The educational transformation of work: towards a new synthesis

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Formal education not only educates individuals, it reconstitutes the very foundations of society through a pervasive culture of education with a legitimate capacity to reconstruct work and its central components such as ideas about human productive abilities, new organisations and management, widespread professionalism and expertise, and the emerging educated workplace. The ubiquitous massive growth and spread of education has transformed the world into a schooled society, and in turn the schooled society has transformed work. The implications of the educational revolution and empirical findings from a range of recent research studies are applied to – the narrow version of human capital theory and education-as-myth sociological theory – two widely employed theories of education and work over the past 40 years. And a new theoretical synthesis that takes into account the empirical realities of the schooled society is proposed.

Keywords: educational transformation of work; mass professionalism management; job complexity

Laborers have become capitalists not from a diffusion of the ownership of corporation stocks, as folklore would have it, but from the acquisition of knowledge and skill that have economic value. (Theodore W. Schultz 1961 – Presidential Address to the American Economic Association)

Schools used to be for educating people, for developing minds and characters. Today, as jobs depend more and more on certificates, degrees and diplomas, aims and motives are changing. Schooling has become more and more a ritualized process of qualification-earning … ritualistic, tedious, suffused with anxiety and boredom, destructive of curiosity and imagination; in short, anti-educational. (Ronald Dore, 1976)

The ubiquitous massive growth and spread of education has transformed the world into a schooled society – a wholly new type of society where dimensions of education reach into, and change, nearly every facet of human life (Baker, forthcoming). As educational expansion, most recently the expansion of mass higher education, continues unabated into the twenty-first century, formal education not only transforms individuals, it reconstitutes the very foundations of society through a pervasive culture of education with a legitimate capacity to reconstruct work and its central components such as ideas about human productive abilities, new organisations and management, widespread professionalism and expertise, and the emerging educated workplace. The implications of the educational revolution and its resulting schooled society are applied to – the narrow version of human capital theory and education-as-myth

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sociological theory – two widely employed theories of education and work over the past 40 years. And a theoretical synthesis that takes into account the empirical realities of the schooled society is proposed.

From the 1960s to the 1980s, as the mass education revolution heated up, enrolment rates in lower- and upper-secondary and higher education expanded, and many educators, economists, sociologists and experts of national development predicted dire consequences from a worldwide oversupply of educated youth working in jobs beneath them. In wealthy nations the poster-boy for seemingly run-away over-education was the embittered PhD driving a taxi for a living, while in less wealthy nations it was the angry young man with an upper-secondary diploma who could not find a prestigious job in the nation’s civil service.¹

As the first wave of the masses began to swell into educational opportunities formerly reserved mostly for elites, it threatened the upper levels of the older educational order, which had been tightly connected to a small number of elite jobs. The assumption was that the expanding enrolment would mean that as more students received higher levels of educational degrees than in the past, the upper reaches of the labour market would become full; and with their expectations for an elite future dashed, the over-educated might turn disaffected and unruly. Over-education was considered a looming social problem, even as a kind of disease on the verge of epidemic proportions.

Ironically, at precisely the same period in which the fears of an oversupply of the educated began to circulate widely within intellectual and policy circles, and also the education revolution unfolded apace, a radically new theory about labour in modern economies was born. Human capital theory’s innovative ideas, and the research agenda that these ideas fostered, rapidly became a dominant force in the study of economics and the application of economic principles to development of nations’ economies.

Human capital and the diploma disease are two polar opposite views of the relationship of education to modern society, serving as bookends around the debate over the nature of work in the schooled society. The ideas originating from each influence how the opposing camps of intellectuals think about education today, which in turn influences how policy-makers make decisions about education programmes and its practice in the world’s school systems.

As extremes, these two perspectives produce a certain amount of stereotyping of the ‘real relationship’ between the education revolution and the world of work. And as often happens in such cases, over-reliance on stereotypes leads to some misconception. Some would have it that there is no relationship between what schooling does for students and what they need in jobs, while others see a narrow one-to-one correspondence between the two. Yet for the naysayer there is growing evidence that not only does educating people change their productivity, having greater numbers of educated people in the workplace changes the nature of work itself. And for the yea-sayer the evidence suggests that the relationship between schooling and work is more complicated and probably less efficient than they imagine, or wish.

Two models of education and work

The relationship between education and work is much studied and there are significant conceptual and empirical literatures from any number of academic disciplines on this central connection in modern society. Nevertheless, some might wonder what all the
fuss is about since from everyday observations there are all kinds of indications that education and work are related. And indeed that is what a virtual mountain of systematic research shows in nation after nation, then as well as now, and without exception across the whole literature: All else equal, on average workers with more education make more income than less educated workers. The ‘education premium in wages’, as this finding has become known, is assumed to reflect an underlying difference in the marginal productivity of workers because of their education. Or in other words, all other economic factors equal, education makes a better worker. But does education really mean more productivity? And if so, how does it generate this change? After nearly four decades of research, answers to these two central questions about education and work are still fiercely debated. By and large, the whole debate boils down to two contrasting models of the nature of the relationship, each one fundamentally different from the other in terms of what takes place in school and its relevance to the world of work.

On one side are the human capitalists who brought education in out of the cold of classical and even neo-classical economics and placed it into the mainstream of economic analysis. For them, education is directly and inseparably tied to work through the ability of individuals to invest in their own productivity through skill acquisition from either formal education or on-the-job training (e.g. Becker 1993; Schultz 1961). Even though the human capital literature is full of discussions of ‘skill’, what it really means in almost every case is ‘skill acquired through education’.

The main version of the human capital model takes schooling at its face value as an imparter of useful capabilities to individuals; schooling does what it is ‘supposed to’ in an everyday sense. The human capital model only assumes that what actually happens inside schools is for the most part useful work skill acquisition, so it never really brings this key assumption into question. As tautological as it may be, the fact that there is an education premium in wages in the labour market is enough for the human capitalist to assume that market forces choose workers with greater productivity and hence education must be the main causal factor behind the wage gap. Even though the human capital perspective was radical for its time, since its inception a generalised form of it has become common, so much that it is now called the ‘human capital perspective’ on education and work.

The other side of the debate takes formal education to be a kind of myth or even a grand rip-off: schooling does not for the most part do what it is ‘supposed to’. It does not impart useful skills as much as it is a rather expensive societal sorting machine telling employers which students have the ability and attitude to work (e.g. Spring 1988). The titles of Paul Willis’ and Jay MacLeod’s popular ethnographies of the education of working class British and American youth – *Learning to Labor* and *Ain’t No Makin’ It* – lean heavily on this idea: Schooling is far more allocative than truly educational. What can be referred to as the ‘education-as-myth’ perspective, along with its cruder version of the diploma disease, attempts to debunk schooling as an educational transforming process by arguing it only sorts and allocates individuals into the world of work based on their innate ability and crude socialisation. Beyond sorting, what goes on in school in the guise of learning is mostly irrelevant and even oppressive (Giroux 2000). Like the human capitalists, the education-as-myth model assumes it too knows what happens in schools, yet it rarely looks inside the black box.

Most economic research on the schooled society originates from a general human capital perspective, while most sociological research is guided by the cynical
education-as-myth position. Hence these two major research literatures infrequently, if ever, influence one another. And interestingly, given the important role that formal education plays in each research literature, both positions ignore the power of education as an institution to not only train and allocate students, but also to transform our understanding and expectations for peoples’ capabilities, the nature of work, and even what is usable knowledge for economic value. Interestingly, too, there is a fair amount of new research indicating a more complex reality than either of these two models suggests, and it can be argued that this complex reality stems precisely from the broader neo-institutional impact of the schooled society on how we work and think about work (Baker, forthcoming; Meyer 1977).

Recognising this complexity leads to a kind of new synthesis of the two models. Schooling does in fact include the learning of skills that transform the individual and when there are mass numbers of educated in the workforce this then transforms the work world. At the same time, schooling sorts and allocates individuals with increasing legitimate authority and this rising authority reconstitutes the main cultural ideas of the productive worker, the workplace and the nature of jobs.

It should be noted that this has been a result of a process of accretion more than a big bang, and as such, the forces behind the trend take some unpacking to clearly see how they operate. The evidence supporting this synthesis stems from several sources.

First, clear evidence shows how wrong the dire predictions were that the education revolution would produce extensive over-education and thus social upheaval. Higher education expansion has not led to any of the problems assumed to stem from over-education by so many sociologists and educationalist.

