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Social Networks, Innovation and Learning: Can Policies for Social Capital Promote both Economic Dynamism and Social Justice?

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Social Networks, Innovation and Learning: Can Policies for Social Capital Promote Both Economic Dynamism and Social Justice?¹ by John Field, University of Stirling

What works?

Learning, innovation and social capital are closely intertwined. We have plenty of evidence to support this bald assertion. A growing body of academic research shows that people who engage in community activities are more likely to be participating in learning, and that organisations with strong internal and external linkages are more likely to adopt new and successful approaches to the way they conduct their business. Conversely, people who are pursuing new skills and knowledge are more likely to engage in civic life, while successful innovative organisations are likely to build and contribute to networks and clusters (Field 2005; Lundvall and Johnson 1994; Maskell 2000; Porter 2000; Strathdee 2005; Szreter 2000). And the language of social capital is often associated with inclusiveness and community building. What more could we ask for?

In the face of the evidence, it seems sensible to conclude that networks and sociability are important ingredients in any coherent strategy to build a learning society and a sustainable economy. And since social capital can equally be shown to promote many other benefits for individuals and the community – from health improvements to reductions in crime levels – it seems that a good society must be one that promotes broad innovative capabilities with lifelong learning for all.

These are important issues, for policy makers and for the wider community, as well as for researchers. This paper is written from the perspective of a researcher who is interested in policy and practice. I entirely accept the challenge from policy makers and professionals to researchers to help find evidence of 'what works' (Davies, Nutley and Smith 2000). Though, of course, research can also be helpful in identifying 'what doesn't work', as well as drawing attention to contextual and other factors that can influence the effectiveness of any given approach. And I will suggest later that finding out 'what works' can be a rather conservative activity, at least if it sets fixed limits to where we are planning to go in the future.

Outline summary

This paper reviews the nature of the relationship between innovation, learning and social capital, and then goes on to consider some of the implications for policy and practice. It starts by examining some of the problems in translating research into practice. Having looked at the difficulties, it then assesses what we know about the relations between social capital and learning, and between social capital and innovation. In each case, I acknowledge that there are significant 'dark sides' to the debate, but I also point to conclusive evidence of the positive resources that we can

use to promote capabilities for sustainable growth and social justice. In reviewing the evidence, I also acknowledge that there is some force in certain of the scholarly criticisms of the current debates over social capital, innovation and learning; in particular, some research does not point to a clear and linear relationship between the various factors, but rather indicates much that is highly contingent. Nevertheless, I conclude that ducking the policy challenge is deeply conservative; however radical the language, it boils down to letting market forces take their course. Rather than lamenting the risks and threats of policy development, we should try to turn the debate on its head, and ask what policies might be adopted if we place sustainability and justice at the heart of our approach.

Complex problems as a focus for policy

Learning, innovation and social capital are all intrinsically desirable. They are all capable of conveying significant benefits to individuals and to communities, and in our fast changing environment they seem also to offer an opportunity for sustainable advantage. According to some scholars, they are even among the things that generally make us happier (Bell and Blanchflower 2005; Putnam 2000). Generally speaking, they also appear to work rather well together, each promoting the other in an enviable virtuous circle. Yet translating these simple insights into concrete policy instruments is no easy task, even with the benefit of a growing body of empirical evidence.

At first sight, a social capital approach appears to suggest a very clear and obvious set of messages for policy makers. If social capital promotes learning, and learning promotes social capital, while both together help promote other desirable goals, then it seems to follow that public agencies should adopt policies which support lifelong learning and build social capital. Yet things are rarely so simple in the complex world of policy. A minority of researchers challenge the belief that social capital and lifelong learning are wedded comfortably and fruitfully together. And even if it can be shown that the two are at least cheerful cohabitantes, it does not necessarily follow that government can find and follow a simple menu of policy prescriptions.

The first reason why policy is complex is the uncertainty and risk that are inherent in the innovation process. Even from a linear perspective, it is impossible to predict with certainty what applications will emerge as new knowledge is applied. If we follow more recent commentators in treating innovation as 'a social, non-linear and interactive learning process' (Tura and Harmaakorpi 2005, 1113), then the development of multi-faceted opportunities for learning is one way of counterbalancing the unpredictability of innovation processes. However, it does not remove it altogether. Bluntly, there are invariably risks of unintended (and possibly undesirable) consequences as a result of any given policy intervention designed to

promote social capacities for innovation. I have argued elsewhere that similar uncertainties and risks are associated with policy measures designed to promote lifelong learning (Field 2006).

A second reason why policy is complex is that it is by no means clear that innovation, learning and social capital are readily compatible with social justice and equality. On the contrary: each may be pursued without any positive impact upon existing inequalities, and moreover they may well reinforce these inequalities or create new ones. Examples spring readily to mind. The promotion of lifelong learning may inadvertently lead to the creation of a 'learning divide' between the 'knowledge rich' and 'knowledge poor', which in turn legitimates the exclusion of those who fail to acquire the required skills and credentials. Similarly, policies designed to promote community development may be iniquitous if the disadvantaged groups and communities are isolated for some reason from networks and resources that are situated outside their own community.

Equally, policies designed to promote social cohesion may reduce capacities for innovation and knowledge exchange. Again, examples are not hard to find. Promoting social networks in particular neighbourhoods or groups may well be a good way of increasing people's access to support and other resources, but it can also help to reinforce low expectations, and encourage people to resist innovation. In many circumstances, moreover, strong social networks can provide a rather inefficient channel for communicating new ideas and techniques, or even lead people to share ways of avoiding the adoption of novel approaches. Indeed, paradoxically, where there are strong networks among a particular group – residents of a low income neighbourhood, or owner-managers of small and micro-enterprises – stronger horizontal bonds within the group can be a substitute for vertical ties with business development agencies, universities or larger companies. In these circumstances, measures designed to help build social capital can unintentionally cut across and even damage policies intended to promote the transfer of innovation and knowledge.

