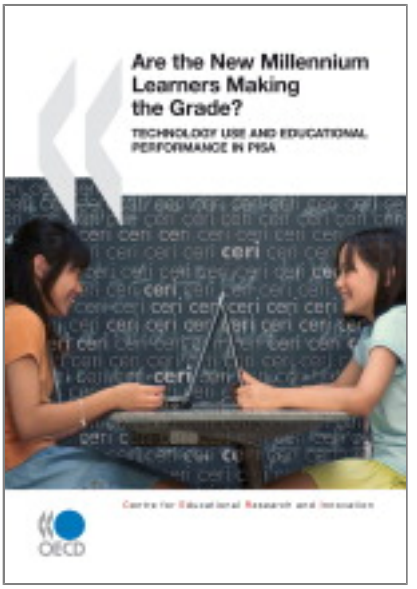
OECD *Multilingual Summaries*

Are the New Millennium Learners Making the Grade?: Technology Use and Educational Performance in PISA 2006

Summary in English



- Using data from PISA 2006, this book analyzes to what extent investments in technology enhance educational outcomes. One of the most striking findings of this study is that the digital divide in education goes beyond the issue of access to technology. A new second form of digital divide has been identified: the one existing between those who have the right competencies to benefit from computer use, and those who do not. These competencies and skills are closely linked to the economic, cultural and social capital of the student.
- This finding has important implications for policy and practice. Governments should make an effort to clearly convey the message that computer use matters for the education of young people and do their best to engage teachers and schools in raising the frequency of computer use to a level that becomes relevant. If schools and teachers are really committed to the development of 21st century competencies, such an increase will happen naturally. And only in these circumstances will clear correlations between technology use and educational performance emerge.

Are the New Millennium Learners Making the Grade?: Technology Use and Educational Performance in PISA 2006 - ISBN 978-92-64-017733

Objectives of the report

What is the relationship between technology use and educational performance in science? The OECD PIS A (Programme for International Student Assessment) provides a source of evidence for the analysis of this relationship. This report presents the main findings and policy implications of this analysis. This work was carried out under the umbrella of CERI 's New Millennium Learners project. The work presented here updates the findings of a previous report (OECD, 2006) and seeks to go deeper into the determinants of technology use, both in frequency and in purpose, and into the impact on educational performance.

This report presents results based on PIS A 2006 and continues the work initiated at the OECD in 2005 which presented an initial picture of the role of ICT in education based on PIS A 2003 data (OECD, 2006). It continues the investigation of how equitable the access is to computers across countries, how familiar students are with ICT, how often and where they use computers, for how long they have been using them, how confident they feel, for which tasks they use them and, finally, what the relation is between these characteristics and students' performance.

How the report is organised

More precisely, the Introduction presents overall considerations on the PIS A 2006 data and establishes the objectives and structure of the report. Chapter 1 summarises the current policy debate on the putative benefits of the use of ICT in education. Chapter 2 presents students' access to ICT, in terms both of infrastructure, e.g. computers, Internet connections and computer software, and of the context or conditions in which ICT access takes places, i.e. at home or at school or in both. Chapter 3 shows how students use ICT. In this analysis, a profile emerges indicating that 15#year#old students who use ICT are far from a homogeneous group. Also included in this chapter is a more in-depth analysis of the role that ICT use may play in students' attitudes to science. Chapter 4 examines the relation between students' access to and use of ICT and their performance in PIS A 2006. To do so, the current relation between ICT use and student performance is first presented. Then, a more detailed microeconometric analysis explores the possible causality effect of ICT use on students' performance. Chapter 5 draws the main conclusions and makes some policy recommendations that may help improve overall ICT policy in education. A future research agenda identifying crucial data needs is also highlighted. These data could serve to provide more solid evidence on the role and impacts of ICT in education.

Main findings

- **1. Today all students in OECD countries are familiar with computers.** On the whole, less than 1% of 15-year-old students in OECD countries declared that they had never used a computer. Interestingly, neither gender nor socio-economic status is an important determinant in this respect.
- **2. Frequency of use at home is not paralleled by use at school.** In most OECD countries more than 80% of 15 year-olds use computers frequently at home but a majority do not use them at school, except in Hungary.
- **3. Despite increasing investment in ICT infrastructure in schools, student-computer ratios are still a handicap for ICT use in schools.** The OECD average is five students per computer. It has dropped by 50% since 2000, when it was ten students per computer, but it is roughly the same as it was in 2003.
- **4. Digital media are increasingly used as educational resources, but disparities across countries are large.** As access to digital media and the Internet at home increases, the importance of books as tools for coursework decreases.
- **5. The main use of computers is related to the Internet or to entertainment.** More than 60% of students frequently use their computers for e-mail or chatting (69%) and to look up information about people, things or ideas on the Internet (61%). More than 50% frequently use them to download music (58%) and play games (54%), and the relatively lowest percentage of frequent computer use is to download software (41%) and to collaborate with a group or team (37%).
- **6. A variety of student profiles are linked to different uses of technology.** The six suggested profiles (analogue, digi-casual, digi-wired, digi-sporadic, digi-educational, and digi-zapper) reflect a variety of computer uses which relate to socio-economic status (ES CS) and gender. The strong socio-economic differences in students' use of computers for leisure activities is not matched by similar differences in the type of activities more likely to be practiced in school. In fact, the difference between students from the bottom and

top ES CS quarters is twice as large for Internet and entertainment uses as it is for programmes and software uses. This is an important finding because it gives support to the assumption that school use of digital media can help to reduce the digital divide.

