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Education, Globalisation and the Future of the Knowledge Economy^[1]

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The dominant view today is of a global knowledge-based economy, driven by the application of new technologies, accelerating the shift to high-skilled, high-waged European economies. This view is reflected in the expansion of higher education and the key role of higher education in national and European economic policy. The Lisbon agenda seeks to make the European Union 'the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Commission, 2003, p. 2) Not only is education believed to hold the key to international competitiveness but to the foundations of social justice and social cohesion.

This article will outline the underlying assumptions of this mantra, which in many respects has changed little since the 1960s when human capital theory gained increasing prominence in education and economic policy (Halsey, 1961). It will then examine the prospects for the creation of high-skills economies throughout Europe in light of new realities of the global economy. This analysis is based on interviews with senior managers and executives in leading transnational companies and government policy makers in seven countries including China and India. In conclusion, we will outline a series of issues as a contribution toward a new agenda for education and the knowledge economy within the European Research Area.

Technological Evolution and the Rise of the Knowledge Economy

A striking feature of what Grubb & Lazerson (2006) call the 'educational gospel' is the continuity in thinking about economic development and the role of education. It is consistent with a technocratic model of evolutionary social change that has a long tradition in the social sciences. Clark Kerr and his colleagues (1973) highlighted the progressive nature of industrialisation since it depended on a greater role for science and technological innovation that demanded high levels of education and meritocratic opportunity.

While some sociologists have been critical of economic theories of human capital because of their emphasis on economic rationality (Fevre, 2003), they have shared a similar model of industrial progress that runs through the writings of Comte, Durkheim, Parsons and Bell. Societies are assumed to move from simple to complex divisions of labour driven by scientific knowledge that accelerates the pace of technological innovation. These trends are mirrored in the transformation of the education system – from mass elementary to mass higher education – as the demand for

skilled workers increases due to what economists call 'technological bias', which asserts that at the same time that new technologies eliminate some jobs through automation they create new higher skilled employment and up-skill existing jobs (Lauder et al, forthcoming).

The transformation of work is also assumed to change the relationship between employees and employers. As high skills (including individual expertise, knowledge and creativity) become a major asset that determine the profitability of companies, superseding the ownership of land, machines, and material capital, it is the competition for ideas, knowledge and skills that comes to define the new economy because it is no longer ownership of capital that generates wealth creation (Drucker, 1993). Consequently, the increase in educated labour is interpreted as a power shift where the prosperity of individuals, companies and nations depends on human and intellectual capital rather than on issues of ownership that defined Marxist accounts of the capitalist system.

The importance of human capital theory to current policy debate is not limited to issues of skills upgrading but to the broader relationship between credentials, jobs and rewards. Investments in education are premised on a political equation of high skills = high wages. The introduction of 'user pays' models for the funding of higher education rests on the human capital view that income reflects the level of skill. Low-skilled workers get low wages because the market value of their labour is limited because other people are able to undertake the same jobs with little formal training. Alternatively, high-skilled workers are assumed to be paid more because they are more productive and have greater market worth.

Globalisation as Knowledge Wars

The impact of the global economy on the prosperity of Western nations has increased rather than diminished the importance attached to human capital and the idea of a high-skilled, high-waged economy. The Leitch Review of Skills in the United Kingdom, when reflecting on the increasing global economic competition, observed that 'skills were once a key lever for prosperity and fairness. Skills are now increasingly the key lever' (Leitch, 2006, p. 3).

This is premised on the view that globalisation dramatically weakens the power of nation-states to manage the economy in the national interest. In the global economy it is no longer possible for Western governments to protect domestic workers from the full force of international competition. The shift of manufacturing jobs to low-cost economies such as China, Poland and Brazil bears testimony to the realities of the new economy. Higher living standards in North America and Western Europe can only be achieved by competing within niche markets for customised goods and services, based on the application of knowledge, skills and entrepreneurial ideas (Jones, 1999; Stewart, 2001).

Robert Reich (1991) explained the growth in income polarisation in the United States in the 1980s in terms of the relative ability of workers to sell their skills, knowledge and insights in the global job market. He argues that the incomes of the top 20% have pulled away from the rest because of their ability to break free of the constraints of local and national labour markets. The global labour market offers far greater rewards to 'symbolic analysts' or 'knowledge workers' precisely because the market for their services has grown, whereas those workers who remain locked into national or local markets have experienced stagnation or a decline in income.

Reich, amongst others, interprets rising wage inequalities as proof of both the realities of the global labour market and as evidence of the failure of the existing education system (Brown & Lauder, 2006). The reason why income inequalities have grown is not explained as a 'structural' problem – that the proportion of high-skilled, high-waged jobs is limited by the occupational structure – but due to the failure of the education system to make a larger proportion of the workforce employable in the global competition for high-skilled, high-waged work.

Thomas Friedman (2005) is also upbeat about what can be achieved by investing in the knowledge and skills of the workforce:

America, as a whole, will do fine in a flat world with free trade – provided it continues to churn out knowledge workers who are able to produce idea-based goods that can be sold globally and who are able to fill the knowledge jobs that will be created as we not only expand the global economy but connect all the knowledge pools in the world. There may be a limit to the number

of good factory jobs in the world, but there is no limit to the number of idea-generating jobs in the world. (p. 230)

It is believed, therefore, that there is now a global auction for jobs. Low-skilled jobs will be auctioned on price and will tend to migrate to low-waged economies such as those in Asian or Eastern Europe, while high-skilled jobs will continue to attract higher wages. These jobs will be auctioned on 'quality' rather than price, including the skills, knowledge and insights of employees. The main bidders for 'quality' jobs are assumed to be today's advanced economies. This offers the potential for countries such as the United Kingdom, France and the United States to become *magnet* economies, attracting a disproportionate share of high-skilled, high-wages jobs (Brown & Lauder, 2006).

But the technocratic model of an evolutionary shift from physical to mental labour is not limited to the changing relationship between education and the occupational structure within specific societies. It is extended to include the relationship between nation-states. The rise of the global knowledge-based economy is believed to remove much of the source of conflict and strife between nations. Trade liberalisation is presented as a 'win-win' opportunity for both developing and developed nations.[2] The territorial disputes that drove nations to war in pursuit of land and material wealth become less important in terms of power, privilege and wealth. According to Rosecrance:

In the past, material forces were dominant in national growth, prestige, and power; now products of the mind take precedence. Nations can transfer most of their material production thousands of miles away, centring their attention on research and development and product design at home. The result is a new and productive partnership between 'head' nations, which design products, and 'body' nations, which manufacture them. (Rosecrance, 1999, p. xi)

This shift from *bloody wars* to *knowledge wars* represents the highest stage in evolutionary development as nations compete for ideas, skills and knowledge that contribute to economic advantage by 'out-smarting' economic rivals. Schools, colleges, universities, think tanks, design centres and research laboratories are now on the front line in the search for competitive advantage. This is reflected in current attempts by organisations such as the Organisation for Economic Cooperation and Development's Programme for International Student Assessment (PISA) studies and the International Education Association (IEA) to develop comparative measures of academic quality and performance, along with global rankings of universities such as that developed by Shanghai's Jiao Tong University (Marginson, 2006). It is no longer the qualities of individual students within national systems that are benchmarked, but the quality of these national education and training systems as a whole. As Gordon Brown (2004), Britain's Prime Minister, has suggested, 'if we are to succeed in a world where offshoring can be an opportunity ... our mission [is] to make the British people the best educated, most skilled, best trained country in the world'.

A Report from the Field

What is surprising about policy and academic debates about the impact of globalisation is the lack of detailed empirical evidence. Much of the evidence is derived from consultancy companies that invariably conflate prognosis with prescription in order to profit from their knowledge. It has also been dominated by American writers on management and business issues that have tended to focus on US transnational companies and business interests. While some of this research is excellent, it may limit our understanding of the wider global transformation that is currently in progress.

Much of the debate is also outdated given the pace of change and the fact that globalisation is a process which, assuming further liberalisation of international trade (which is by no mean inevitable), will have an increasing impact at the national level as companies exploit new, cheaper and more reliable ways of communicating and working across knowledge, cultural and geographical boundaries.

Our argument is based on research with leading transnational companies at the vanguard of global economic change. The United Nations estimates that there are around 64,000 transnational companies, a rise from 37,000 in the early 1990s. These transnational companies comprise parent

enterprises and foreign affiliates which vary in size and influence. The foreign affiliates of these companies generated around 53 million jobs around the world (United Nations Conference on Trade and Development [UNCTAD], 2005).[3] General Electric had the largest foreign assets in 2003 with 330 enterprises in the United States and over 1000 foreign affiliates.[4]

The key role that these firms play in shaping the global economy is reflected in the fact that a third of global trade is due to intra-firm activities where components, products, services and software are sold between affiliates within the same company. Equally, it is estimated that over 60% of the goods exported from China in 2005 came from foreign-owned firms that had moved manufacturing plants to increase profit margins.[5]

Over the last three years we have interviewed 180 senior managers and executives in 20 leading transnational companies in financial services, telecoms, electronics and the automotive sector, to achieve a better understanding of their global corporate strategies and the future of skills. We investigated how transnational companies were globalising their human resources and whether high-skilled jobs were concentrated in the developed economies as predicted within the official discourse. We interviewed the same companies in different countries, often including the 'home' country, where the head office is typically found, and in two other countries including Britain, China, Germany, India, Korea, Singapore and the United States. We also interviewed government policy makers in each of these countries to understand their competition strategies in respect to high-value inward investment from foreign transnational companies.

