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Digital Divide in Poland: An Exploration of Some Sociological Impacts of Personal Computer Possession, Internet Use and PC Proficiency*

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Abstract

Purpose: The purpose of this research was to analyze correlates of access to, use of and skills with PC and Internet tools with social characteristics such as occupational category, income and other indicators of status.

Methodology: The research reported here presents trend analysis and multiple regression results based on nationally representative samples of Poles collected in 2003 and 2008. The data are from the Polish Panel Study (POLPAN) collected by the Institute of Philosophy and Sociology, Polish Academy of Sciences.

Findings: The results showed that there are lingering disparities in PC ownership and Internet use by occupational status (employed vs. unemployed) and occupational category. On the positive side, all groups are more likely to possess a PC or use the Internet in 2008 relative to 2003. The results further showed sharp disparities across occupational categories for PC skills. For example, while 100% of professionals claimed the ability to receive an email, only 51.5% of farmers attested to such skill. A regression analysis showed that only PC ownership had a weak positive effect on later income. Neither Internet use nor proficiency with PCs and the Internet were revealed to have positive impacts on income after five years. The results of this study challenged the notion of the digital divide. The analysis showed that, except in the case of access to a PC in the home, which had a small impact on income growth, PC/Internet use and skills in Poland in recent years do not have any statistically significant relationship with income. It was concluded that the finding where two of the three factors are not correlated with income growth is evidence of digital parity or a growing digital equality among citizens in modern Poland.

Keywords: digital divide, information society, digital competency, Internet, personal computer

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Introduction

Since before the end of the twentieth century, researchers have been investigating the existence, characteristics and causes of a presumed digital divide. The digital divide refers to inequalities in access to, understanding of and facility with digital technologies, particularly personal computers (PCs), the Internet, tablets, smart phones and similar tools which are collectively referred to as information and communication technologies, or ICTs (ITU 2009). The earliest studies on this topic focused on exploring the extent to which such a digital divide existed and discussing why disparities in access to digital technologies could result in increasing social inequality on various dimensions. After having established the existence of inequality in access to and uses of digital tools, researchers focused on uncovering the social statuses that were most clearly affected by digital exclusion and began to assess the impacts of the digital divide (Hoffman and Novak, 1998; Fairlie, 2004). In recent years, more attention has been given by scholars of the Internet society to measuring the existence of actual benefits resulting from digital proficiency (DiMaggio and Bonikowski, 2008).

In 2015, roughly twenty years since the beginning of the period of rapid expansion of PC ownership and the proliferation of web-based telecommunication made possible by the Internet revolution, does the digital divide continue to have relevance or not? Considering that in the most developed countries of the world Internet access is widespread and PC ownership is pervasive, is there still any meaningful social disparity based on access and use of PCs and the Internet? With this concern in mind, this study posed the following questions:

1) Do those who have access to and use PCs and the Internet achieve substantial social benefits that the "non-wired" do not achieve?
2) Are there ongoing gaps in access, use and skills between social groups?
3) To what extent does the gap in access to, use of and skills with PCs and the Internet between social groups resemble the economic, social and political resource gaps between social groups?
4) To what extent do access, use and skills provide economic, social and political benefits to individuals?

This study sought to answer these questions by building on previous research and analyzing longitudinal data that included measures of when people acquired PCs and access to the Internet and measures of social status.

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The analyses relied on data collected in Poland from 1988 to 2008 in five-year waves.[3] Poland is an ideal location for conducting research on the digital divide. In 1988 at the end of the Communist period, Poles had limited opportunities for acquisition and use of modern ICTs. By 1993, a few members of Polish society had PCs or mobile phones, for example, so it is possible to determine who the "early adopters" were. By 1998, when many people in the richer Western countries had opportunities to acquire modern ICTs, such as a PC wired to the Internet, a small but growing number of Poles also had such technologies. In 2003, just before the time when Poland joined the European Union, digital technologies really began to penetrate the Polish marketplace; however, there were still large disparities in who did or did not have certain technologies. Finally by 2008, Poland had experienced a lengthy period of economic growth and integration with Europe and the rest of the world. Have ICTs penetrated all levels of Polish society? Are there still disparities in terms of who has access to and benefits from technology in Poland? This study explored these and related questions to better understand the relationship between technology and selected aspects of social inequality.

