

Journal of Sociology

<http://jos.sagepub.com>

Beyond the 'digital divide': Internet diffusion and inequality in Australia

Suzanne Willis and Bruce Tranter

Journal of Sociology 2006; 42; 43

DOI: 10.1177/1440783306061352

The online version of this article can be found at:
<http://jos.sagepub.com/cgi/content/abstract/42/1/43>

Published by:



<http://www.sagepublications.com>

On behalf of:



The Australian Sociological Association

Additional services and information for *Journal of Sociology* can be found at:

Email Alerts: <http://jos.sagepub.com/cgi/alerts>

Subscriptions: <http://jos.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.co.uk/journalsPermissions.nav>

Citations <http://jos.sagepub.com/cgi/content/refs/42/1/43>

Beyond the 'digital divide'



Internet diffusion and inequality in Australia

Suzanne Willis and Bruce Tranter

School of Sociology and Social Work, University of Tasmania

Abstract

The increasing potential of the Internet to widen access to information and enhance communication capacity has brought opposing arguments about the social consequences of Internet use. Advocates of the 'digital divide' thesis argue that the Internet advantages privileged groups while further marginalizing disadvantaged social categories. Critics of the thesis see the expansion of the Internet as enabling and egalitarian, promoting social inclusion and facilitating democratic participation. In order to assess which view is more plausible, we examine the social barriers to Internet use in Australia over a five-year period, using multivariate analyses of national survey data. The notion of a 'digital divide' is too simplistic to capture the complexity of social barriers to Internet use. Although the Internet has become more accessible to all social categories, and further technological diffusion should widen this accessibility, household income, age, education and occupational class location remain as key dimensions of differential Internet use.

Keywords: digital divide, Internet, social class, social inequality

As the Internet becomes increasingly important in the workplace and in the home, and as the range of services provided through the Internet expands, the debate intensifies over the impact of information and communication technologies (ICTs) on patterned social inequalities. Early predictions concerning access to ICTs, and the Internet in particular, were largely optimistic. The non-hierarchical nature of the Internet, together with the declining cost of computing technologies and increasing user-friendliness, were all seen as socially levelling and as undermining existing patterns of class, race and gender inequalities (Tambini, 2000). Here, the Internet was

Journal of Sociology © 2006 The Australian Sociological Association, Volume 42(1): 43–59
DOI:10.1177/1440783306061352 www.sagepublications.com

seen as an increasingly accessible tool for networking and accessing services that would democratize both consumption and civic participation. These forecasts paralleled the optimistic predictions of authors such as Bell (1973), who saw new information technologies as paving the way for a more meritocratic and open society, stratified along dimensions of knowledge and scientific/technological skills, rather than gender, race and class. More recently, in light of the development of the Internet, such expectations were reinforced by optimistic commentators such as Castells (2001), who argued that the formation of 'networked societies' would lead to a proliferation of horizontally organized 'communities of choice', rather than hierarchical relations of class and status. In such accounts, ICTs were seen as promoting equalization and democratization (Norris, 2001).

These optimistic interpretations were criticized for ignoring social relations that influence the social distribution and impact of the new ICTs. In spite of the widening opportunities for networking, critics argued, the use of such technologies was typically restricted to those at the top of existing social hierarchies (Dawson and Foster, 1998; Wolf, 1998). Due to increasing commercial application, the new digital technologies function as commodities, and their distribution – at least initially – tends to follow existing divisions of class, race and gender. Therefore, rather than assisting with equalization, the new information and communication technologies tend to reinforce social inequality, and lead to the formation of socially and technologically disadvantaged and excluded individuals (Golding, 1996; Zappala, 2000).

Which account of the relationship of the Internet and social inequality is more plausible? Australian (and international) analyses support an egalitarian scenario, but with some important qualifications. They illustrate the initially uneven spread of the Internet, with an apparent socio-demographic divide between those who use the Internet and those who don't. However, technology–society relations are complex and the empirical results projected from the early studies are often confusing, failing to consider changing patterns of social stratification as a whole.

In an attempt to overcome this confusion, we situate our research within the broader theoretical framework of social inequality and technology studies; we assess inequalities in Internet use through analysis of survey data over the period 1998 to 2003; and we explore persisting barriers to Internet diffusion in Australia using regression analysis. In the concluding section we discuss the implication of these findings on key processes of social inequality. A central question we address is whether the remaining barriers to Internet use in Australia result in reinforcement of social inequalities along old dimensions such as class and gender, or whether these inequalities are becoming less stark and detached from traditional divisions.

Technological diffusion and the Internet

The spread of new technologies involves the gradual absorption of technological artefacts in the social practices of diverse social groups; a process captured by the theory of technological diffusion. Diffusion theory shows that new technologies spread or diffuse unevenly: initial access is typically among those with higher status, economic resources and educational capital (Rogers, 1995). Possession of high income, and occupational and educational resources gives access to additional information, which may further exacerbate existing social disparities and strengthen advantage. In this way the technology spreads amongst those already high in resources – the process of *homophily*.