Our findings show that there are new global possibilities for transnational companies to define, deploy and develop their human resources in new ways. As a result human resource issues have assumed greater strategic importance because they have come to represent a major source of competitive advantage (Ashton et al, forthcoming). While a global brand does not necessarily represent a global company, many leading transnational companies have realised that the new competition depends on developing the global capacity to integrate people, knowledge, software, networks and other corporate resources both within and beyond the organisation. This challenges much of the established literature on the knowledge economy because it does not adequately grasp the realities of knowledge capitalism or the transformation in the global division of knowledge-intensive work.

To understand why the policy discourse outlined above has failed to grasp the nature and implications of the economic transformation which is now in train we will focus on a number of interrelated issues to explain why this vision of a high-skills, high-wage economy is illusory.

Quality and Price

Much of the literature has suggested that the comparative advantage of nations depends on their ability to compete on quality or price. We have described how developing economies are assumed to be restricted to price competition for low-skilled, low-value goods and services because they lack the skilled labour and hi-tech capabilities of Organisation for Economic Cooperation and Development (OECD) countries, such as the United States, Germany or United Kingdom. In turn, to maintain their prosperity workers and businesses in developed economies must move up the value chain towards the 'quality' end of the market, based on the assumption that the value of knowledge will continue to rise.

But at a time where human knowledge is being taught, certified, and applied on a scale unprecedented in human history, the overall value of human knowledge is likely to decline rather than increase. We are witnessing an increasing polarisation in the market value of different kinds of qualifications, knowledge and occupational roles. If knowledge is the key asset of the new economy, the task of business is not to pay more for it but less. There are two aspects to the strategies that companies adopt to pay less for more. The first is by accessing the increasing supply of graduates from across the globe, many of whom will work for far lower incomes than those in the West, either by offshoring or by locating their high-skills work, such as research and development (R&D), in developing nations including China and India. The second is by standardising knowledge work through processes that we call Digital Taylorism (see below).

Companies will continue to pay a premium for outstanding 'talent' (however it is defined) as part of the hierarchical segmentation of 'knowledge' work. This has long been a feature of

capitalism, but today it has greater significance because the incomes of so many workers in Western economies depend on maintaining if not increasing the market value of what they know. It has also become more significant because the global economy offers employers new ways of reducing costs and raising productivity that were not available until now. A high-profile political example is the growth in offshoring in key sectors such as financial services and information technologies. The cost of employing a chip design engineer in the United States is over four times more than a designer in Korea and 10 times or over the costs associated with the same workers in India and China (Brown et. al, 2006). In financial services, relocations increasingly involve 'front' as well as 'back' office functions, including financial analysis, research, regulatory reporting, accounting, human resources and graphic design.[6] Quality has become price sensitive and labour arbitrage (profiting from differences in labour costs around the world) no longer stops with factory workers and call-centre operatives.

The new competition is based on quality *and* price that is enabling companies to raise their game and lower their costs at the same time. While national governments in the developed economies may see the knowledge economy as a way of increasing prosperity, and while there is a tendency in the policy literature to understand competitiveness and productivity as a question of competing for knowledge and skills rather than profits, it is far removed from the way companies understand the new competition, which involves getting smart things done at a lower price.

High Skills: a declining advantage

The argument that a knowledge-driven economy demands a larger proportion of the workforce with a university education and with access to lifelong learning opportunities has had a major impact on participation rates in tertiary education. In OECD countries, university is no longer the preserve of an elite, whatever the merits of the economic case for expanding higher education. There has been a significant expansion in all OECD countries with the exception of Germany. Canada was the first country to achieve the target of over 50% of people aged 25 to 34 entering the job market with a tertiary-level qualification. Korea is not far behind, having engineered a massive growth in tertiary provision since 1991. Germany is the exception due to its continued commitment to the dual system of workplace and off-the-job training.[7]

This expansionary phase is unlikely to end in the near future as most countries benchmark themselves against those with the highest participation rates, although its relationship to employment, productivity and economic growth remains unclear (Ashton & Green, 1996). This expansion is consistent with the Western view that low-skilled jobs will be auctioned on price and will tend to migrate to low-waged economies such as those in Asia or Eastern Europe, while high-skilled jobs will continue to attract higher wages. However, this fails to recognise the mass production of well-qualified candidates from developing economies that will enable transnational companies to export some of their 'brain' work as well as their 'body' work to low-cost economies.

The collapse of communism, economic integration, and advances in information technologies have brought China, India and Russia, along with a number of smaller nations, into the global competition for education, knowledge and high-skilled employment. The distinction between 'head' and 'body' nations seems little more than a remnant of economic imperialism that fails to understand that some developing countries have already entered the competition for knowledge-intensive, high-tech and high-skilled employment: 'the composition of China's exports has begun to change rapidly, away from reliance on cheap low-margin goods to more value-added manufacturers offering much higher profits'.[8] China and India want to move their cost advantage further up the value chain. As we were told by a government official in Beijing, 'today China is the world's factory, tomorrow the world's competitor'.

In an interview with a senior Indian government official in New Delhi, we discussed India's expansion into manufacturing. This was his response:

the Chinese have a great advantage when it's mass production. We will not be able to compete with them there ... but increasingly every item is requiring new inputs like design inputs, it's requiring innovation and embedded software. That is our skills advantage, we are moving up the value chain in manufacturing.

It is this attempt to move up the value chain that will transform the global auction for jobs as 'knowledge' workers in the developed economies are no longer immune from price competition with highly qualified workers in low-cost locations.

China had over six times as many students in higher education as the United Kingdom and almost as many as the USA in 2002, including 600,000 engaged in postgraduate studies. The latest figures suggest that China has now overtaken the USA, with around 20 million students enrolled in higher education.[9] In India, there has also been a major expansion of higher education with the aim of increasing the participation rate of 18-23 year-olds in higher education from 6% in 2002 to 10% in 2007.[10] India's Prime Minister, Mr Manmohan Singh, recently observed that:

In the next one or two years, the knowledge sector will receive our attention to the extent that it deserves. I do recognise that India has to be the centre, the hub of activity as far as the knowledge economy is concerned. We don't want to miss the chance.[11]

There is little sense of countries such as China, India, Malaysia, Poland or the Czech Republic being content with doing the 'body' work within the global economy while the 'brain' work is left to the developed economies such as the United States, Japan, Germany and Britain.

Although the quality of education is likely to vary in countries experiencing rapid expansion of educational provision, it is nevertheless the case that Asia is producing more engineers than Europe and North America combined. In the natural and agricultural sciences (including physical, biological, earth, atmospheric, and ocean sciences) Asia is also ahead, although this is not the case for mathematics and computer sciences.

In the United States, close to half of those gaining a doctoral degree in engineering, mathematics and computer science are foreign students. Some of these remain within the developed economies but others return to their indigenous countries, adding to the stock of highly skilled workers (Saxenian, 2006). Alone, South Korea graduates as many engineers as the United States and according to recent evidence from a US Business Roundtable report, by 2010 more than 90% of all scientists and engineers in the world will be living in Asia.[12] The World Bank also estimates that Russia has the third-highest numbers of scientists and engineers per capita in the world and other Eastern European countries also have a growing proportion of well-educated scientists and information technology specialists.[13]

On this evidence, the view that it will take decades for developing economies to compete in the global market for high-skilled jobs has grossly underestimated the speed of educational reform and business innovation in emerging economies including China and India.

Where to Think?