Last, there is a real problem with the concepts and language. As a social researcher, I am fully persuaded of the economic importance of trust, and have even been known (mainly for fun) to put a cash price on the value of my own friends. I can also carry on for hours about varieties of informal learning. Fortunately, I've never had to explain why any of this matters to an audience of hard-pressed local government finance officers, or economists working for business umbrella associations. It isn't just the jargon which worries me – in my experience, clear language can cope with all but a very few serious social theories. But at the outset I would have to tell my audience that no commonly understood metrics exist for explaining the complex social capital dimensions of any particular decision. The

effects of trust are not directly quantifiable, and anyway there is enormous scholarly disagreement over which types of trust generate what kinds of consequence. In so far as we can measure social capital empirically, I would explain, we social scientists have usually adopted indicators that seem to work at the level of the individual or that of the wider community, but are not really appropriate to the analysis of regional level innovation networks. I would not forget to mention fundamental critiques of all the core concepts by post-structuralists, neo-Marxists and critical feminists. We academics kick each concept around like rugby ball in an ill-tempered encounter between undisciplined sides with long-held grudges. By this stage, I suspect, the local government officers would be snoring, the economists muttering dismally among themselves.

Both lifelong learning and social capital are complex, ill-defined areas, populated by a vast array of poorly-coordinated actors with a variety of goals. So although leaving things to the market is not a sensible option, neither is a simple unilinear model of growing public investment in learning and social capital. This suggests that there are good reasons for examining more closely how social capital and lifelong learning support equity and innovation, and then identifying those ways in which both may be promoted in tandem.

A virtuous cycle?

By far the strongest claims for the virtues of social capital are those made by the American political scientist, Robert Putnam. Putnam since the mid-90s has been centrally preoccupied with what he believes is the collapse of community in the United States (Putnam 1995, 2000). Drawing on a massive reserve of survey data and membership records, Putnam demonstrated that civic connectedness in the USA had declined dramatically since the 1950s. By comparing data cross the individual States, Putnam also showed that populations with the lowest levels of civic engagement were overwhelmingly likely to suffer from high crime rates, poor health, weak economic growth and wretched educational attainment; conversely, populations with high levels of social capital enjoyed a much better quality of life (Putnam 2000). While educational attainment, for Putnam, is simply one among many indicators of quality of life, his evidence clearly suggests a positive association between social and human capital.

This was, of course, not a new notion. Workers and employers have long understood that skill is a collective phenomenon. Rob Strathdee reminds us that eighteenth century Kentish hop farmers preferred to recruit teams of pickers rather than individuals: In addition to reducing the cost and difficulty of negotiating employment relationships on a one-to-one basis, employing teams of workers

offered advantages to employers because they were natural 'skilling' organisations (Strathdee 2005, 25).

In the same period, Yorkshire colliery owners recruited small teams of miners to work a 'stall'; often based around a family unit (including women and children until 1842), the team provided a dependable supply of skilled labour while allowing the employer to externalise the costs of supervision, training and recruitment (Harrison 1979) ². Such team-based employment survived into the more bureaucratised world of modern industry, but under Fordist conditions it was increasingly replaced by more formalised systems of supervision, training, organisation and recruitment, based less on personal networks and individual trust, and more on standardised procedures and institutional structures. Strathdee has explored in detail what this meant for the 'skilling' of the labour force. In his study of vocational training in Britain and New Zealand, he shows how the value of a worker's skills came to depend less and less on his or her personal reputation among a group of peers, and instead depended more and more on formal credentials to convey 'trustworthy information' about their holder (Strathdee 2005).

Again, the role of social networks in innovation is not a new discovery. In eighteenth century Britain, the 'key stakeholders' were individuals who met up over coffee or the dinner table. The cutting edge of science met the leading edge of industry over the knives and forks of informal sociability. Birmingham's enlightened engineers, chemists, designers and industrialists chose the name of Lunar Society for their monthly gatherings, held on the night of a full moon so that they could walk home in safety (Uglow 2003). Similarly civic-minded networks subsequently lobbied for and created explicitly secular university colleges in London and England's provincial cities, providing them with a clear dual role of scientific and civic enlightenment (a role already taken for granted, to some extent at least, in Scotland's universities).

Much of this dual mission survived the shift towards a modern industrial economy, albeit sometimes – as in the case of adult extension programmes – in an increasingly threatened condition. But the rapid growth of higher education from the mid-twentieth century onwards took place in very different circumstances. Local and regional pride played some part in the founding of universities like Kent, Warwick or Stirling, but their researchers and senior staff never shared the same sense of locale as the Sheffields and Birminghams, while many other third level institutions were keen to shake off the associations of their origins (which often lay in upper vocational education for local industries). Personalised knowledge and social networks became less significant within the higher education sector, not least because of increased academic mobility, but also in response to the growing formalisation of relationships with business.

Rather than relying on whether the Professor of Chemistry happened to get on with the manager of the local brewery, universities and businesses came to depend on institutionalised forms of trust. Universities like Kent and Melbourne developed reputations as institutions, both for the quality of their research and the standards of their degrees, quite independently of the personal relationships and reputations of individual students and academics. Similarly, businesses developed specialised research and development functions, whose tasks included identifying trustworthy research findings on behalf of their firm.

Of course, personalised relationships continued to play a role in all this. But although governments have substantial experience of developing policy measures that can help to promote innovative capacity, sometimes with considerable success, they have tended to draw on rather traditional models of knowledge creation. Traditional approaches to innovation policy tended to rest on what has been called a 'linear model' of change. They can be described as 'top-down' in that they usually focussed on the application of explicit and codified knowledge developed in specialist research processes. In this view, at each level of innovation, new outputs – techniques, knowledge or methods – are created which may then be transferred to the next level as inputs, and so on in a virtuous and unidirectional line of change.

This picture of innovation has sometimes been described as characteristic of 'Mode 1 knowledge'. Typically, Mode 1 approaches relied on specialist research organisations, often based in academic institutions, insulated from the immediate requirements of the outside world, and developing on the basis of discipline-based experts seeking to produce and test abstract and codified generalisations (Gibbon et al 1994). This model of innovation, however, is increasingly criticised as 'too research-based, sequential and technocratic' (Tura and Harmaakorpi 2005, 1112). In other words, the very qualities which were so well suited to the Fordist period – predictability, routine, specialist expertise and technocracy – had become barriers to innovation.