Commodification and market competition, however, together with technological developments and government policies that promote the wide diffusion of a technology, mean that access eventually spreads to those who are disadvantaged – the process of *heterophily* (often referred to as the 'trickle-down' effect, or normalization). Following this secondary diffusion to the less advantaged, social differences in access decline as the new technologies become mass media. Studies of technological diffusion, for instance, show that the spread of the television in advanced countries has largely followed this pattern – an initial uneven distribution, followed by gradual uptake over the past 60 years until near-universal levels of ownership have seen the removal of barriers to TV access for those less advantaged (Norris, 2001).

The spread of Internet access seems to follow a similar pattern. The number of Internet users worldwide has risen dramatically, far more rapidly than the spread of television, with Australia placed in the top handful of countries in terms of Internet use.¹ Within Australia, *household* access has increased from 16 percent in 1998 to 53 percent in 2003, suggesting that, as the number of users rises, the socio-demographics of Internet users will normalize to reflect those of the population generally (Caslon, 2005).² Indeed, many studies now show a broadening of the socio-demographic profiles of connected households within Australia (Lloyd and Hellwig, 2000; Curtin, 2001–2). However, disparities in Internet use between some social groups have endured along socio-demographic dimensions. These dimensions include education (Lloyd and Hellwig, 2000), income (McLaren and Zappala, 2002), age, region (Curtin, 2001–2), disability (HREOC, 2001) and indigenous people (ABS, 2002 and 2003).

This uneven spread of the Internet has contributed to the popularity of the concept of the 'digital divide'. It highlights the emerging social gap between those individuals who use the Internet and those who do not. Mainstream political and popular discussions of the 'digital divide' implicitly assume a dichotomous gap based on socio-demographic dimensions, derived from the early data on the pattern of social diffusion.

Understanding digital inequalities in this manner, however, needs to be enhanced in two ways. First diffusion should be looked at within a broader time frame. Second, it needs to be considered in the context of an increasingly complex pattern of social stratification.

The 'digital divide' in Australia and overseas

Recent research confirms that Internet use in Australia is widening, but is still not equitably distributed. It appears that gender inequalities have largely disappeared and age inequalities are narrowing. While inequalities in Internet use according to income and education persist, the studies show they are also likely to decrease in importance, while household composition and geographic location seem to have become more important. We consider each of these disparities in turn.

While gender differences in Internet use were widely recognized as substantial in the early Internet studies, and the ABS (2002 and 2003) reported a seven percentage point difference as recently as 2000, other studies report only a small gender gap in Internet use (Lloyd and Hellwig, 2000: 7). Most studies agree this gap is closing.

At the same time as the initially wide gender gaps have largely diminished, the disparities in the age distribution of Internet users persist but are also becoming smaller. Here, Internet use is increasing among the middle aged and more elderly, although their level of use is still well below that of young Australians (Lloyd and Hellwig, 2000: 7).

Differences in Internet use according to income persist and, at least in the short term, may continue to grow. Internet use increases strongly with level of household income in Australia (ABS, 2002 and 2003). The gap in Internet use between the highest and lowest income brackets increased from 39 percentage points in 1990 to 59 percentage points in 2000 (ABS, 2001). However, as Lloyd and Hellwig (2000) and Curtin (2001–2) point out, this distribution is likely to level out as the high-income categories become saturated with Internet use, and the rate of use by those on lower incomes continues to grow. Higher educational qualifications also continue to have a strong influence on Internet use. However, the higher uptake rates for those with low levels of education may eventually result in a levelling out of these educational inequalities in Internet use (Lloyd and Hellwig, 2000).

Household composition persists as an important determinant of Internet use in Australia, with households with children, children over 10 (Lloyd and Hellwig, 2000: 12), or under 15 years (ABS, 2002 and 2003) more likely to have higher household Internet use. This gap is actually increasing over time (ABS, 2002 and 2003). Regional disparities in Internet use also persist between metropolitan and rural areas, with this divide enduring over the past few years (ABS, 2002 and 2003). The urban/rural divide is an important dimension as there is a strong regional telecommunications focus

in Australia around access and service levels, especially with the impending full privatization of Telstra.

Finally, the home has become the most common place of Internet access (ABS, 2002 and 2003), although those living in lower income households (AU \$40,000 p.a.) are more likely to use the Internet at home, with higher earners more likely to use the Internet at work. The 18–24-year-old category are more likely to use the Internet at places other than in the home or at work, given that there is a high level of students in this category.

One of the few Australian studies to use a multivariate approach to assess Internet use found education to be the most important influence, followed by income (Lloyd and Hellwig, 2000), while age and occupation were found to be secondary factors. Regional and state differences were apparent, although these factors in themselves did not explain variations in Internet use. Lloyd and Hellwig (2000) attributed place-based differences to socio-demographic factors such as higher educational achievement rates among those living in metropolitan areas, but found no indication that dependent children had a major impact on Internet access.