Innovation remains a crucial source of competitive advantage as mass customisation has assumed greater importance in virtually all industrial sectors. The demand for constant innovation has also been fuelled by rapid technological advancement and consumer tastes. Over 80% of BMW Minis produced in Britain for the global market are built to customer order, offering a range of over 250 factory-fitted options and dealer-fitted accessories, making every Mini uniquely similar. In the United States the Toyota Tundra sports has 22,000 possible configurations and the Chrysler Dodge Ram is available in 1.2 million variations.[14]

The use of build-to-order where products are only made to the specific requirements of customers is not restricted to the auto industry. Dell computers has established a sophisticated made-to-order business that gives customers the opportunity to build a computer based on a choice of the 20 or so product features that go into a computer, including memory (RAM), disk space, modem, processor, screen and software. The same processes are being applied to clothes, watches, sports shoes, cosmetics, window frames and houses. Nike offers customised sports shoes where customers can choose between a range of 'uppers' and 'soles' and have their names embroidered on the back of each shoe, while 'customatix', an Internet company, allows you to design your own shoes based on an almost limitless combination of colours, graphics, logos and materials.[15]

These trends not only highlight the importance of accelerating the development of new ideas and improving on existing ones, but also on reducing the time and cost to get them into the marketplace. To reduce the time from 'innovation to invoice' some companies use 24-hour design teams that work around the clock, moving through time zones across Asia, Europe and North

America. This is not only intended to reduce the time between invention, application, and market launch, but also to reduce costs, due to lower salary levels in much of Asia. As a senior executive in a German multinational told us, 'we have to drive innovation, we have to be at the leading edge at reasonable cost ... we have to try to get higher skills at reasonable cost and high flexibility'.

This is leading companies to give more thought to 'where to think'. Typically, this has led them to question the role of the appropriately named 'head' office as the primary source of corporate brain-power. But where to think is more than a question of finding the cheapest locations, as it reflects a number of other considerations such as the need for a critical mass of people that understand the organisation, or share the collective intelligence necessary for advanced R&D. It is also assumed to reflect the importance of embedded capabilities as innovation rarely depends on the skills of individuals working in isolation but on a culture of mutual collaboration and purpose. However, companies are increasingly experimenting with research, design, market and product development activities in the emerging economies.[16]

Such trends reflect a quality revolution within emerging economies that challenges much of the existing literature on the social foundations of economic performance. It is, for instance, assumed that quality depends on particular 'regimes of production', such as the dual system of workplace and college training in Germany or high-trust relations in the 'third Italy', that are difficult, if not impossible, to duplicate (Hall & Soskice, 2001). But what companies have discovered as they experiment with higher end activities such as research and design in lower-cost countries, is that quality may not be impaired and may even be improved, although there are also companies who retreat because they struggle to achieve the standards they require or due to fears about intellectual property rights.

Our studies show that the assumption that hi-tech depends on social sophistication in the form of democratic politics, welfare provision and high GDP per capita, fails to capture the extreme forms of uneven development where the pre-industrial and the post-industrial share the same postcode. There is a tendency to study economic activity from the outside looking in, based on an assumed correspondence between society and economy, but business is being turned 'inside out'. While companies need a decent infrastructure (roads, communications) and supply of well-educated and motivated workers, they are able to set up 'oasis operations' (high-tech factories, offices and research facilities in low-spec societies). It is also a mistake to assume that the rapid development especially in China, is at the price of quality. One does not need to spend much time in Beijing, Shanghai or Guangzhou to understand that they are building to compete with the United States, Japan and Germany rather than other developing economies.

The rise in quality standards around the world is making it more difficult for highly qualified workers in developed economies to shelter from the global competition for jobs. Equally, as the performance gap rapidly narrows, differences in labour costs between developed and developing economies are narrowing far more slowly, apart from in a few hot spots in China and India, and even here there is still a long way to go before the price advantage is seriously eroded. Consequently, companies have greater scope to extract value from international webs of people, processes and suppliers, based on a Dutch or reverse auction where quality is maintained while labour costs go down.

In the late 1990s, when we asked a leading German car manufacturer whether they could make their executive range anywhere in the world, the answer was an emphatic 'no'. Today it is an equally emphatic 'yes'. Another car maker, this time from the United States, added:

If you had asked me five years ago I would have said that the skill sets probably are still in the advanced economies but I think that is changing very, very quickly ... The advantage from our perspective is that you are paying those guys anywhere from sort of 12 to 15 thousand dollars a year versus say a European or a US engineer at anywhere from 75 to 95 thousand dollars a year with a whole bunch of benefits as well.

A leading engineering corporation also told us that there has been a significant narrowing in the performance of operations and factories around the world: 'those in emerging countries are catching up fast and this is making it more difficult for plants in the West. It's really a bit of a rat race'. Research in China revealed that many enterprises had adopted the latest high-performance management practices which flourish in the context of a highly educated labour force, enabling them to produce high value-added goods at much lower costs (Venter et al, 2002). Moreover, a

United Nations survey of transnational companies also found that China was the most attractive prospective R&D location in 2005-09, followed by the United States, India, Japan, United Kingdom and the Russian Federation.[17]

As differences in quality and productivity narrow between operations in different parts of the world, the cost and working conditions of Western employees are no longer the global benchmark. This has been true for various kinds of low-skilled activities in the manufacturing sector for 30 years. But the same may now be true for high-skilled workers in the developed economies as a growing proportion of high-skilled, high-value activities can be undertaken in low-cost locations. In moving inward investment up the value-chain of products and services, transnational companies are not only 'following the business' into rapidly expanding emerging markets, but adopting a deliberate strategy to establish leading-edge operations in parallel to those in the developed economies. This not only gives them global flexibility and continuity if there are industrial relations problems or problems of underperformance in a specific regional centre, but it also enables companies to point to their lower-cost operations in the emerging economies when negotiating with employees in the West.[18]

Digital Taylorism

While the policy spotlight has focused on the creation of new ideas, products and services, the ability of companies to leverage new technologies to globally align and coordinate business activities has also brought to the fore a different agenda involving the standardisation of functions and jobs within the service sector, including an increasing proportion of technical, managerial and professional roles. As Jay Tate (2001) has observed, 'industrial revolutions are revolutions in standardization'.

Standardisation is well understood in manufacturing, where the same standard components such as wheels, brake linings, and windscreens can be made in different factories around the world and shipped for final assembly at one location in the knowledge that all the components meet international quality standards and will fit together. This not only gives companies flexibility but enables them to reduce costs. The same logic is now being applied to service sector occupations that were previously difficult to standardise because there were no digital equivalents to mechanical drills, jigs, presses and ships, all required to create global supply chains in manufacturing.

The potential to transform work in the service sector, that is, work that does not involve physical proximity to the customer, client or patient (although our understanding of what can be done 'remotely' is being transformed by new communication technologies), is inevitably limited so long as knowledge remains in the heads of individuals working in idiosyncratic ways using different computer systems and application software. But the communication technologies that we have today, including the capacity for digital processing; Internet capability; and increasing bandwidth (that determines the volume and speed that data, information, or live video can be transferred across a network), have created the realistic possibility of developing global standards that reduce technical complexity and diversity (Davenport, 2005).[19]

Through building modular applications, business processes, including ordering, marketing, selling, delivering, invoicing, auditing, and hiring, can be broken down into their component parts, which include the unbundling of occupational roles so that job tasks can be simplified and sourced in different ways. In other words, an increasing proportion of managerial and professional jobs, that were previously sheltered because they were not tradable, are being redesigned, although it is difficult to predict how far this process can transform technical, managerial and professional occupations (Bryant, 2006).

Terms such as 'financial services factory' and 'industrialisation' are being applied by leading consultancy companies to describe the transformation of the service sector. Accenture Consulting (2007, p. 1) is a proponent of 'the concept of industrialization – breaking down processes and products into constituent components that can be recombined in a tailored, automated fashion – to non-manufacturing settings'. Likewise, Gupta (2006) states that

by componentizing their business processes, the Financial Services firms have begun to look at each component independently of the other components while selecting the best sourcing option

(i.e. insourced or outsourced, onshore and/or offshored, etc.). Should the trend continue tomorrow's banks would look and behave no differently to a factory. (p. 43)

It is this form of organisational innovation in the way companies hire, order, market, sell, deliver, distribute, invoice and account, driven by new information technologies and greater choices in terms of where to produce, partner or purchase goods and services, that define today's knowledge capitalism. These trends remain in their 'craft' stage, resembling manufacturing in the early twentieth century. Yet while it took decades for manufactures to 'lift and shift' through standardisation the process is likely to be much quicker when applied to service sector employment because the only hardware you need can fit on the average office desk.[20]

This part of our analysis suggests that if the twentieth century brought what can be described as *mechanical Taylorism* characterised by the Fordist production line, where the knowledge of craft workers was captured by management, codified and re-engineered in the shape of the moving assembly line, the twenty-first century is the age of *digital Taylorism*. This involves translating *knowledge work* into *working knowledge* through the extraction, codification and digitalisation of knowledge into software prescripts that can be transmitted and manipulated by others regardless of location.

Anell & Wilson (2002) argue that

the question of how to extract and distribute knowledge efficiently will not be answered by recommendations about how to build and use human and structural capital. The solution resides in the ability of knowledge firms to extract and translate more or less tacit, personal knowledge into explicit, codified knowledge, into what we call prescripts. Prescripts constitute a form of capital, to be regarded in the same vein as the company's human, structural, social and financial capital. (pp. 7-8)

While there seems little doubt that the extent to which companies can capture the knowledge of those who think for a living is often exaggerated, the problem for 'knowledge' workers was recognised by Harold Wilensky nearly half a century ago when he envisaged a time when the distinction between conception and execution would move further up the occupational hierarchy as new technologies would give senior managers and executives much great control of the white-collar workforce.