Second, contrary to older visions of jobs and skills, extensive new evidence suggests that as more waves of educated individuals flooded the workplace, increasingly in larger formal organisations, there were sustained shifts towards jobs with more managerial, communicative components, that yielded a spread of a kind of mass professionalisation of work. This is in large part driven by a new image of the worker and training and skill that was, and continues to be, transformed by the education revolution in the form of educationally produced authoritative knowledge from the university, along with the credentialing of expanding ranks of experts who specialise in a proliferating set of functions and activities in the heavily organised workplaces of the late twentieth century.

Third, new research on technology adoption and the content of jobs in firms shows that the education level of employees causes substantial changes in basic job activities in firms more than the reverse causal direction, which is the one usually assumed.

And fourth, several lines of research show that the schooled employee of the schooled occupation in the schooled workplace does not just come about because of changes in lots of individuals’ skill sets. Rather, what is necessary for these new arrangements to come about is a profound change in the beliefs and values about the capabilities, expectations and qualities of educated people.

A good way to illustrate this new synthesis between the education revolution and the nature of work in the schooled society is to revisit three of the most influential books on the subject of education-as-myth and over-education and critique them in light of a number of new findings from neo-institutional research and some fascinating related research on the workplace about how the education revolution has changed work in modern society in fundamental, yet surprising, ways. Most of the existing critiques of the substance of the human capital model just raise the education-as-myth model and do not try to integrate the two as is done here.
Three sets of evidence about the educational transformation of work

*The great diploma disease that wasn’t, as everyone becomes a professional*

In 1976, venturing out from his usual scholarly confines on the economic development of Japan, the renowned British Japanologist Ronald Dore published a book with the provocative title *The diploma disease*. The book, and particularly its title, came to stand for a whole litany of discontent with the worldwide expansion of schooling. Dore, along with an impressive number of experts of the time, predicted that over-educated and under-employed masses of youth would eventually become embittered over the gap between labour market opportunities. Their unmet expectations for a significantly better job created through more advanced school would cause all sorts of social problems.

The logic behind the forecast was compelling and easy for the public to grasp at the time. The decades of the 1960s and 1970s were a time when youth worldwide were enrolling in secondary education at unprecedented rates. Prior to this, primary education had already been growing rapidly and now the same was happening with secondary education, particularly upper-secondary. Further, as shown in Figure 1, during these decades in many developed nations, and even some developing nations, enrolments in higher education began to increase at a rate that had never been witnessed before. In countries all over the world, what had been for the most part the sole educational confines of the elite began in a few short years to include youth from a wide range of social and economic backgrounds.

Before this, tight access to the upper reaches of formal education had been widely thought of as a more or less efficient sorter of individuals into a relatively small
number of upper-level jobs; the earlier gains in primary education for the masses did not threaten this arrangement and were even welcomed for a host of assumed economic and social benefits. But this new expansion into upper-secondary and higher education was different, it did seem threatening – a severe oversupply of educated people would surely be a social problem. If advanced schooling were offered to a much larger proportion of students, what would happen when this large group competed for limited jobs geared to higher levels of education? The thriving education revolution completely blew the lid off an older elite education system, and as the masses edged towards formerly reserved advanced schooling, many worried about the implications for the world of work and even for worldwide social stability.

Part of the reason for the success of Dore’s book was that it hit on an already circulating image of a society with an extreme oversupply of educated people frustrated by a fixed number of appropriate jobs; in many quarters this had become a foregone conclusion from the middle part of the last century on. For example, note how one professional observer of American higher education predicts the consequences of expansion of college as early as in the late 1940s (Harris 1949, 64):

> College students within the next 20 years are doomed to disappointment after graduation, as the number of coveted openings will be substantially fewer than the numbers seeking them. (Harris 1949, 64)

It is not surprising then that The diploma disease became an instant best-seller rapidly translated into a number of languages and even today remains on the list of influential works on education as a classic statement of the effects of too much education expansion. The book is about not only the abstract relationship between education and society, it is grounded in the debate over ideas about how poor nations can (and should) develop. Many of its chapters were intended to influence the then emerging endeavour of helping impoverished nations develop modern economies. This modern take on Adam Smith’s old question about how national economies influence the wealth of nations arguably made the biggest policy impression of the book. For experts of international development, Dore was a prominent comparative scholar suggesting what up to then had been for them unthinkable: That the supposed ameliorating effects of bringing light to the dark reaches of world poverty through education had apparently backfired; schooling had become a national disease.

Eloquent and persuasive, Dore writes with verve about his take on the consequences of the educational revolution and its transformation of society. The book predicts several dire consequences from the diploma disease. First, as lower-income nations, particularly those which entered economic development relatively late (i.e. moving away from an economy primarily based on agriculture to one based on manufacturing), expand education, the more widely held education credentials (i.e. certificates or degrees) will be used for occupational selection. Dore predicts this could lead to educational ‘qualifications inflation’. Inflation in the sense that for the same jobs, successful job-seekers will have to increase their level of education as verified through examination-driven educational credentials, all caused through no other process than relentless competition for the credentials themselves. What Dore refers to as ‘qualification inflation’ is what labour economists think of as within-job education qualification upgrading (or just ‘educational upgrading’ for short); meaning that instead of upgrading skills required for a job, education upgrading is pure credentialism, and in a rational economy it is considered inefficient and wasteful. Notably, Dore argues that
education is certainly an important component of national development, but run-away credential hunting may cause more economic and social harm than good through skillless educational upgrading and a whole mass of over-educated youth.

The diploma disease supposedly corrupted education itself too. Dore predicts that in a hyper-competitive education system, spurred on by mass enrolments in secondary and higher education, most credentialing will be reduced to performance on gatekeeper examinations. This imagery was particularly salient in the quasi-British education systems used in many former colonies that Dore had first-hand experience with in the middle of the twentieth century. He forecasted that expansion would lead to downgrading of the curricular content, aim of instruction and motivation of students because the only goal of education would be to pass examinations for credentials. As the epigraph above quotes, with the spread of the diploma disease education becomes ritualistic in the sense of merely attempting to pass examinations, devalued in the sense that those involved lose intrinsic sense of inquiry, and irrelevant in the sense that people are not transformed by it through the competition for better jobs.4

Dore’s vision of the role of education in the future was ultimately a cynical one, at least in terms of examinations and higher education credentials for the masses. He suggested that as the education revolution has pushed students to ever higher levels of education, a grand ‘paper chase’ for degrees, which in turn pushes the expansion of education even further. In the process, so the story goes, education looses its real aims and becomes a distorted, down-graded version of its former self. Education does not produce more qualified or productive workers, instead it acts only as a passport, or union card, to a job. Because students are chiefly filtered through examinations, which are increasingly irrelevant to future jobs, many school finishers are over-qualified and over-specialised in irrelevant skills and knowledge.

In short order, Dore’s book helped foster a mini genre of educational, demographical and public policy literature on the pending consequences of too much education (see e.g. Bowles and Gintis 1976; Clogg 1979; Freeman 1975, 1976; Rumberger 1981b; Smith 1986; Witmer 1980). In one version after another, over-education during the initial rise of both secondary enrolments in less wealthy nations and higher education enrolments in wealthy nations was defined as a growing social problem with predictions of wide and disastrous proportions, with each successive account’s pessimism outdoing the last. Some went so far as to blame the threat of a whole societal upheaval on over-education. One report stressed that frustrations of the over-educated and under-employed are nothing less than the ‘central dynamic for social discontent emerging in America’, while another influential book claimed that the ‘incongruence between the aspirations of college students … and the labour requirements of the economy is the chief cause of student radicalism’ (Blumberg and Murtha 1977; Bowles and Gintis 1976, respectively, as quoted in V. Burris 1983, 455). Even the much trumpeted international Trilateral Commission and the US Government got into the act, with an influential report from the latter proclaiming ‘the potential for frustration, alienation and disruption resulting from the disparity between educational attainment and the appropriate job content cannot be overemphasised’ (US Department of Health, Education and Welfare, n.d., 136, as quoted in V. Burris 1983, 456; Trilateral Commission 1975).

Though an unrealistically grim picture, many in modern society did, and still do, see it precisely this way. The image of over-education and its looming negative consequences seems to help many understand the rapid, and at times disconcerting, growth of education occurring in their midst. When one’s whole sense of an educated-self
becomes obsolete in less than a single generation, when more family time and energy must be committed to schooling in a seemingly never ending upward spiral, when more years in the lives of youth are devoted to studying instead of working, and when so much emphasis is placed on educational credentials in getting jobs, it is an easy relief to embrace some version of Dore’s diploma disease. The problem is that as appealing as this cynical vision of education and the world of work may be, it turned out to be wildly inaccurate.