In the above respects, the Australian situation does not appear to be unusual. Global inequalities in Internet use remain substantial, with international evidence supporting the continuing relevance of socio-demographic dimensions for influencing Internet use (Haythornthwaite and Wellman, 2002). However, the nature of disparities between users varies between countries (Chen and Wellman, 2004). While gaps based on gender, age and region are narrowing in the US, divides based on age, education and rural/urban residence persist, with income the most important factor for predicting use. The picture in the UK is similar, while in Germany educational difference is the principal dividing factor. In fact, in contrast to the Australian case, the gender gap in Internet use in Germany is both sizeable and growing.

Beyond diffusion theory

As these studies highlight, the spread of the Internet appears to be more complex than the diffusion of other information and communication technologies. The diffusion of a physical device (like the one-off purchase required for television or radio access) differs from the up-take of a technology like the Internet, which requires considerable updating and substantial infrastructure, even after the initial acquisition. In addition, the rapidly changing form of the Internet, together with its multiple uses, stresses the need for technological skills, literacy and confidence.

More broadly, the process of Internet diffusion cannot be depicted as a simple linear trickle-down, from the elites to the masses, and it cannot be explained by deterministic assumptions that social change results from technological innovation (Livingstone, 2002: 34). Such a linear diffusion

theory fails to place the spread of a technology with reference to a set of changing social conditions (MacKenzie and Wajcman, 1999). Instead, technologies are best seen as socially constituted and constituting. The combination of three technologies that forms the Internet (computers, telecommunications and content) results in a complex pattern of social diffusion. This is because the very combination widens the social application and opens the way for new commercial utilizations, such as e-Bay auctioning and financial transactions.

Social change and information technologies

This acceleration in diffusion and widening social reach is linked to the dynamics of social change. Social change in advanced societies is typically described in terms of accelerated commodification, rationalization, differentiation and dense networking and interdependence, all seen as aspects of globalization (Crook et al., 1992; Waters, 1999). These processes suggest an increasing pace of technological absorption, intensifying consumption of communication services and increasingly complex social interaction, especially across social and regional boundaries. The social matrix of technological diffusion – the social structure – becomes more permeable and more absorptive of new technologies, especially those that are highly commodified like the Internet. This has important implications for patterns of social inequality, especially those related to class hierarchies, in the patterns of relations between members of social groups.

Diffusion of technology throughout the social structure is very much dependent on existing structured social inequalities. Patterns of social stratification in advanced societies have been changing with advanced modernization and globalization (Waters, 1999). The key dimensions of these changes in most advanced societies involve, among other aspects: increasing affluence and accelerating consumption among middle and some lower strata; diversification of status hierarchies along the lines of social and cultural capital; de-traditionalization undermining 'old' status divisions (especially gender and race); and intensified social mobility especially based on merit and human/cultural capital (Bourdieu, 1984; Grusky, 2001; Pakulski, 2005). The old patterns of class, race and gender inequalities are gradually morphing into new patterns of complex social hierarchies that are more status/lifestyle dependent, more diverse and fluid than the old patterns. In particular, the increasing importance of human and cultural capital as determinants of life-chances means that the lack of knowledge and skills becomes a potential barrier to technological diffusion. At the same time, the differentiation of lifestyles, intensifying consumption, and the fracturing of class and status divisions results in the formation of multiple and overlapping social hierarchies.

An increasingly complex stratification system would be reflected in an equally complex pattern of Internet diffusion, incompatible with the 'reinforcement' pattern underlying the concept of the 'digital divide'. We investigate these two scenarios, the 'reinforcement' ('digital divide') model and the complex inequalities model, with a series of multivariate analyses of Australian survey data on Internet use covering the five-year period 1998–2003.

The data

We analysed national samples of adults (aged 18 and over) from the 2001 Australian Election Study (AES) survey (Bean et al., 2002),³ and the 2003 Australian Survey of Social Attitudes (AuSSA; Gibson et al., 2004).⁴ From these surveys we constructed three dependent variables that enabled a comparison of Internet use over time. We considered early Internet usage before 1999 compared with non-usage; Internet usage in 2001 compared with non-use; and use in 2003 compared with non-use. We also compared place of Internet access to consider its impact on diffusion. To assess the most important socio-demographic predictors of Internet usage we constructed a series of binary logistic regression models (Long, 1997). Using logistic regression we were able to estimate the individual effects of particular influences on the dependent variable by holding other factors constant.

Independent variables used in the regression models follow the key dimensions of the possible 'digital divide'. They include sex, age, education, household income, location (large city versus other) and occupational class. Occupational class models were based upon Brint's (1984) 'new class' schema, comprising three sub-groups of professionals: social and cultural professionals, human services professionals, and technical professionals.⁵ Managers and remaining white-collar workers (clerical and sales) are allocated separate categories. In conjunction with the education measure, our model operationalizes the most popular dimensions of the 'digital divide'.

This model enables us to examine the dynamics of Internet diffusion. We were able to consider whether the early pattern of use has persisted over time with entrenched inequalities, or if inequality in Internet use is transient, typical of the early stages of technological diffusion.

