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The applicability of networks to Australian adult and vocational learning research

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Abstract

Networks have increasingly been recognised by educators as important in adult and vocational learning contexts, in that they have the capacity to help potential learners engage and become better connected with a wide range of learning organisations through their families, jobs and communities and also with opportunities for future learning and work. The importance of 'being connected', including through networks to and between learning organisations, has come into higher relief with a recent increase in theorising about aspects of social capital including learning networks, the growth of lifelong learning and an identification of the particular penalties associated with several forms of disengagement from learning for people of all ages. This paper begins with a scan of research literature on networks in adult and vocational learning. The paper identifies some new techniques involving networks, found by experience to assist in the process of adult and vocational learning research: particularly for identifying potential research interviewees within learning organisations and communities, strengthening relationships between learning organisations and identifying opportunities for future collaboration. It also provides some insights from new data on organisational networks derived from a number of recent research studies about learning networks in TAFE, adult and community education and public safety organisations in small and remote towns. The paper finally provides a number of tentative, general findings about the broader applicability of network theory to research and theories about learning in such contexts.

INTRODUCTION

While the widespread use of the term *network* in education is relatively recent, many of the foundational research methods for studying networks came out of communications network research in large military and industrial organisations after the 1950s. Hare (1962, p 273), in a *Handbook of small group research* noted that in such organisations 'a segment of the organisation often serves as an information processing centre … [though] frequently some of the members are separated physically from each other and communicate by telephone and other devices in restricted networks.' Though network theory and the term network have recently become largely appropriated within a technological paradigm with the enormous subsequent development of information and computer technology network theory has continued to evolve, shape and inform education and other social research fields to a point that the 'social fallout' of connecting at a distance has become a topic of research (Chayco 2002).

In 1983 Knoke and Kuklinski (1983, p.7) observed that network concepts and methods of social research had undergone dramatic growth in sociology and anthropology during the previous decade and that their rapid introduction to audiences in other fields, including education, could be anticipated. For social researchers the early promise (Mitchell 1969, cited in Knoke and Kuklinski, p.13) had been that 'The patterning of linkages [could] be used to account for some aspects of behaviour of those involved', of consequence not only for individuals but also for the system as a whole. As Knoke and Kuklinski (1983, p.9) noted, network theory might enable a move away from

> … the atomistic perspectives typically assumed by economics and psychology, [where] individual actors are depicted as making choices without regard to the behaviour of other actors, in ignorance of the social contexts in which the social actor is embedded.

The term *network* has since become a relatively common one in vocational and adult education research literature (network appeared in 155 titles on the VOCED data base[1]), in 52 instances in association with the term *education* and 22 cases in association with the term *learning*. The term network appeared in the text of 937 entries in the same data base, primarily in association with education, (619 cases) learning (346 entries) and also employment (146 entries).

LITERATURE REVIEW

A close perusal of this vocational education and training literature about networks shows that the term is now used to apply to a number of different contexts: from formal organisations that have a formal network function (e.g. Job Network and Local Learning and Employment Network); loose associations of professional educators and trainers (e.g. Skills and Education Network; National TAFE Science Network) to broader, more diffuse network constructs (e.g. network of women, international network national learning network, information network, international network) and more recently to networks with an electronic communication function (e.g. network-based flexible learning, electronic networks).

The particular and increasing use of network theory in education derives in part through the application of social learning theory (Bandura 1977) and relatively new perspectives on the quintessentially social character of learning referred to as *situated learning* by Lave and Wenger (1991). In turn Bandura's work on social learning theory has had direct impact on diffusion network theory, in that …

> … both theories seek to explain how individuals change their overt behaviour as a result of communication with other individuals. Both theories stress information exchange as essential to behavior (sic) change, and view network links as the main explanation of how individuals alter their behavior.   (Rogers 1995, p.330).