When sociologists searched for social unrest because of the education revolution they could not find even the remotest of traces. A representative example is the comprehensive Val Burris’ comprehensive analysis of a large nationally representative sample of working Americans (1983). He finds no substantial differences between people who are over-educated for their jobs and those who are not across their stated job satisfaction, political radicalism, political alienation, unionism and allegiance to an achievement ideology (Spencer 1988, and Vaisey 2006 for modest effect on job satisfaction). Nor did the education revolution cause social unrest among less wealthy nations. Nor is there much evidence that mass education causes down-grading of its own effectiveness in curricular content, instruction and student motivation. If anything, there is more evidence of upgrading across a certain pattern of academic content (e.g. Baker et al. 2009). In short, the diploma disease with its pending dire effects on the health of the social contract never happened.

Dore and other’s made it sound as if over-education would be a seeping outcome of expanding education, but actual estimates of how many people were involved and who they were paint a different picture. In the midst of the ‘over-education crisis’ estimates of mismatch between education level and required job skill ranged from a low of 14% to a high of 22% of employed individuals experiencing a education-job skill mismatch in the late 1970s and early 1980s (B.H. Burris 1983; Clogg and Shockey 1984). And as might be expected, there is evidence the level of mismatch is rising but is doing so very slowly, particularly relative to the fast pace that the education revolution is unfolding. Additionally, in and of themselves the estimates are not very high and even though the highest estimates represent a sizable group, they do not suggest a mass of over-educated and under-employed that is going to tear so viciously at the social fabric.

Also, the kinds of people most likely to experience a mismatch are illustrative of the larger picture of a changing workplace exactly due to more employment of educated workers. The greatest concentration of education–job mismatch occurs in two places in the labour market: one, among those workers with some higher education, but not a college degree (the group predicted to cause the most social upheaval), and two, among people working as managers (B.H. Burris 1983; Clogg and Shockey 1984). In the American case, the former is most likely due to the rising two-year institutions of higher education in the USA at the time (although participation in higher education was increasing in all developed nations), while the latter is due to rising education requirements of managers, which are discussed below. Unlike what Dore and many others predicted, the supposed largest newly ‘over-educated’ group – the college graduate – experienced relatively little job mismatch despite the rapid expansion of mass higher education (Schofer and Meyer 2005).

The over-educated argument also underestimated how dynamic the relationship between education and the world of work became as the rising demand and supply of education became a worldwide norm. Operating on the incorrect image of a fixed structure of jobs into which education merely feeds trained individuals, it was no
wonder that as Dore, and others of a similar mindset, watched the education revolution take off into secondary and higher institutions they predicted a volatile clash in the labour market. What the over-education image fails to account for is that with large numbers of more educated people flowing into jobs, this massive demographic change also led, and continues to lead, to changes in the world of work – education expansion changed jobs and the nature of the workplace.

Why the diploma disease did not happen is illustrated in the story of the rise of professionals and managers in wealthy nations’ economies. There is a vast sociological literature on the rise of the professions and professionals, a major sub-theme of which is that in modern society profession becomes a pervasive form, or more accurately a model that is spreading through the organisation of work well beyond the ancient traditional ones such as medicine, law and theology. It is widely hypothesised that one of the cornerstones of expanding professionalisation is formal education, particularly access to, and expansion of university-based education (e.g. Parsons 1971). If this is true, then as mass education expands into higher education, one should see growth in jobs taking on more qualities of professions, as well as the roles of workers in these jobs taking on more qualities of professionalism. And this is exactly what has occurred for a substantial part of the American and many other nations’ workplaces.

Two economists of the US Bureau of Labor Statistics, Ian Wyatt and Daniel Hecker, recently compiled the most comprehensive, comparable set of information on trends in occupation groups over the twentieth century to date (2006). Census data have always included information about the occupational categories (menial workers, technical workers, professionals, etc.) of jobs that American workers have done over the last century, but because of different definitions and the emergence of new job categories over time, it was difficult to accurately compare trends across time. Wyatt and Hecker painstakingly developed a standard set of occupational categories that can be used to compare across censuses, thus for the first time there is a full picture of changes in the American labour forces during the time of the rise and acceleration of the schooled society in the USA.

As Figure 2 shows, the most striking change over the century is the radical increase in the occupational group termed ‘professionals, technical and kindred workers’ which increased their share of the overall labour market from about 4% in the early part of the twentieth century to 23% by the beginning of the twenty-first century, an expansion of 1.7 million to over 30 million workers!

Unpacking this overall trend, Wyatt and Hecker show that a multifaceted transformation of the American economy went hand in hand with the rising supply of more advanced educated individuals streaming into the labour market (Goldin and Katz 1996). Technological production, particularly the introduction of computers in the workplace around 1970, the growth in size and complexity of formal organisations, the growth in healthcare, education, social service and government each contributed to the professionalisation of the workplace; or in other words, the increase in jobs for people with special expertise to use university-generated authoritative knowledge, mostly trained and credentialed through formal advanced education.

Correspondingly, computer specialists grew 95 times as a proportion of total employment between 1960 and 2000; engineers grew nine times from 1910 to 2000; accountants and auditors grew 13 times over the century; healthcare professionals grew five times; educators at the university level grew 12 times, and teachers, a large single category of white-collar workers, grew 1.4 times (Wyatt and Hecker 2006).
Certainly a proportion of this expansion is due to increases in technical components of jobs (see below), but a fair amount of it is due to the growth in jobs that take on professional, read – educated – qualities.

Among Wyatt and Hecker’s list of labour market transformations, perhaps the most relevant to the impact the education revolution had on the mass spread of professionalisation into the workforce is the growth in the number, size and internal complexity of formal organisations. In other words, organisations that have formal decision-making, explicitly articulated rules and universalistic principles, offices holders, and operate under general bureaucratic and highly rationalised means-goals procedures, as opposed to informal organisations such as traditional small firms, families or clan, are increasingly prevalent.

As founders of the study of modern organisation, Arthur Stinchcombe and James March insightfully observed as early as 1965 that a schooled society raises ‘practically every variable which encourages the formation of organizations and increases the staying power of new organizations’ (1965, 150). Specialised formal organisations are widely found across the globe organising all kinds of human activity to a degree unheard of in traditional society. The world is now made up of formal organisations that, regardless of their mission and societal sector, are based on essentially the same cultural model, a model whose popularity has grown over time, and thus operate in a similar fashion (e.g. Boli and Thomas 1999; Carroll and Hannan 1999; Chandler and Mazlish 2005; Dobbs, Meyer, and Scott 1993; Drori, Meyer, and Hwang 2006). In the 1950s, the earliest students of the rise of formal organisations in modern society barely envisioned such a future that has come to pass, but even then they were confident that the emerging schooled society constructed the bedrock upon which a proliferation of formal organisations would flourish.

Figure 2. Proportion of total employment of professional, technical and kindred workers, 1910–2000. Note: Data for 1930 are an average of 1920 and 1940 data because 1930 data were unavailable when this article was written. Source: Wyatt and Hecker (2006, 44).
If one could collect information on the kind of places in which the vast army of late twentieth-century educated professionals and technicians work, there is no doubt they would predominately be employed in formal organisations instead of self-employed or small family-run businesses. This means that more people, across all kinds of education levels, work within formal organisations. Including all for-profit corporations and other economic organisations, as well as non-profit organisation; the sheer density of populations of formal organisations results in extensive networks of organisations interacting among themselves, and is a major facet of modern society. But moreover, the emergence of the modern organisation, coinciding exactly with early waves of masses entering secondary and post-secondary institutions, makes it the premiere model of workplace characteristics that were originally adopted by, and now are widely expected by, individuals with advanced education.

Organisational sociologist Walter Powell’s insightful study of the emerging institutionalised organisational design of corporations and hence the landscape of labour finds ‘how rapidly the social technology of organising work has changed’ over the past 50 years (2001, 68). The dimensions of this new social technology have recently been thoroughly documented in a multi-part study of the globalisation of formal organisations by Gili Drori, John Meyer, Hokyu Hwang and nine other neo-institutional scholars (2006). They find that the new modern organisation has three central qualities largely based on the schooled society’s leveraging of the organisational capacity of humans.