Internet diffusion and social inequality in Australia

Almost 70 percent of Australians currently use the Internet (Table 1). Although usage has increased steadily over time, there was a greater uptake between 1998 and 2001 than between 2001 and 2003. Men were slightly more likely to have been early Internet users; based upon these survey data, however, there have never been substantial gender differences in Internet use in Australia.

Table 1: Internet usage in Australia (percent)

<i>Total Internet users</i>	<i>%</i>	<i>Men</i>	<i>Women</i>	<i>p</i>	<i>n</i>
Users 1998 or earlier	21	24	19	.028	(361)
Users 2001	57	58	56	.172	(1076)
Users 2003	69	69	69	.427	(2787)

Note: For 'Users 1998 or earlier' we use respondents to the 2001 AES who began to use the Internet three years ago or more. For 'Users 2001' we take respondents to the question 'In general, how often do you use the Internet?' Responses: (1) several times a day; (2) about once a day; (3) three to five days a week; (4) one to two days a week; (5) every few weeks; (6) less often; (7) do not use the Internet. Responses 1–6 were classified as users of the Internet. For 'Users 2003' we take respondents who access the Internet at home, work or in an 'other' place, derived from the question: 'Please tell us if you use the Internet at any of the following?' (response categories: home, work, other [university, internet cafe, public library]; no access to the internet). The '*p* value' is the probability of making an error if we accept that these results hold in the population of Australian adults, based upon the sample data.

Sources: Australian Election Study 2001 (Bean et al., 2002) and Australian Survey of Social Attitudes 2003 (Gibson et al., 2004).

Comparing the magnitude of the odds ratios and the R^2 statistics in the three columns of Table 2, it is apparent that the influence of social background on Internet use has declined over time.⁶ The strong early effects of gender and region of residence associated with early Internet use have decreased, with the estimates for these variables no longer statistically significant in 2003. Several other social background variables, such as age, have tended to become weaker predictors of Internet use, perhaps evidence of some 'catching up' by disadvantaged groups and of more egalitarian Internet use in general.

Disparity in Internet use persists, however, such as the durable occupational class effects. In particular, professionals and managers are much more likely than the working class to be Internet users, with white-collar employment in general increasing the likelihood of use compared to blue-collar workers. More specifically, while the overall strength of location in a professional occupation seems to have decreased over time, robust effects remain, particularly among technical professionals. The general levelling out of class inequalities is likely to be due to the uptake of new ICTs in work places across the board (ABS, 2005).

However, despite some closing in the gaps between users and non-users, entrenched inequalities remain (Table 2). Although age effects have weakened somewhat over time, they continue as very important dimensions of Internet inequality in 2003. While the odds ratio for those in the 30–49 age group is showing slight increases, consistent with slow increases in use by the middle aged, those in the under-30s age group are still over five times as likely to use the Internet than those aged over 50.

The stark educational effects associated with Internet use before 1999 had softened by 2001, with the 2003 estimates actually showing a slight

Table 2: Internet usage and social background (odds ratios)

	<i>Early versus non-users < = 1998</i>	<i>Current users versus non-users 2001</i>	<i>Current users versus non-users 2003</i>
<i>Men</i>	1.9*	1.6*	1.1
Aged 18–29	9.0**	6.3**	5.2**
Aged 30–49	2.6**	3.4**	3.5**
Aged 50+ (reference)	1	1	1
Dege	6.7**	2.7**	3.6**
<i>Occupational class</i>			
Social and cultural prof.	13.9**	7.6**	2.6*
Human services prof.	4.3**	5.0**	2.9**
Technical prof.	17.9**	9.2**	5.8**
Managers	3.8**	3.7**	3.2**
Other white collar	3.3**	3.2**	2.7**
Working class (reference)	1	1	1
<i>Income</i>			
< \$70K/78K (reference)	1	1	1
\$70K/78K+	5.1**	3.7**	4.5**
Live in large city	2.7**	1.7**	1.2
Cox and Snell R ²	.59	.39	.33
<i>n</i>	(839)	(1435)	(3590)

* $p < .01$ ** $p < .001$

Note: Dichotomous dependent variables as per Table 1.

Sources: Australian Election Study 2001 (Bean et al., 2002); Australian Survey of Social Attitudes 2003 (Gibson et al., 2004).

increase in the magnitude of the odds ratio for this variable. Those with a university degree are over three-and-a-half times as likely as the non-tertiary educated to use the Internet in 2003. The household income odds ratio is also large, and has also increased between 2001 and 2003, indicating that financial circumstances are an increasingly important predictor of Internet use. Those who live in households with an income over \$78,000 in 2003 are more than four times as likely to be Internet users as those earning less.

Overall then, Internet usage increases with higher education levels, professional and white-collar occupational class and higher income dimensions, and tends to decrease with age. These results indicate that while some social barriers to access, like gender and region, are gradually breaking down, access to the Internet is still strongly influenced by social

background, particularly the dimensions of occupational class, income, age and education.

