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Skill, education and credentials in the new economy: the case of information technology workers

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Introduction

According to many social commentators, we live in a ‘new economy’ in which the nature of work is changing at a rapid pace. Technological change, organizational restructuring, and globalization appear to be having a dramatic impact on the nature and availability of work. Many researchers have demonstrated how labour in the new economy is increasingly contingent and insecure (Castells, 2000a; Cranford et al., 2003; Kalleberg, 2000). Workers face greater risk and uncertainty (Beck, 2000; Castells, 2000a; Smith, 1997). They are encouraged to be flexible, adaptable, and accepting of frequent changes in job content and location (Castells, 2000b; Smith, 1997). While some commentators argue that these changes allow workers more autonomy, flexibility and creativity, others emphasize experiences of job loss, insecurity and stress (Cranford et al., 2003; Sennett, 1998).

Widely debated is the impact of this so-called ‘new economy’ upon workers’ skills and education patterns. Over the past several decades, some researchers have argued that economic and technological change has increased the demand for skilled, educated workers (Bell, 1973). Expanding use of computer technologies is said not only to raise, but also to change, the skills required at work, increasing demand for people with problem-solving and analytical skills (Zuboff, 1988: 75). For many observers, the new economy is a knowledge economy, where intelligence and education are rewarded and valued as never before (Károly and Panis, 2004). Statistics reveal steady growth in jobs requiring higher education, especially in the information technology field

(Bureau of Labor Statistics, 2001; Statistics Canada, 2005). Nevertheless, some remain skeptical. Rising education requirements need not reflect actual increases in skill demanded at work (Braverman, 1974; Collins, 1979). Higher requirements may reflect credential inflation (Collins, 1979), or a desire for more socialized workers (Sears, 2006).

It is notable that trend studies also show job growth in unskilled jobs, requiring little education (Bureau of Labor Statistics, 2001). In light of this latter finding, many commentators have argued that what we are actually witnessing is bifurcation. For instance, Dunkerley (1996) argues that the economy is polarizing between educated, skilled users and developers of technology, and those less-technologically competent who are marginalized and vulnerable. While Manuel Castells (2000a) is generally positive about the ability of technological change to foster job growth, he too warns of polarization. Castells (2000b: 12) suggests that workers in the new economy increasingly fall into two camps. First, there are 'self-programmable workers' who are flexible, adaptable, and quick to retrain, and, hence, successful in the labour market. Second, there are 'generic' workers who, lacking flexibility and skills, are increasingly 'exchangeable and disposable' and forced to compete for work with 'machines and with unskilled labour from around the world' (Castells, 2000b: 12).

Who are the successful, skilled and flexible workers in the 'new economy'? Writers like Dunkerley, Castells and others point to information technology (IT) workers as being 'paradigmatic' (cf. Ensmenger, 2003). They are the highly skilled knowledge workers on the cutting edge of social developments and technological change. They work with, create and transform the technology that many see as transforming our lives. They are the ones with the skills in demand in the new economy. Castells (2000a) and others have suggested that they are also at the forefront of new flexible patterns of working. Rapid technological change appears to require adaptability. Does it also require education? The evidence is somewhat mixed.

In recent decades, education and credentials in the IT and computing field have expanded as professional organizations in the field have sought to professionalize it by formalizing and specifying its knowledge base and skill set. Nonetheless, the significance of formal education to skill acquisition for these workers is not entirely clear. IT has long been a technical field where the self-trained high-school drop-out might work alongside a PhD in science (Ensmenger, 2003: 154).

In this article, we contribute to the debate on skill, education and work in the 'new economy' through a consideration of the education, credentials and skill acquisition activities of IT workers in Canada and elsewhere. We begin with a brief review of the theoretical literature debating the relationship between education and skill. We continue to explore this relationship, and consider whether it might be changing in the 'new economy' through a consideration of the experiences of information technology workers. There is a growing literature on employment in the IT field that stresses the importance of adaptability, flexibility and self-learning. These workers appear to be 'self-programmable' in Castells'

sense, but are they also educated? Is education a primary source of skill in the new economy? How relevant is formal education – and the credentials it confers – to IT employment? We argue that education is important, but less for the skills it brings, than for the adaptability it implies. If IT workers are at all emblematic, new economy workers may feel increasing pressure to acquire skills through a variety of formal and informal strategies.