Top executives, surrounded by programmers, research and development men [and women], and other staff experts, would be more sharply separated from everybody else. The line between those who decide, 'What is to be done and how' and those who do it – that dividing line would move up. The men who once applied Taylor to the proletariat would themselves be Taylorized. (1960, p. 557)

Whereas the distinction between conception and execution in a period of mechanical Taylorism transformed the relationship between the 'working' and 'middle' classes, digital Taylorism also takes the form of a power struggle within the middle classes, as these processes depend on reducing the autonomy and discretion of the majority of managers and professionals. It encourages the segmentation of talent in ways that reserve the 'permission to think' to a small proportion of employees responsible for driving the business forward.[21] But the loss of autonomy for managers and professionals remains significantly different from the era of mechanical Taylorism, because its digital variety eliminates the need for close, over-the-shoulder, supervision. Control is remote because it is built into the software, so that the monitoring of activities is at a distance. Equally, it does not eliminate the importance of employee motivation or the need for good customer-facing skills as the standardisation required to achieve mass customisation still needs customers to feel that they are receiving a personalised service. This may contribute to a continuing demand for university graduates but their occupational roles are far removed from the archetypal graduate jobs of the past.

Creating a 'War for Talent'

While the 'official' account of the knowledge economy assumes a linear relationship between education, jobs and rewards, where mass higher education is predicted to reduce income inequalities as people gain access to high-skilled, high-waged jobs, the reality is more complex. In

the USA and Britain the expansion of higher education has been associated with an increase in wage differentials (Mishel et al, 2007). This is not only between university graduates and non-graduates but within the graduate workforce. Frank & Cook (1996) argue that income inequalities are not the result of changes in the distribution of human capital – that some have invested more in their education and training than others – but due to the changing structure of the job market (Brown, 2006). Even within ‘graduate’ occupations those at the top of the occupational pyramid receive a disproportionate share of rewards, in what Frank & Cook call ‘winner-takes-all markets’. They argue that changes in domestic and global competition make ‘the most productive individuals more valuable, and at the same time have led to more open bidding for their services’ (p. 6).

This argument is consistent with that of consultants from McKinsey’s, who popularised the idea of a ‘war for talent’ (Michaels et al, 2001). They argue that reliance on talent increased dramatically over the last century:

In the 1900s, only 17 percent of all jobs required knowledge workers; now over 60 percent do. More knowledge workers means it’s important to get great talent, since the differential value created by the most talented knowledge workers is enormous. (Michaels et al, 2001, p. 2)

Whatever the merits of this argument, virtually all those we spoke to in China, Korea, India and Singapore, as well as the United States, Germany and Britain, believed that they were in a war for talent, which was increasingly global.

Therefore, is the war for talent essential to higher productivity and competitiveness, or can it be explained in terms of positional conflict (i.e. bosses taking a larger share of the profits)? It seems clear that there is a more intense positional conflict within organisations, especially when the emphasis is on shareholder value (Lazonick & O’Sullivan, 2000). When the focus is on maximising the returns to shareholders, senior managers and executives need to be aligned to short-term profit maximisation, often through share options which require a consistent attempt to reduce costs. Workers who are not defined as top talent will constantly come under pressure to ‘prove their worth’ within an increasingly global context. We know that in many transnational companies a larger share of the profits is also going to shareholders rather than the workforce predicted by pundits of the knowledge economy (Roach, 2006). There is also evidence of corporate executives in the United States and Britain gaining massive wage hikes that often bear little relationship to business performance (Bebchuk & Grinstein, 2005).

But this is not the whole story because the war for talent also reflects the changing nature of economic competition. The value of a company is not simply determined by the ‘value’ of what it produces, but on its ‘reputational’ capital (Brown & Hesketh, 2004), or what is commonly referred to as ‘branding’. As Samsung, a leading global electronics firm, has observed, ‘in the digital era, a product will be distinguished by its brand more than by its functions or by its quality’.[22]

This emphasis on the ‘social’ rather than the ‘technical’ facets of business success is also highlighted in the nature of services that include management consultancy and the creative industries. As Alvesson (2001) has suggested:

the ambiguity of knowledge and the work of knowledge-intensive companies means that ‘knowledge’, ‘expertise’ and ‘solving problems’ to a large degree become matters of belief, impressions and negotiations of meaning. Institutionalized assumptions, expectations, reputations, images, etc. feature strongly in the perception of the products of knowledge-intensive organizations and workers. (p. 863)

Value added in knowledge-intensive industries (e.g. consultancy or financial services) stems from branding the company in order to maximise the price of its professional knowledge. But the value of corporate branding is not restricted to the image of the goods or services sold to consumers around the world. It also relates to the workforce. The more corporate value is ‘embodied’ in the people who work for it, the more companies want to be seen to recruit ‘the best’ (Brown & Hesketh, 2004).

It is assumed that the best graduates gravitate towards the elite universities. This view is actively promoted by leading universities as higher education has become a global business. The branding of universities and faculty members is integral to the organisation of academic enquiry. Claims to world-class standards depend on attracting ‘the best’ academics and forming alliances

with elite universities elsewhere in the world, while recruiting the 'right' kinds of students. Universities play the same reputational games as companies, because it is a logical consequence of market competition.

We can also see how a new global hierarchy is being created that transforms 'national' hierarchies; this is exemplified by recent reforms in German higher education. Until recently it has been based on 'parity of esteem' between universities. To date there has been little difference in the market value of a degree from one German university rather than another. Yet the introduction of 'excellence' reforms is leading more resources to be targeted at a small number of universities. In short, this policy will create an elite in an attempt to lift the profile of German higher education within global rankings of leading universities. In ripping up the level playing field, it will transform the positional relationship between students from different universities. In an attempt to recruit the best and to be seen to do so leading companies will target this elite group, based on the assumption that the most talented students will go to these universities because they are the most difficult to get into. Hence, the idea of a war for talent in Germany is real in its consequences, as a likely outcome will be growing income inequalities between German graduates.

As it becomes impossible for employers to have first-hand knowledge of universities or the quality of their students, reputation (like branding) becomes key. All companies benchmark leading universities around the world based on their own formulations often in conjunction with public rankings of top universities. Despite much talk of greater diversity the ranking of universities by reputation has made it more important to study at a leading national university with an international reputation. Notions of diversity are being transformed from a concern to recruit from a broad range of social backgrounds within a given national context, towards viewing diversity as the recruitment of foreign nationals as part of the internationalisation of human resource management. In reality, this form of diversity is about recruiting elites from different countries in the global war for talent. To qualify, individuals have to go to the 'best' universities whatever country they live in.

These issues have profound implications for understanding the relationship between education, jobs and rewards, as human capital theory (with its emphasis on technical knowledge) fails to account for positional conflict surrounding shareholder models of corporate governance, or the increasing importance of 'reputational' capital in assessing the differential value of individual credentials and knowledge. Although the relationship between reputation and performance is hazy, its consequences are stark, as reputation and performance are woven together through the exercise of symbolic power to define which employees are to be truly valued as exhibiting high potential or outstanding performance. Employees defined as 'top talent' are able to draw on this reputational capital to leverage a better remuneration package whereas other equally well-qualified employees find themselves in a reverse bidding war as companies try to reduce the cost of knowledge.

In short, almost without exception, companies were not only 'segmenting' their educated workforce based on occupational function but also on 'performance' driven by an attempt to reduce the cost of knowledge work, while retaining what they perceived as top talent. Within a context of increasing globalisation, digital Taylorism and the expansion of high-skilled, low-cost workers from developing economies, companies are developing new ways to compete for the best ideas at the same time as delivering them at lower cost. Within this new economy of knowledge, employees are caught in a pincer movement where those defined as 'top talent' are judged to have high market value, while others in the same occupations increasingly find themselves in a cost-driven competition whether domestic or global.

Conclusion: towards a European research agenda

This article challenges the dominant discourse on education in a knowledge-based economy within the European Union.

1. Expanding higher education and raising the skills of the workforce look inadequate given the changes described in this study. While the skills of the workforce remain important, it is not a source of competitive advantage because many countries, including China and India, are adopting the same tactics. It is how the capabilities of the workforce are combined in innovative and productive ways that holds the key, although high-skilled workers within high-cost European

Union countries will have to contend with the price advantage of university graduates in developing economies. Indeed, in the early decades of the twenty-first century we may witness the rise of high-skilled, low-waged economies.

Therefore, the technocratic model of skills upgrading and rising value of investments in human capital on which the European agenda rests is subject to the laws of diminishing returns. Human capital theory does not offer a universal theory of the relationship between education, job and rewards, but represents a 'transitional' case in the second half of the twentieth century characterised by educational expansion and a rising middle class.