As we pointed out above, gender is not directly related to Internet access. It does have an impact on access, but its influence is more subtle, tending to cross-cut other social divisions, as gender interacts with occupation, income, age and educational dimensions (Table 3). Income, age, education and class are consistent predictors of Internet use, although these socio-demographic dimensions are mediated by gender. Occupational class is perhaps the strongest indicator of women's Internet use, with the largest odds ratios for technical, and social and cultural professionals. Income, age and education effects have all changed from being more important for men in 2001, to being slightly more important predictors of Internet usage for

Table 3: Internet usage and social background by gender (odds ratios)

	2001			2003		
	<i>All</i>	<i>Men</i>	<i>Women</i>	<i>All</i>	<i>Men</i>	<i>Women</i>
<i>Men</i>	1.6*	–	–	1.1	–	–
Aged 18–29	6.3**	7.9**	5.4**	5.2**	4.8**	5.3**
Aged 30–49	3.4**	3.9**	2.9**	3.5**	3.2**	3.8**
Aged 50+ (reference)	1	1	1	1	1	1
Degree	2.7**	4.7**	2.0	3.6**	3.3**	4.0**
<i>Occupational class</i>						
Social and cultural prof.	7.6**	5.9	9.6**	2.6*	2.0	5.6*
Human services prof.	5.0**	1.9	8.2**	2.9**	2.2*	3.5**
Technical prof.	9.2**	7.2**	19.2**	5.8**	5.6**	6.1**
Managers	3.7**	3.7**	4.1*	3.2**	2.5**	5.7**
Other white collar	3.2**	2.8**	4.1**	2.7**	2.6**	3.1**
Working class (reference)	1	1	1	1	1	1
<i>Income</i>						
< \$70K/< \$78K (ref.)	1	1	1	1	1	1
\$70K+ / \$78K+	3.7**	4.2**	3.2**	4.5**	4.3**	4.9**
Live in large city	1.7**	1.7*	1.8*	1.2	1.3	1.1
Cox and Snell R^2	.39	.44	.35	.33	.32	.35
<i>n</i>	(1435)	(711)	(724)	(3590)	(1733)	(1457)

* $p < .01$ ** $p < .001$

Note: Dependent variable: users versus non-users 1 = use Internet, 0 = do not use Internet as per description in Table 1.

Source: Australian Election Study 2001 (Bean et al., 2002); Australian Survey of Social Attitudes 2003 (Gibson et al., 2004).

women in 2003. The R^2 results also reflect the fact that social background effects were stronger predictors of Internet use among men than women in 2001, while in 2003 the situation is reversed.

The place where people access the Internet also influences Internet diffusion. The Internet is used mostly in the home (58.6 percent) followed by the workplace (36.3 percent). Very few people – only about 11 percent of Australian adults – access the Internet in cafes, libraries and other public places (Table 4).⁷ There are no statistically significant gender differences in home Internet access, although men are slightly more likely than women to access the Internet at work, and at both work and home.⁸

Those aged between 18 and 29 are most likely to use the Internet at both home and work, although being aged under 50 is a strong predictor of usage in any location (Table 5). Those with a university degree are more likely to use the Internet in general terms, but were six times as likely to use it at home and work compared to those without a degree. Higher-income earners are also about five times as likely as those on lower incomes to use the Internet at home; over eight times more likely at work only; and nine times as likely to use it at both work and home. The R^2 statistics show that social background 'explains' a much larger proportion of the variation in use at both home and work, and at work only than it does at home only, again confirming the stronger social background effects associated with work access. While type of work plays a major role here, our findings in relation to work access are not indicative of democratization.

Conclusion

The Australian data on Internet usage provides a more nuanced understanding of digital inequality than either of the early scenarios of 'equalizing access through diffusion' or popular conceptualizations of the 'digital divide'. While initial Internet use strongly followed traditional social

Table 4: Type of Internet usage in Australia 2003 (percent)

	%	Men	Women	<i>p</i>	<i>n</i>
<i>Total Internet users 2003</i>	69	69	69	.427	(2787)
Internet at home	59	60	58	.106	(2378)
Internet at work	36	38	35	.022	(1473)
Internet at 'other' location	11	11	11	.251	(443)
Internet at both work and home	46	48	44	.017	(1178)

Note: The 'other' category includes universities, Internet cafes and public libraries.

Source: Australian Election Study 2001 (Bean et al., 2002) and Australian Survey of Social Attitudes 2003 (Gibson et al., 2004).