In a globalised knowledge economy, the search for sustainable competitive advantage has challenged this top-down approach, suggesting instead that it may be more fruitful to see knowledge creation and exchange as a socially embedded process that involves a wide range of actors. In its place, Tura and Harmaakorpi propose a model of innovation as being both a social and technical process, which develops as non-linear processes deeply embedded in normal social and economic activities, and as processes of interactive learning between firms and their environment (Tura and Harmaakorpi 2005, 1113).

Rather than unidirectional flows of knowledge and techniques from laboratory to manager to employee within a unified chain of command, the socio-technical

approach emphasises multi-directional flows of information that take place in a variety of working contexts, have their roots in problem-solving as much as scientific research, and are incremental and frequently long term rather than radical and instantly visible. For Michael Gibbons and his colleagues, this is typical of 'Mode 2 knowledge', which is highly hybridised, created by teams that are usually both multi-disciplinary and multi-sectoral, working on problem-solving approaches to real-world problems, and preoccupied with applicability as much as generality (Gibbons et al 1994).

For a long time, the idea that people's personal reputation, networks and trust counted for anything seemed a rather antiquated notion. Compared with the latest developments in programmed learning and standards-based certification, heroic scientific discovery and successful professional application, talk of social reputation, social networks and interpersonal trust sounded positively Luddite. It also appeared suspect in the eyes of many in government agencies, attuned as they increasingly were to meritocratic views of human capital. How could we be seen to behave fairly and sensibly if we chose staff on the basis of personal knowledge rather than formal credentials? How could our policies be acceptable if we worked with partners on the basis of reputation and interpersonal trust, rather than establishing clear ground-rules which applied to all our contracts with outside agencies?

These ideas are neither irrational nor purely self-serving. They express fundamentally decent beliefs in equality of opportunity and fair dealing with all. Unfortunately, they have also tended to prevent us from recognising some of the failures of bureaucracy (understood to mean standardised systems and transparent hierarchies), as well as leading us to ignore the strengths of informal and interpersonal relationships as a basis for policy development.

Social capital and learning

The specific idea that human capital and social capital complement one another is rooted in James Coleman's work on schooling. Coleman led a major study for the United States Office of Education of school achievements among African American pupils in the 1960s, drawing on a monumental amount of data to demonstrate that although schools had a significant direct influence on pupil attainment, in certain circumstances it was outweighed by community and family characteristics (Coleman et al 1966). Coleman explained this relationship with reference to social capital, which he defined as, "... the set of resources that inhere in family relations and in the community social organisation and that are useful for the cognitive development of a child or young person." (Coleman 1994, 300).

More specifically, Coleman pointed to the dense ties that existed around faith-based schools, involving not only the school and its teachers but also the parents, the clergy and the wider community. Simply stated, social capital for Coleman 'exists in the interest, even the intrusiveness, of one adult in the activities of someone else's child' (Coleman 1990, 334). While ties rooted in the immediacy of family were strongest of all, Coleman also took a bright view of organised religion as a basis for positive cooperation. He appears to have had no particular interest in the types of connectedness that fascinate Putnam, such as sports, volunteering or work-based socialising.

Further empirical work on ethnic minority communities in the USA and Europe has generally tended to support Coleman's central finding, of a positive association between social capital and pupil achievement. A North American meta-analysis of fourteen empirical studies found that the majority reported a positive association between different scores on both counts (Dika and Singh 2002, 41-3), and further support has been provided by European researchers (Lauglo 2000). It has also been found that social connections, notably family ties, appear to play a significant role in promoting transitions to higher education, a role which is particularly important for middle class school-leavers and mature students (Reay, David and Ball 2005).

Precisely why educational attainment and social capital are so deeply intermeshed is not yet entirely clear, but their positive association with one another is well established. Coleman's initial suggestion was that the socialisation process was at its most powerful when all the key adult influences – parents, teachers, neighbours, priests – were singing in harmony (Coleman 1990, 1994). Essentially, his argument focussed on the positive pressures and negative sanctions that influenced young people's behaviour. However, a reading of Pierre Bourdieu's influential work on the role of cultural and social capital in reproducing social and economic inequalities suggests that there is more to it than simple pressures to conform to community norms (Bourdieu and Passeron 1977; Bourdieu 1980).

There is a simple process of calling in favours: school children acquire connections through their school, often by proxy, who will intervene on their behalf (eg a teacher who calls their old college tutor); this process almost invariably favours the relatively well-placed (Reay, David and Ball 2005). And perhaps even more importantly, there are hidden cognitive gains from social connections. For example, family shapes such capacities as verbal facility and behavioural patterns, with evidence of serious cognitive disadvantages for children born into families where parents were unemployed or low-skilled (Parcel and Menaghan 1994).

So far, the evidence reviewed has concerned social capital and learning among the young.

By contrast with the relatively clear findings of Coleman and his successors, researchers in adult learning have produced rather complicated results. First, much research has found that, as with young people, many adults derive educational advantages from their social connections. Recent statistical analysis in Wales points to the persistent influence of family on participation in adult learning, with an impact that appears to stretch back at least three generations (Gorard and Rees 2002). While this study is unusual in examining the role of family in adult learning, a well-established body of work points to a positive mutual relationship between active citizenship and adult learning. Internationally, an analysis of the International Adult Literacy Survey results for 17 countries showed a positive association between levels of participation in adult education on the one hand, and membership of voluntary associations (and, to a lesser extent, trust) on the other (Tuijnman and Boudard 2001, 40). A similar comparison of data from the European Values Survey and the European Labour Force Survey produced similar results (Field 2005, 36).

The most substantial body of evidence in the UK comes from a meticulous study of volunteering and learning in the English Midlands (Elsdon, Reynolds and Stewart 1995), which incidentally demonstrated that levels of volunteering – particularly in local and self-help bodies – were seriously understated by official statistics. This study's findings have been confirmed by work elsewhere in the UK. Thus in a small scale study of adult learners on access courses, a type of programme that presupposes a significant commitment to personal development and formal study, Roseanne Benn found that two thirds had previously been active in voluntary organisations (Benn 1996).