We argue that developed economies in Europe and North America are not 'knowledge' economies, where the value of knowledge continues to rise, but they are characterised by an economy of knowledge, that is transforming the relationship between education, jobs and rewards. This will inevitably lead to claims that education is failing to meet the needs of industry, but the overriding problem is a failure to lift the demand for 'knowledge' workers to meet the increasing numbers entering the job market with a bachelor's degree (Keep, 2004).

2. The European discourse does not challenge the notion of the magnet economy or the expansion of higher education. It maintains the idea of the knowledge wars in which the supply of workers rather than the demand for their services is the dominant policy issue. It also serves to heighten the individual's responsibility for labour market outcomes not simply by applying neo-liberal notions of market freedom but through the rhetoric of lifelong learning. The individual, disembedded from national institutions of education, training and labour markets, is transformed into an individual learner responsible for the development of their capabilities within a European-wide framework of lifelong learning; as Lawn (forthcoming) suggests, lifelong learning as a vision of Europe and its governance,

created a programme in which the citizens of Europe were both appealed to and constructed. Europe was about competitiveness and decisiveness and the individual was the place in which this could be situated. They were to be given the task of managing the future by acquiring the capacity to exercise responsibility for their own education and training choices. (p. 9)

3. The disjunction between education, jobs and rewards has profound implications for our understanding of educational opportunity, justice and social mobility. Ernest Gellner (1983) observed that 'modern society is not mobile because it is egalitarian; it is egalitarian because it is mobile' (pp. 24-25). This suggests that the growing evidence of declining social mobility in both Europe and North America is not simply due to increasing inequalities in opportunity but reflects the transformation of work that we are beginning to capture in this article. Moreover, the role of higher education will undoubtedly be subject to intensive political and educational debate as the returns to knowledge decline for many, and when income inequalities are increasingly seen to be divorced from 'meritocratic' achievement.

4. The idea of a European Research Area is primarily focused on the integration of research activities and actors within Europe, including both private and public sector organisations. While the research strengths of the United States loom large in such debates, there is surprisingly little discussion of the rapid growth of R&D activities in developing economies such as China and India. It also have very little to say about the rapid expansion of R&D foreign direct investment into developing economies that challenges the rhetoric of European high-skills, high-wage 'magnet' economies.

Equally, the focus on raising R&D expenditure within the European Union from the current rate of 1.9% to 3% is a worthwhile goal but it is based on an assumption that the development of new ideas in Europe will ensure that the majority of jobs that derive from innovation will remain within Europe (European Commission, 2002). But as leading companies develop global skill webs the issue of where to think is no longer restricted to the developed economies. While some leading-edge jobs are likely to remain in the research centres where new products and services are developed, other value-added jobs may well be shifted to low-cost locations not only to reduce costs but to speed up the time from ideas to invoice, such as the use of 24-hour design teams where the work 'follows the sun'.

5. While the European discourse speaks of integration and collective fate, education continues to play centre stage in economic 'nationalism'. Indeed, other nations within the European Union are presented as competitor nations. The success of education systems will continue to be judged at

national rather than European level. Indeed, education as a major source of nation building continues to be important in virtually all EU member states. Moreover, jobs and investment going to Poland, Germany or France rarely make British or Belgium workers feel that 'they' are benefiting because they live within the European Union.

6. This study lends support to those who have highlighted the growing importance of international benchmarking. This was illustrated in the German Government's response to lower than expected performance within PISA. The alignment of higher degrees through the Bologna process is also supported by international companies whose skill strategies are being denationalised but their agenda is not European but global. Such trends are likely to create greater polarisation in the funding of higher education establishments within national societies. A greater emphasis on international standing is leading national governments to ensure that some domestic universities are judged to be 'world class' but at the expense of 'parity of esteem' within national systems of higher education.

7. Today, the 'positional' advantage of many with university credentials is not only declining domestically (as higher education is expanded) but also globally as access to tertiary education becomes more widespread both within and across countries. We predict that the global expansion of tertiary education will lead to downward pressure on the incomes of skilled workers in the developed economies, along with some upward pressure on those in emerging economies. At the same time, there are trends towards 'winner-takes-all' markets, which reveal that people with similar qualifications in the same occupations, organisations and countries will experience increasing polarisation in future career prospects (Frank & Cook, 1995).

If the 'war for talent' is global, those elites who have been able to mobilise their material and cultural resources in the acquisition of credentials and other personal qualities, on the basis of market rules unencumbered by the demands of meritocratic competition, are likely to benefit most in a global competition for high-skilled jobs.[23] Competition systems based on meritocratic rules may avoid problems of polarisation in the domestic competition for a livelihood, but social elites may feel disadvantaged in the global competition, when compared to students in a market system who have received intensive hot-housing as part of an social elite.

Consequently, not only will market rules be endorsed by social elites who already play by these rules, but the social elites from other countries, such as Germany, France and Sweden, may also press for the same rules if they are to maintain a level playing field beyond their national boundaries. A consequence of market rules being introduced into national education systems is that while it may lead to greater equality between elites from different countries, it would increase problems of social exclusion and polarisation within societies. Hence, if elites from other developed countries follow the Anglo-Saxon model of market competition for credentials, there is the prospect of growing international class conflict, where elites will seek to maximise their labour market power unencumbered by the demands of the societies in which they live (Brown, 2000). How positional competition would be organised within a European context is a central policy issue.

8. Given that notions of the knowledge-based economy rest on the development of science and innovation, our research evidence shows that much of the global capability in science and engineering is transferring to Asia. How European societies respond to this issue will have a major impact on the competitiveness of European countries.

9. It also challenges the 'West knows best' assumptions about the organisation of education and curriculum content. There may be important lessons to learn from the Asian Tigers, China and India especially, for new European Union member states. Indeed, there are increasing attempts to develop new models of 'Asian' education in a context of 'reverse Orientalism' which 'entail the attribution of a set of cultural values to East and Southeast Asian societies by Western social scientists in order to contrast the recent dynamic progress of Asian development with the stagnation and social disorganisation of contemporary Western economies and societies' (Hill, 2000, p. 177).

European 'grand illusions' as the world's brightest and best will inevitably have to confront the new realities of the world economy. But the real revolution in values is not limited to refocusing on the source of personal or national wealth, as it is the economic growth model and market individualism that also needs to be challenged. This is being reinforced by environmental

concerns about the degradation of the planet as a result of human consumption and expansion of the world economy.

10. If the trends towards digital Taylorism prove to be accurate, it raises important questions about the relationship between education and jobs. Are we witnessing the development of a new correspondence between a modularised, pressurised and metrics-driven system of assessment (where students get reduced to a set of numerical grades), now found in the English education system, with the growth in employment requiring well-qualified people capable of handling 'working knowledge'? While we reject the economic determinism inherent in Bowles & Gintis's (1976) original account, there seems little doubt that the current view of education for creativity and personal fulfilment bears little relationship to the future employment of many university graduates. If 'permission to think' is limited to a relatively small proportion of the European workforce, it raises fundamental issues about the role and content of mass higher education.

Acknowledgement

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Notes

- [1] This is an extended and amended version of a chapter in D. Epstein, R. Boden, R. Deem, F. Rizvi & S. Wright (Eds) *World Year Book of Education 2008. Geographies of Knowledge, Geometries of Power: higher education in the 21st century*. London: Routledge.
- [2] See, for example, <http://www.dti.gov.uk/ministers/speeches/hewitt200904.html>
- [3] See United Nations Conference on Trade and Development (UNCTAD) World Investment Report, 2005, Transnational Corporations and the Internationalization of R&D. <http://www.unctad.org/wir>
- [4] Ibid. Appendix A, pp. 267-268. These figures exclude transnational corporations in the financial sector.
- [5] See Heather Stewart, 2005.
- [6] A.T. Kearny Consultants. <http://www.atkearney.com/main.taf?p=1,5,1,130>
- [7] The relative merits of the German dual system and its future have been widely debated. See Brown et al, 2001; Streeck, 1997.
- [8] Report by Richard McGregor in Beijing, *Financial Times*, 4 July 2006, p. 10.
- [9] Private communication with the Department of Education in Beijing (based on figures for October 2005).
- [10] India's 'Tenth Plan' for education is focused on increasing access; quality; adoption of state-specific strategies; liberalisation of the higher education system; relevance, including curriculum, vocationalisation, networking and information technology; distance education; convergence of formal, non-formal, distance and information technology education institutions; increased private participation in establishing and running of colleges and deemed to be universities; research in frontier areas of knowledge; and meeting challenges in the area of internationalisation of Indian education. http://www.education.nic.in/htmlweb/approach_paper_on_education.htm
- [11] See Rajat K. Gupta, 2005.
- [12] See *Tapping America's Potential: The Education for Innovation Initiative* (2005). <http://www.businessroundtable.org/publications/publication.aspx?qs=2AF6BF807822B0F1AD1478E>
- [13] See Maria Trombly, 2003.
- [14] See: The Challenge of Customization: bringing operations and marketing together. <http://www.strategy-business.com/sbkwarticle/sbkw040616?pg=all&tid=230>
- [15] Michael Chanover, Mass Customization-Who? – What Dell, Nike and others have in store for you. http://www.core77.com/reactor/mass_customization.html
- [16] But while companies may want to offshore some of their R&D activities there is a constant concern about 'reverse' engineering and technology transfer. The opportunity to extend into new markets of

the size of China and India also raises the threat of low-cost competitors able to create competing products or services. This makes multi-national corporations (MNCs) reluctant to 'share' their state of the art knowledge, technologies and know how, but at the same they need access to emerging markets and to reduce development costs.