Table 5: Type of Internet usage and social background (odds ratios)

	'Other'	Home	Work	Home + Work
<i>Men</i>	0.9	1.2	1.4	1.5*
Aged 18–29	19.0**	4.9**	7.7**	8.2**
Aged 30–49	3.8**	3.3**	6.1**	6.0**
Aged 50+ (reference)	1	1	1	1
Degree	6.8**	3.6**	5.4**	5.9**
<i>Occupational class</i>				
Social and cultural prof.	2.8	2.6*	5.1**	5.1**
Human services prof.	2.0	2.8**	6.5**	6.9**
Technical prof.	4.9**	5.7**	14.8**	15.9**
Managers	3.1**	3.0**	8.9**	9.0**
Other white collar	2.8**	2.6**	6.4**	6.8**
Working class (reference)	1	1	1	1
<i>Income</i>				
< \$78K (reference)	2.2**	4.6**	8.6**	9.1**
\$78K+	1	1	1	1
<i>Live in large city</i>				
Cox and Snell R^2	1.4	1.2	1.3	1.2
	.32	.24	.43	.45
<i>n</i>	(1407)	(3213)	(2419)	(2138)

* $p < .01$ ** $p < .001$

Note: Dichotomous dependent variables derived from the question: 'Please tell us if you use the Internet at any of the following?' (response categories: home, work, other [university, internet cafe, public library]; no access to the Internet).

Source: Australian Survey of Social Attitudes 2003 (Gibson et al., 2004).

divisions, subsequent diffusion has moderated those divisions based on occupational class, region and gender. In countries such as Australia, where Internet use is relatively unrestricted, use of the Internet appears to have widened 'across the board' over time. This egalitarian diffusion is intimately linked with the widening commercial application, declining cost of communication and computer equipment, and increasing user-friendliness of the new information and communication technologies. However, some barriers to use (particularly income, age and education) remain, signalling the persistence, and perhaps the entrenchment of these social barriers to Internet use. We emphasize however, that although these barriers may endure over time, they do not resemble the 'digital divide' as it is often conceptualized.

As the proportion of Internet users has increased over time, social differences between users have narrowed; the Internet has become more of a mass medium. In support of other Australian studies, our findings show

that direct gender differences do not persist, and that geographical location is not a primary cause of Internet inequality in Australia, although there is ongoing debate about the disadvantage of high-cost and poor-quality services for those outside of metropolitan areas (Lloyd and Hellwig, 2000; Curtin, 2001–2).

Internet use is particularly important for some occupational categories, such as professionals and managers, confirming the Internet as 'an indispensable professional tool' in a 'knowledge economy' (Castells, 2001: 253). However, the picture is complicated by the fact that occupational class location is a more important predictor of Internet use than gender, although there is significant cross-cutting of these two dimensions. As with other forms of social inequality, gender interacts with occupational class location (Baxter and Western, 2001), with women facing considerably stronger barriers to Internet use than men in all occupational class locations. Further, while the service sector facilitates access to the Internet, only some service industries and occupations require the specialized knowledge and Internet skills that enhance career opportunities (Walby, 2000).

Although the Internet is embedded in existing social relations, the pattern of diffusion highlights some new aspects of inequalities associated with age and knowledge. In advanced industrial societies, certain types of knowledge are no longer gained through an accumulative process associated with ageing. Instead, knowledge of new technologies, such as the Internet, is strongly associated with youth. Young people are not only more likely to access the Internet, they use it for different purposes than their elders, from email contact with friends, to social movement networking and political campaigning. These activities are already changing personal interaction patterns, while the increasingly fast and efficient circulation of information provides the potential for broader social and political change through the rapid organization and mobilization of large numbers of people.

Resistance to change by older age groups, together with the difficulties in learning new skills, have also been suggested as barriers to Internet use by the elderly. Although younger people have been exposed to the Internet in education, the workplace and socially through email use, the number of elderly Internet users is now also steadily increasing, although elderly people are more likely to use the Internet if they are still in employment (Castells, 2001).

The relevance of the Internet outside work has also been one of the main reasons for its commercial successes. Home use of the Internet for social communication, commercial transactions, education and home entertainment has increased rapidly, with more than half of all Australian adults now claiming home usage. Home use is likely to continue to increase as workplace use stimulates home use, while children who use the Internet at school or with friends may push for home access (ABS, 2002 and 2003).

Technological diffusion results in some equalizing of Internet use (some would view this as evidence of 'democratization'), yet the persistence of social barriers to Internet use suggests entrenchment. We are in accordance with other Australian researchers who argue the simplistic notion of a digital divide is no longer useful. Although inequalities persist along some traditional (industrial) aspects of inequality such as income, changing patterns of social stratification are reflected in the diminished gender disparity and the declining impact of occupational class on the rate of absorption. Internet use in Australia is structured by complex inequalities, as income, age, education, occupational class and indeed gender cross-cut one another.

Notes

The authors would like to thank Jan Pakulski as well as the editors and referees of this journal for their comments and suggestions.