Benn concluded that civic participation helped people develop valuable cognitive and affective resources, in particular a willingness to take risks and a stronger individual 'perception of power and self-worth' (Benn 1996, 173). It is not clear from Benn's work whether all forms of participation produced these learning gains, but a study of adult learning in a northern French mining region in the 1970s suggested that it is important to distinguish between different types of participation. In this study, Jacques Hedoux found that people who took part in traditional festivals and societies were no more likely to attend adult education than those who did not; however, people who engaged in more 'modern' forms of community life, which brought them into contact with 'local notables', were much more likely to be active learners (Hedoux 1982, 264).

An analysis of British survey data also pointed to a differentiated pattern of association between civic engagement and adult learning; in general, participation in learning was higher among people involved in sociable and out-going forms of leisure and volunteering, and lower among people involved in home-based pursuits, such as gardening (Field 2003b). A more detailed analysis of Northern Ireland survey data suggested a further degree of complexity (Field 2005, 88-96). In this study, levels of participation in learning were highest among those who were relatively active in named forms of civic engagement, and lowest among those who were relatively inactive. However, there was a third group, consisting of those who were completely uninvolved in the named forms of civic engagement; they were less likely to be learning participants than were people who were active members of the community, but more likely to be learning than people who were occasionally active in the community. A simple model of joiners (with high levels of participation in learning) and non-joiners (with low levels of participation in learning) simply will not do.

So far, the analysis has concentrated on evidence pointing to a positive if complex association between social capital and adult learning.

However, a small body of work poses questions about the universality of this pattern. In the case of Northern Ireland, some survey and qualitative data point to the possibility that, for many purposes (including such key transitions as job-finding), some people rely on connections instead of participating in formal learning (Field 2005, 40-62). It is important to emphasise that this did not mean that people were learning nothing at all; indeed, the prevalence of social connections as a source of information and ideas meant that much learning took place informally. But informal learning and social connections appeared to substitute for, rather than complement, participation in organised learning. This has a number of consequences, including a tendency for outsider exclusion (so that information did not reach people who weren't in key networks) and self-exclusion (as in communities who actively avoided further education institutions, thereby reducing the prospects of gaining skills and qualifications that are valued in the labour market). The same study also indicated a tendency towards 'levelling-down' among some excluded communities, where individuals who 'got above themselves' were viewed with suspicion and mistrust; this was particularly the case for adults, and especially for women (Field 2005, 65-71).

Social capital and cultural capital can both reinforce one another in promoting educational achievement; in Bourdieu's terms, however, they also help to reproduce educational inequalities. However, Bourdieu was wrong to define social capital as something that almost exclusively functioned to preserve privilege. While it certainly can perform this function, Coleman's work is notable for demonstrating

that low income and minority communities can create network resources that then help them use education in order to overcome other sources of disadvantage.

Innovation and knowledge exchange

Just as lifelong learning has risen up the policy agenda since the 1980s, so has the importance of innovation and knowledge transfer increased. Moreover, all of these factors have become increasingly significant for all types of organisations, including companies, as they seek to improve performance in response to external competitive pressures. They are indeed closely related to one another, a relationship sometimes expressed in the language and aspiration of the knowledge economy or learning economy. These models are particularly relevant at the regional level, where the possibility exists of bringing key actors together and building new policy mechanisms around existing relationships.

These ideas have particular appeal in the high wage economies, where old competitive advantages such as location near sources of skilled labour, raw materials or product markets are losing their importance. In a globalised knowledge economy, where technology and science are virtually ubiquitous, competitive advantage stems increasingly from the capacity to innovate and adapt. Of course, this is not an absolute: the success of low-fare airlines is merely one example of the continuing advantages of strong cost controls, even if this is at the price of reduced spending on training and customer service. Nevertheless, sustainable high wage economies can only prosper through constant innovation and knowledge transfer.

Increasingly, economists acknowledge the marked contribution of the social dimension to economic growth. Much knowledge transfer takes place because of investments in human capital: specialist workers are able to copy ideas and techniques from elsewhere, and to apply the same scientific discoveries to different processes. In contrast with the dominant linear model of innovation in the past, contemporary analyses emphasise that innovation processes are not simple ones. As noted above, innovation is fraught with uncertainty and risk.

Uncertainty is inherent in innovation processes, partly because social and cultural factors are such critical intervening variables. But the nature of knowledge itself also creates uncertainty and risk; all knowledge, but particularly tacit knowledge, is deeply embedded in social and cultural relationships, and these influence how knowledge is created, shared, applied, and (re)developed. For example, people may reasonably decide that they do not wish to share new ideas and methods with their competitors; a whole industry of copyright and patent protection is growing up

around precisely this concern. Moreover, much knowledge is context-specific; especially in service industries, where suppliers interact directly with customers, it is important to understand and take account of local laws, languages and cultures. Local and regional languages and cultures are also important in determining the extent to which people share a common identity as full members of the community (Lee, Árnason, Nightingale and Shucksmith 2005), and are therefore receptive to new ideas and information from other people.

Further, the value of much knowledge depends on the ways in which it is applied. While general principles may be codified and transmitted relatively easily, it is not always possible to specify precisely just how a particular tool or technique works in a particular environment. Much knowledge – including many practical applications – is tacit, or embedded in specific social networks with their largely unquestioned routines; indeed, these networks are often creating and re-creating knowledge, rather than simply engaging in a series of one-way knowledge transfers.

For economists, then, the rapid diffusion of knowledge can present something of a problem. While it is relatively easy to transfer standardised and codified knowledge from one setting to another, it is precisely this form of knowledge that is most easily protected in legislation. This places all potential users on much the same footing: provided they are willing either to pay the owner of the intellectual property, or take the risk of legal action, they are all able to adopt the same methods and innovate in the same ways. While this may certainly lead to productivity gains across the board, it does little to secure a sustainable advantage. In this case, the advantage goes to those whose costs are lowest – and usually this will be because they are operating in a low-cost labour market.