The first component, and the one that is most obviously a direct result of the schooled society, is the extensive degree and broad scope of personnel professionalism permeating throughout the modern organisation. Personnel professionalism means two things. First, not only are leading core professionals of the organisation educated and formally credentialed, but so are increasing numbers of others who work there. Education provides not only the people with the skills to function in the modern organisation, but it certifies them as such. Maybe most importantly is that the system of credentials, in terms of degrees giving access to sets of activities and management responsibilities inside the organisation, has become thoroughly blended with the hierarchy of the modern organisation.9 Second, is that with the notion of personnel professionalism comes a workplace based on ideas towards personnel as responsible individuals who are ‘thinking and choosing actors, embodying professional expertise and capable of rational and creative behavior’ (Luo 2006, 230), all qualities that have become embedded in the education systems of most nations as attributes expected of everyone. This is in direct contrast to the average workplace earlier in the twentieth century where workers were seen as ‘adjuncts of machines, course, unclean, unreliable, and prone to drunkenness’ (Common et al. 1921, as quoted in Luo 2006, 230).

The second component is the increase of intensive rationalisation within the modern organisation. Rationalisation of human activities as an explicit organisational strategy flourished in the early bureaucracies of the nineteenth century, and the social technology of the modern organisation now applies rationalised means-ends activity with more authority to ever more aspects of the social order (e.g. Perrow 1986; Weber 1978). Just as the modern organisational form is applied to a wider set of human activities once considered outside the reach of formal organisation, intensive rationalisation is applied to ever more aspects internal to organisations. The rise of accounting and auditing, fundraising, elaborate legal contracts, corporate social responsibility, human relations and strategic planning are just a few examples of now heavily...
rationalised internal activities of all formal organisations in which an expert culture reins supreme.

The connection to the schooled society and the world of work is obvious. The underlying belief in a schooled society is that these rationalised domains are to be trusted only to *educationally credentialed* individuals in *educationally created* areas of expertise. Hence, the rise in these rationalised internal activities as ‘naturally’ connected to professionalised occupations, with clear career ladders shared across organisations, standard ethics, technical procedures and professional associations – i.e. the accountants, the auditors, the fundraisers, the legal staff, corporate social responsibility experts, directors of planning and so forth are organisational professionals interchangeable across organisations engaged in all kinds of areas of activity (Drori, Meyer, and Hwang 2006; Shanahan and Khagram 2006).

The last component is that the modern organisation has become horizontal in its authority structure. Authority and responsibility are far more widely distributed within organisations than in the past, meaning that aspects of more jobs take on managerial components. The wide-scale impact of this change on the composition of job skills is discussed below, but for example, this change in organisations (along with the rapid overall increase in numbers of organisations) has meant that Americans employed as managers grew from 6.5% of the workforce in 1910 to 14.2% in 2000, or an absolute growth from 2.5 million to just over 18 million managers (Wyatt and Hecker 2006). In terms of historical changes in job skills in the USA, Howell and Wolff (1991, 488) find that many jobs have greatly expanded in terms of the interactive skills required of workers, and in particular this means ‘the relative authority, autonomy, and degree of responsibility for people and things’, or in short – managerial skills of various types.

No doubt those still faithful to Dore’s image will suggest that the rise in new professionals through the expansion of formal education is an ersatz professionalism, a phony accommodation to growing rates of higher education enrolments and thereby a type of whitewash that somehow fools the newly educated into taking the same old jobs merely wrapped in the trappings of an educated professional. Yet like all of the literature on over-education, this falsely assumes that jobs represent some fixed order, or even worse, some *naturally* fixed order. But this has never been the case. Jobs and their labour requirements in the nineteenth century were no more fixed than now, and so forth throughout history. This is perhaps the central insight of Karl Marx, arguably the founding sociologist and economist of work, who observed that the organisation of work is immutably constructed by, and tied to, a society’s social order. And since Marx, this is what so much historical sociology on the nineteenth century illustrates. If this was true then, there is no reason why it shouldn’t be true now. And therefore, as a large part of the emerging social order over the twentieth century was and is dominated by educational expansion, then it is not surprising that the workplace and work, evermore frequently embedded within the modern formal organisation in the schooled society, undertook a corresponding significant degree of personnel professionalism, rationalisation and managerialism.

If for some strange reason jobs and the workplace had not been changed by the effects of the educational revolution, one could envision, along with Dore, numerous and extreme mismatches in education and jobs that would have produced some degree of social unrest. But what happened instead was not widespread over-education, rather the very nature of work changed with the qualities, ideas and even the skills, of the educated worker.
Academic intelligence and the nature of job skills in the schooled society

If it can be argued that the schooled society has created more jobs in more workplaces that are compatible with the educated worker, it should be true that the very content of jobs themselves have changed as well. Even though this is not commonly assumed to have happened, there is significant evidence that it has.

The most traditional human capital conception of education and skill demands of jobs is that the former services the latter. Somehow jobs change and their skills levels go up or down, or more accurately low- or high-skilled jobs are added or subtracted to the overall labour market, and education (individual’s costs to acquire it) adjusts accordingly, and if everything goes right, formal education supplies the appropriately skilled workers for the skill mix of the labour market at any particular time. Seen from this perspective, education does nothing more than produce workers with the skills demanded by the labour market; in other words it has little effect on work itself beyond the training of individuals. For the traditionalist on education and work, the education revolution does nothing more than make productive workers more plentiful, but it does not really fashion different jobs.

Contrasting with this narrow human capital view, a certain amount of observed looseness between skills and education suggests to the education-as-myth critic that there is little, or even no, correspondence between the two. Further, the education-as-myth perspective suggests that for the most part changes in jobs are towards de-skilling through the assumed pernicious combination of technology and profit seeking to the point that education matters little to the real content of what is done at work. If it happens at all, upgrading of jobs by educational degrees does not represent a ‘true’ increase in the need for more skill for a particular job; the education-as-myth perspective sees educational upgrading as a byproduct of a bias on the part of employers in favour of social sensitivities of the educated more than any advanced skills (e.g. Bowles and Gintis 1976). The argument is that rampant educational upgrading happens as a result of duping students about the workplace, duping employers about education, or both. This image suggests a world where education and skills are mostly disconnected throughout most of the labour-force, and if they do connect, it is only through a formalised myth such as minimum school degree requirements. Education trains students to be workers in attitude and complacency, not in real skills and hence the education revolution rapidly brings on the world of Dore’s diploma disease. From this highly cynical view, education makes mostly a more compliant worker, although maybe ultimately a highly dissatisfied one, and just as with the narrow human capital perspective, education does not really influence the workplace beyond individuals.

Sociologist Ivar Berg’s widely noted Education and jobs: The great training robbery is perhaps the fountainhead of the education-as-myth opinion: Change in the content of jobs is only through education upgrading not real skill upgrading. Written in 1971, five years before Dore’s monograph, over the years the book’s putative message has become even more extreme than its original claim, so that now it is the standard bearer of the most cynical perspective on education and job skills. Although infrequently read and mostly ritualistically cited today, the book still stands for the claim that there is virtually no connection between education and jobs beyond vacuous credentialism, and it is widely cited as so. As its provocative title suggests, in the early 1970s Berg saw the educational revolution as some sort of societal rip-off, with the huge sums of public and private funds poured into maintaining the schooled society as a waste on too much education.
Its prowess as a standard citation aside, reading *Education and jobs* today one finds it a peculiar book; missing Dore’s lucid argumentation, its clunky prose is more diatribe interspersed with empirical demonstrations than a cogent argument supported by analyses. Often the point of the empirical exercises seems to be obvious only to Berg himself, and upon further reflection much of the information he presents actually supports the counter-argument – namely that there is more real skill upgrading than run-away education upgrading (i.e. vacuous credentialism). The book begins by Berg citing mostly platitudes and naiveties about the assumed all-encompassing benefits of education to modern society and props these up like straw-men to be picked apart. For him, a kind of generalised human capital perspective’s assumption about the connection between education and job skills is both too mechanical as well as too much of a kind of social injustice perpetrated on unsuspecting members in society:

The idea fell on willing ears in a society that accepted a mechanistic interpretation of the relationship between education and employment. If jobs require increasing educational achievements, and if society provides opportunities for education, then, according to the sapient orthodoxy, the burden falls upon the individual to achieve the education necessary for employment. (Berg 1971, 9)

Berg is so committed to a sceptical view of mass education that he never takes the full implications of the education revolution into account. He already has his answer – mass education has resulted in mass educational (skill-less) upgrading because employers believe in rising educational requirements of jobs as a general rule, not because of any observed increased productivity as the human capitalists claim. And like Dore, Berg limits his conception of education to a black box that only presumes to change individuals one at a time, never considering the wider impact of educating large proportions of workforces to levels never before seen in human society.