- 1 The NOIE (2002) survey placed Australia as the third highest in the world behind Sweden and the US, while the OECD Science, Technology and Industry Scoreboard (2003 cited in ABS, 2005) showed Australia was ranked seventh, behind Denmark, Sweden, the US, the UK, Japan and Canada.
- 2 Although the overall numbers are still increasing, the rate of change is slowing (*Year Book Australia* ABS cat. no. 8146.0 2002 and 2003).
- 3 The 2001 Australian Election Study survey was conducted via mail-out/mail-back administration undertaken between 12 November 2001 (the initial mail-out date) and 5 April 2002 – the cut-off date for returns. The final sample of 2010 cases was drawn from the 2001 Australian electoral roll by the Australian Electoral Commission (Bean et al., 2002).
- 4 The Australian Survey of Social Attitudes (Gibson et al., 2004) was administered as a mail-out/mail-back survey with data collected between 3 August and 24 December 2003. Persons were sampled from the 2002 Australian electoral roll using a stratified systematic sample for a final sample size of 4270. The AES and AuSSA were obtained from the Australian Social Science Data Archives in the Research School of Social Sciences at Australian National University.
- 5 The occupational groups are derived from the Australian Standard Classification of Occupations (ASCO) groups.

The 'Social and Cultural Professionals' category includes the following occupations: doctors and lawyers, university and CAE teachers, artists, photographers, designers and illustrators (i.e. all artists and related professionals), education researchers, other social scientists, architects, ministers of religion, marketing and advertising, urban and regional planners, journalists, film and TV actors and dancers.

'Human Services Professionals' are health diagnosis and treatment (excluding medical practitioners), teachers, social workers, librarians, counsellors, nurses, psychologists, dentists, pharmacists, optometrists, physios, vets, dieticians.

The 'Technical Professionals' category consists of natural scientists, engineers, surveyors, computing professionals, miscellaneous professionals (excluding librarians), mathematicians, statisticians and actuaries, business and organization analysts, property professionals, other business and information professionals, other professionals – economists, accountants, public relations officers,

personnel specialists, other business professionals, technical officers (medical and science, engineering air and sea transport).

'Managers' is a broad ASCO classification that includes all senior and junior managers, farmers, farm managers and managing supervisors. The residual 'Middle Class' category consists of police, miscellaneous para-professionals, clerks and sales persons and the 'Working Class' group includes trades people, unskilled and semi-skilled workers.

- 6 We present odds ratios to facilitate the interpretation of the logistic regression results. Using dummy variables in our models, the odds ratios are comparable to their respective reference categories. An example may serve to illustrate this. In Table 2, column 1, men have an odds ratio of 1.9. This can be interpreted as men being 1.9 times as likely as women to be early users of the Internet, as opposed to being non-users of the Internet. An example of an odds ratio less than 1 is apparent in Table 5, column 1, for men. In this example, men are approximately 1.1 times *less likely* (1 divided by 0.9 = 1.11) than women to use the Internet in 'Other' locations, as opposed to not using the Internet. Asterisks denote statistical significance in the regression tables.
- 7 We exclude missing cases when calculating these percentages.
- 8 In order to differentiate between different types of users, we compare those who access the Internet at home against non-users, those who access from work against non-users, 'other' sources against non-users, and finally we consider people who access the Internet at both home and at work against non-users.

References

- ABS (Australian Bureau of Statistics) (2001) *Household Use of Information Technology*, cat. no. 8146.0. Canberra: Australian Bureau of Statistics. URL (consulted November 2005): <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/18F57C84FDE10995CA2568880027891E>
- ABS (Australian Bureau of Statistics) (2002 and 2003) *Household Use of Information Technology*, cat. no. 8146.0. Canberra: Australian Bureau of Statistics. URL (consulted November 2004): <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/F3399E7CCF1392CDCA256F16007C4778>
- ABS (Australian Bureau of Statistics) (2005) 'Business Use of Information Technology', *Year Book Australia*. URL (consulted November 2005): <http://www.abs.gov.au/ausstats/abs@.nsf/94713ad445ff1425ca25682000192af2168bd1499d3221ce3ca256f720083304b!OpenDocument>
- Baxter, Janeen and Mark Western (eds) (2001) *Reconfigurations of Class and Gender*. Stanford, CA: Stanford University Press.
- Bean, Clive, David Gow and Ian McAllister (2002) *Australian Election Study 2001, User's Guide for the Machine-readable Data File*, SSDA no. 1048. Canberra: Social Science Data Archive.
- Bell, Daniel (1973) *The Coming of Postindustrial Society: A Venture in Social Forecasting*. New York: Basic Books.
- Bourdieu, Pierre (1984) *Distinction: A Social Critique of the Judgment of Taste*. Cambridge, MA: Harvard University Press.
- Brint, Steven G. (1984) ' "New-Class" and Cumulative Trend Explanations of the Liberal Political Attitudes of Professionals', *American Journal of Sociology* 90(1): 30–71.
- Caslon (2005) Analytics Profile 'The Digital Divides in Australia'. URL (consulted 26 August 2005): <http://www.caslon.com.au/dividesprofile3.htm>