Hence the significance of social capital, and particularly of networks, reciprocity and trust. As a number of economists now acknowledge, tacit and embedded knowledge are most easily promoted where high levels of trust exist between established networks of workers and firms (Cooke, 2002; Lundvall and Johnson 1994; Kim and Nelson 2000). Survey data has been analysed to show that social capital is at least as strongly associated with economic growth as more conventional assets, such as human capital (Whiteley 2000).

As with participation in learning, macro-level findings need to be treated with caution, not least because researchers are generally forced to rely on proxy indicators for social capital; while far from useless, these indicators are certainly not a direct fit. Nevertheless, the survey data do suggest that there is some association between connectedness and growth.

A number of studies at regional and company level have also drawn attention to networks as a channel for innovation and competitive advantage (Porter 2000). Firms that lack access to more conventional business assets, such as financial and human capital (or well-endowed research departments), are particularly likely to depend on interpersonal networks. In the UK, for example, small firms are much more likely to co-operate with scientists if they are located near a university; while proximity may help promote co-operation with larger companies, by contrast, it is not an essential pre-requisite (Lambert 2003, 79). Maskell's study of the Danish furniture industry shows that, despite high labour costs, the industry remains internationally competitive because of close ties between workers and managers in different firms, leading to willingness to share ideas and information (Maskell 2000). Even well-established firms, with good access to more conventional resources, benefit from reductions in transaction costs arising from trust based relationships.

So far, so good: social capital appears to promote innovation and knowledge transfer, to the benefit of all concerned. People are willing to share with competitors because they expect to benefit themselves, if not now then at some later stage, and because they trust the competitor to play fair with them. To be more precise, social capital increases efficiency by creating efficient channels of communication, and reducing the costs of monitoring and enforcement of shared norms; and it 'creates opportunities for adaptive efficiency', by reducing uncertainty and providing opportunities for checking and reviewing information that is received (Tura and Harmaakorpi 2005, 1115). And, depending on its nature, social capital also influences the range and types of knowledge that an actor can access.

As in the case of lifelong learning, though, there can also be a number of negative dimensions. The first is that, just as networks can reinforce innovation and dynamism, so they can reinforce conservatism and 'lock-in', so that entrepreneurs find new ways of getting more out of old methods and techniques rather than investing in change (Field 2005, 72-3). Second, the problem of 'insiderism' is a potential feature of network-based economic development. Those who are in a network may have a vested interest in keeping others out, in order to limit the competition. These divisions can easily run along ethnic lines, and thus help to reproduce existing inequalities. They also frequently involve a powerful gender dimension (Lee, Arnason, Nightingale and Shucksmith 2005). Insiderism is likely to be strongest where there is a dominant cultural identity, which can lead to the perception of outsiders as people to be ignored or excluded. Third, people can engage in rent-seeking behaviour through networks; for example, individuals can focus on doing one another favours, rather than pursuing collective goals.

Fourth, innovative business clusters tend to develop in regions which are already endowed with key resources, such as universities or natural assets (Rosenfeld 2002, 19). And finally, business networks can have a 'dark side': they can share information on how to cut corners, evade legislation on such issues as food hygiene or occupational health or pollution control, and help members work out how to avoid paying tax (Field 2003a, 71-90). Few discussions of clusters and business networks pay attention to these negative aspects; nor does the conventional literature normally attend to issues of equity and justice.

Once again, then, we see a complex relationship between social capital and economic behaviour. While there is general evidence to support the proposition that social capital promotes innovation and sustainable growth, the pattern is not clear cut. It seems that networks and trust based relationships are important in many business contexts, but there is relatively little evidence either way on the impact of civic engagement and associational membership. There are also signs that people can use their networks to pursue unscrupulous goals, which may cut across efforts at innovation and sustainability, as well as undermining the legitimacy of business growth policies.

Finally, there are profound differences between cohesion and innovation as goals of policy. The tension between the two can be seen in the spatial reference points that people use when they are discussing cohesion and innovation: while the first is usually located in the context of the local and the familiar, the second is situated in a global perspective where all is new. The language of community development and neighbourhood renewal, for example, is saturated with references to the importance of the immediate, known settings in which people live their everyday lives, to the trust and reliance that people place in existing community leaders, and to the need to avoid risks or threats to existing community-based identities (see for example McGivney 1990, 38-50). The spatial reference points for this debate are, then, usually presented as the fixed and local co-ordinates of neighbourhood and its associated relationships.

The discourse of the innovative knowledge economy, by contrast, is rooted in debates over globalisation. Capacities for innovation and knowledge exchange are widely viewed as the basic equipment needed by firms and nations that are competing in a global market place. Local and regional identities can be a business disadvantage if the firm is associated too closely with a region, though of course this can be turned to advantage in some specific cases (some stereotypes of the Scots are hugely resented at home, for example, but internationally they have helped build the brand of Scotland's banks).

In general, though, most regional or national branding exercises have tended to present the uniqueness of a locale by emphasising symbols and values that are ubiquitous; one comparative European study of local branding, for instance, found that rural regional authorities in several countries all used similar stylised images of hills to represent the 'distinctive' strengths of their region. As they noted, while this branding strategy suited some business sectors such as tourism or crofting, it could also undermine the development of other, newer industries (Lee, Arnason, Nightingale and Shucksmith 2005, 274-6). There is, then, a considerable latent tension between the global perspective associated with the knowledge economy and the local and regional perspectives that commonly underpin debates about community and neighbourhood regeneration.

Resolving policy ambivalence

In these circumstances, policy makers and educators might be forgiven for throwing up their hands in horror. Academics are notorious for demonstrating conclusively that the world is a complex place, and the debate on social capital is certainly no exception. As Graham Crow puts it, the promotion of social networks is an intellectual puzzle and a political challenge' (Crow 2004, 16). While it is widely accepted that people's networks can play an important role in helping them realise their goals, the complexities and uncertainties mean that the law of unintended consequences penalises all but the most sensitive policy interventions. Examples are not hard to come by: later in life, James Coleman bitterly regretted the policy reception of his own report on equality of educational opportunity, since measures such as bussing had helped to damage the very communities that he had examined in his research, and probably contributed more to diminishing rather than increasing the educational opportunities of African-Americans (Coleman 1990, 69-74). And at least Coleman was engaging constructively with policy. Many social researchers prefer to remain within their own comfort zone.