Education and skill

There are a number of different theoretical accounts of the significance of education and skill to employment. Perhaps the most influential is human capital theory, which holds that there is a close relationship between education, skill acquisition and labour market success. Education is seen to provide valuable skills and knowledge that make workers more productive and, hence, more attractive to employers (Becker, 1975). Education and training, whether formally or informally acquired, provide workers with capital (knowledge, skills, abilities) that brings benefits to them (in terms of labour market outcomes), as well as to workplaces and society more generally (in terms of productivity and social outcomes). While education cannot guarantee a good job, it is clear that those with education are better off than those without (Statistics Canada, 2005).

In contrast, theorists like Collins (1979) and Bourdieu (1996) hold that while education is important for employment, it is less because of the skills it imparts, than the credentials, or symbolic and cultural capital, that it confers. Collins shows that educational credentials can serve as mechanisms of social closure, limiting access to good jobs. As a workforce becomes more educated, existing educational requirements become less effective social closure mechanisms. Credential inflation results: people in positions of influence raise requirements to limit access further. Collins casts the commonly assumed link between education and skill into doubt. So does Bourdieu (1996: 118) who argues that ‘the educational institution confers, not just a certificate of technical competence giving one the right to a particular job, but a pass to a job in which the major portion of the necessary technical competence is often acquired on the job.’ For Bourdieu, while education provides some skills, it also provides socialization, contacts and credentials that encourage labour market success, and thereby open up opportunities for skill acquisition on the job.

Traditional Marxian approaches to education have also tended to see formal education less as a source of skill acquisition, than as a means of imparting traits and socialization important to work in a capitalist economy. Bowles and Gintis (1976) argue that the education system instils good work habits, obedience and acceptance of authority and hierarchy among its students. For them, the ultimate purpose of education is to prepare people for their future roles in the industrial, capitalist economy.

Nevertheless, the capitalist economy is changing. According to many pundits the ‘new economy’ no longer requires obedient drones, but rather seeks

flexible knowledge workers. Perhaps the role of education (and its relationship to skill and employment) is changing. The recent work of Alan Sears (2006) is relevant here. Sears argues that formal education institutions are still geared towards instilling discipline. He believes that the push for higher education standards seen in Canada and elsewhere in the past decade or two is more about creating disciplined workers who are committed to acquiring marketable skills and skill-upgrading, than it is about providing workers with the skills needed in the labour market. For him, recent educational reform is creating an 'instrumental approach to education' which 'has little to do with skills and a great deal to do with attitudes' (Sears, 2006: 337). Education also provides a mechanism for separating the good, trainable workers, from the 'bad': those who fail or struggle through their schooling are not the disciplined, malleable workers that employers want. Degrees, then, may be indicators of work ethic and attitude, but not of skill.

Credentials may also signal to employers that an employee is competent and trainable. According to signaling theory and theories of statistical discrimination, employers see credentials (and characteristics like gender and age) as signals of competence and productivity (Rosenbaum et al., 1990; Thurow, 1975). Rather than seeing credentials as representing skills learned, employers believe they signal potential (Arkes, 1999). Employers think 'people with more education are more likely to be smarter and more trainable than those with less education, more motivated and more broadly socialized' (Alic, 2004: 334; Arkes, 1999).

All of these theoretical approaches suggest that education has a direct link to employment outcomes: whether it provides skill, needed credentials, social and cultural capital or appropriate attitudes, education can help you get a good job. Only some of the approaches argue that education imparts useful skills. Has the relationship between education, employment and skill changed in recent years? Many writers argue that there is something fundamentally different about work and employment today (Castells, 2000a; Karoly and Panis, 2004). For Sears, education has become more instrumental, encouraging students to be adaptable to the needs of capital. Perhaps as Castells argues it is this adaptability that is most important in today's networked economy; education today may be less important as a means of acquiring skills and achieving social closure.