The problem is illustrated in the electronics sector. We were told by a leading MNC that the Chinese were capable of copying the latest mobile phones in two months. This had led this company to retrench its R&D activities within the home base to protect its product developments for as long as possible. They also launch the same product simultaneously in different countries to gain a lead on the competition even if they can catch up very fast.

- [17] See United Nations Conference on Trade and Development (UNCTAD) World Investment Report 2005, Figure IV.11, p. 153.
- [18] Germany is an obvious example.
- [19] Davenport identifies various initiatives that have been introduced to standardise and commodify business process, such as the Supply-Chain Operations Reference (SCOR) model that outlines five key steps of plan, source, make, deliver, and return. Another is the Software Engineering Institute's Capability Maturity Model (CMM), and ISO 9000 for quality standards for product development. ISO 9000 is based on the design, development, production, installation, and servicing of products. ISO 9000-9003 were created by the International Organisation for Standardisation, which is a global consortium of national standard bodies. Six Sigma focuses less on management process and more on the output of the process, especially defect reduction.
- [20] Combined with offshoring, the potential is huge, as Suresh Gupta (2006) notes: 'Our research indicates that when used in conjunction with offshoring, componentization can deliver massive benefits. This model assumes three important capabilities: disaggregating (and digitizing) a process into self-contained components and using broadband to ship them offshore; processing each component using best mix of offshore resources and shipping them back to the original location; and reassembling the "processed" components into a coherent whole' (p. 45, Financial Services Factory, The Capco Institute, *Journal of Financial Transformation*).
- [21] We are grateful to Ian Jones, Innovation and Engagement Officer, Cardiff School of Social Sciences, for the term 'permission to think', which he used in discussion with Phil Brown.
- [22] Samsung Company Report.
<http://www.samsung.com/AboutSAMSUNG/ValuesPhilosophy/DigitalVision/index.htm>
- [23] These differences in the rules of competition reflect contrasting social priorities. Meritocratic rules, for instance, involve restrictions on the middle classes in the use of their superior market power in the interest of social cohesion or state legitimation.

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Response from WANG YINGJE

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Expanding the Higher Education System and Building World-Class Universities: China's response to globalization and the knowledge economy

Knowledge is power. Knowledge is the most important capital for economic development. The distribution of knowledge directs the flow of social wealth. In the era of globalization knowledge is a decisive factor to determine a nation's weight in the world. The university mission is to create knowledge, manage knowledge, direct the flow of knowledge, and determine the quantity and direction of the flow. With this mission the university is moving from the periphery to the center of society. Facing the tides of globalization and the knowledge economy, China has made two important policies, i.e. to greatly expand its higher education system and build world-class universities.

China started to dramatically expand its higher education system in 1999 when it took a great leap forward in college enrolment. That year it admitted 45% more new college students than in 1998 (see Figure 1.). China has rapidly reached the stage of mass higher education. Less than 10 years ago it had an elite higher education system which only served less than 10% of its college age cohort. The total enrolment was over 17 million in 2006, and if the number of students enrolled in adult higher education institutions is added, the total enrolment reached 25 million, and the gross enrolment ratio was 22% (see Table I). The target is to reach a gross enrolment of 25% in 2010. Though the great expansion happened more in the fields of humanities and social sciences, the proportion of students majoring in sciences and engineering is still very high. They represented 47% of the total enrolment in 2006 (including agriculture and medicine) (see Table II). This fact reflects a traditional value of Chinese society, which emphasizes sciences for national and individual development.

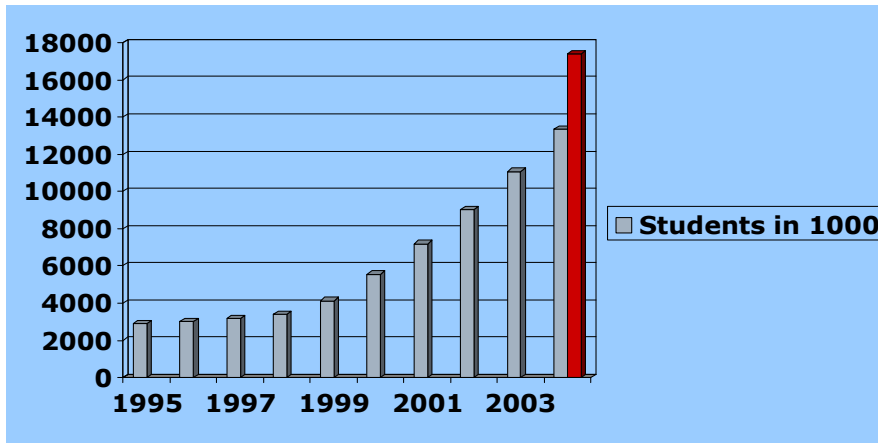


Figure 1. Great expansion of higher education enrolment in China since 1999.
Source: <http://www.moe.edu.cn> (accessed July 2007).

Year	%
1999	10.5
2003	17.0
2004	19.0
2005	21.0
2006	22.0

Table I. Gross enrolment ratio since 1999 (number of students in tertiary education, regardless of age, as a percentage of the college-age population).
Source: <http://www.moe.edu.cn> (accessed July 2007).

	Students	% of total
Philosophy	18,258	0.1
Economics	986,213	5.7
Law	966,675	5.6
Education	1,046,383	6.0
Literature/language	2,834,546	16.4
History	90,936	0.5
Science	1,330,159	7.7
Engineering	5,013,263	28.9
Agriculture	341,898	2.0
Medicine	1,577,438	9.1
Military Science	315	0.0
Administration/mgt	3,122,391	18.0
Total	17,328,475	

Table II. Distribution of enrolment by subjects in 2006.
Source: Yearbook of Educational Statistics (2006).

When China started to expand its higher education system, the major factors to influence decision making were the high demand of parents for their children’s higher education, and the expectation of expansion of higher education to stimulate the national economy through tuition fees (China began to charge for tuition in the mid 1990s) and campus construction. To prepare high-skilled workers for the coming knowledge economy and intense world competition are certainly the constant motivation for the national government to promote the massification of higher education.

The great leap forward brought higher education to general families, satisfied a greater number of parents' desire to send their children to college, and prepared a great pool of talents needed by the development of the knowledge economy and global economic competition. But the great leap forward also caused some problems to higher education institutions and to society. First, the campuses are now overcrowded. Second, there are fewer resources per student, though hundreds of millions of Yuan have been invested on campus construction. Third, academic quality has not been improved along with the expansion. Last but not least, the competition for jobs has become more intense. There were about 4.13 million college graduates in 2006, which represents a 22% increase over 2005, but the job market was about the same as in 2005. The oversupply of college graduates and the great competition for talent in the knowledge economy together polarized wages for college graduates. According to a survey, the wage difference of graduates from 89 higher education institutions can be five times between the highest and the lowest in 2006 (<http://www.51poll.com/member/forum/printpage.asp> [July 2007]).

With all these problems in higher education development, the Government realizes that the nation does not only need a good quantity of highly skilled workers, but also needs talents that can compete in the global knowledge economy. In fact China began to heavily support a group of selected universities 12 years ago. In 1995, China launched the 211 Project, which intended to build 100 universities to the world level in the twenty-first century. Up to 2005, 105 universities and over 900 disciplines gained special national and provincial grants. The total amount of grants reached 29.24 billion Yuan (RMB), among which 8.755 billion Yuan were specially granted by the central government.

Later on, the concept of the world-class university was officially used by the nation's president in his speech on the occasion of the one hundred year anniversary of Peking University in 1998. With his call for building the world-class university the Government launched the 985 Project. At the beginning of the implementation only Peking University and Tsinghua University were supported, and up to now 38 universities have been selected to be the members of the project. During the first period of the project (1999-2004), the central government granted 14 billion Yuan. The second period will end in 2007. In 2003, Peking University's annual operating budget was about \$250 million, of which \$75 million came from the 985 Project. This means an increase of 30% over the ordinary budget.