While the idea of social capital can be a helpful one for asking new questions about policy, whether in education or business growth, it certainly does not offer policy makers a magic bullet. The promotion of networks and linkages as a focus for policy does not necessarily lead to direct, or even indirect, benefits to low-income groups, small firms and disadvantaged regions. The first requirement for policy is, then, that public support for networks and clusters should be based on a clear expectation of social benefits. This means turning the conventional critique on its head: rather than lamenting the equity risks associated with networks and clusters, policy should frame equity programmes around clusters (Rosenfeld 2002, 16). This means tackling a whole range of systematic obstacles to full participation in clusters and networks.

Priorities will of course vary depending on local contexts. Social capital is field-specific in nature; I have also argued above that much knowledge is also at least partly tacit in nature, and is embedded in relationships and routines that are characteristically taken-for-granted. People involved in particular social networks are inclined to share knowledge (including information and skills) precisely because of their common history – yet it is this same history which determines the specific characteristics of the network and its knowledge-sharing capabilities. To put it simply, each social network, with its own groups of actors and shared values, is unique; and almost by definition, informal networks are considerably more distinctive than formal ones.

Nevertheless, it is relatively easy to identify the main factors preventing people from accessing the benefits that arise from networks and clusters, as well as reducing their chances of making an effective contribution to them (Rosenfeld 2002). As might be expected, the first is skills and knowledge (including affective as well as cognitive capabilities). These are needed in order to engage fully in network-based approaches to community and economic development, and also in order to take advantage of the opportunities that are subsequently created. In turn, this implies that education providers are able to engage with network based approaches, and feel able to develop local demand-led programmes.

Second is the importance of 'bridging ties' that span different communities. Traditional community development strategies were designed to build solidarity within low income or excluded communities; many business cluster strategies are intended to strengthen bonds within a particular grouping of firms. By consolidating such 'bonding ties', these approaches then reinforce external boundaries, and increase reliance on internally-available resources. This parochialism in turn creates exclusionary pressures, which cut off access to resources that are only available outside the grouping. In particular, it forms a barrier to dissonant information and ideas which may challenge the accepted wisdom of the grouping. Yet it is precisely such dissonant material which provokes the richest learning, particularly when it undermines previously unquestioned articles of faith. As Tura and Harmaakorpi observe with respect to regional innovation strategies, it is not the number of social relations in a region that is critical, but rather their diversity which 'enhances the regional ability to take advantage of different sources of information, and thus promotes the chances for successful regional innovation processes' (Tura and Harmaakorpi 2005, 1120).

This points to the third important factor, the role of intermediary actors. In building bridging partnerships, policy makers often identify intermediary bodies which enjoy the trust of at least one of the core sets of stakeholders. Yet the majority of these bodies tend to be run and staffed by people who come from a social service or

community organising background, rather than from business or the professions. This means that they 'have much stronger ties to the supply side, i.e. the individuals that need help of educational institutions, than to the demand side' (Rosenfeld 2002, 40). Little wonder that exclusionary tendencies seem almost insuperable. Exceptions include some of the personal advisers appointed under the New Deals for benefit claimants in the UK; a study of the New Deal for Musicians points to the impact of personal advisers with an industry background, who are able to 'talk the talk' on both ends of the bridge, and can therefore explain each side to the other (Cloonan 2004).

Fourth, the structures and procedures of government frequently impose barriers on knowledge exchange. It is not simply that government is marked by sharply defined interdepartmental boundaries, though these can certainly serve to inhibit effective networking, as well as militate against effective service delivery. Nor is it just a matter of political will, as though strong political leadership will result automatically in a shared regional vision with enthusiastic backing from the entire community. If the last thirty years have taught us anything, it is that top down approaches are rarely successful in achieving their aims. Strong leadership has its place, but in providing a favourable environment where networks flourish and are valued. This can best be achieved by recognising that the dynamics of social networks are different from those of government agencies, and that placing public responsibilities onto networks does not mean subjecting them to the same processes of governance as those which apply to the state.

As Marilyn Taylor suggests, we need to consider 'new approaches to risk which allow flexibility to govern the interface between the informal and the formal', opting for policies which foster trust rather than replacing it through the application of standardised rules for partnership (Taylor 2004, 215-6). After all, innovative behaviour involves risk, and appropriate policies are needed which can accept 'failure' as a process of learning, and encourage people who want to try something that is not already a proven success (Taylor 2004; Lee, Árnason, Nightingale and Shucksmith 2005). It is not best promoted by bodies whose behaviour only provides models of caution, suspicion and restraint. And rather than evidence-based policy which demonstrates 'what works', policy makers and researchers alike will have to accept a degree of uncertainty: what we need is 'what might work', and not what has already been tried and tested.

Fifth, regional innovation strategies can benefit from a strong shared sense of regional identity. Strategies rooted in a strong sense of shared identity are more likely to command widespread support, and to be inclusive in approach. They are therefore more likely to be sustainable. This is perhaps one important lesson from Ireland's recent economic success: as well as some very wise policies, such as the

creation of the Regional Technology Colleges as a new, distinctive and highly responsive sector of applied third level education, the Republic of Ireland is a relatively small nation – much smaller than almost all of the German *Länder* or Canadian provinces – whose population largely shares a powerful sense of national identity³. Where such identities exist, they can also form a basis for developing cultural industries that are sustained by existing unifying values and symbols, and in turn help to build the quality of life for residents.

Attention to the economic contribution of cultural sectors can also help promote sustainability more readily than narrow innovation strategies that focus exclusively on technology and manufacturing. However, the wider appeal of any such identity is vital in determining whether a particular region becomes the 'place of choice', able to attract skilled workers, entrepreneurs and specialist scientists from outside as well as instil pride among existing residents. Again, in policy terms, this is a difficult question of balance.

Within the UK

How can such strategies be developed and pursued? Which organisations are in a position to assume a leadership role? Do they have legitimacy among all the key actors?