Indeed one might debate the importance of credentials to employment in the new economy. Strathdee (2005: 444) holds that while qualifications are very important for employment, there are several 'pressures' that may 'reduce their value in the labour market'. These include credential inflation, labour market growth in the services sector where credentials do not serve as good indicators of required skills (e.g. inter-personal skills), and, perhaps most importantly, the fact that the flexibility and innovation demanded in the new economy depend more on tacit knowledge than formal, codified knowledge. While the latter can be disseminated in formal education settings, tacit knowledge is more informally conveyed through social networks. Strathdee (2005: 449) argues that 'innovation ... is unlikely to come from credentialed learning.' Nonetheless, he and many others agree that education, and the credentials that

signify it, still appear to be very important for employment and labour market success.

Overall, while there is substantial evidence that education is important to work in the new economy, there is reason to question why and how it is important. Does education provide the skills workers need? Is it more important as a source of credentials, or social capital, or flexible attitudes? In the next few sections we look at skill, education and employment in the IT field. As a professionalizing field that has expanded and formalized education programs and credentials over the last few decades, the case of IT appears to indicate the continuing value of credentials and formal education to employment in the new economy. However, there is a growing literature emphasizing the importance of informal education, self-learning and flexibility to employment in the field that tells another story.

Professional development and credentials in the IT field

Over the past 40 years or so, professional associations and educational institutions have established credentials and education programs in the IT and computing fields. Professional development in these fields dates from the development of electronic computers following the Second World War. Originally, people working on and with computers sought forums for exchange of information and ideas, but many of the organizations they founded soon turned their attention to formal education, credentials and skill development. The American Association for Computing Machinery (ACM) led initiatives to define the discipline of computer science and worked to establish it as an accepted university subject from the early 1960s. Organizations in the UK, the USA and Canada endeavoured to establish credentials for computer-related workers in this era as well. Many in the field believed it imperative that rigorous training programs were established and that workers in the field possess credentials in order to enable employers to differentiate between the skilled and unskilled. This was seen as particularly important in IT given that workers entered the field from a variety of disciplines and with varying levels of educational attainment (Ensmenger, 2001, 2003; Adams, 2007).

Professional groups in IT have worked to formalize their core bodies of knowledge and itemize their core skills (with mixed success), to formulate curricula, establish examinations, and create credentials (Adams, 2007). In some countries, like Canada and the UK, organizations have successfully sought to have their credentials recognized through government legislation. By establishing credentials and formalizing their knowledge base, IT organizations, like other professionalizing groups, attempt to demonstrate and transmit professional expertise, and to pursue social closure (Larson, 1977; Murphy, 1988). Yet, professional groups in IT have obtained very little social closure thus far (Benner, 2003; Ensmenger, 2001). While IT credentials have been established by professional organizations, as well as by large software companies, they are

rarely required for practice in the field. A key issue, according to Benner (2003), is the fact that professional associations in IT are unable to exercise monopoly control over access to core knowledge. There are many different ways that IT skills can be acquired. Moreover, it is difficult to define precisely what the 'core knowledge' in the field is, because technology and techniques change frequently. Despite over 50 years of professional activity, IT organizations have achieved little social closure, and employment in the field is not restricted to those who have undergone a sanctioned or accredited education program, or possess specific credentials.

IT workers, education and their work

If entrance into IT employment is not through a specific degree or program, what kinds of education do IT workers have? The literature indicates that IT workers in Canada, the UK, Australia, and the USA are typically well-educated: at least three-quarters of workers in all countries have some kind of post-secondary credential (Adams and Demaiter, forthcoming). A recent Canadian study, by Gunderson et al. (2005) provides an illustration. Of Canadian IT workers surveyed, 51 per cent possessed a university degree and 27 per cent held a college diploma. An additional 13 per cent had received some college or university education, but did not obtain a credential. There is some indication that IT workers in the USA, UK and Australia are even more likely to hold a university degree (Adams and Demaiter, forthcoming). While fewer IT workers have university credentials than members of established professions, they are still, on average, more educated than workers in many other fields. If IT workers are 'paradigmatic' knowledge workers, however, it is notable that a sizeable proportion of them lack a university degree.