The conditions for instruction and research in these top universities have been improved impressively. The ranking by the total amount of academic papers published internationally has been raised from fifteenth in 1991 to fourth place in the world in 2007. The proportion of papers written by Chinese authors in the Science Citation Index (SCI), the Engineering Index (EI) and the Index to Scientific and Technical Proceedings (ISTP) journals reached 7% of the total in 2007, which constitutes a similar contribution to that of the United Kingdom, Germany or Japan. But the project has not been implemented without challenges. The Government role in the selection of these universities was questioned. How could the Government make such a selection of universities? And what are the standards for selection? What should be the proper procedure to assess the success of the project? Some scholars claimed that the traditional value of 'parity of esteem' among universities was threatened. 'Reputation' is now a life or death matter for universities. The research university is becoming a unique model that other higher education institutions have to follow. Maybe the more serious and hidden problem is that the traditional culture of meritocracy in Chinese society is reinforced. The problem of positional competition is exacerbated as the middle classes seek to gain access to the 'elite' universities. And in turn, the school system is getting more examination-centered.

What I write above supports some points of view expressed above by Phillip Brown, Hugh Lauder and David Ashton, but there still remain some questions for further study.

1. Is China moving to a 'head' nation? Indeed, China is making efforts to move to a 'head' nation; as the article by Brown et al quoted, 'today China is the world's factory, tomorrow the world's competitor'. China has a continuous civilization of five thousand years. For a long time China thought it was in the center of the world as its name literally means the kingdom in the center. But finally reality made it recognize that it is a peripheral nation, or a 'body' nation. It has a long way to go to catch up with central nations or 'head' nations. Its best universities cannot really compete with the major universities in the 'head' nations. According to Shanghai Jiaotong University's ranking, the best university in China only ranks 163rd place in the world. And in *News*

Week's ranking no Chinese universities entered the list of the one hundred world best universities. Though China produces a largest group of engineers each year, not many of them are suitable to work in multinational companies. As an article (*McKinsey Quarterly*, 2005) pointed out, each year 1.6 million young engineers graduated, but only one-tenth of them are qualified to work in multinational companies. The article concluded, '... therefore China unable to compete globally in higher value industries'. As China has such a huge population, and the average number of years of schooling for the people above 15 years old is only 8.5, China will be a 'body' nation for a long time. For the best it will be mainly a 'body' nation with some function of a 'head' in the foreseeable future.

2. Is the knowledge economy leading to globalization of knowledge work? Based on facts in the knowledge economy, the answer should be 'yes'. But it seems the factor of human nature and government policies needs to be included in answering the question. Thinking about this question from the perspective of human nature and government policies, at least two questions can be asked: Are the 'head' nations really willing to locate their high-skill work in developing nations? Are the government policies of the 'head' nations encouraging or impeding the move of high-skill work to developing countries? Even if we look at the issue from the perspective of the knowledge economy, we still need to study the question: Who makes global standards to standardize knowledge work? And where are they made? If making standards remains a privilege of the 'head' nations, could we say the 'head' nations are taking initiatives to help the 'body' nations develop 'head' work?

3. Is rapid growth of the higher education system in developing countries a main force to cause a devaluation of college credentials in Western countries? Now we live in a global village. The distance between neighbours is narrowing. Certainly the rapid growth of higher education systems in developing countries has a certain impact on the value of college credentials in Western countries, but it seems it should not have such an important role. The credential is only a commercial good in a market economy. If it is produced in a great quantity, its value cannot avoid going down in the market. Therefore the main force that causes the devaluation of college credentials must be the universalization of higher education in Western countries, and the increased output of college graduates in developing countries should not be blamed, even if they assume some 'head' work.

4. Trade liberalization is presented as a 'win-win' opportunity for both developing and developed nations. Is this also the case of the war for talents between developing and developed nations? Who wins more in this war? Developed countries or developing countries? Head nations or body nations? It is true that China is making a full basket of policies to attract talents back to China. But so far there are far more young people going out to Western countries to study than those who graduated overseas and came back. Since the early 1980s there have been over 700,000 young talents who went to Western countries to study, but only 170,000 of them came back to China. Though it is true that there are a growing number of young talents working in multinational companies in China, we can still easily observe that the Western countries are still winning and their 'heads' are getting larger.

In summary, China, India or some other developing countries are determined to move to the center of the world. In the past when nations tried to change their status in the world, or in other words, tried to move from periphery to the center of the world, very bloody ways were utilized. But now we are in a different world, a world of the global village, a world of the market economy, a world of participation and equality. We have to be realistic and recognize that competition between nations cannot be avoided. To expand the higher education system and build a world-class university has become a priority policy choice for the Government to adopt. In order to grasp the win-win opportunities provided by this new world, we all need to become a whole person with a head, a body, and maybe more ideally with a heart too. Then the very traditional mission of education is presented in front of us, to educate people with three Hs (head, hands and heart). Without any of these three Hs, neither people nor nation can survive in this very sophisticated world. Maybe this is one of the few things left, that we, educators, still can teach our businessmen and politicians in this very commercial and political world. How to teach three Hs should be a priority in our research agenda.

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Education, Globalisation and the Future of the Knowledge Economy: three comments

The article by Brown, Lauder and Ashton raises important questions about the future of education in a globalising world and challenges the current state of thinking on these issues in a stimulating way. In this brief comment, I would like (1) to challenge the fears about globalisation and the emergence of new competitors for economically advanced countries; (2) acknowledge that education is not the answer to everything while putting in perspective the concerns and debates on over-education; (3) call for further research and ideas about the changes for education implied by the emergence of new business models such as 'digital Taylorism'.

Globalisation and the Emergence of New Competitors: is it a threat or an opportunity to currently rich countries?

Is the development of poor economies a danger for the currently economically advanced countries? And more specifically, to what extent is the development of China and India a challenge to them? Some of the argumentation in Brown et al's article forcefully raises these two questions. However, the authors tend to overlook the (at least potential) positive effects of globalisation and to forget that the size of countries matters when it comes to wealth.

The process of outsourcing is arguably the most visible evidence of a negative impact of globalisation on people living in economically advanced countries: while the (neoclassical) economic theory assumes a perfect fluidity of capital and labour between factors and sectors, which makes reconversion straightforward in case of crisis, this is unfortunately rarely true outside stock markets. In an ideal economic world, people losing their jobs because the textile industry is no longer viable in their country should be able to easily find new work in another sector. In practice, we know that it is not as easy. It heavily depends on the structure of the economies, the characteristics of the labour markets, and the skills of the people. People who lose their job sometimes lack the skills (or the education to acquire quickly the new skills) that would be useful in other sectors – and the employers, the incentives to hire and train them. While this outsourcing phenomenon used to be limited to blue-collar jobs, the authors rightly point out that this may also happen for professional and other highly skilled jobs too. This is certainly a real challenge to economically advanced countries (and their regions) – although even the largest projections of jobs lost to outsourcing are relatively small in comparison to general job turnover (Organisation for Economic Cooperation and Development [OECD], 2007a). There will be arguably more competition for highly skilled services and jobs, and quality differentials will be more important in deciding whether to locate their production in the current advanced economies or in emerging economies.

However, there is another, more positive, side of the coin. The fact that globalisation can have negative impacts at the micro level does not mean that it does not have an overall positive impact at the macro-economic level for rich countries. The reasons why globalisation is described as a win-win process for both developing and developed countries, and thus as positive for rich countries, need to be recalled. Rich countries also benefit from low-cost labour in emerging economies because the products and services they buy from them are cheaper and because

emerging economies represent a new market and source of revenues for their more expensive products and services as they develop. Moreover, a rise of wages generally follows growth, and thus a new demand for more expensive products. This in turn fuels growth and new employment opportunities in richer countries. Of course, in both cases, the benefits at the macro level have to be redistributed to the whole population through appropriate institutional mechanisms.

China and India are generally the focal points of these fears. Their tertiary education systems develop quickly. China has now the largest tertiary education system in the world. It also produces an impressive number of engineers and tertiary education graduates every year. While the transition to a knowledge economy will require strong capacity development (Dahlman & Utz, 2005; Dahlman et al, 2007), they have real assets compared to many other emerging countries. Willekens (2008) shows that given the size of their cohorts it would just take a small increase of their entry rates to tertiary education to reach the current levels of highly skilled human resources in Western Europe and North America.

So what? Unsurprisingly, the Netherlands trains fewer engineers a year and has fewer researchers in employment than France or the United Kingdom, which in turn train fewer engineers than the United States. However, the Netherlands is not poorer (per capita) than France or the United Kingdom. (In relative terms, it has fewer engineers than France but more than the United Kingdom (OECD, 2007b).) It should not be that worrying that China or India have more students and graduates than the United States given that China and India have populations of 1.3 and 1.1 billion people, respectively, against 300 million in the United States. In relative terms, that is participation rates in tertiary education and tertiary educational attainment, China and India are still well below most European countries. They also need to improve considerably their in-job training compared to OECD countries. Moreover, it is likely that while they develop their economies will also need more and more engineers to supply their own needs and absorb their tertiary education graduates (rather than generate direct competition for those of European economies).

