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Research Note: Digital Divide Across Borders—A Cross-National Study of Adolescents' Use of Digital Technologies

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In this study, we analyse digital divides in terms of social inequality in digital access and use patterns from a hierarchical perspective. Using data from the Programme for International Student Assessment (PISA) 2003 in 30 nations, we focus on social cleavages in mid-adolescents' access and use of digital technologies, taking into account both individual-level and country-level influences. Our study shows that adolescents from higher socio-economic and two-parent family households are more likely to have Internet access at home. Additionally, adolescents from higher-status families use the Internet more often for informational purposes than children from lower-status families. Adolescents from single-parent are less likely to have home Internet access. Nevertheless, they use the Internet more frequently for information and communication and play computer games more often than their peers living in two-parent families. Testing simultaneously individual and country characteristics shows that a country's level of modernization can be separated into compositional and contextual effects. Overall, a country's level of modernization only affects whether digital applications are available at the family home, but not how they are used. These findings suggest that once a family has access to the Internet, the digital use patterns of their adolescent children do not differ across nations.

Introduction

The diffusion of digital technologies has sparked concerns about a 'digital divide', defined as an unequal access to digital applications—most notably the Internet—resulting from differing economic, cognitive, and socio-cultural resources (Gunkel, 2003; Dimaggio *et al.*, 2004; Selwyn, 2004). Several theoretical ideas toward the digital divide phenomenon have been developed. One position, labeled as the 'normalization model' or 'disappearing digital divide approach', states that social cleavages in access to digital technologies, and thereby unequal access to information, will gradually disappear through the egalitarian character, accessibility, and diffusion of the Internet (Norris, 2001; Martin and Robinson, 2004; Peter and Valkenburg, 2006). However, recently, scholars have also called attention to the fact that social inequality in informational resources may manifest itself not only in differential digital access but also in differential digital use patterns (Bucy, 2000; DiMaggio *et al.*, 2004; Van Dijk, 2006; Ono and Zavodny, 2007). According to this 'stratification model' or 'emerging digital differentiation approach', mere access to a computer or the

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Internet does not imply that people actually can or will make effective use of it or have similar use patterns (Van Dijk, 2006; Ono and Zavodny, 2007). Even if the divide in access to digital technologies is closed, a social cleavage in digital use patterns may still exist (Norris, 2001; DiMaggio *et al.*, 2004; Peter and Valkenburg, 2006).

In line with the original idea of the digital divide in terms of social inequality in digital access, scholars have largely focused on people's demographic characteristics to predict access to, and use of, digital technologies (e.g. Bonfadelli, 2002), thereby neglecting the possibility of contextual country-level influences. In contrast, scholars who focused on the 'global' digital divide have studied predominantly cross-national differences in the diffusion of digital applications, thereby neglecting individual characteristics as influences on the digital divide (Hargittai, 2002; Guillén and Suárez, 2005). Consequently, there is virtually no empirical research on the digital divide that includes both individual and country-level contextual factors. This is surprising given that a person's adoption of new technologies is inherently socially determined (Fulk, 1993) and, at the same time, heavily depends on a country's economic resources and existing technological infrastructure (Rogers, 1995).

This study is a first step to fill some lacunae in the digital divide literature. We acknowledge the relevance of a social divide in digital access as well as the rising importance of a social cleavage in digital use patterns. Hence we study adolescents' access to digital technologies at home, but also their digital informational, communicational, and computer game playing preferences. Furthermore, our investigation tries to contribute to, and extends, existing digital divide research in that it simultaneously tests both micro-level (demographics, family background) and macro-level (country) influences on adolescents' access to, and use of, digital technologies.

To do so, we use a dataset that includes information on 179,675 15-year-old students from 30 countries (PISA, 2003). The focus on 15-year-olds, that is, mid-adolescents, is useful for several reasons. First, all across the world, adolescents have become the defining users of digital technologies, most notably the Internet, which they integrate in more varied ways into their daily lives than adults do (Lenhart *et al.*, 2005). Given the developmental shifts in mid-adolescence, 15-year olds in particular seem to use the Internet as an additional venue to find out and experiment with their identity (Valkenburg and Peter, 2007). Second, when we study adolescents' access and use of digital technologies, we can meaningfully investigate the impact of parental and family characteristics—an aspect often neglected in the digital divide literature. Finally, theories of developmental research, such as ecological systems theory (Bronfenbrenner, 1979) or developmental systems theory (Lerner and Castellino, 2002), have outlined in detail that adolescents' behaviour is subject to influences from different levels, ranging from the individual to the cultural. Both from a pragmatic and a conceptual perspective, then, a focus on adolescents may allow us to study divides in digital access and digital use patterns in a more up-to-date and encompassing way than it would be possible with an adult sample.