To work in the IT field, do people need education in computer science or engineering, or do they come to the field from a variety of backgrounds? The Canadian study by Gunderson et al. (2005) suggests that workers come to IT from a diverse set of educational disciplines. Of their respondents with a university degree, over half were educated in a computing or engineering field. Many others had studied in related fields like mathematics and science (17.4 per cent). Nevertheless, a substantial proportion studied in fields less closely related such as arts, education, social sciences and business (36 per cent). The findings were similar among college graduates: over half had training in computer science and engineering technology, while the rest came from a variety of disciplines (Gunderson et al., 2005). When information on education level and field of study are combined, we see that almost half of all IT employees in Canada lack either formal advanced education or credentials in their field.

There is also evidence that IT workers lack other kinds of credentials. Despite the efforts of professional associations and industry organizations to create certifications and credentials, these have not been embraced by IT workers, nor do they seem particularly important for employment in the field (Adams and Demaiter, forthcoming; Gunderson et al., 2005).

The literature on education, skill and employment raises questions about whether education is important for the credentials, contacts and socialization it confers, or the skills it engenders. Although further research is needed on this question, studies of IT work indicate that formal education cannot provide the cutting-edge skills that many workers require (Strathdee, 2005). Rather, IT workers seem to emphasize the importance of self-learning and informal learning for skill acquisition (Benner, 2003; Kunda et al., 2002; Adams and Demaiter, forthcoming). For instance, when asked where they acquire their skills, Canadian IT workers stress self-learning activities (86 per cent), informal on-the-job training (72.2 per cent), and previous work experience (67.8 per cent) (Gunderson et al., 2005). Formal college or university education was a source of skill for 44 per cent (Gunderson et al., 2005).

An expanding body of literature on IT work, skill and education provides support and context for these findings. In IT, work demands and knowledge are said to be frequently shifting, requiring workers to upgrade their skills regularly. Formal education is problematic in this environment, with frequent technological change rendering today's techniques obsolete tomorrow. The response of IT workers, according to Ensmenger (2003: 177), is typical of many technical workers: 'Although they are generally well-educated ... [they] also value intuition and craft knowledge. They tend to learn on the job' and through social networks. Frequent technological change requires the use of tacit knowledge that is neither conveyed by formal education, nor accurately measured by credentials (Strathdee, 2005). In a rapidly changing field, and/or when workers are innovating, they learn experientially; as one Canadian IT worker explained,

you can't get training on what we do No training courses exist when you're innovating. It's that simple. People train themselves through what they innovate. (Cited in Adams and Demaiter, 2007)

The nature of IT employment exacerbates the issue. Whether employed on permanent or short-term contracts, much IT work is project-based, requiring workers to focus intensely on a project for a period of time, before moving on to something else (Benner, 2003; Kidd Damarin, 2006). Different projects, customers and employers come with different demands, and workers must be flexible, adaptable and up-to-date to meet them. IT workers on short-term contracts emphasize the importance of maintaining cutting-edge skills to broaden their employment opportunities (Kunda et al., 2002); for them, self-learning is 'an issue of survival and not simply a means of getting a job done or a route to personal satisfaction and growth' (2002: 254). Workers appear to face a great deal of pressure to learn new things and keep their skills up-to-date: 'You've got to be on the ball all the time ... if you're not learning something you're done' (IT worker in Duerden Comeau and Kemp, 2007: 223). When new developments in IT are not formalized, workers must engage in other kinds of strategies to acquire new knowledge and skill; they rely heavily on informal ties, on-the-job training and experiential learning (Darr, 2002; Newell et al., 2002; Strathdee, 2005).