Berg presents several sets of evidence in an attempt to buttress his cynical perspective; however, the weaknesses of each illustrate the problem with the education non-skill upgrading argument in general. One set points to the fact that responses from a small survey of senior managers of largish private firms at the time showed that managers did not keep an account of the productivity of workers by their educational attainment, and hence did not know if there is such a relationship. From this Berg infers that managers believe more in education than in actually knowing about its real impact on work, and in part he is right. This belief is an important part of the institutional impact of education on the workplace that is discussed below. But a belief in something does not in and of itself suggest that it could not also be true. Writing as if he knows the methodological thin ice here, he nevertheless continues to reference how firms tend to use only limited rationality as some kind of proof that education and skill are unrelated. From 40 years of research on organisations and their use of rational strategies, it is well known that there are all kinds of disconnections among organisational actions, beliefs and rationally derived information (e.g. March and Simon 1993). In light of what we now know about how organisations function, the fact that some managers do not know if there is a relationship between education and productivity in their production sites is not surprising, nor is it much evidence either way about the true relationship between education and job skills.

Berg does eventually present some direct evidence about education and productivity, but even here his results are not very convincing. He describes a study in the garment industry which found that among pieceworkers the rate of production did not differ among their education levels, yet this is a dubious test of his argument.
Garment making (machine sewing and cutting) is notoriously immune to technological short-cuts, even in today’s factories around the world (e.g. Ross 2004). There is, of course, technique, dexterity and certainly a learning period, but once mastered, mass apparel production does not lend itself to enhancement through additional skills, particularly those mostly learned in school.

Further on in the book, more realistic evidence is presented about productivity and education among workers in six technical engineering and scientific firms. A small sample to be sure, but the data are interesting; yet again Berg’s resistance to considering the full implications of a link between education and jobs leads him away from a richer evaluation of these data. First, he examines the relationship between education and salary – the educational wage premium – which increases linearly from lowest to highest levels of education across all six firms, and argues that since the absolute size of the education premium varies somewhat among firms, it is not tied to real skill differences, and hence this represents the villain waiting in the wings – educational upgrading. Perhaps, but there are many reasons for some variation across firms in the education wage premium such as age differences in the labour force, regional differences in availability of people with certain education and so forth. In and of itself, cross-firm variation does not prove a disconnection among education, job skill and productivity.

In an accompanying table Berg presents some intriguing information contrasting the salary averages by education in these firms between workers with ordinary performance and workers with highly valuable performance (as judged by management). Although the table plainly shows that across each education level valuable performance is rewarded with higher salaries, Berg ignores this and instead makes much of the fact that the payments on performance are larger for workers with PhDs versus those with masters degrees and so forth on down through the education levels. Even if one were to ignore the fact that this observed pattern is exactly what a human capital hypothesis would predict – wage premium by productivity rate due to education (labour investment) levels – there is nothing in these results that points to a dramatic degree of educational upgrading that is unrelated to skill or productivity levels. In fact the whole table is a kind of mini-testimonial to the opposite claim from that of Berg’s!

The final type of evidence Berg presents is what the book has become best known for among the proponents of the education-as-myth idea. Using what was for the time a rather obscure federal archive of information about jobs, Berg presents a direct examination of the historical shift in skill levels across many jobs in the American economy. The US Department of Labor’s Dictionary of Occupational Titles (DOT) documents direct assessments of the educational and vocational preparation needed for the skill requirements of thousands of jobs (US Department of Labor 1956, 1965, 1977). From the middle part of the twentieth century until 1986 the DOT undertook various updates and hence provides a sort of historical record of direct measures of skills requirements of detailed jobs.

Berg, as most researchers who have examined this archive, focuses on the GED measures for each job. The GED has three sub-measures, one each for language, mathematical and reasoning skills. Contained in the DOT are also measures and indicators of the physical demands of the job, requirements for interpersonal skills, autonomy versus control of the job and the job’s overall substantive complexity (Spenner 1983). To assure independence between job skills and education, the DOT explicitly states that the job skills are assessed irrespective of education levels of workers that might have these skills, therefore in the collection of the information, just the skills needed
to successfully do the work of the job were recorded, so that the GED levels are not just a tautological reflection of education levels, although of course they are related (Fine 1968). Exactly how they are related and whether or not the relationship is only one of educational upgrading or represents skill upgrading is the question to which Berg applies these data.

Examining just the change from 1956 to 1966, Berg takes only the highest score among the three sub-measures of the GED to represent the change in skill requirements and completely ignores the considerable information contained in each measure, as is examined in the more recent research discussed below. But even with his rather crude way to address the data, contrary to the education-as-myth perspective that he wants to support, Berg finds considerable skill level upgrading, with about a third of the 4000 jobs examined undergoing skill upgrades in just one decade.

Berg then juxtaposes a decade of job skill changes with changes in education attainment of American workers, and proposes that the results indicate mostly skillless educational upgrading. But it is not clear what his analysis really shows. As best as one can tell, as Berg never explicitly describes his logic, he thinks that if there is a degree of mismatch between skill upgrading and educational attainment of the labour force, then this must mean educational upgrading. This assumption, particularly in such a short time frame, does not really hold up: Even if job skill upgrading were happening in conjunction with education, none but the hardest-core human capital enthusiast would assume a perfect agreement between the two.

Berg goes on to demonstrate that depending on how the analyst decides which GED levels match to which education levels, the data can be made to show some mismatch, but they can also be made to show considerable matching. Astonishingly enough, after all of this modelling of the data, Berg actually concludes that there is more of match in the data than mismatch! He concedes that there just is not much proof of run-away educational upgrading because of increases in educational attainment of Americans over this decade. What his analysis does show, and he even notes it, is that there is substantial upgrading of the low-level jobs to expanded-skill jobs for more educated workers:

It is possible that this consolidation reflects actual upgrading of a number of low-level jobs. We can speculate that employers, having access to better-educated workers, have in fact expanded the scope of some jobs. (Berg 1971, 48, emphasis added)

As an argument about extensive educational upgrading Education and jobs is unremarkable if it had not become one of the standard sources for the opinion that education and skill, as well as education and the workplace, are not very related (as is demonstrated below in the discussion on Collins 1979). As one goes beyond the title and unfounded assumptions, they will find the actual data mostly support the opposite conclusion; job skills and education are related and there seems to be more than just run-away educational upgrading happening historically. To think that the education revolution is some kind of societal rip-off again assumes that there is some ‘natural’ world of work and that educational attainment is rarely connected to this. The labour market in Berg’s view is mostly fixed and therefore large-scale changes on the education side must be trivial at best, or may even become a major social problem. And we come full circle back to essentially Dore’s unfounded conclusion of over-education. But ironically the way out of this view is captured in Berg’s own words above: A useful way to look at the rising skill requirements in the American labour market is as
an outcome of a supply of workers with increasing levels of education and not as phony credentialism, but as a real adaptation to what educated people think about themselves, how they have come to think about their world, how they expect to work, and maybe also even as the market adapting to higher levels of productivity by educated workers.

What if the world of work is not mostly fixed in some preconceived ‘natural’ fashion and instead expands and adapts given large-scale changes in the characteristics of the work force? Thinking about the education revolution as not only so many people receiving more schooling, but also as a massive transformation of the ideas about people as workers leads to a very different conclusion about the relationship between education and work. Demand for skilled labour means more than just a change in recruiting and training, it means redesigning the jobs themselves to fit the capabilities and mentalities of high-skill, read – highly educated – workers. Recent research on shifting job skills and their relationship to the education revolution shows precisely this.

New analyses of the American job market and its shifting skill requirements paint a very different picture from Berg’s education-as-myth perspective. Working with the same information from the measure of the DOT as Berg, but with a longer time series from the 1960 to 1985 and with a detailed systematic approach to the measures, two more labour economists, David Howell and Edward Wolff (1991), find that across a consistent set of 264 occupations and 64 industries three major changes occurred over the past four decades. First, not surprising, is a persistent decline in the demand for physical motor skills in American jobs. Second, no doubt part of the education fostered managerial revolution examined above, is a sharp rise in interactive skills for working with co-workers. And last is the growth in the cognitive skills of analytical reasoning and synthetic reasoning.