Some Previous Findings

Several researchers recently explored the connections between digital proficiency and subsequent effects on social status. For example, Dimaggio and Bonikowski (2008) found that use of the Internet both at work and at home has positive effects on income growth over time. The authors employed various models for explaining this effect, from economically focused explanations of technology in the workplace to human and social capital explanations. They argued that, in addition to enhanced workplace productivity, use of computers and the Internet can support acquisition of social capital and information gathering about jobs, where this use can enhance cultural capital accumulation. Also, use of computers and the Internet over time may result in accumulation of digital skills that non-users or new users will not have. In spite of their finding that PC and Internet use had the effect of increasing users' income over time, DiMaggio and Bonikowski argued that their use of data from 2000 to 2001 may have resulted in a historically specific effect. This is because of the unique expansion of especially Internet use that occurred at that time. In their conclusions, they argued that the positive impacts of PC and Internet use on income will eventually decrease. The current study, by analyzing data from 2003 to 2008, will consider this evaluation.

[3] The dataset, known as POLPAN, is described in more detail in the Methods section.

Two recent studies examined more closely exactly why PC and Internet use can contribute to a digital divide. Notten, Peter, Kraykaamp and Valkenburg (2009) focused on adolescents and the factors that enable them to have access to and become proficient with ICTs. According to the authors, "adolescents from higher socio-economic and two-parent family households are more likely to have Internet access at home. Additionally, adolescents from the higher-status families use the Internet more often for informational purposes than children from lower-status families" (Notten et al., 2009, p. 551). Thus, their study concluded that the way in which adolescents use the Internet is affected by socio-economic status. This difference in ways of using the Internet could explain long-term benefits of Internet use.

Hargittai (2010) extended this research by looking at young adults and focusing more closely on disparities in web skills associated with social inequality. Based on her analysis of 1,060 young adults, Hargittai tested both Internet skills and diversity of use of the Internet among the subjects. The study showed that laptop ownership, number of use years, number of use locations and weekly hours on the web among college students were all impacted by the level of parental education. Furthermore, young adults with more highly educated parents had better web use skills and a greater variety of types of websites visited. Race, ethnicity and gender also had effects on Internet skills and the variety of net uses. The results of Hargittai's study reinforce the argument that socio-economic status is related to both access to digital tools and the ways in which those with such access use digital tools (Hargittai, 2010).

Digital Parity?

The most interesting characteristic of the Internet, in comparison to other types of contemporary ICTs such as traditional mobile phones or GPS devices, is the exceptional extent to which it enables the user to access a nearly infinite amount of information, often in an interactive way. While the Internet can be used for a wide range of purposes, from professional work like occupational or academic research to pure entertainment like gaming or watching streaming television video, one can hypothesize that in general, Internet users attain technical skills that translate into tangible benefits for social status attainment. Additionally, human capital can be gained by accessing any of the hundreds or thousands of websites, such as Wikipedia.org and Ask.com, that instantaneously offer answers to almost any question the user can come up with (Qualman, 2009, p. 33–43). Social capital can be achieved, for example, through use of any

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of the many networking sites, such as Facebook.com or LinkedIn.com, that allow users to share selected information with hundreds of people immediately.[4]

Although such research described structural factors that result in a lingering digital divide in access to ICTs, several recent studies documented the growing commonness of PC and Internet use in Poland and other developed countries (Green and Kryszczuk, 2009; ITU, 2009). For example, while there used to exist a huge gap in access to the Internet between urban and rural communities, now in the most developed countries, Internet access is commonly available through high-speed cable, satellite or wireless technology. While members of the lower classes were behind in PC access and Internet use years ago, now widespread ownership of a PC or smart phone and use of the Internet are nearly as common as owning a television.

Yet, studies from the 2000's demonstrated clearly that there were discernable disparities in PC ownership and Internet proficiency in terms of social class, race, residence location, age, gender, educational attainment and other factors (Fairlie, 2004; Green and Kryszczuk, 2009). The general presumption made by scholars and policy makers at that time was that those disparities would result in an unfortunate lack of access to the benefits made possible by a digital economy. However, data from the mid-2000s going forward showed that most of the disparities in PC and Internet use have been partially or largely surmounted by the near saturation of PCs into the marketplace, the near pervasiveness of Internet access, and the inclusion of PC and Internet tools and skills into the educational structure of schools throughout the developed world.

However, several questions remain to be fully answered:

1) Is access to PCs and the Internet the most important component of the causes of the digital divide, or is PC proficiency (i.e. ability to use a computer for research, organization, business development, programming, etc.) a more important component?
2) Do the various ways in which people use PCs and Internet, for example, for education, entertainment, social networking and business, result in persisting disparities such as income inequality?