There is a difference between absolute and relative numbers, and both matter for different reasons. Absolute numbers of researchers are important when it comes to reaching a critical mass: while this critical mass exists internationally, this is not always the case nationally. Moreover, having larger young cohorts of trained people can be important if innovations mainly come from the younger part of the workforce. Absolute wealth (and size) is of course very important too when it comes to political and geostrategic issues – and it also confers some economic (negotiation) power. The economic growth of China and India gives them more of these powers.

For people though, relative wealth, that is, GDP per capita, is more important than absolute wealth. In 2004, China and India had a GDP per capita of USD 5896 and USD 3139, respectively, compared to between USD 30-40,000 for the United States and the richest OECD countries. When we focus on educational attainment, we also acknowledge that relative numbers of graduates are more important than absolute ones for a country. It will actually take China and India some time to reach the levels of wealth per capita and tertiary educational attainment of OECD countries – not least because of their size.

Moreover, albeit often overlooked in the debate, *quality* also matters, and it is not certain that tertiary education graduates have the same average quality across the world. While recognising their dynamism, scholars working on the Indian and Chinese tertiary education systems stress their very uneven quality. China has a few universities of international quality, but most of its system still needs to improve considerably to reach 'international quality standards' (although what these are is largely unknown). India has its prestigious Institutes of Technology, but they cater for an insignificant number of Indian students. OECD countries probably still have a competitive advantage in terms of quality of their systems, although they still have to figure out themselves whether they have the appropriate level of quality. Within the OECD area, we know that the outputs of all school systems are not the same (see, for example, PISA studies), and this is probably the same at the tertiary education level. We also know that adult competences are sometimes only loosely correlated with formal educational attainment (OECD, 2005).

This is not a call for complacency though. China and India are probably not a threat to European and economically advanced economies, but the emergence of economies of that size can indeed deeply transform the economies of European countries. Even if they were a threat, it is not

clear why rich economies should not continue to focus on knowledge-intensive activities that can generate high value added.

**Criticism of the Usefulness of More Education:
declining advantage of high skills**

This leads us to another, related, interesting point of the article: the critique of the discourse about the 'knowledge economy' and the calls for raising tertiary educational attainment.

We all know that there is something rhetorical about the knowledge economy and the emphasis on highly skilled (i.e. tertiary educated) human capital. Like many other clichés, we use them for their convenience, knowing that they are not fully true. And clearly, for educationalists, there is an incentive to use them without questioning them: why would they fight the idea that education is increasingly important? However, there is generally something true about clichés (Foray, 2004; OECD, 2004).

There are actually a few economic theories explaining the relationships between education and skills, productivity and economic growth, and some empirical evidence too. But after all, Luxembourg, the richest OECD country (per capita), for example, does not have a particularly well-educated workforce by OECD standards (27% of tertiary educational attainment against an average of 26% within the OECD area). France and Germany are below the OECD average (with 25% of tertiary educational attainment). More education tends to become the advocated solution to all social issues and there is little evidence that it is really the critical factor. While educational attainment may partly explain the wealth of nations, high educational participation and attainment might also in part be a luxury that people in wealthy countries can more easily afford than in poorer countries. It is indeed simplistic to believe that rising educational attainment will on its own lead to economic growth. To be fair, there are more nuances in economic theory than is often acknowledged. Some studies are interested in the optimal levels of education; others have challenged the idea that education leads to growth; and while they acknowledge the importance of education for growth, the consensus among economists is not that more education is always better (e.g. Krueger & Lindahl, 2001). Economists would say that countries which are close to the knowledge frontier should focus their investment in tertiary education, while others should focus on primary and secondary education (e.g. Gemmell, 1996). At the macro level, the extent to which countries should invest in education is still relatively unclear. Countries have thrived with growth regimes that relied to a different extent on a highly educated workforce. While there is ample evidence that education matters, the mechanisms through which it matters are not fully clarified yet.

However, as interesting and important as it may be at the macro level, this does not have much impact on individual decisions at the micro level. Is it the 'knowledge economy' rhetoric that pushes people to get more and more education? Some see this trend as a driver for people to become 'overeducated' and then frustrated given the kinds of 'under-qualified' jobs they can eventually get. In fact, more than rhetorical, the incentives are economic. Besides all the social benefits of tertiary education accruing to individuals (prestige, social capital, cultural capital, health, etc.), it is still true that on average people are better off economically if they are tertiary educated than if they are not: tertiary education graduates earn on average more than upper secondary education graduates, they are more likely to be part of the workforce, and less likely to be unemployed. In 2004, people with tertiary education earned on average 57% more than those with only upper secondary education (with a median at 49%) (OECD, 2007b). While there may be diminishing returns to tertiary education (as shown by the fact that the returns are much higher in developing countries where tertiary educational attainment is much lower), in most OECD countries the returns to tertiary graduation compared to upper secondary graduation have generally not fallen over time, possibly because the returns to upper secondary education have decreased, but also because technological change has favoured tertiary educated workers (Machin & McNally, 2007). In the OECD area, the returns to tertiary education have generally been stable or continued to increase. Moreover, recent European surveys on the transition of graduates in the labour market have shown that in most countries tertiary education graduates had found a satisfactory job two years after graduation (Schomburg & Teichler, 2006).[2] There is thus arguably

no over-supply of tertiary education graduates (yet). People clearly have good reasons to try to get as much education as they can, and people from disadvantaged backgrounds even more so as they do not have the connections (social capital) that will help them succeed without formal education.

As long as people are better off with than without tertiary education, they are likely to continue to try to get a higher education experience – even though they may not be very realistic about their chances to actually graduate. Hence, the demand for tertiary education is likely to continue to be sustained, and it is difficult to find strong arguments to discourage people from doing so, especially as it is likely that those whose access would be barred will come from less advantaged groups. Tertiary education systems will thus probably continue to expand, at least in relative terms (OECD, 2008).

In some countries, like France, there has been a decline over time of the returns to higher education. A high educational attainment has benefited some cohorts more than others. In other countries, like the United States, this has not been the case: returns to tertiary education have continued to increase. This mainly relates to the structure of the economy: there are more vacancies at certain times than others in managerial positions (more room at the top). While falling returns over time can fuel the perception of over-education, one should repeat that as long as the returns to tertiary education are (significantly) higher than those to upper secondary education, people have indeed an interest to become tertiary educated. However, declining returns over time can legitimately feed a social debate on intergenerational justice, that is, a debate on which generations pay and benefit from what publicly funded services over their lifetime (Chauvel, 2002).

Another reason for the feeling of ‘over-education’ lies in the existence of official skill classification for jobs in some countries. Recent studies in France (where such a classification exists) point to some ‘over-education’ by this standard: the actual skills/formal qualifications of job holders are higher than the required skills according to the classification (Chardon & Estrade, 2007). This classification was negotiated to guarantee workers some rights and levels of compensation in the labour market. However, job contents have changed since its negotiation: the job of a secretary is no longer the same as it was 20 years ago. Skill mismatches according to such classifications may thus be more an evidence of changes in the labour market than one of ‘over-education’.

Finally, is it not ironical (if not contradictory) to be concerned on one hand about the fact that countries such as China and India challenge (or catch up with) richer OECD countries by raising their educational participation and attainment, and on the other hand, claim that the rationale for expanding tertiary education in richer countries is questionable? Rising educational attainment might be inappropriate (and certainly insufficient) to meet the challenges of a booming R&D in China and India and an increasing competition for high-skill jobs, but one would wish to know what a more appropriate response would look like.

Digital Taylorism and the Shape of (Tertiary) Education

Changes in business models and practices, such as the ‘digital Taylorism’ depicted in Brown et al’s article, are interesting for education as they may shape the future of education and education systems. Some studies, like Foucault’s *Discipline and Punish*, made interesting links between the Industrial Revolution and the rise of the factory and the details of the current school system. In rich economies, the relationships between customers and companies have changed, with more emphasis put on quality, on the demand of customers, as well as on services (including for selling products).

Current ways of organising education (the classroom, the way of teaching, the standardisation, etc.) can be and have been interpreted as a direct response to (or even offspring of) the Industrial Revolution. If globalisation and information and communication technology are inducing a second industrial revolution, it is important for educationalists to think of how this might translate to the world of education and of tertiary education.

What are the kinds of skills, curricula, learning and social experiences that would fit the emergence of this new form of capitalism (digital Taylorism)? Can we think about a more personalised and modularised education? What would the school and university of the digital Taylorism era look like? This will be a fascinating future research agenda.

Notes

- [1] The author is an Education Analyst at the Centre for Educational Research and Innovation (OECD, Directorate for Education). The views expressed are the author's and are not necessarily those of the OECD and its member countries.
- [2] A second round of this study has shown consistent results over time:
<http://www.fdewb.unimaas.nl/roa/reflex/>

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