Bandura (1977) held that 'Learning would be exceedingly laborious, not to mention hazardous, if people had top rely solely on the effects of their own actions to inform them what to do'. The central ideal of social learning theory is that an individual learns by means of observational modelling. Lave and Wenger's related idea of situated learning was developed from studies of apprentices but goes beyond the related, earlier notions that emphasised the importance of learning that takes place 'in' an individual: for example for apprentices or through 'learning by doing'. The term,

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[1] www.ncver.edu.au: accessed 14 January 2004. Contains 24, 462 entries.

situated learning suggests that learning that is typically produced collaboratively, in group situations and within a framework. In essence, Lave and Wenger (1991, cover) propose 'that learning is a process of participation in communities of practice, participation that is at first legitimately peripheral but that increases gradually in engagement and complexity'. Their theory is consistent with the contemporary idea of vocational and adult learning as a set of situated opportunities, and of a learning curriculum as 'a field of learning resources in everyday practice viewed *from the perspective of learners'* (Lave and Wenger 1991, p.97, their italics). In the context of this paper, social learning and situated learning theories that presuppose the importance of networks appear to lend themselves to critical examination by means of network theory.

The most recent advances in network theory other than in the field of electronic networks (and presumably in the covert intelligence community in their pursuit of terrorist networks) appear to have been made in the literature on the field of diffusion of innovation (eg Rogers 1995). This literature on the diffusion of knowledge and ideas through networks is of potential interest as they might apply to education and learning networks in relatively small organisations and communities typical of those found in smaller organisations and communities. Rogers (pp.290-293) summarised four main methods of measuring network links in diffusion networks: sociometric, informant ratings, self-designating techniques and observation. The sociometric method effectively asks a large number and range of network system members about their linkages. While the method has high validity it requires a large number of informants and involves analysis of very complex sociometric data.

The informant ratings method explores linkages in a similar manner but between a subjectively selected number of key informants. It saves cost and time but requires informants to be thoroughly familiar with the network context. The self-designating technique asks respondents to identify their own role in a particular network but is very dependent on the accuracy of respondent self-reporting.

Finally, observation methods observe, identify and record network exchanges at a micro-level. Though observation has high validity it is very obtrusive, time consuming and impractical in most 'real life' networks, examination of the micro instances of social interaction through conversation analysis (eg Boden 1994) informed by ethnomethodology (Garfinkel 1967) has been used to some effect (Falk and Harrison 1998; Falk and Kilpatrick 1999) to establish the relationships between learning and social capital in rural communities.

Of the three methods identified by Rogers, it is a variation of the informant rating method that has been found by the author to be particularly applicable and useful in learning network research in smaller towns and communities and which is elaborated later in the current paper. As Rogers (1995, p.292) summarised, asking only a handful of 'key *informants* who are especially knowledgable about the networks in a system' provides a 'precision that is almost as accurate as sociometric techniques when the system is small and when the informants are well-informed.'

It is pertinent to note at this point that the fact that small-scale learning organisations and relatively discrete, small country towns lend themselves extremely well to network-based research is not a new finding. Two decades ago the 'most prevalent

studies of networks select[ed] small-scale organisations – classrooms, offices, gangs, social clubs, schools … and treat[ed] their individual members as the nodes' (Knoke and Kuklinski 1982, p.14). In 1962 'Communication Network' comprised a chapter in the *Handbook of small group research.* By the late 1990s 'Networks and Linkages' had become only a short paragraph in a similarly definitive book on *Theory and research on small groups* (Ed. Tindale, Heath, Edwards *et al.* 1998), and a definitive text on *Networks in and around organisations* (Andrews and Knoke 1999) had gravitated mainly to consideration of networks at they apply in inter-organisational, global and corporate contexts.

This move towards the analysis of larger scale network systems was anticipated by Knoke and Kuklinski, who noted in 1982 with some foresight that although small scale organisational settings 'have the considerable advantages of sharply delineated boundaries and enumerated populations, nothing intrinsic to network analysis prevents application to large scale systems' (p.14). It is perhaps timely to return to some of what was already known about smaller scale networks and network relations in Knoke and Kuklinski's era to ask why the widespread current application of network constructs to larger scale education policy and practice contexts has come about, and particularly why this application is not matched by a more rigorous use of network analysis and network theories in vocational and adult education and learning research.