[4] It is worth mentioning that the main language of the Internet, English, can be an important factor as a barrier in the exploration of information for non-English speakers. The same problem relates to the early history of books in the Guttenberg era. Many books were published in one of the dominant languages, e.g. German, Latin and French. Eventually this led some nations to insist that information be published in their own language. Some say that this ultimately played a role in the nationalism that grew in the 19th and 20th centuries (Volti, 2006).

3) Are there still significant disparities in PC and Internet skills? If so, do these disparities result in negative outcomes, such as lower wages, for people who have been left out of the digital revolution or have chosen not to join it?

This study answered these questions by analyzing trends in PC ownership, Internet use and PC proficiency using longitudinal data collected in Poland between 1988 and 2008, known as the POLPAN study. Previous analyses of POLPAN data documented the evolution of household PC possession and the growth of Internet use in a post--Communist country (Green and Kryszczuk, 2006; Kryszczuk and Green, 2007; Green and Kryszczuk, 2009). During the period of this study's analyses, Poland was transformed by two independent processes: the information revolution and systemic change. However, just as in typical capitalistic countries, the study results show that there are clear distinctions in access to and use of ICTs in Poland across rural and urban groups, different levels of educational attainment and occupational groups. These analyses give some preliminary evidence that possessing a PC and using the Internet have a small, but statistically significant effect on income. The current analysis attempted to confirm this by comparing people who use the Internet alone or with the help of others, to those who do not use the Internet at all, to determine if there are significant differences in income growth among Internet users as compared to those who do not use the Internet. With the addition of a new measure of PC proficiency, this study sought to further understand how both access and use of ICTs and having the skills to maximize their utility can potentially translate into social advantage.

Methods

To explore the influence of social factors as they relate to the digital divide, this study employed trend analysis, descriptive statistics and regression analysis of POLPAN data from 1988 to 2008.[5] The POLPAN data was collected in five waves, initiated in 1988 and then continued each subsequent five years. In technical terms, the POLPAN data was repeated cross-sections since many of the original subjects did not participate in subsequent waves. Many subjects were also added in each wave to ensure representativeness and inclusion of new subjects to replace lost ones. Nevertheless, some subjects were included in all five waves, and many subjects participated in more than one wave. The analysis made use of data collected over time in the form of trend analysis and descriptive statistics. The last analysis made use of the panel nature of the data by examining responses of subjects in both the 2003 and 2008 waves.

[5] For more information about POLPAN, see http://www.ifispan.waw.pl/socnierowno/projects/index.html.

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The data included an indicator of whether respondents possessed a PC in their household (all waves) and an indicator of whether they used the Internet, either alone or with help (2003 and 2008 waves only).[6] The trend analysis was focused on examining whether possession of a PC and Internet use were related to job status (employed or unemployed) and occupational category. The occupational categories measured were as follows: legislators and managers, professionals, technicians and qualified clerks, clerks at medium administrative levels, service workers, skilled manual workers, semi-skilled manual workers, farmers, and business owners. This categorization of occupations followed work by Pohoski and Słomczyński (1978) and Domański, Sawiński and Słomczyński (2006), who developed the system based on official work classifications in Poland and determined that it is an appropriate schema for grouping workers in the Polish job market.

In addition to a trend analysis, the study presented descriptive statistics on the ability of respondents in each occupational category to complete specified tasks on the computer. In the 2008 wave of POLPAN, respondents were asked if they could do the following tasks on a computer: receive an e-mail, create a folder on the desktop, save data onto a CD-ROM, create a ".doc" file, use an Internet browser, compress a graphics file, use several applications at once, and write a macro.[7] Based on their responses, the percentage of respondents was compared in each occupational category to determine who was able to do each task.

Finally, to assess the connection between use of digital tools and later income, a series of multivariate regressions was conducted. The purpose of the regressions was to determine if possession of a PC, use of the Internet and PC proficiency were positively correlated with income when controlling for other expected predictors of income, such as sex, age, education, occupational category and previous income. The measure of PC proficiency was based on the respondents' answers to the questions about their ability to complete the described computer tasks. A negative score indicated less computer proficiency while a positive score indicated more proficiency. The proficiency score was constructed as a Rasch scale based on item response modeling, using a two parametric logistic model (DeMars, 2010). Construction of the scale was preceded by item analysis and dimensionality assessment. The scale had better psychometric characteristics than a scale based on simple addition of positive response categories of respondents, both in terms of distribution shape and reliability (Pokropek, 2009).