This last finding is particularly telling of the wider impact of education on the workplace. The rise of a culture of academic intelligence that is at the heart of the schooled society is among the most fundamental impacts that mass education has made on modern society (Baker, forthcoming; Young 2008). It would be a strange world if after most people were socialised in formal school instruction lasting from 12 to 16-plus years of their lives during which they learned these skills and value them in themselves and others, that the world of work did not reflect this change. And by ‘reflect’ one means more than the mere addition of some higher level cognitive jobs. Instead, given the large scale transformation that the education revolution has brought in how people think about thinking, one would expect a similar transformation of the entire workplace. And this is just what Howell and Wolff find.

Benefiting from earlier research on the DOT (e.g. Spenner 1983; Zuboff 1988), these researchers calculated two measures of the cognitive skills required in jobs: one is the combined GED measures (mathematics, language and reasoning skills) to form an indicator of analytical reasoning; and the second is a measure of the substantive complexity of the job to form an indicator of the synthetic reasoning, i.e. putting different ideas and concepts together in new ways (also referred to in cognitive development as effortful thinking and new problem-solving). It is notable that both of these skill sets rely heavily on the components of fluid IQ that have been so thoroughly institutionalised as key academic intelligence capabilities through mass education (Blair et al. 2005). And this is true in the labour market as well.

Howell and Wolff find that from 1960 to 1985 occupations with the highest level of substantive complexity grow from a fifth of all studied occupations to just fewer
than 30%. And over the same time, jobs with the lowest levels of substantive complexity dropped to 15%. Similarly, the jobs with higher cognitive complexity attracted large gains in employment growth. Added to these trends over this period is the growth of the entire service sector, which has higher than average skill requirements relative to the manufacturing sector (Howell and Wolff 1991, table 6).

Also Howell and Wolff find that among the industries with the greatest growth in cognitive job skills there is the least amount of inequality in skill across jobs, in other words – ‘upgrading of cognitive skill is associated with narrowing cognitive skill requirements across jobs’ (1991, 498). And this is true even though the American labour market continues to have areas of significant inequality in wages and job conditions. As mass education has spread an ideology of the universal individual with developed thinking skills, change in the nature of some jobs has reflected this shift.

This is not to say that because of the rising skill levels, particularly in the areas of substantive complexity and formal education skills reflected in the GED, all of this is a positive change for workers. Along with these trends in the USA there is also growing inequality in income across education levels, the segregation of females into lower paying part-time jobs (but many demanding considerable cognitive skill levels), and growing inequality between low and high skill-educated parts of the labour market (e.g. Massey and Hirst 1998).

It is also true that those who have not played the education game well increasingly suffer in the labour market. Starting in the late 1970s and continuing into the 1990s in the USA, the real wages of workers with 12 or fewer years of schooling fell by 26% and have never recovered since. A similar pattern has clearly happened throughout the labour markets of other economically developed nations and most likely is now happening in less developed economies too (e.g. Berman, Bound, and Machin 1998; Hanson and Harrison 1995). In the current world economy the once embittered taxicab driver with a PhD, the symbol of what turned out to be the benign diploma disease of the 1970s, is now very likely to be fully employed in a higher-level job at a good wage; it is the under-educated taxicab drivers taking him to work that are at much greater risk of economic uncertainty than before.

Nevertheless there is compelling evidence to indicate that the content of jobs has changed and that a substantial portion of this change is exactly as one would predict from the growing emphasis on cognitive skills in mass education. Contrary to what Berg wants his analysis to show, most studies using the DOT find an observable skill upgrading of existing jobs and creation of new jobs, particularly in terms of more cognitive skills (see Spenner 1983). So the question becomes: What causes job skills and the workplace to change given the presence of evermore educated workers? The answer lies in examining the dynamic relationship among education, jobs skill and technology.

The myth of the myth-of-education, job skill and technology

Perhaps the reason that the education-as-myth perspective has gotten so much traction over the past decades is that up until now there has never been a thorough investigation of the relationship among education, job skill and technology. There are research literatures on the relationship between any two of these, but not all three together. Similarly, the human capital perspective often assumes skill change away by arguing that whatever happens is driven by firms reacting to market forces. This is certainly true, but why firms choose to react one way, say through deskillings, instead of another...
way, say through job skill upgrading through technology, is more complex than just maximising profit, which is a given in any case. Recently though, research has begun to untie the complicated knot among these three forces, and the findings shed further light on the way education has transformed work. Putting this new research in perspective about the educational transformation of society leads to the last of the three major defining works on education and work.

A whole generation of American sociologists of education cut their conceptual teeth on Randall Collins’ first book, aptly titled *The Credential Society*. In the late 1970s it represented a third possible sociological argument between what was turning out to be a limited Marxist analysis of schooling (closely related to the education-as-myth model) and a theoretically weak technological functionalism (somewhat related to the human capital model). Now a classic in the intellectual development of a sociology of education, the argument of the book merges an early institutional view of education with observations of the rising schooled society in the USA, and recasts three central questions: why education expands, why educational credentials become so prominent, and why professions use educational exclusion through credentialing to win economic and social standing in modern society. And much to the book’s credit, the way Collins framed each question shifted the study of schooling and its relationship to society.

As a result of rethinking central questions, Collins took the idea of education-as-myth a step further, arguing that education is part of a larger ‘myth of technocracy’, or namely, the myth that society follows where technological advances take it. And that education becomes the main mechanism by which individuals fit (are allocated) into the technocratic order. Because undeniably there has been so much technological change over the past several centuries and just as undeniably there has been so much educational expansion, many, according to Collins, misinterpret these concurrent trends as being directly related in only this way. Collins goes on to argue that this widely held misinterpretation is a falsehood that pervades how people have come to think about the relationships among technology, education and jobs.

Instead of the myth of the technocracy, Collins reasons that education, through credentialing, actually is mostly a mechanism to capture control over the social and physical resources that human society has amassed through technological advances. Here credentialing is neither of the Dore’s and Berg’s vacuous and duping type, nor is it merely a screening device. Rather Collins insightfully recognises that the presence of educational credentials is really a whole system by which education degrees become the main route to power within an increasingly professionalised and formally organised society. What he calls *credentialism* is an aggregate process, one by which power (often in formal organisations with large professional staffs) in society is distributed in highly legitimated ways. It is education as an institution, directly interjected into the growing *personnel professionalism* of large formally organised white-collar workplaces, as described above. The schooled society makes educational credentials ever more dominating not only for individuals but also for the very nature of how the overwhelming volume of resources and riches of a technological world are legitimately divided up.

Seen this way, educational credentials essentially codify the entire package of access, control and rights of usage of authoritative knowledge. Credentialing becomes the embodiment of an educationally constructed everyday world of expertise and the expert, and it is the manifestation of education’s unique institutional privilege in modern society (Bills 2003). For example, lawyers capture larger roles in struggles over competition of resources (capital and power), managerial cadres of MBAs come
to control larger shares of organisational resources, educationally defined and exclu-
sive groups of professionals lay claim to certain privileged functions within the
evermore organised, yet fluid in competition for resources, workplace. Furthermore,
Collins does not see this unfolding in some smooth purely technical fashion; just the
opposite, his version of credentialism is fraught with conflict among professional
groups (read, educationally credentialled groups) to capture resources and privileges in
society. Most, if not all, of the increasing professional, managerial and technical occup-
ations described above are controlled through educational credentialing, and Collins’
chief insight is that this credentialism becomes grafted on to society wit large, because
in a schooled society educational success of individuals and groups becomes
synonymous with individual and group social power.

Illustrative of this insight, the book ends with a comparison of how American
engineers, lawyers and physicians historically used credentialism to control whole
occupational-organisational sectors and the associated rewards in power, prestige and
material wealth. In Collins’ technocracy, credentials play a central sociological role
far beyond just allocating individuals, educationally generated credentials become
nothing less than the central currency of social power.13

This is a sweeping and telling observation, one that foreshadows the kind of reason-
ing about education and society stemming from the neo-institutional argument behind
the new synthesis at the heart of the discussion here. Recent research shows that there
are some improvements to be made on Collins’ useful original argument, and there is
also some old baggage left to jettison in order to lighten its conceptual load.