These are particularly acute questions in the UK, where local government has been stripped of its powers in recent decades, and at least in England no real layer of regional government exists. From Putnam's pioneering work on social capital in Italy in the early 1990s onwards, a body of work exists which suggests that effective local and regional government represents a substantial resource for regional development (Putnam 1993; Lee, Arnason, Nightingale and Shucksmith 2005; Tura and Harmaakorpi 2005).

However, these studies are mainly based on findings from countries which do have robust structures of local and regional government, possessing significant discretionary powers over innovation and learning, and able to help influence the local and regional 'opportunity structure' within which other actors can then operate. English government structures are relatively weak at local level (largely as a result of decisions taken by successive national governments, it has to be said), and virtually non-existent – and certainly unelected – at regional level. It is extremely difficult to see how regional innovation strategies can be pursued in a systematic way without either a significant devolution of power to the local and regional level, or the creation of legitimate but unelected public agencies at the regional level. In this respect, then, the English model may well be one that offers

mostly negative lessons to those who are seeking to promote sustainable regional innovative capabilities.

Matters are rather different in Wales and Scotland, where the 'devolved governments' are in some respects comparable to those of regions like the Emilia-Romana, or the medium-sized German *Länder*, as well as those of such small European nations as Finland and Ireland. Similarly, the majority populations in these examples largely share a comparatively strong sense of regional-national identity. Collective actors such as the business community or the higher education sector have been quick to notice the possibilities that strong regional or devolved government can offer. University leaders in Scotland, for example, are quite clear about the desirability of being able to get all the key players around one table in discussions with policy makers and the business community.

Similar considerations might apply to the devolved administration of Northern Ireland, were it not subject to repeated suspension ⁴. The constantly interrupted status of the Northern Ireland Assembly means that its political leadership has had no opportunity to develop sustained working relationships with civil servants, let alone with civil society and the business community.

Conclusions

What we know about learning, innovation and social capital can be summed up very simply. Strong social networks tend to be associated positively with learning and innovation. In order to achieve these benefits, policy makers should seek to promote innovation and learning in ways that are socially embedded, socially inclusive, and create ties that bridge and link together actors from different social settings and different geographical entities (including the international level). Such networks have an important role to play across a variety of socio-economic contexts, from post-industrial urban regions to remote, rural and island communities.

There is a body of community development experience, as well as social capital research, which indicates how such networks can be built and sustained. Equally, this established body of knowledge shows that individuals and groups can exploit their social capital in order to control access to resources, and exclude others. Until recently, policy makers and some researchers have tended to underplay the importance of this 'dark side' to social capital.

Policy makers therefore need to consider how best to intervene in the creation and support of *process* mechanisms that foster social capital as a resource, enhancing people's ability to work together in an inclusive manner. This will involve change on the part of government bodies, including a concerted attempt to ensure coordinated and collaborative activity across a variety of governmental departments and agencies (notably, those concerned with community development, economic regeneration and lifelong learning). It will also involve regional actors with real powers and deep legitimacy, developing broad strategies that encompass a wide range of economic, social and cultural activities. This is easy to say and hard to do. It is achievable, nonetheless.

Last, let me end with a few words about the learning capacities that we derive from our own social capital. In this context, I am thinking about the relations between researchers and policy makers and other actors who are concerned with regional and local capacities for innovation and learning. What opportunities exist for sharing and fostering innovative thinking and exchanging information between researchers and others? How inclusive are those opportunities, and who are our own trustworthy brokers? Are we making best use of our own resources, and enhancing our own capabilities? Can we confidently grasp our own interactions as opportunities for expansive learning?

If we are concerned about the answers to these questions, then we need to consider how best to create our own social networks, enriched by bridging and linking ties to other network resources that lie beyond our own comfort zones, in order that we are also involved in and contributing to a dynamic process of continuing, purposeful learning.

References

- Bell, D. and Blanchflower, D. (2005) *The Scots May be Brave but they are Neither Healthy nor Happy*, Working Paper, Department of Economics, University of Stirling
- Benn, R. (1996) Access for adults to higher education: targeting of self-selection?, *Journal of Access Studies*, 11, 2, 165-76
- Bourdieu, P. and Passeron, J. C. (1977) *Reproduction in Education, Society and Culture*, Sage, London
- Bourdieu, P. (1980) Le capital social: notes provisoires, *Actes de la recherche en sciences sociales*, 2-3
- Cloonan, M. (2004) A Capital Project? The 'New Deal for Musicians' in Scotland, *Studies in the Education of Adults*, 36, 1, 40-56
- Coleman, J. S. (1990) *Equality and Achievement in Education*, Westview Press, Boulder, Colorado
- Coleman, J. S. (1994) *Foundations of Social Theory*, Belknap Press, Cambridge, Massachusetts
- Coleman, J. S., Campbell, E.Q., Hobson, C.J., McPartland, J., Mood, A.M., Weinfeld, F. D., and York, R.L. (1966) *Equality of Educational Opportunity*, United States Government Printing Office, Washington
- Cooke, P. (2002) *Knowledge Economies: Clusters, learning and cooperative advantage*, Routledge, London
- Crow, G. Social Networks and Social Exclusion: an overview of the debate, pp. 7-19 in C. Phillipson, G. Allan and D. Morgan (editors) (2004), *Social Networks and Social Exclusion: Sociological and policy perspectives*, Ashgate, Aldershot
- Davies, H., Nutley, S. and Smith, P. (editors) (2000) *What Works? Evidence-based policy and practice in public services*, Policy Press, Bristol
- Dika, S.L. and Singh, K. (2002) Applications of Social Capital in Educational Literature: a critical synthesis, *Review of Educational Research*, 72, 1, 31-60
- Elsdon, K. T., Reynolds, J. and Stewart, S. (1995) *Voluntary Organisations: Citizenship, learning and change*, National Institute of Adult Continuing Education, Leicester
- Field, J. (2006) *Lifelong Learning and the New Educational Order* (second edition), Trentham Books, Stoke on Trent
- Field, J. (2003a) *Social Capital*, Routledge, London
- Field, J. (2003b) Social Capital and Lifelong Learning: survey findings on the relationship between sociability and participation, pp. 32-41, in N. Sargant and F. Aldridge (eds.), *Adult Learning and Social Division: a persistent pattern*, National Institute of Adult Continuing Education, Leicester
- Field, J. (2005) *Social Capital and Lifelong Learning*, Policy Press, Bristol
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S. Scott, P. and Trow, M. (1994), *The new Production of Knowledge*, Sage, London
- Gorard, S. and Rees, G. (2002) *Creating a Learning Society? Learning careers and policies for lifelong learning*, Policy Press, Bristol
- Harrison, R. (editor) (1979) *The Independent Collier*, Harvester, Brighton
- Hedoux, J. (1982) Des publics et des non-publics de la formation d'adults, *Revue française de sociologie*, 23, 253-74