Individual Level: Demographic Characteristics and Family Background

Digital divide research has shown that both digital access and digital use patterns differ by an individual's demographic characteristics. By and large, this also applies to adolescents' access to, and use of, digital technologies. For example, better-educated adolescents and adults not only use the Internet more frequently but also use it more often for informational and less often for entertainment purposes than less well-educated adolescents and adults. Gender has also been found to predict the Internet use. Female adolescents generally use the Internet less often and play computer games less frequently than male adolescents do (Bonfadelli, 2002; Van Dijk and Hacker, 2003; Korupp and Szydlik, 2005; Peter and Valkenburg, 2006; Livingstone and Helsper, 2007).

Previous research also suggests that adolescents' digital access and use patterns may be affected by their family background. Generally, family structure is found to be highly effective for a person's resources and socialization (Sayer *et al.*, 2004). For instance, children in single-parent households can experience restrictions in financial support and/or parenting time. Furthermore, research has repeatedly revealed that also a family's socio-economic position can affect adolescents' resources and behaviour. In order to enhance their children's overall well-being, parents transmit their resources and skills onto their children. Therefore, parental assets are highly distinctive when it comes to adolescents' resources and habits (Bourdieu, 1984; Lareau, 2003).

When parents invest in home access to digital technologies and regulate their adolescent children's use of such technologies, their key motivation is to

increase their children's future educational success (Livingstone, 2007). However, parents from various social backgrounds are not homogeneously equipped with economic and cultural resources to support their children's access to and use of digital technologies. Generally, higher status and higher educated parents are themselves experienced and sophisticated users of digital technologies. In higher socio-economic households, parents also have a more positive attitude toward computer and Internet use and presume to a higher extent than lower status parents that their children need digital competency for future educational success (Clark *et al.*, 2005; Livingstone, 2007). Accordingly, family factors and parental socialization have been found to play an important role both in providing home access to digital technologies and in shaping and differentiating adolescents' digital use. Therefore, we expect to find substantial differences between adolescents from various family backgrounds when it comes to digital access at home and digital use patterns.

Country Level: Wealth and Educational Expansion

As with the introduction of all other new technologies, country-specific features can also be expected to play a role regarding both the access to and use of digital technologies (Rogers, 1995). Previous cross-national research on the digital divide has generally found that country differences in PC ownership, Internet access, and frequency of Internet usage in the parental home are due to different levels of national development (Chen and Wellman, 2004; Ono and Zavodny, 2007). Because countries differ in their stage of modernization, both in terms of wealth and educational expansion, we expect that a country's economic and educational development may affect adolescents' digital access and use patterns.

Studies on the diffusion of technological innovations and the development of digital infrastructures have shown that a country's economic position or wealth are dominant predictors of Internet penetration (Rogers, 1995; Hargittai, 1999; Guillén and Suárez, 2005). Despite the rapid diffusion of digital applications and Internet connectivity, digital access still seems more common and widespread in countries with higher levels of wealth and modernization. More specifically, cross-national research on the digital divide has revealed that a nation's wealth seems to outweigh all other factors in explaining differences in digital usage across nations (Norris, 2001). However, digital divide research has never empirically investigated whether a country's level of economic development remains influential when differences between social groups are taken into account. It could very well be that cross-country differences in the influence of a country's wealth on digital access and use disappear when social inequalities on the individual (i.e. citizen) level are taken into account.

There is good reason to assume that access to digital technologies and digital use patterns may also be related to a country's level of modernization in terms of its educational expansion. To become and remain an 'information society', a country's knowledge or educational level might be highly relevant too. Because the use of digital technologies is completely interwoven with the daily life of the higher educated (Bonfadelli, 2002; Korupp and Szydlik, 2005), a country's proportion of higher educated citizens may affect the spread of both digital technologies and their use. In addition, governments and private companies might invest more in the technological development and the quality of Internet connectivity when the proportion of the information seekers in a population is high.