- Castells, Manuel (2001) *The Internet Galaxy: Reflections on the Internet, Business and Society*. Oxford: Oxford University Press.
- Chen, Wenhong and Barry Wellman (2004) 'Charting Digital Divides: Comparing Socioeconomic, Gender, Life Stage and Rural–Urban Access and Use in Eight Countries', in William Dutton, Brian Kahin, Ramon O'Callaghan and Andrew Wyckoff (eds) *Transforming Enterprise*. Cambridge MA: MIT Press.
- Crook, Stephen, Jan Pakulski and Malcolm Waters (1992) *Postmodernization: Changes in Advanced Society*. London: Sage.
- Curtin, Jennifer (2001–2) 'A Digital Divide in Rural and Regional Australia?', *Current Issues Brief* 1. URL (consulted November 2005): <http://www.aph.gov.au/library/pubs/cib/2001-02/02cib01.htm>
- Dawson, Michael and John Bellamy Foster (1998) 'Virtual Capitalism', pp. 51–68 in Robert W. McChesney, Ellen Meiskins Wood and John Bellamy Foster (eds) *Capitalism and the Information Age: The Political Economy of the Global Communications Revolution*. New York: Monthly Review Press.
- Gibson, Rachel, Shaun Wilson, David Denmark, Gabriel Meagher and Mark Western (2004) *D1070: The Australian Survey of Social Attitudes, 2003*. Canberra: Australian National University.
- Golding, Peter (1996) 'World-wide Wedge: Division and Contradiction in the Global Information Infrastructure', *Monthly Review* 48(3): 70–86.
- Grusky, David B. (2001) *Social Stratification*, 2nd edn. Boulder, CO: Westview Press.
- Haythornthwaite, Caroline and Barry Wellman (2002) 'Moving the Internet out of Cyberspace: The Internet in Everyday Life – An Introduction', pp. 3–44 in Barry Wellman and Caroline Haythornthwaite (eds) *The Internet in Everyday Life*. Oxford: Blackwell Publishing.
- HREOC (Human Rights and Equal Opportunity Commission) (2001) 'Building Bridges over the Digital Divide'. URL (consulted November 2005): http://www.hreoc.gov.au/disability_rights/inquiries/ecom/bridges.htm
- Livingstone, Sonia (2002) *Young People and New Media*. London: Sage.
- Lloyd, Rachel and Otto Hellwig (2000) 'Barriers to the Take-up of New Technology', *Discussion Paper* no. 53. Canberra: NATSEM.
- Long, J. Scott (1997) *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage.
- MacKenzie, Donald and Judy Wajcman (1999) *The Social Shaping of Technology*. Buckingham: Open University Press.
- McLaren, Jennifer and Gianni Zappala (2002) 'The "Digital Divide" among Financially Disadvantaged Families in Australia', *First Monday* 7(11). URL (consulted November 2005): http://www.firstmonday.org/issues/issue7_11/Mclaren
- NOIE (National Office for the Information Economy) (2002) *The Current State of Play: Australia's Scorecard*. Canberra: NOIE.
- Norris, Pippa (2001) *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*. Cambridge: Cambridge University Press.
- OECD Science, Technology and Industry Scoreboard (2003) cited in Australian Bureau of Statistics 'Measures of Australia's Progress' Year Book Australia.
- Pakulski, Jan (2005) *Globalizing Inequalities*. Sydney: Allen and Unwin.
- Rogers, Everett M. (1995) *Diffusion of Innovations*, 4th edn. New York: The Free Press.
- Tambini, D. (2000) *Universal Internet Access: A Realistic View*. Institute for Public Policy Research/Citizen Online Research Publication no. 1. Author home page, URL (consulted November 2005): <http://www.csls.ox.ac.uk/people-research-staff-dtambini.shtml>

- Walby, Sylvia (2000) 'Analysing Social Inequality in the Twenty-first Century: Globalization and Modernity Restructure Inequality', *Contemporary Sociology* 29(6): 813–18.
- Waters, Malcolm (1999) *Globalization*. London: Routledge.
- Wolf, Alecia (1998) 'Exposing the Great Equalizer: Demythologizing Internet Equity', pp. 13–32 in Bosah Ebo (ed.) *Cyberghetto or Cybertopia? Race, Class, and Gender on the Internet*. London: Praeger.
- Year Book Australia* (2005) Australian Bureau of Statistics. URL (consulted November 2005): <http://www.abs.gov.au>
- Zappala, Gianni (2000) 'The Economic and Social Dimensions of the New Economy', *Australian Journal of Social Issues* 35(4): 317–32.

Biographical notes

Suzanne Willis is a PhD candidate at the University of Tasmania. Her research interests include society–technology relations, social inequality, poverty and gender. *Address*: School of Sociology, University of Tasmania, Private Bag 17, Hobart, Tasmania, Australia 7001. [email: smwillis@postoffice.utas.edu.au]

Bruce Tranter lectures in sociology at the University of Tasmania. His research interests include Australian identity, postmaterial value change, environmental social movements and the analysis of political attitudes and behaviour. *Address*: School of Sociology, University of Tasmania, Private Bag 17, Hobart, Tasmania, Australia 7001. [email: Bruce.Tranter@utas.edu.au]