The problem lies in Collins’ incorporation of Berg’s faulty assumptions about
education and job skills. Like many critical sociologists of education at that time,
Collins assumes that schooling and job skills, and by extension technology, are
essentially unrelated, except of course through the credentialing-power access link.
There are two problems with this. First, Berg’s cruder education-as-myth argument
cheapens Collins’ cogent insight about how access to power and resources through
education has become the main system legitimating social stratification. The latter’s
argument need not rely on an image of educational upgrading. Second, it may be more
consistent to apply Collins’ insight about the rise of the schooled society to a dynamic
interaction of education, job skill and technology: Education transforms job skill
upgrading, workplaces and the distribution of power. In fact, one can argue that a
fuller view of the transformative power of education yields an analysis that is
consistent with the self-reinforcing nature of formal education and its production of
credentialism.

A more limiting problem with Collins’ argument is his reliance on content-less
educational upgrading image leaves technology hovering in the wings. Other than
producing the social and physical resources that are the prizes of (and motivation
behind) credentialism, technology in this version of the technocracy has no other role
as it is only indirectly related to education. Technology is relegated to a kind of socio-
logical no man’s land. But this seems to fly in the face of so much observation of work,
education and technology; the modern workplace, as well as the production process
are brimming with technology that changes, sometimes radically, with new innova-
tions. Can it really be the case that mass education has no impact on this? As insightful
as Collins’ observation of credentialism was, by assuming education in the schooled
society is part of a larger myth of a technocracy, his assumptions about education and
technology in 1979 handicap any subsequent institutional inquiry about the impact of
education on technology – two things that loom so large in modern society.
Since then, there is an emerging research literature indicating that the schooled society has had a profound impact on many dimensions of technology, including how it is incorporated into work. Largely on the pages of the *Quarterly Journal of Economics*, economists of labour and national development have developed an insightful set of empirical findings about the relationship among education of workers, technology and the organisation of the work inside firms.

This research is motivated in part by an intriguing counter-intuitive finding about the expansion of higher education and what economists refer to as the ‘college wage premium’, or how much more salary college educated workers make (Autor, Katz, and Krueger 1998). The puzzle is as follows: In the USA from 1940 to 1970 college educated workers in the labour force grew by 2.73% each year, and then from 1970 on increased annually by 3.66%. As the large American baby boom was finishing high school and heading to college, these rates represented a massive change in the educational composition of the labour force that continues into the present. So to economists it made sense that from just before WWII as the supply of college-educated workers rapidly increased, their skills became less and less unique, and so following the law of supply and demand, the college wage premium fell as expected from an advantage of 55% more wage for a college graduate than high school graduates in 1970 to 41% by 1981. But as the supply of college educated in the workforce rose even faster after the watershed year of 1970, the college wage premium did not continue to decrease, instead, paradoxically, it turned and increased so that by 1995 the college graduates were earning 62% more. Yet given the relationship between labour supply and demand (as reflected in wages) this should not have happened, so why did it?

A big part of the answer to this paradox is what education does to individuals and in turn what that means for the use of technology in the workplace. Recently, labour economists have been exploring a phenomenon known as *complementary technology*, or the process by which the educated worker transforms the workplace through the expectations of what he/she is capable of and hence what technologies will be most productive and profitable (Acemoglu 1998).

When most think about the relationship between technology and the skill capabilities of workers, they think about technology as replacing, not complementing, workers. And there is a long history of just such a relationship, as throughout the eighteenth century most innovative technology – spinning jennys, weaving machines, printer cylinders and the later assembly lines, etc. – replaced workers (Acemoglu 1998). And the same process can still be found in today’s workplaces, as for example when computers replaced some skilled jobs that are now done by less-skilled workers. But this is not the only way technology influences the workplace. There are now a number of examples of how technology complements the rising education of workers and makes employing them more profitable.

Further, it is not just any technology that is complimentary with more educated workers, rather it is what labour economists refer to as ‘pervasive skill-biased’ (read, pervasive educated-biased) technology that is responsible for the complimentary relationship with education that is transforming the workplace (Autor, Katz, and Krueger 1998; Berman, Bound, and Machin 1998; Murnane and Levy 1996). And this is what a number of studies of firms, technology, and worker education have shown.

Research on complimentary technology started about 15 years ago with the simple enough finding of a positive relationship between an educated work force and computer adoption in production, as well as the findings that the addition of more non-production employees – i.e. managers – is associated with the adoption of more
computers in the firm (e.g. Autor, Katz, and Krueger 1998; Dunne and Schmitz 1995). In an attempt to sort out the direction of causality, or in other words, to answer whether the educated workforce drive adoption of technology, or vice versa, Dom, Dunne, and Troske (1997) show that firms that adopt new factory automation technologies hire more educated workers. For instance, the researchers report that when firms replace traditional teams of draftsmen and model builders working to develop new products with computer-automated design workstations, their labour force reorganises towards higher levels of education. And the effects are substantial; compared to firms with the lowest level of technology adoption, firms with high levels of technology have workforces that include proportionally four times more college degree holders and twice as many college-educated managers. And most telling about the question of the impact of education on the world of work is that Dom, Dunne, and Troske find a longitudinal pattern of hiring and technology adoption that suggests that firms that already have an educated workforce are more likely to incorporate advanced technologies in production than firms with a less educated workforce. The relationship between complimentary technology and the educated labour force appears symbiotic more than one occurring before the other. Or as Murnane and Levy summarise about their case study of computers and higher education of workers in a bank:

The development of computerization, the design of jobs, and the recruitment of college graduates – three sides of the same coin – are not fully played out [at this bank] … experience suggests that an increased demand for skilled labor means more than just a change in recruiting or training. It means redesigning the jobs themselves to maintain the interest of higher-skilled workers. (1996, 262, emphasis added)

So, does the pattern of falling and rising education premium in the USA defy the laws of supply and demand? No, instead after a certain point when a type of education becomes more widespread as the growth of college degrees did in the USA, firms see that capitalising on the increased capabilities of workers through more advanced production technology is profitable and then they pursue these kinds of workers and pay them wages to retain their skills. But only by considering education as a skill transforming process – as a real transformation of the individual in addition to simple screening or credentialing – does the law of supply and demand hold true.

Perhaps the best example of this phenomenon is how the USA developed the schooled society with an industrial economic base before the higher education expansion. Two additional labour economists examining the history of the American economy, Claudia Goldin and Lawrence Katz, have shown that much of economic development has been a spiralling interplay between rising human (i.e. educational) capital of the working populations and technological change (1998). Noting ironically that virtually the entire American literature on labour history rarely mentions the education of production workers, they find that the education-biased process that seems so newly pronounced in recent decades, actually began in turn-of-the-twentieth century manufacturing.

Certainly many types of industries developed during this period in the widely recognised classical progression of moving from collective skilled artisan production to mass unskilled labour forces in assembly lines using Taylorism production. In these cases, technology and capital intensification deskill many jobs in the first industrial revolution of cotton, woollens, silk textiles, footwear, lumber, stone, clay and cement. Yet what has tended to be overlooked is that during the same era, a number of industries moved beyond unskilled mass production by using new contin-
uous-process and batch production technologies in firms in petroleum refining, dairy products, paints, chemicals, rayon and non-ferrous metals. In these industries, as well as those that began to use significant amounts of electrical instead of steam power, high-technology for the time such as in radio production, there is clear evidence of an educational expansion of workforces, i.e. more employment of workers with secondary education and non-production managers. Various new managerial strategies also added to this emerging complementary relationship between education and technology in the first half of the twentieth century (Chandler 1977). Firms that intensified capital through these ‘hard and soft’ technologies hired significantly more high school graduates (i.e. the wave of masses on the edge of educational expansion during this era), while many other firms continued to invest in the traditional formula of deskill mass production.

Goldin and Katz’s review of federal archival documents on labour from the second decade of the twentieth century illustrates that transforming industries wanted to recruit the more educated worker not for his middle-class sensibilities and habits as the education-as-myth perspective insists, nor for narrowly defined technical skills as a traditional perspective suggests, but rather for the cognitive skills found in the emerging curriculum of academic intelligence that went hand in hand with educational expansion and also increased production. As Goldin and Katz describe it:

Cognitive skills were valued in various trades. High school graduates were sought because they could read manuals and blueprints, knew about chemistry and electricity, could do algebra and solve formulas and ... could more effectively converse with nonproduction workers ... Blue-collar positions requiring some years of high school or a diploma were described as needing cognitive skills such as ‘good judgment’, ‘skilled in free-hand drawing’, ‘special ability to interpret drawings [and] chemical formulas’, ‘general knowledge of chemicals used’, ‘[ability] to mix the chemicals’ ... ‘knowledge of electricity and electric wire sizes and insulations’, and ‘general knowledge of photography’. (1998, 718; quoted texts are from US Department of Labor reports from 1918 to 1921)

This historical story is important for the argument here that the unfolding of the mass education revolution had a profound impact on society. Not only is the third cycle of the revolution – the spread of mass higher education – transforming the current workplace, the earlier cycles of schooling expansion also played a role in transforming the workplace of one hundred years ago.