6 The latest wave was not available for this study.

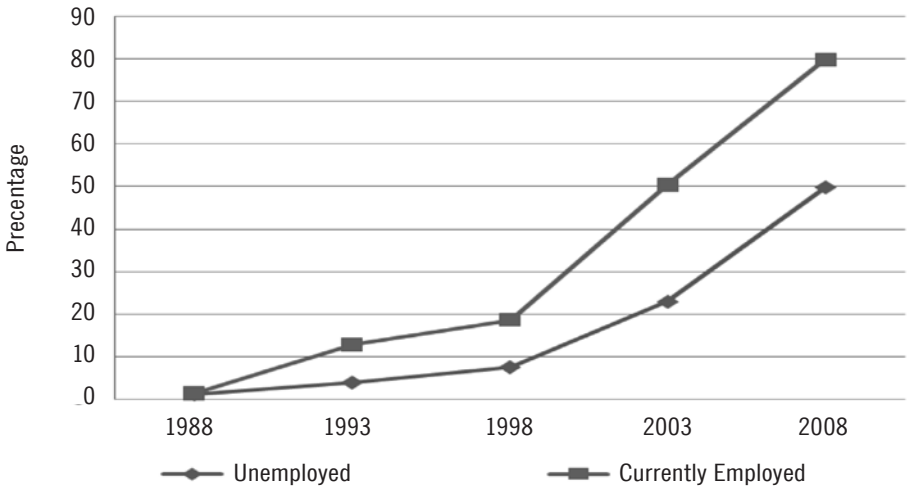
7 A macro is a short program written to make completion of tasks on a computer easier and faster by creating a single process for combining several steps.

Trends in Access and Skills

Globally and within many of the most developed countries, the digital divide still exists and has an impact on people's lives. For example, recent work by Notten et al. (2009) shows that even among the more developed countries of Europe, a country's overall level of development affects access to digital tools in the home. Within the most developed countries, where PC possession and Internet use are nearly ubiquitous, there are often sharp contrasts in access to digital devices across urban and rural regions. But in spite of these ongoing disparities in access to PCs and the Internet, the general trend is positive: disparities in access to digital tools across groups distinguished by various social and personal characteristics are decreasing.

Figure 1 shows the percentage of Poles who possessed a PC in their home across the five waves of the survey. The graph shows the trends in PC possession for employed and unemployed people separately. While there continues to be a disparity in the number of Poles who possess a PC based on employment status, the trend clearly shows that everyone in Poland is consistently more and more likely to possess a PC. In 1998, for example, the employed were more than twice as likely to possess a PC in comparison to the unemployed (18.6% compared to 7.5%), but by 2008, the employed were only about 1.6 times more likely to possess a PC (79.9% compared to 49.8%).

Figure 1. Percentage of Poles who Possess a PC in their Household, Unemployed and Currently Employed. 1988 to 2008



Source: analysis of the data from the Polish Panel Survey.

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Among those who are employed, there is a strong and consistent pattern of increased likelihood of PC possession. Table 1 shows the trend in the percentage of Poles who possess a PC over the twenty year period of the POLPAN survey, with the subjects divided into the nine occupational categories. Among all groups, the percentage of subjects who possessed a PC increased from near 0% in 1988 to a minimum of 62.5%, with most groups possessing PCs at a rate nearer to 80% or 90% by 2008. Despite the ongoing distinction between farmers, the least likely group to possess a PC at 62.5%, and legislators and managers, the most likely group to possess a PC at 96.0%, among all groups of workers in Poland, the majority of people possessed a PC in 2008.

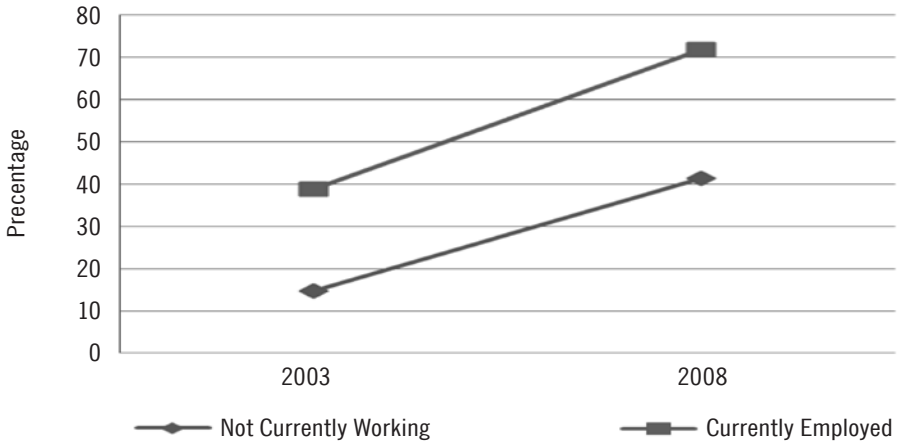
Table 1. Percentage of Poles Who Possessed a PC over the Twenty Year Time Span of the POLPAN Study, by Occupational Categories