- Kim, L. and Nelson, R.R. (2000) (eds.) *Technology, Learning and Innovation: Experiences of newly industrializing economies*, Cambridge University Press, Cambridge
- Lauglo, J. (2000) Social Capital Trumping Class and Cultural Capital? Engagement with school among immigrant youth, pp. 142-67 in S. Szepter, J. Field and T. Schuller (eds.), *Social Capital: critical perspectives*, Oxford University Press, Oxford
- Lee, J., Árnason, A., Nightingale, A. and Shucksmith, M. (2005) Networking: Social capital and identities in European rural development, *Sociologia Ruralis*, 45, 4, 269-83
- Lundvall, B.-*, and Johnson, B. (1994) The Learning Economy, *Journal of Industry Studies*, 1, 2, 23-42
- Maskell, P. (2000) Social Capital, Innovation and Competitiveness, pp. 111-23 in S. Baron, J. Field and T. Schuller (eds.), *Social Capital: critical perspectives*, Oxford University Press, Oxford
- McGivney, V. (1990) *Education's For Other People: Access to education for non-participant adults*, National Institute of Adult Continuing Education, Leicester
- Parcel, T. and Menaghan, E. G. (1994) Early Parental Work, Family Social Capital and Early Childhood Outcomes, *American Journal of Sociology*, 99, 4, 972-1009
- Porter, M. E. (2000) Location, Competition and Economic Development: local clusters in a global economy, *Economic Development Quarterly*, 14, 1, 15-34
- Preston, J. (2004) *Identity, Learning and Engagement: a qualitative inquiry using the NCDS*, Wider Benefits of Learning Research Report No. 13, Institute of Education, London
- Putnam, R. (1993) *Making Democracy Work: Civic traditions in modern Italy*, Princeton University Press, Princeton
- Putnam, R. (1995) Bowling Alone: America's declining social capital, *Journal of Democracy*, 6, 1, 65-78
- Putnam, R. (2000) *Bowling Alone: The collapse and revival of American community*, Simon and Schuster, New York
- Reay, D., David, M. and Ball, S. (2005) *Degrees of Choice: social class, race and gender in higher education*, Trentham Books, Stoke-on-Trent
- Rosenfield, S. A. (2002) Just Clusters: Economic development strategies that reach more people and places, Regional Technologies Strategies, Carrboro, North Caroline
- St Clair, R. (2005) Do capital based perspectives help to conceptualise the potential of lifelong learning?, Paper presented at the 35th Annual Conference of the Standing Conference on University Teaching and Research in the Education of Adults, 5 - 7 July 2005, University of Sussex, England
- Strathdee, R. (2005) *Social Exclusion and the Remaking of Social Networks*, Ashgate, Aldershot
- Taylor, M. (2004) Community Issues and Social Networks, pp. 205-18 in C. Phillipson, G. Allan and D. Morgan (eds.), *Social Networks and Social Exclusion: Sociological and policy perspectives*, Ashgate, Aldershot
- Tuijnman, A. and Boudard, E. (2001) *International Adult Literacy Survey: adult education participation in North America: international perspectives*, Statistics Canada, Ottawa
- Tura, T. and Harmaakorpi, V. (2005) Social Capital in Building Regional Innovative Capacity, *Regional Studies*, 39, 8, 1111-25
- Uglow, J. (2003) *The Lunar Men: A story of science, art, invention and passion*, Faber and Faber, London
- Vuorensyrjä, M. (2001) Tacit Human Capital, pp. 57-79 in E. Patzar, R. Savolainen and P. Tynjälä (eds.), *In Search for a Human-Centred Information Society*, Tampere University Press, Tampere
- Whiteley, P. F. (2000) Economic Growth and Social Capital, *Political Studies*, 48, 3, 443-66

¹ This is a new paper, but it rests on research that has been aired in a variety of other settings, and I have benefited enormously from the views that others have expressed. In the spirit of any serious discussion of social capital, I will start by accepting that some of the most helpful exchanges have been informal ones, and it is typical of informal exchanges that I have probably forgotten precisely who said what, when they said it, and how it influenced me. I have also enjoyed and learned from more formal discussions involving policy makers and practitioners as well as fellow scholars, including those organised by the Scottish Adult Learning Partnership, the National Adult Education Guidance Association, PASCAL and the Active Democratic Citizenship network of the European Society for Research in the Education of Adults.

² In order to avoid any possibility of misunderstanding, unintentional or not, let me make it very clear that neither Rob Strathdee nor I are romanticising these arrangements. The point is simply that they represent a particular mode of knowledge creation and exchange, which itself formed part of a historically specific set of employment relations. It is also true that they were heavily male dominated, and further more involved the exploitation of children. For the purposes of this discuss, it is important not to assume that male domination - and other forms of inequality - are absent from contemporary social networks. In short, we should not romanticise recent social movements (including feminist movements), business associations and innovation networks, and we should not therefore ignore their structur ed inequalities and inefficiencies.

³ This is, of course, an over-simplification which ignores such factors as a favourable demographic structure and the impact of European Union policies and third-country investment (particularly from the United States). But the main point about social cohesion and national identity remains.

⁴ Northern Ireland also raises the question of the legitimacy of democratic government. Most people probably assume that a democratically elected parliament and its executive are legitimate, while unelected bodies are not. But the legitimacy of public institutions in Northern Ireland is either contested, or relative, or both; and it is dynamic, in that it changes over time, rather than static and once-for-all.

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