In such an environment, IT workers' formal and informal networks appear to be crucial resources for skill acquisition. Benner (2003) shows how workers in Silicon Valley have established numerous guild-like organizations and networks to facilitate knowledge transfer, and to provide job contacts. Workers maintain the 'market relevance of their skills by taking advantage of networks of information exchange in communities of workers who share similar types of expertise' (2003: 199). Finegold's (1999) work on high-skill ecosystems similarly argues that workers in California benefit from networks of institutions that facilitate knowledge transfer: 'the difficulty of transmitting tacit knowledge, particularly when it is new and changing rapidly ... encourages enterprises to be in direct and frequent contact with each other' (Finegold, 1999: 71). The workers he studied valued informal over formal learning, and relied on a network of colleagues to help them learn and problem-solve.

Overall, the literature on information technology workers portrays them as cutting-edge knowledge workers, who have to be adaptable, flexible, and to upgrade their skills constantly through their network contacts and self-learning activity. While education may be important for these workers, many of them emphasize self-learning and work experience as more important sources of skill. In this manner they resemble the adaptable, trainable, 'self-programmable' workers, described by Castells (2000b).

Education and skill in the new economy

The case of IT provides some insights for ongoing debates on the role of education in the labour market, and the significance of education for work in the new economy. The value of informal modes of skill acquisition for IT workers is a finding that does not negate human capital theory, but the theory provides few insights on the merits of formal versus informal modes of learning. Similarly, Collins' theory with its emphasis on credentials and social closure does little to illuminate trends in IT. Greater support is found for signaling theory and Sears' (2006) work: in IT, credentials may 'signal' trainability and the ability to learn. Given the importance of self-learning and on-the-job informal training, employers appear to prefer to hire those with a credential, perhaps believing that they will be more successful self-learners. In the words of one Canadian IT employer,

I wouldn't be too concerned about educational background because ... I come from a totally different background than programming so, I don't see the education so much as just the ability to teach yourself The ability to learn for yourself ... I mean ... you can take somebody who's come from a different discipline and as long as that person knows how to learn for themselves I think they can do just about anything. (Cited in Adams and Demaiter, forthcoming)

Research indicates that those with credentials are more attractive to IT employers, and they have more job opportunities and more job mobility (Gunderson et al., 2005).

If IT workers are at all typical of others in the new economy, education should continue to be important for workers, but less for the skill it confers, than for the ability and willingness to learn that a degree implies. Indeed there is evidence that some employers in a variety of fields view educated workers as more adaptable and capable of learning new things (Adams and McQuillan, 2000; Alic, 2004).

While adaptable, self-programmable workers are the fortunate ones in the new economy, according to Castells, the requirement of constant skill-upgrading can be problematic. The demands of self-learning can bring too much extra work to workers who may already be over-burdened (Hyman et al., 2005). Moreover, it may serve as an additional form of managerial control (Rasmussen and Johansen, 2005). The constant need for upgrading may also place women at a disadvantage, especially those with children, working a double day. Older workers may also be at a disadvantage as research suggests younger IT workers are seen as more adept at learning new skills and adapting quickly (McMullin et al., 2007).

Conclusion

Debate about the link between education, skill, and employment has existed for decades. Discussion has gained momentum with recent workplace change, which is believed to have inaugurated a 'new economy' in which only educated knowledge workers possess the skills to succeed. While most writers agree that education is important to employment in the new economy, there is disagreement about whether education is primarily important as a source of skill, or whether the credentials, contacts and work habits students acquire through education are more important, while real skill acquisition occurs on the job. Increasingly, studies argue that adaptability and innovation in the 'new economy' require cutting-edge knowledge and skills that are not conveyed through formal education. Self-learning, learning by doing, and networking appear to be increasingly important. The case of IT suggests that educational credentials are important, but more because they signal an ability and willingness to learn, than because of the skills and knowledge they represent.