Year	Legislators and Managers	Professionals	Technicians and Qualified Clerks	Clerks at Medium Level	Service Workers	Skilled Manual Workers	Semi-skilled Manual Workers	Farmers	Owners
1988	3.05	3.88	3.68	1.85	1.55	0.31	0.00	0.45	2.59
1993	16.78	24.52	18.12	18.23	10.00	8.74	8.43	3.30	28.66
1998	31.93	37.17	23.60	24.03	10.67	7.98	3.03	2.38	41.73
2003	72.58	75.00	66.67	63.54	49.23	40.22	40.63	26.32	57.89
2008	96.00	95.70	93.18	90.00	77.69	73.22	64.71	62.50	92.68

Source: own study based on the data from The Polish Panel Survey – see: http://polpan.org.

In 2003, POLPAN included items regarding Internet use. Figure 2 shows the percentage of subjects who used the Internet in 2003 and 2008, broken down by employment status. Again, while there is still a meaningful difference between the percentage of working and not working subjects who use the Internet, both groups experienced a sharp increase in the number of users. While the employed were approximately three times more likely to use the Internet than the unemployed in 2003, the gap had decreased by 2008 such that the employed were somewhat less than twice as likely to use the Internet. Looking at the trends for the two groups separately, working subjects were nearly twice as likely to use the Internet in 2008 relative to 2003 (38.8% rising to 71.8%). Non-working subjects were nearly three times more likely to use it over the same time interval (14.8% rising to 41.3%). In spite of these trends, the gap between the employed and the unemployed remained large.

Figure 2. Percentage of Respondents Who Used the Internet, Broken down by Employment Status. 2003 to 2008



Source: analysis of the data from the Polish Panel Survey.

Breaking down the Internet use among the working subjects (Figure 3), a consistent pattern emerged of growing Internet use over time, which increased sharply among all groups. Among those working occupational groups considered as working or lower middle class, all groups, including farmers, skilled and semi-skilled laborers and service workers, at least doubled their likelihood of using the Internet in the five years from 2003 to 2008. Among the professional, legislative, managerial, technical, clerical and owner occupational groups, Internet use increased approximately 15% to 50% percent over the five years. In spite of the dramatic growth in Internet use over the five year period, some groups, particularly farmers and semi-skilled manual laborers, were significantly less likely to use the Internet relative to professional and technical workers (Figure 3).

Access to a PC and simple use of the Internet can indicate something about a subject's position in the digital divide, but they do not say much about the user's proficiency with digital tools. Thus, to more closely understand digital proficiency, the study analyzed data on the subjects' abilities to complete certain tasks with a computer. Table 2 depicts the percentage of respondents who could complete those tasks, broken down by occupational category. The analysis revealed that while a large majority of respondents can use an Internet browser, there are still many disparities in PC proficiency across occupational groups. For example, though respondents from the profe-