- **7. ICT familiarity matters for educational performance.** Performance differences associated with the length of time students have been using a computer remain once socio#economic background is accounted for.
- **8. There is a stronger correlation between educational performance and frequency of computer use at home than at school.** In a large majority of countries, the benefits of greater computer use tend to be larger at home than at school. In every country, students reporting “rare” or “no use” of computers at home score lower than their counterparts who report frequent use. Clearly, in the case of school use, more computer use does not mean better results in subject-based standardised tests such as PIS A 2006.
- **9. With the right skills and background, more frequent computer use can lead to better performance.** The analysis of PIS A data shows that for educational performance, computer use amplifies a student’s academic skills and competences. These competences are closely related to the student’s background, and particularly to his/her economic, cultural and social capital. Given the lack of such capital, the benefits from more computer use would be limited.
- **10. The first digital divide has faded in schools but a second one is emerging.** In nearly every OECD country, all students attend schools equipped with computers, 88% of which are connected to the Internet. However, there is still a digital gap related to home access. In the light of the results of this study, it can be concluded that the importance of the digital divide in education goes beyond the issue of access to technology. A second form of digital divide has been identified between those who have the necessary competences and skills to benefit from computer use and those who do not. These competences and skills are closely linked to students’ economic, cultural and social capital.

Policy implications

- **1. Raise awareness among educators, parents and policy makers of the consequences of increasing ICT familiarity.** Policy makers have to consider the educational implications of the changes brought about by technology. First, students need technology and access to digital media for learning purposes which current provision in schools may not adequately meet. More importantly, education standards need to include the kind of skills and competences that can help students become responsible and performing users of technology and to develop the new competences required in today’s economy and society which are enhanced by technology, in particular those related to knowledge management. Teachers need a clear policy message in this respect: public recognition that teachers are expected to deal with these competences as a priority in their subject areas or domains. This public recognition will require the inclusion of these competences in national and international assessments. In a number of respects, those responsible for teaching the new millennium learners have to be able to guide them in their educational journey through digital media. Teacher training, both initial and in-service, is crucial for disseminating this key message and for equipping teachers with the required competences. Parents also need to be aware of these changes. In the light of the findings of this study, it is clear that parents have a crucial responsibility to help their children develop a responsible attitude to using digital media in a networked environment. Their influence has to go beyond safety issues to include approaching digital media critically to make the most of them. Public policies can help to raise parental awareness in this respect.
- **2. Identify and foster the development of 21st century skills and competences.** Today’s labour force needs the skills and competences that are required by a knowledge economy. Most of these are related to knowledge management and include processes related to selection, acquisition, integration, analysis and sharing of knowledge in socially networked environments. Not surprisingly, most of these competences, if not all, are either supported or enhanced by ICT. For young people, schools are the only place where such competences and skills can be gained. Accordingly, governments should make an effort to identify and conceptualise the required set of skills and competences so as to incorporate them into the educational standards that every student should be able to meet by the end of compulsory schooling. Two requirements must be fulfilled. First, participation of both economic and social institutions, ranging from companies to higher education institutions, is critical. Second, this set of skills and about. This will only be achieved by incorporating them into national education standards that are enforced and assessed by governments.
- **3. Address the second digital divide.** Computer use can make a difference in educational performance if the student has the appropriate set of competences, skills and attitudes. This is another powerful reason for governments to engage in the identification of the 21st century skills and competences, and for teachers and schools to consider the importance of developing them in order to address this second digital divide. Teachers and schools can make a difference for students who lack the cultural and social capital that will allow them

to benefit from the use of digital media in a way that is significant for their educational performance. If teachers and schools fail to acknowledge this second digital divide, and act accordingly, they will reinforce its emergence. It is important to realise that the fact that students appear to be technologically "savvy" does not mean that they have developed the skills and competences that will make them responsible, critical and creative users of technology.

- **4. Adopt holistic policy approaches to ICT in education.** Besides public investments, other factors could improve ICT use in schools. An overall favourable environment, the inclusion of ICT in curriculum design or strong leadership and commitment from teachers and headmasters to implement ICT-rich teaching could also significantly influence the use of ICT in schools. As this report shows, one of the limitations of many educational ICT policies is that most countries have not developed holistic policies for the educational use of ICT. The current results suggest the value of critically evaluating current policies and their results in order to develop complementary policies that would maximise the effects of the deployed infrastructure.
- **5. Adapt school learning environments as computer ratios improve and digital learning resources increase.** Students should be able to locate and use a computer at any time, according to the particular needs of their individual and team assignments. Although there are indications of innovative developments in this direction everywhere, governments should provide the conditions for them to flourish and should assess their effects. Two areas which deserve particular public policy attention are computer ratios, particularly in the light of the growing trend to introduce 1-to-1 computing arrangements, and the availability of digital learning resources.
- **6. Promote greater computer use at school and experimental research on its effects.** An alternative explanation for the lack of correlation between computer use at school and educational performance gains from computer use at home because the frequency of use has reached a critical level. According to the existing evidence, such a level is far from the marginal one a student currently experiences at school. Governments need to create the necessary incentives to engage teachers in the exploration of the benefits of ICT in education. But in so doing they should acknowledge that as responsible professionals teachers are particularly receptive to one powerful incentive: the evidence of what works. Finally, it should be stressed that data availability remains one of the main handicaps for understanding the role of ICT in education. New data could give a more nuanced picture of the availability and use of ICT and its effects on educational attainment, the quality of the teaching and learning process, and the development of the 21st century competences.

Reference OECD (2006), Are Students Ready for a Technology-Rich World? What PISA Studies Tell Us, OECD Publishing, Paris.