problem-solving skills.

The report is the product of a collaborative effort between the countries participating in PISA, the experts and institutions working within the framework of the PISA Consortium, and the OECD. The report was drafted by the OECD Directorate for Education, principally by Claire Shewbridge and Miyako Ikeda, under the direction of Andreas Schleicher, with advice from the PISA Editorial Group and support from Donald Hirsch, Kate Lancaster, Sophie Vayssettes and John Cresswell. The PISA assessment instruments were prepared by the PISA Consortium, under the direction of Raymond Adams at the Australian Council for Educational Research. Data analytic support was provided by Alla Berezner and technical advice by Christian Monseur, Keith Rust and Wolfram Schulz.

The development of the report was steered by the PISA Governing Board, chaired by Ryo Watanabe (Japan). Annex C of the report lists the members of the various PISA bodies as well as the individual experts and consultants who have contributed to this report and to PISA in general.

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ICT in PISA and Educational Policy

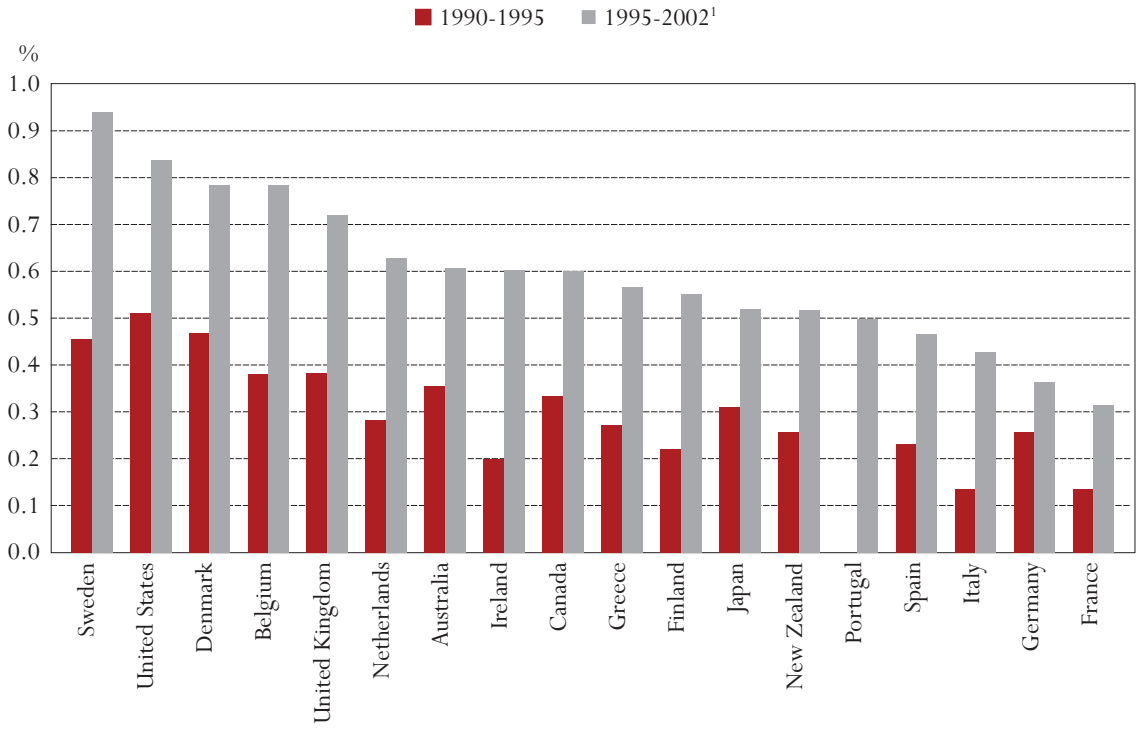
INTRODUCTION

Information and communication technology (ICT) is playing a central role in the development of modern economies and societies. This has profound implications for education, both because ICT can facilitate new forms of learning and because it has become important for young people to master ICT in preparation for adult life. But is ICT living up to its potential in schools and in the lives of young people? To start to answer this question, the extent to which young people are exposed to and making use of such technology and whether those who do so are achieving desirable learning outcomes must be determined. In 2003, the OECD's Programme for International Student Assessment (PISA) collected data to explore these questions. This report explores what the data reveal.

DRIVERS FOR THE INTEGRATION OF TECHNOLOGY INTO SCHOOLS

Every young person will need to use ICT in many different ways in their adult lives, in order to participate fully in a modern society. It is also now possible to estimate the overall value to economies of ICT. Investment in this technology can give competitive advantage in global markets. Figure 1.1 shows the growth of GDP in percentage points directly attributable to investment in ICT. In all eighteen OECD countries for which data are available it is clear that there have been increased gains in GDP directly attributable to investment in ICT between 1990 and 1995 and between 1995 and 2002. This suggests that countries will continue to invest in ICT and that ICT will become

Figure 1.1 ■ **Contribution of ICT investment to GDP growth, 1990-1995 and 1995-2002, in percentage points**



1. Data refer to 1995-2002 for Australia, Canada, France, Germany, Japan, New Zealand and the United States, and 1995-2001 for other countries.
Source: OECD Productivity Database, September 2004 (*www.oecd.org/statistics/productivity*).

commonplace in the workplace. Given this evidence and the extent of organisational and process changes seen throughout professional and personal environments, it is clear that there will be an increasing demand for young people to acquire familiarity with ICT at school, coming from policy makers, parents and even young people themselves.

Moreover, ICT not only makes new demands on schools in terms of desirable outcomes, but also offers an important new tool in the education process. Policy makers and educators have begun integrating technology into schools with the primary aim of improving teaching and learning in different subjects and also with an aim of increasing motivation for both students and teachers. An effective use of ICT in schools can have an immediate positive impact on the schools' learning environments, for example by: creating more dynamic interaction between students and teachers, increasing collaboration and team work in problem-solving activities, stimulating creativity in both students and teachers, and helping students to control and monitor their own learning. Further, a successful use of ICT in schools can help students to develop skills, both specific to ICT and more generally, that will be useful for them in their future academic and professional lives. Whether pursuing further academic or vocational studies or choosing to commence working life directly at the end of compulsory education, students who have effectively used ICT during their compulsory studies should be able to continue to effectively use ICT to control and plan their own projects and to collaborate well with others. Such students will have the advantage of being familiar with different media common to the modern workplace, and should be able to use these ICT skills to access, compile, synthesise and exchange information effectively.

PISA 2003 AND HOW INFORMATION ON ICT WAS COLLECTED

In 2003, PISA ran its second three-yearly survey of student knowledge and skills. PISA is the most comprehensive and rigorous international programme that assesses student performance and collects data on characteristics of students and the institutions where they study. Such contextual data can help explain differences in performance.

PISA is policy driven and aims to provide participating governments with information on how well young adults are prepared to meet the challenges of today's knowledge societies. It therefore assesses students at age 15 who are approaching the end of compulsory schooling. PISA measures how well 15-year-olds can use their knowledge and skills to meet real-life challenges, rather than how well they can reproduce what they have learned.

What did PISA 2003 assess?

PISA 2003 assessed student performance in mathematics, reading and science, as well as in cross-curricular problem-solving skills. In 2003, the domain to which most assessment time was devoted was mathematics. In the first survey, conducted in 2000, the major domain was reading, and in 2006 it will be science. In PISA 2003 the total assessment time of 390 minutes was organised in different combinations of test booklets with each individual being tested for 120 minutes. The time devoted to the assessment of mathematics was 210 minutes (54% of the total) and 60 minutes was devoted to each of the assessments of reading, science and problem solving.