Ultimately, it remains to be seen whether the IT workers of focus here are harbingers of trends affecting others in the economy, or whether their industry and employment situation make them relatively unique. Are their experiences typical of those 'switched-in' networked workers Castells (2000a) describes, or are they unique to the frequently changing IT industry? Are workers in other fields required to be self-programmable, and is there increased pressure to acquire skills through a variety of means to maintain employability? If this trend is at all generalizable, it raises concerns about work load and job security. It also raises concerns about access to knowledge and social inequality. Post-secondary education has not historically been accessible to all, but effort has been made in recent decades to broaden access. If access to employment skills requires not only a degree, but also access to informal networks and other

sources of knowledge, many people, by virtue of their gender, race, age and/or class, will be at a disadvantage. Access to tacit knowledge and work-related networks can vary significantly by race, gender, and class (Bourdieu, 1996; McGuire, 2002; Vallas, 2003); stereotypes portray older workers as reluctant to learn new skills (McMullin et al., 2007). The emphasis on both education and informal learning may continue to privilege the employment of younger men, who currently predominate in the IT field.

For some, our 'new economy' promises golden opportunities for educated, skilled knowledge workers. This may be the case, but much research remains to be done to determine exactly why and how education is important in the new economy, and whether – if there is a trend towards self-learning and informal learning – there are additional barriers for those who lack the credentials and the social capital to access the skills required for employment.

References

- Adams, T. (2007) 'Inter-Professional Relations and the Emergence of a New Profession: Software Engineering in Canada, the US and the UK', *Sociological Quarterly* 48(3): 507–32.
- Adams, T. and Demaiter, E. (2007) 'Knowledge Work in the New Economy: Skill, Flexibility and Credentials', paper presented at the American Sociological Association meeting, New York City, August.
- Adams, T. and Demaiter, E. (forthcoming) 'Knowledge Workers in the New Economy: Skill, Education and Credentials in IT Employment', in J. McMullin and V. Marshall, (eds) *Ageing and Working in the New Economy*, Elgar, Edward.
- Adams, T. and McQuillan, K. (2000) 'New Jobs, New Workers? Organizational Restructuring and Management Hiring Decisions', *Relations Industrielles/Industrial Relations* 55(3): 391–412.
- Alic, J.A. (2004) 'Technology and Labor in the New US Economy', *Technology in Society* 26(2/3): 327–41.
- Arkes, J. (1999) 'What Do Educational Credentials Signal and Why Do Employers Value Credentials?' *Economics Education Review* 18(1): 133–41.
- Beck, U. (2000) *The Brave New World of Work*. Cambridge: Polity.
- Becker, G. (1975) *Human Capital*, 2nd Edition. Ithaca: Columbia University Press.
- Bell, D. (1973) *The Coming of Post-Industrial Society*. New York: Basic Books.
- Benner, C. (2003) "'Computers in the Wild": Guilds and Next-Generation Unionism in the Information Revolution', *International Review of Social History* 48(December, Supplement 11): 181–204.
- Bourdieu, P. (1996) *The State Nobility*. Stanford: Stanford University Press.
- Bowles, S. and Gintis, H. (1976) *Schooling in Capitalist America*. New York: Basic Books.
- Braverman, H. (1974) *Labor and Monopoly Capital*. New York: Monthly Review Press.
- Bureau of Labor Statistics (2001) 'Fastest Growing Jobs 2000–2010', URL (consulted 4 August 2004): www.bls.gov/opub/ted/2001/dec/wk1/art02.htm
- Castells, M. (2000a) *The Information Age, Volume 1: The Rise of the Network Society*, 2nd Edition. Oxford and Malden, MA: Blackwell.