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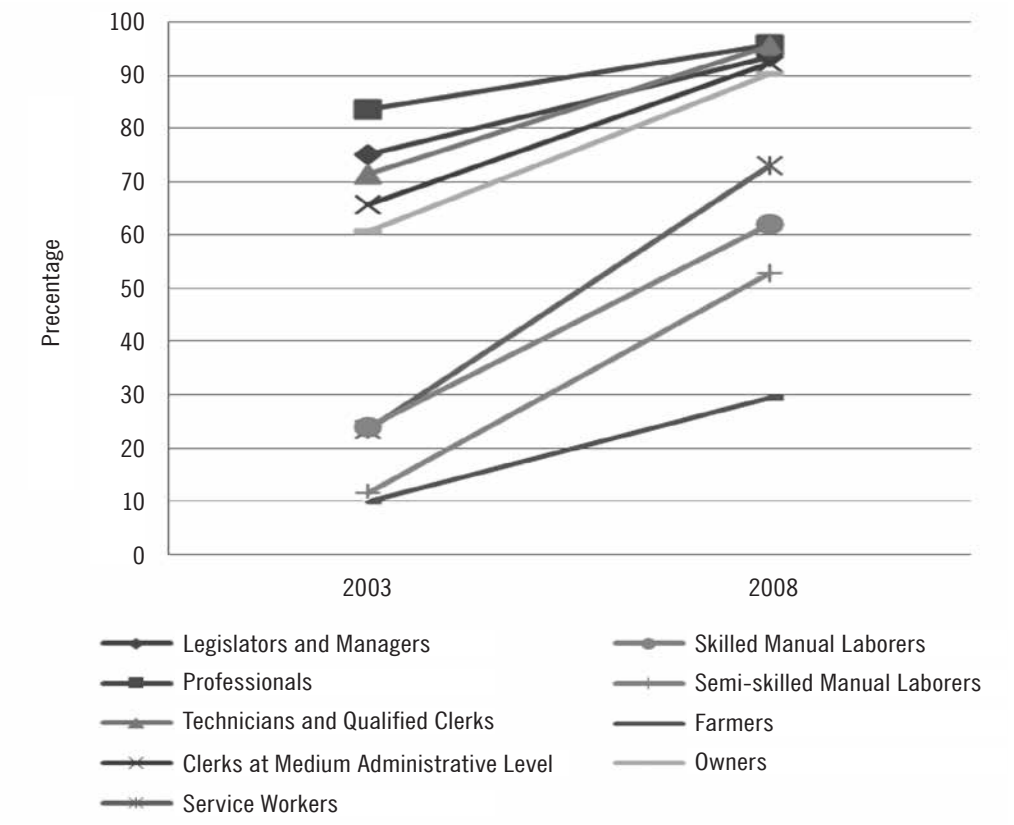
ssionally oriented occupational groups are almost entirely able to receive email, create a folder on the desktop, save data to a CD-ROM, create a document file and use several applications at once, respondents in the semi-skilled laborer and farmer groups are significantly less likely to express an ability to complete these tasks. Farmers are the group least likely to be able to do these tasks. Approximately half of farmers declared being able to receive an email, 36.4% could create a folder, and only 30.3% could use several applications at once in 2008. In spite of the growing parity observed in digital proficiency in general, based on these results, there was agreement with Hargittai (2010) that socio-economic status, as indicated herein by occupation, is still connected with PC proficiency and digital skills (Table 2).

Figure 3. Trends in Percentages of Working Adults Who Use the Internet. 2003 to 2008



Source: analysis of the data from the Polish Panel Survey.

Table 2. Percentage of Respondents who are Able to Complete Certain Tasks on the Computer (answer Yes for the questions). Average PC Proficiency Scale Score also Shown by Occupational Category. Data from 2008 wave of POLPAN (n=757)

Occupational Categories	Receive e-mail	Create folder on desktop	Save data on CD-ROM	Create a 'doc' file	Browser use	Compress graphic file	Use several applications	Write macro	Average PC Proficiency Scale Score
Legislators and managers	93.2	84.7	90.4	90.4	93.2	81.9	88.9	55.4	0.15
Professionals	100.0	93.3	97.8	97.8	98.9	81.1	88.9	63.6	0.31
Technicians and qualified clerks	95.3	88.4	95.2	97.7	95.3	81.0	95.3	63.4	0.35
Clerks at medium administrative level	95.1	90.9	91.8	92.6	95.9	77.7	87.6	46.1	0.05
Services workers	90.2	86.0	90.2	93.1	95.1	75.8	80.0	37.6	-0.03
Skilled manual workers	77.6	77.3	82.9	84.8	91.4	74.8	67.6	37.5	-0.27
Semi-skilled manual workers	81.5	71.9	78.1	74.2	92.4	66.7	56.1	30.2	-0.37
Farmers	51.5	36.4	48.5	60.6	75.8	45.5	30.3	18.2	-0.95
Owners	91.8	74.6	83.3	87.5	93.1	69.0	74.6	37.5	-0.17
Total	87.9	81.5	86.7	88.3	93.5	74.7	76.8	43.8	-0.07

Source: analysis of the data from the Polish Panel Survey.

Internet Use, PC Proficiency and Income

Although inequality was found in ownership of PCs and use of the Internet among groups of different socio-economic categories, the question remained as to whether there was a positive long-term effect on income growth among those on the positive side of the digital divide. The following set of results, presented in Table 3, show

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regression analyses that predicted respondents' income in 2008 based on several independent variables. The analysis included demographic factors and controlled for income in 2003.