In conclusion, an encompassing investigation of social cleavages in adolescents' access to, and use of, digital technologies requires a focus not only on individual-level influences but also on country-level factors. We use two country-level factors that have shown to be of relevance in cross-national and/or digital divide research: a nation's wealth (economic development) and its educational expansion. In combining individual-level and country-level factors, our study may advance beyond investigations that have dealt with either individual or country influences on the digital divide. Country-level characteristics may reveal a country's social composition, thereby indirectly reflecting influential features at the individual level. However, in studying individual- and macro-level characteristics simultaneously, we may be able to distinguish between purely compositional effects and tangible country-level context effects.

Data, Measurements, and Methods

The data we use come from the OECD's Programme for International Student Assessment (PISA), conducted in 2003 (OECD, 2005). More specifically, we make use of the Student Questionnaire and Computer Familiarity Questionnaire. From the 32 countries in which the Computer Familiarity Questionnaire in the PISA 2003 study was fielded, we had to exclude two

countries (Japan and Liechtenstein) because of incomplete or incomparable data on relevant characteristics.[1] Furthermore, we removed all adolescents with missing values on one of the relevant variables from the data set. These selections resulted in a hierarchical dataset containing 179,675 adolescents (15-year-old students) at the individual (lower) level and 30 countries at the country (higher) level. To study differences in digital use patterns (i.e. informational, communicational, and game use), we selected students with Internet access at home (61 per cent of sample). This resulted in a hierarchical dataset with 107,246 adolescents nested in 30 countries. The PISA-data are unique, because they enable us to compare adolescents' digital access and uses patterns across 30 countries. However, it should be taken into account that only students in secondary school were interviewed. Because drop-out and (secondary) school enrolment rates differ over countries, our results may not be generalizable to the entire population of 15-year-olds in a particular country.

In the PISA questionnaire, students are asked whether they have Internet access at home. The response categories of the variable *Internet access at home* are recoded to (0) no Internet access at home and (1) Internet access at home. Three questions on digital use patterns were used. *Informational use* is measured by the question 'How often do you use the Internet to look up information about people, things, or ideas?' *Communicational use* is assessed through the question 'How often do you use a computer for electronic communication (e.g. e-mail or chat rooms)?' *Game use* is measured by the question 'How often do you use games on a computer?' All questions had identical answer categories: (1) almost every day, (2) a few times each week, (3) between once a week and once a month, (4) less than once a month, and (5) never. All three variables about use patterns are recoded to dichotomous variables indicating daily use: (1) (almost) daily use and (0) less than daily use.

The *sex* of the respondents is coded (0) male and (1) female. Since the PISA sample consists of 15-year-old students, the *respondents' educational track* is a dichotomous variable indicating (0) lower secondary education and (1) higher secondary educational level. From an index of family structure, four dichotomous variables are constructed that indicate family composition: *two-parent family*, *single-parent family*, *stepparent family*, and *others* (residual category). The variable *others* is included in estimating the models, but is not presented in the tables because of its low score (2.5 per cent). Parental socio-economic background is measured by parental educational level (in years) and occupational status. *Parental educational level* is classified using the International Standard Classification of Education (ISCED), ranging from (0) none to (6) ISCED 5A and 6: theoretically oriented tertiary and post-graduate education (OECD, 2005). The score of the parent with the highest education is recoded into estimated years of schooling, ranging from 0 to 17 years. In PISA 2003, the *parental occupational status* is measured by the highest score on the International Socio-Economic Index of Occupational Status (ISEI) (Ganzeboom *et al.*, 1992) of the students' father or mother, ranging from 16 to 90. For use in the multilevel models, we centred parental educational level (in years) and occupational status to the mean.

We use two variables at the country level. A *country's wealth* is measured by GDP per capita at purchasing power parity (PPP) in 2003, current international dollars ($) (Worldbank, 2007). A *country's educational expansion* is measured by the percentage of gross enrolment in tertiary education (ISCED 5 and 6) in 2003, which represents the general level of participation in tertiary education in a given country (UNESCO, 2008).[2] Both variables are centred to the mean. See Appendix 1 for more detailed information.

To analyse our hierarchical data, we use multilevel modeling. In this method, differences between countries and individual respondents are estimated simultaneously (Snijders and Bosker, 1999). Multilevel analysis enables us to model heterogeneity and obtain more correct estimations of country effects. We apply logistic or binomial multilevel models with a random intercept and fixed slopes. This means that we assume that the effects of the individual variables (covariates) are fixed among countries, whereas the mean effect of each country is allowed to vary.