- Castells, M. (2000b) 'Materials for an Exploratory Theory of the Network Society', *British Journal of Sociology* 51(1): 5–24.
- Collins, R. (1979) *The Credential Society: A Historical Sociology of Education and Stratification*. New York: Academic Press.
- Cranford, C., Vosko, L. and Zukewich, N. (2003) 'The Gender of Precarious Employment in Canada', *Industrial Relations* 58(3): 454–79.
- Darr, A. (2002) 'The Technicization of Sales Work: An Ethnographic Study in the US Electronics Industry', *Work, Employment and Society* 16(1): 47–65.
- Duerden Comeau, T. and Kemp, C. (2007) 'Intersections of Age and Masculinities in the Information Technology Industry', *Ageing and Society* 27(2): 215–32.
- Dunkerley, M. (1996) *The Jobless Economy? Computer Technology in the World of Work*. Cambridge: Polity Press.
- Ensmenger, N. (2001) 'The "Question of Professionalism" in the Computer Fields', *IEEE Annals of the History of Computing* 23(4): 56–74.
- Ensmenger, N. (2003) 'Letting the "Computer Boys" Take Over: Technology and the Politics of Organizational Transformation', *International Review of Social History* 48(December, Supplement 11): 153–80.
- Finegold, D. (1999) 'Creating Self-Sustaining High-Skill Ecosystems', *Oxford Review of Economic Policy* 15(1): 60–81.
- Gunderson, M., Jacobs, L. and Vaillancourt, F. (2005) *The Information Technology (IT) Labour Market in Canada: Results from the National Survey of IT Occupations*. Prepared for the Software Human Resource Council. URL (consulted 24 January 2008): http://www.ictc-ctic.ca/uploadedfiles/English/Labour_Market_Intelligence/SHRC_OSRC_final_fullreport_e.pdf
- Hyman, J., Scholarios, D. and Baldry, C. (2005) 'Getting On or Getting By? Employee Flexibility and Coping Strategies for Home and Work', *Work, Employment and Society* 19(4): 705–25.
- Kalleberg, A. (2000) 'Nonstandard Employment Relations: Part-Time, Temporary, and Contract Work', *Annual Review of Sociology* 26: 341–65.
- Karoly, L.A. and Panis, C.W.A. (2004) *The 21st Century at Work*. Santa Monica: RAND.
- Kidd Damarin, A. (2006) 'Rethinking Occupational Structure: The Case of Web Site Production Work', *Work and Occupations* 33(4): 429–63.
- Kunda, G., Barley, S. and Evans, J. (2002) 'Why do Contractors Contract? The Experience of Highly Skilled Technical Professionals in a Contingent Labor Market', *Industrial and Labor Relations Review* 55(2): 234–61.
- Larson, M.S. (1977) *The Rise of Professionalism*. Berkeley: University of California Press.
- McGuire, G.M. (2002) 'Gender, Race, and the Shadow of Structure: A Study of Informal Networks and Inequality in a Work Organization', *Gender and Society* 16(3): 303–22.
- McMullin, J., Duerden Comeau, T. and Jovic, E. (2007) 'Generational Affinities and Discourses of Difference: A Case Study of Highly Skilled Information Technology Workers', *British Journal of Sociology* 58(2): 297–316.
- Murphy, R. (1988) *Social Closure: The Theory of Monopolization and Exclusion*. Oxford: Clarendon Press.
- Newell, S., Robertson, M., Scarborough, H. and Swan J. (2002) *Managing Knowledge Work*. Basingstoke: Palgrave.

- Rasmussen, B. and Johansen, B. (2005) 'Trick or Treat: Autonomy as Control in Knowledge Work', in R Barrett (ed.) *Management, Labour Process and Software Development*, pp. 100–122. New York: Routledge.
- Rosenbaum, J., Kariya, T., Settersten, R. and Maier, T. (1990) 'Market and Network Theories of the Transition from High School to Work', *Annual Review of Sociology* 16: 263–99.
- Sears, A. (2006) 'Education for an Information Age?', in V. Shalla (ed.) *Working in a Global Era*, pp. 320–40. Toronto: Canadian Scholars Press.
- Sennett, R. (1998) *The Corrosion of Character*. New York: Norton.
- Smith, V. (1997) 'New Forms of Work Organization', *Annual Review of Sociology*, 23: 315–39.
- Statistics Canada (2005) *Labour Force Historical Review, 2004*, Report 71F0004XCB. Ottawa: Statistics Canada.
- Strathdee, R. (2005) 'Globalization, Innovation, and the Declining Significance of Qualifications Led Social and Economic Change', *Journal of Educational Policy* 20(4): 437–56.
- Thurow, L. (1975) *Generating Inequality*. New York: Basic Books.
- Vallas, S. (2003) 'Rediscovering the Color Line Within Work Organizations: The "Knitting of Racial Groups" Revisited', *Work and Occupations* 30(4): 379–400.
- Zuboff, S. (1988) *In the Age of the Smart Machine*. New York: Basic Books.

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