The analysis was completed in four models. The first model included only socio-demographic variables that were expected to be related to income: age, education, sex, occupation and previous income. It did not include the measures of PC possession, Internet use and PC proficiency because in this way the model showed the base relationships that the socio-demographic variables had with income. The analysis showed that, controlling for all other variables, age is negatively associated with income in Poland, while sex does not have a statistically significant association. The variable "years of education" had a positive effect on income, even controlling for the type of occupational field of the respondents. In terms of occupational categories, in comparison to farmers as a reference group, legislators and managers and also business owners made statistically significantly more money, controlling for other factors.

Table 3. Regression Analysis of 2008 Income on Basic Demographic Factors, Occupational Category, 2003 Income, and Indicators of the Digital Divide. Unstandardized coefficients shown with standardized coefficients in parentheses. Dependent variable measured in Polish Zlotys

Predictors	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Sex (female=1)	-113.44	-126.96	-111.91	-130.12
	(-.03)	(-.03)	(-.03)	(-.03)
Age	-22.43**	-22.60**	-21.22**	-22.66*
	(-.12)	(-.12)	(-.11)	(-.11)
Years of Schooling	116.63**	104.22**	110.92**	129.55*
	(.17)	(.16)	(.17)	(.17)
Occupational Category[1]				
— legislators & managers	1008.58**	959.57**	945.33**	452.96
	(.16)	(.15)	(.15)	(.08)
— professionals	-113.79	-176.16	-178.51	-698.01
	(-.02)	(-.03)	(-.03)	(-.12)

– technicians & qualified clerks	-218.14	-254.79	-276.00	-782.69
	(-.02)	(-.03)	(-.03)	(-.08)
– clerks at a medium level	-151.88	-202.16	-207.53	-679.80
	(-.02)	(-.03)	(-.03)	(-.11)
– service workers	-251.96	-294.41	-268.46	-844.32
	(-.03)	(-.04)	(-.04)	(-.10)
– skilled manual workers	242.18	201.71	228.58	-449.72
	(.05)	(.04)	(.05)	(-.08)
– semi-skilled manual workers	-141.90	-149.05	-131.27	-676.98
	(-.02)	(-.02)	(-.02)	(-.07)
– owners	1412.69***	1327.41***	1368.08***	944.64
	(.19)	(.18)	(.19)	(.13)
Income in 2003	.75***	.73***	.74***	.74***
	(.46)	(.44)	(.45)	(.45)
PC Ownership in 2003		352.72*		
(1=yes)		(.09)		
Internet Use in 2003			159.19	
(1=yes)			(.04)	
PC Proficiency Scale				37.60
				(.02)
Constant	547.72	610.20	540.91	965.60
Adjusted R2	.43	.44	.43	.38
Std. Error of Estimate	1512.56	1506.88	1514.48	1760.54

*p<.05; **p<.01; ***p<.001.

[1] Occupational categories compared to farmers as a reference group.

Source: own study based on the data from The Polish Panel Survey – see: http://polpan.org.

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Model 2 in Table 3 included previous PC possession, measured in 2003, to determine if income in 2008 was correlated with prior access to a PC. The results showed a statistically significant association. Controlling for all other factors, those who had a PC in 2003 had an average monthly income of 352.72 more zlotys than those who did not have a PC, although the effect was not strong (beta=.09). Model 3 included previous use of the Internet in 2003 to assess whether later income is correlated. The results showed that Internet use in the previous wave of the study was not associated with income in 2008. Finally, Model 4 included the scaled indicator of PC proficiency based on the respondents' ability to complete the tasks described in Table 2. The regression analysis showed that the PC proficiency measure was not associated with current income. In the case of each of the models including indicators of PC and Internet use and proficiency, there were no meaningful changes in the association between current income and the demographic or control variables, in comparison to the baseline results shown in Model 1.

Conclusions

The analyses of trends in PC possession and Internet use revealed some lingering group disparities reminiscent of a digital divide. While it is still true that the unemployed and those working in less prestigious occupational categories are less likely to possess a PC or use the Internet, the magnitude of the differences between groups is decreasing. By conducting a regression analysis in which the primary predictors of income, such as age, sex, education, occupation and previous income, are controlled and measures of PC and Internet use and proficiency are included, the study analyzed whether these indicators of the digital divide had a long-term impact on income. The results showed that only PC ownership had a weak positive effect on later income. Neither Internet use nor proficiency with PCs and the Internet were revealed to have positive impacts on income after five years.