Results

We start our analyses with estimation of the null model (model 0) with a random intercept and without predictors to assess the variance component at the country level. The significant country-intercept variance in Model 0 of Table 1 shows that Internet access at home varies significantly among countries. Next, in Model 1, we include the country and individual characteristics. With regard to the individual effects, it shows that girls have lower odds of Internet access at home than boys. Also, for students enrolled in higher secondary education, the odds for Internet access are 36 per cent ($e^{0.31}$) higher than for students enrolled in lower secondary education. As for the family structure variables, it shows that adolescents living in

Table 1 Logistic multilevel regression modeling on Internet access at the parental home ($N = 179{,}675$ individuals; $N = 30$ countries)

	Model 0		Model 1	
	b	**SE**	***b***	**SE**
Intercept	0.47*	0.25	0.66***	0.16
Individual level (level 1)				
Sex (0/1)			−0.22***	0.01
Higher secondary education (0/1)			0.31***	0.02
Two-parent family (0/1) (ref.)				
Single-parent family (0/1)			−0.47***	0.02
Step-parent family (0/1)			−0.36***	0.03
Parental educational level (13 = 0)			0.12***	0.00
Parental occupational status/10 (49 = 0)			0.30***	0.00
Country level (level 2)				
GDP/1000 (22,813 = 0)			0.09***	0.02
Percentage of tertiary education/10 (56 = 0)			0.18*	0.10
Country-intercept variance	1.83***	0.03	0.68***	0.01
Log likelihood	−91055.382		−82125.866	

Source: PISA (2003).
*$P<0.1$; **$P<0.05$; ***$P<0.001$ (two-tailed test).*

single-parent and step-parent families have significantly lower odds of having Internet access in their parental home than adolescents living in two-parent families. Furthermore, adolescents from better-educated parental households and with parents who have a higher occupational status have significantly higher odds of digital access at home than adolescents from lower socio-economic families.

With regard to potential country-level influences, the results indicate that a nation's economic development and expansion of higher educational enrolments play an important role in the odds of having an Internet link at home. Both national wealth and educational expansion positively affect the odds of Internet access at home. With every additional 1,000$ GDP per capita, the odds of Internet access at an adolescents' home increase by 9 per cent ($e^{0.09}$). An extra 10 per cent enrolled in tertiary education at the country level increases the odds of Internet access by 20 per cent ($e^{0.18}$). Because we control for the effect of education at the individual level, the remaining effect of our measure for a country's educational expansion can be interpreted as a country-level contextual effect. The variance at the country level more than halved.

In Table 2, the significant country-intercept variance in Model 0 indicates that digital informational, communicational, and game use vary significantly between countries. In Model 1, we include countries' wealth and educational expansion as well as the individual-level variables. Model 1 reveals that, at the individual level, the odds of informational and game use for girls are, respectively, 34 per cent ($1 - e^{-0.42}$) and 78 per cent ($1 - e^{-1.53}$) lower than for boys. Higher secondary students have 18 per cent ($1 - e^{-0.20}$) lower odds of game use than students in lower secondary education. For informational and communicational use, there seems to be no significant difference between lower and higher secondary students.

Family structure plays an important role in adolescents' digital use patterns. Adolescents from single-parent families have higher odds of informational, communicational use patterns, and playing computer games compared to their peers living in two-parent families. For adolescents in step-parent families, the odds of using the Internet to look up information are 7 per cent ($1 - e^{-0.07}$) lower, and the odds of game use are significantly higher than for youngsters growing up in two-parent families. Parental educational level and occupational status positively affect an adolescent's informational and communicational use: for every extra year of parental schooling the odds of informational use are 3 per cent ($e^{0.03}$) higher. Conversely, for adolescents with parents with a higher educational degree and a higher occupational status, the odds of playing computer games are significantly lower than for children from less-privileged or lower-status families.