In reflecting on the causes of this earlier trend, Goldin and Katz speculate that the education-biased technology change was caused by the booming growth in secondary education in the USA during the first half of the twentieth century. As other labour economists, they take a narrow view of educational expansion and argue that the jobs created in these technologically changed industries created a demand for more educated workers and people undertook more education as a result. Certainly this was, and is now also, true to a degree, but is it hard to imagine a simple process of job change creating the massive expansion of secondary education for all kinds of people (females, people with dubious academic ability, secondary generation immigration youth and so forth).

Lastly, since the education revolution is worldwide, its impact on economies should be observed worldwide. Economists of an older generation speculated that opening trade between rich and poor nations would greatly favour unskilled workers in the latter and skilled workers would suffer, and hence be more likely to immigrate. But over the last two decades there are indications that the workplace in
less-developed nations is also being upgraded through the educated worker and his ability to use advanced technology.

An international study of manufacturing firms and their production plants by Berman, Bound, and Machin (1998) suggest how this is happening. A rising supply of more educated people entering the labour market leads to more extensive use of education-biased technology, so that jobs within plants are rapidly being upgraded through a complimentary relationship between education and technology. It is important to show, as Berman, Bound, and Machin do, that this is happening across nations within both the same industries and the same plants within those industries as this helps to rule out exogenous factors that could influence the composition of the labour force. The trend is significant; for example, in many developed nations examined over just eight years from 1979 to 1987 there was a 71% shift to more educated workers within plants; an estimated eight times more potent factor than increased trade (Berman, Bound, and Machin 1998). And of course all of this is occurring even while more educated workers receive higher wages. Further, there is still cross-national variation in the rate of the education upgrading of the manufacturing workplace. This makes sense as the rate of educational expansion, while all in a positive direction, varies cross-nationally as well, which is further indication of the transforming power of education in the workplace (Gottschalk and Joyce 1998). This is not to conclude that technology is only used for more enlightened production, there is considerable evidence that computers (and the expert-managers behind them) are also used for command and control functions in firms (Brown and Lauder, forthcoming).

Towards the educated workplace: human capital or myth?
Education goes well beyond the training of individuals in its influence on society (Baker and LeTendre 2005; Baker, forthcoming). New research examined here indicates that the schooled society’s workplace constantly adapts to the ideas of personnel professionalism within an expanding model of the formal organisation as the main context of jobs, while major control of the massive resources and power generated by technological production goes to credentialed experts. Professionalism, technical expertise and managerial skills are the defining components of the twenty-first century job. And there is significant job skill upgrading along these lines, particularly in terms of complex cognitive skills and synthetic reasoning that were more or less unheard of in the workplace one hundred years ago. Its ability to redefine people and their capabilities, as well as technical innovation and information, is how ever-expanding mass formal education shapes work to an unprecedented degree. Neither Dore’s diploma disease, nor Berg’s fears of a mass duping of people about schooling have come to pass. If the education revolution transforms the very basics of work, what is to be concluded about the two contrasting models – the traditional human capital and education-as-myth – that dominate most intellectual discussion of work in modern society?

Most of the research reviewed here is more critical of the education-as-myth perspective than the human capital, but the latter does not go unchallenged. In fact, while the emerging educated workplace supports some of the basic ideas behind the human capital perspective, it points to a number of limitations as well. Most human capital argumentation reads as if there is a natural order of productivity that increases as workers gain more skill. And as is shown above, there is some evidence to support this kind of process in recent decades in the US workplace, one of the most educated
in the world. But a more institutional view of the constructionist powers of education also argues that there is no particular natural order of skill, rather as mass education is unleashed on society, it makes a new order of job skill. In many ways the original spirit of the education-as-myth perspective, particularly as applied by Collins’ vision of a credentialed society, was on to an important insight, it just stopped short of its full implications. Namely, that education fashions a new order of work in society. Educated workers become ‘productive’ in an educationally defined fashion, but not as the education-as-myth perspective would have as in a phony way, because there are real ramifications of this new educational order of work. This ability of education to reshape the workplace, particularly in the large formal organisation, along the dimensions of cognitised abilities, personnel professionalism and mass managerialism in the aggregate is underappreciated by the human capital perspective.

The hypothesised kind of tight one-to-one efficiencies among new skill, wages and productivity are not so easy to empirically find, or at least not on a large scale. The relationship among education, job skill and technology is much looser, and hence evident of a fair amount of change at the micro level. There is considerable evidence that changes brought on by mass education of workers simultaneously occur (and may cause) change at the level of the job and economic sector through the educated workplace. The usual narrow human capital perspective must be expanded to take into account the ways in which formal education both as individual human capital and a mass phenomenon interacts with the modern economy (see also Bills 2003). Unless it does so, its explanatory power will be far less than it could be.

The research here also suggests that the education-as-myth view needs to be put to rest, at least in its crudest application. It censors the full extent of insights of a more sociological model of education, technology and work. There is no reason why a perspective on education and work cannot hold the ideas of education as transforming work and the elaboration of an educated workplace together. Schooled individuals are capable of (accustom to and expect to use) certain kinds of skills (particularly along the lines of those related to academic intelligence) that less or unschooled individuals tend not to be. Work is increasingly organised around these skills as education is intensified through credentialism that is fully integrated into the formal organisations that contain most jobs. This is not to say that the educated worker is a ‘naturally’ more productive worker in every type of workplace, as cruder versions of the human capital view suggest. Rather, the educated worker is the definition of productive in the educated workplace. Workers and jobs change together as the full impact of the education revolution unfold.

A new synthesis of the best of these earlier theories of education and work is in the making (see also Young 2008). A view of the full scope of evidence recognises that the education revolution transforms most individuals and creates new ideas of their capabilities in profound ways never before seen in human history, and as schooling sorts and allocates transformed individuals, it does so with increasingly legitimate social authority, which leads to ever greater power in constructing the dimensions of work.

Notes
1. For some reason most of the over-education literature focuses only on males, but if more attention had been paid to the telling combination of factors behind the similarly skyrocketing enrolments of females these experts might have realised that there is far more behind
the education revolution than just a narrow competition for jobs (e.g. Baker and LeTendre 2005).

2. I am indebted to the succinct conceptualisations of Mark Blaug (1970), Richard Rubinson and Irene Browne (1994) and Peter Wiles (1974); although dated these writings ring as true now as they did then.

3. In the original conception of human capital there were other kinds of investments such as willingness to move to areas with new jobs, and on-the-job training, but over time formal education has proved to be the main investment (Teixeira 2009).

4. Those familiar with current debates about educational accountability policies and the extensive use of testing such as those that make up the No Child Left Behind laws in the USA will recognise Dore’s complaints.

5. The one small difference found was on job satisfaction for very highly educated people working in menial jobs.

6. Obviously growing numbers of university students in some nations led social and political protest, but the dynamic here was not alienation from education–job mismatch, rather in and of themselves student revolts are another macroeducation effect on society (e.g. Meyer and Rubinson 1972).

7. Differences among estimates are due to different methods. Clogg and Shockey use a relative over-education measure with no anchoring in job skills, while B.H. Burris uses a measure of difference between education level and directly observed job skill requirements.

8. I am indebted to Peter Meyer, also of the Bureau of Labor Statistics, for leading me to this research.

9. See Abbott (1988) for the opposite argument that the formal organisation destroys professionalisation in the traditional sense.

10. ‘Piecework’ is an old manufacturing term meaning that workers make an item and are paid per item regardless of the time it takes.


12. GED here stands for General Educational Development and as a measure used by the US Department of Labor to categorise skills requirements of jobs it should not be confused with the GED, or the American General Education Development Diploma, the alternative secondary school degree obtained through its examination.

13. Hence his idea of education as status competition that many sociologists frequently associate with this book.

Notes on contributor

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References