The implications of this study challenge the notion of the digital divide. The basic premise of the digital divide concept is that there will be some advantages accrued by those who acquire and gain competence with ICTs. The analysis showed that in recent years in Poland, this is generally not true in the case of income growth, except in the case of access to a PC in the home, which had a small impact on income growth. Of the three factors analyzed (access to a PC, use of the Internet and PC proficiency) it was expected that Internet access and PC proficiency would likely have stronger impacts on income growth than just simply possessing a PC. The finding that two of the three factors do not appear to be correlated with income growth is evidence of digital

parity or a growing digital equality among citizens in a modern country. Access to and basic proficiency with digital tools have likely become so common that there are minimum benefits achieved just by having them. Interestingly, the strongest predictors of income, besides previous income, were educational attainment and occupational status. Business owners, top managers and legislators had the most income growth over the five year period, even controlling for demographic factors, previous income and indicators of PC and Internet access and use.

References

DeMars, Ch. (2010). *Item Response Theory*. New York, NY: Oxford University Press, http://dx.doi.org/10.1093/acprof:oso/9780195377033.001.0001

DiMaggio, P. and Bonikowski, B. (2008). Make Money Surfing the Web? The Impact of Internet Use on the Earnings of U.S. Workers. *American Sociological Review*, *73*(2): 227–250, http://dx.doi.org/10.1177/000312240807300203

Domański H., Sawiński, Z. i Słomczyński, K.M. (2006). *Nowa klasyfikacja i skale zawodów*. Warszawa: Wydawnictwo IFiS PAN.

Fairlie, R.W. (2004). Race and the Digital Divide. *Contributions to Economic Analysis & Policy* 3: Article 15, http://www.bepress.com/ bejeap/contributions/vol3/iss 1/art 15.

Green, B.E. and Kryszczuk, M. (2006). Stability and Change in Household Computer Possession in Poland: Analysis of Structural Determinants. *Polish Sociological Review*, *2*(154): 103–115.

Gimlin D., Rule, J., and Sievers S. (2000). The Uneconomic Growth of Computing. *Sociological Forum*, *15*(3).

Hargittai, E. (2010). Digital Na(t)ives? Variations in Internet Skills and Uses Among Members of the 'Net Generation'. *Sociological Inquiry*, *80*(1): 92–113, http://dx.doi.org/10.1111/j.1475-682X.2009.00317.x

Hoffman, D.L. and Novak, T.P. (1998). *Bridging the Digital Divide: The Impact of Race on Computer Access and Internet Use*. *Science, 280*: 390–391, http://dx.doi.org/10.1126/science.280.5362.390

ITU (International Telecommunication Union) (2009). *Measuring the Information Society: The ICT Development Index*. Geneva: ITU Press.

Kryszczuk, M.D. and Green, B.E. (2009). Computerization of Polish Households in Social Structural Perspective: A Dynamic Analysis of the Informatization Process over 20 Years. *Polish Sociological Review*, *4*(168).

Kryszczuk, M.D. and Green, B.E. (2007). Computerization of Polish Households: An Analysis of Structural Determinants of the Digital Divide. In: K.M. Słomczyński and S.T. Marquart-Pyatt (eds.), *Continuity and Change in Social Life*. Warsaw: IFiS Publishers.

Notten, N., Jochen, P., Kraykaamp, G. and Valkenburg, P.M. (2009). Research Note: Digital Divide Across Borders – A Cross-National Study of Adolescents' Use of Digital Technology. *European Sociological Review*, *25*(5): 551–560, http://dx.doi.org/10.1093/esr/jcn071

Pohoski, M. and Słomczyński, K.M. (1978). *Społeczna klasyfikacja zawodów*. Warszawa: IFiS PAN.

Pokropek, A. (2009). *Skalogram Rasha dla kompetencji komputerowych skala na podstawie zmiennych z badań empirycznych*. Unpublished report prepared for POLPAN study.

 DOI: 10.7206/mba.ce.2084-3356.147

Qualman, E. (2009). *Socialnomics. How social media transforms the way we live and do business*. Hoboken, NJ: John Wiley & Sons.

Volti, R. (2006). *Society and Technological Change*. Fifth Edition. Worth Publishers. New York, NY.

Wellman B. and Lee, R. (2012). *Networked. The New Social Operating System*. Cambridge: MIT Press.