In Table 2, the only significant influence of country characteristics shows that the higher a country's

Table 2 Logistic multilevel regression modeling on informational, communicational, and game use ($N = 107{,}246$ individuals; $N = 30$ countries)

	Informational use				Communicational use				Game use			
	Model 0		Model 1		Model 0		Model 1		Model 0		Model 1	
	b	SE	*b*	SE	*b*	SE	*b*	SE	*b*	SE	*b*	SE
Intercept	−1.02***	0.07	−0.85***	0.07	−0.41***	0.09	−0.43***	0.09	−0.81***	0.06	−0.13**	0.06
Individual level (level 1)												
Sex (0/1)			−0.42***	0.01			0.00	0.01			−1.53***	0.02
Higher secondary education (0/1)			0.02	0.02			−0.01	0.02			−0.20***	0.02
Two-parent family (0/1) (ref.)												
Single-parent family (0/1)			0.05**	0.02			0.07***	0.02			0.08***	0.02
Step-parent family (0/1)			−0.07**	0.03			0.01	0.03			0.06*	0.03
Parental educational level (13 = 0)			0.03***	0.00			0.02***	0.00			−0.01**	0.00
Parental occupational status/10 (49 = 0)			0.03***	0.00			0.03***	0.00			−0.04***	0.00
Country level (level 2)												
GDP/1000 (22,813 = 0)			0.01	0.01			0.01	0.01			−0.03***	0.01
Percentage tertiary education/10 (56 = 0)			−0.05	0.05			0.05	0.06			0.05	0.00
Country-intercept variance	0.14***	0.00	0.13***	0.00	0.23***	0.00	0.21***	0.00	0.12***	0.00	0.09***	0.00
Log likelihood	−63477.14		−62889.31		−69858.16		−69786.45		−63733.59		−57969.01	

Source: PISA 2003.

*$P < 0.1$; **$P < 0.05$; ***$P < 0.001$ (two-tailed test).*

economic development, the lower the odds of digital entertainment use. With every additional 1,000$ GDP, the odds of an adolescent's game use decrease by 3 per cent ($1 - e^{-0.03}$). A country's wealth has no significant impact on adolescents' digital informational and communicational use. The proportion of people enrolled in tertiary education in a country also has no significant effect on digital use patterns. Consequently, there is no substantive decrease in variance at the country level.

Conclusions and Discussion

This study contributes to existing research on the digital divide, analysing cleavages in adolescents' digital access and digital use patterns by focusing on both individual and country level influence factors. By applying multilevel analysis to the PISA data 2003, we tested the effects of individual and country characteristics on digital divides simultaneously. Our findings indicate that both country and individual characteristic affect adolescents Internet access at home.

Regarding individual level characteristics, our results reveal that female adolescents have lower odds of Internet access at home than male adolescents. This finding is in line with research that has consistently demonstrated sex differences in issues related to digital technologies, at least among adults (Bimber, 2000; Bonfadelli, 2002; Roe and Broos, 2005). Our results suggest that home Internet access is a less prominent issue in families with (only) girls. It may also be that the gender influence we find depends on adolescents' age (Livingstone and Helsper, 2007), with female adolescents starting to use the Internet at home later than boys. We could not investigate this possibility, because all respondents were 15 years old. Future research, however, may specify our findings by studying whether adolescents' age and gender interact in their influence of adolescents' Internet access at home.

Concerning the impact of family background on adolescents' access to the Internet, our results show that adolescents from higher-status and two-parent family households are more likely to have home Internet access than adolescents from other families. This finding extends existing research on digital divides in that it suggests that not only parents' socio-economic background but also the structure of the family affect adolescents' Internet access at home.

On the country level, we simultaneously tested whether a country's wealth and educational expansion make a difference in digital access at home, taking into account individual characteristics. Both greater national wealth and greater educational expansion are associated with higher proportions of adolescents who have Internet access at home. Thus, when countries are rich and when many people enjoy high levels of education in a given country, adolescents are particularly likely to have Internet access at home. We conclude that in becoming an 'information society', not only wealth but also a country's expansion of higher educational enrolments is important.

The effect of a country's educational expansion may be seen as a contextual effect and not purely as a compositional one. In a compositional effect, the country-level association between larger proportions of highly educated people (i.e. educational expansion) and greater proportions of adolescents with home Internet access would merely reflect the fact that, at the individual level, higher educated people have more Internet access. However, because we control for the effect of education at the individual level, the remaining effect of a country's educational level represents a country-level contextual effect. This finding implies that lower-educated people in more educationally developed countries are more likely to have Internet access at home than lower-educated people in less educationally developed countries. More generally, this finding suggests that the hopes of some authors (e.g. Negroponte, 1995) that Internet access may automatically empower less-privileged people may partly depend on the economic and, most importantly, educational situation of a country.

In terms of adolescents' digital use patterns we found, at the individual level, that adolescents from higher socio-economic parental households tend to use the Internet more often to gain information and to extend their social networks, and thereby generate more cognitive and social resources than adolescents with a lower-status parental background. At the same time, adolescents with higher-status parents use computers less often to play games than adolescents with lower-status parents. Our results show that parental socio-economic status is highly influential in differentiating adolescents' digital use. These findings strengthen the idea that the use of digital technologies might function as a modern tool for social reproduction and stratification (e.g. DiMaggio *et al.*, 2004). Family structure also affects adolescents' use of digital technologies. Compared with adolescents from two-parent families, adolescents from single-parent families use the Internet more often for information and communication and also played computer games more frequently. This might be an indication that single-parent families spend less time on parent–child

interaction, leaving adolescents more time to use digital technologies.

A nation's wealth and educational expansion hardly influences adolescents' digital use patterns. This finding should not be prematurely seen in the light of a general insignificance of country-level factors regarding digital divides in the use of digital technologies. It may very well be that other country characteristics, such as a country's ICT penetration or, more specifically, IT readiness, may be more powerful country-level predictors of adolescents' digital use patterns. Future research may find a fruitful task in exploring these possibilities. However, before we do not have further evidence on the influence of country characteristics and adolescents' access to, and use of, digital technologies, our findings suggest that once a family or a household has access to the Internet, adolescents' use patterns no longer differ across nations. Our research indicates that digital use preferences seem to be predominantly an individual- or family-determined behaviour. As a result, our study suggests that future research on digital divides in adolescents' digital use patterns may have to focus more strongly on their family background to deepen our understanding of potentially desirable and undesirable effects of digital usage.

Notes

1. We excluded Liechtenstein because of its extraordinary (banking) economy, low-response rate ($N = 329$), and consequently bad model fit. For Japan, we lacked all information about students' family structure.
2. Because of incomplete data about school enrolment in 2003, we use data for Germany from 1997, for Canada from 2002, and for Serbia and Montenegro for Serbia from 2001 (Worldbank, 2007).

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Appendix 1 Country means

	N	GDP per capita	Tertiary education	Internet access	Informational use	Communicational use	Game use
Australia	11,357	31,265	74	0.86	0.29	0.43	0.20
Austria	4,287	31,205	48	0.72	0.37	0.39	0.21
Belgium	7,484	29,037	61	0.81	0.30	0.61	0.25
Canada	25,014	31,712	60[a]	0.86	0.38	0.67	0.34
Czech Republic	5,773	17,243	37	0.54	0.26	0.29	0.30
Denmark	3,752	30,332	67	0.85	0.27	0.41	0.34
Finland	5,563	27,104	87	0.78	0.17	0.39	0.30
Germany	3,857	28,102	48[b]	0.78	0.30	0.41	0.29
Greece	3,402	25,610	73	0.41	0.27	0.29	0.38
Hungary	4,163	14,652	52	0.27	0.19	0.35	0.31
Iceland	3,195	29,751	62	0.93	0.36	0.47	0.30
Ireland	3,520	33,816	55	0.70	0.11	0.17	0.17
Italy	10,741	26,308	59	0.70	0.22	0.25	0.27
Korea	5,196	18,571	87	0.94	0.17	0.40	0.27
Latvia	3,754	10,267	71	0.21	0.33	0.46	0.32
Mexico	20,658	10,241	23	0.27	0.38	0.55	0.26
New Zealand	3,275	22,505	71	0.85	0.25	0.44	0.23
Poland	4,257	11,694	60	0.34	0.36	0.44	0.41
Portugal	3,892	18,692	55	0.52	0.25	0.41	0.32
Russian Federation	4,743	9,720	65	0.19	0.22	0.34	0.49
Serbia and Montenegro	2,864	7,047	36[c]	0.36	0.27	0.37	0.47
Slovakia	5,796	13,428	34	0.22	0.25	0.28	0.37
Sweden	4,170	28,417	82	0.91	0.24	0.52	0.34
Switzerland	7,626	32,274	44	0.79	0.27	0.39	0.20
Thailand	4,172	6,086	42	0.26	0.19	0.25	0.30
Tunisia	3,207	5,555	26	0.13	0.21	0.29	0.41
Turkey	2,932	6,403	28	0.22	0.24	0.38	0.35
United Kingdom	2,377	28,435	63	0.85	0.30	0.48	0.29
United States	4,889	37,511	82	0.84	0.41	0.56	0.34
Uruguay	3,759	7,340	40	0.49	0.28	0.39	0.37

Source: PISA 2003. Data originate from [a]2002, [b]1997, and [c]Serbia, 2001.