Usefulness of network relations in education

The answer to the second question posed above may have something to do with the radical and relatively rapid, widespread departure from government controlled and directed, initial educational organisations towards the latter part of the most recent century, towards a deliberately dispersed range of opportunities and contexts for lifelong learning in a diverse network of learning organisations for a very wide range of learners. In summary, there have been deliberate moves away from inflexible and hierarchical educational structures and sectors to learning organisations whose managers, employees, learners (and the organisations themselves) are encouraged to be more effective in an increasingly turbulent environment by actively networking and collaborating to routinely facilitate situated, social learning. Knoke and Kuklinski (1982, p. 13) had observed that …

> Formal organisations with a centralised structure among its various divisions and departments may be most effective … in a placid environment, but in a turbulent, rapidly changing environment an organization with a less centralised structure may be more adaptable.'

In the 20 years since there has indeed been a move away from a focus on initial, school-based, centralised educational provision towards a facilitation of lifelong and lifewide learning in diverse contexts. The apparent advantages of networks to governments and policy makers involved in education goes well beyond the now widespread recognition of the importance of a wide range of situated learning over a lifetime, such as in the community, family settings and in the workplace. Networks allow effective transactional relations associated with learning to occur informally beyond the direct reach of governments and apparently at less public cost than if they were provided from a centralised, directive structure. Or put another way by Latham

(1998) within arguments for encouraging social capital and the devolution of structures of governance, there may be a case for …

> … more thoroughly resourcing the work of the non-state public sector … [to] allow more of society's answers to come from community and civic … [and] turning over its decision-making powers as much as possible to intermediary associations linking the power of government to with the capacity of citizens to engage in mutual trust.

Relationships between learning networks and social capital

This very recent and increasingly widespread application of social capital theory (albeit early, tentative: see Productivity Commission 2003) to education and other fields has further expanded the potential for network theory to inform education research. For Bourdieu (1986), social capital referred to resources that were linked to membership of a group. Social capital was seen by Bourdieu as a means of getting access, through social connections, to economic and cultural resources, with a particular emphasis on *social networks* that provide access to a group's resources. Bourdieu, unlike Coleman (1998), was less inclined to hold that social capital could be accrued by individuals. Putnam (1993) tended to focus more on social capital as involving trust, norms and networks that facilitate mutual cooperation. Woolcock and Narayan (2000, p.30) summarised the stance taken by many researchers in the field including the author that despite differences in definition and difficulties in measurement, 'We cannot wait until we know all there is to know about social capital before acting. Rather, to foster further our knowledge and understanding of social capital, we should adopt a learning by doing stance'

By 2002 ABS (2000) had noted that 'social capital is fast gaining wide interest and acceptance amongst policy makers, politicians and researchers alike'. Social capital at the level of learning organisations has some intuitive parallels with the act of socially embedded learning by individuals within those organisations. Learners tend to choose and learn within contexts and organisations that they trust and relate positively to. Part of the success of learning is therefore associated with collaboration (eg with teachers, other students). Staff, students, management committees and volunteers associated with many learning organisations experience the benefits of reciprocity. The very basis of much teaching and learning is widely regarded as didactic and reciprocal. Learning is greatly enhanced where norms are shared. In community owned and managed organisations, social capital is arguably the *modus operandi* on a range of levels (Falk, Golding and Balatti 2000). In rural communities social capital '… remains crucial … allowing people to communicate widely, think strategically and make informed decisions in order to deal with persistent problems and accelerating change.' (Cavaye 2003a, p 14).

While 'The literature contains a variety of definitions of social capital … most authors agree that social networks and/or social norms are key elements of social capital' (Productivity Commission 2003, p.7) and that trust 'is either an additional element of social capital or a proxy for the level of social capital present in a community' (p.7). There is now a widely held view, after a decade of theorising and empirical study, that social capital is 'a *resource* that people can use to achieve certain objectives, albeit not one that one individual can own in a formal sense' (Productivity Commission, p.7). In this sense learning and particularly the social learning of Bandura (1977) or the

situated learning of Lave and Wenger (1991) might well be viewed as either a subset of social capital or very closely related.

There is, however, a case that education might need to depart somewhat from some of these general agreements about the 'social capital metaphor': that social capital advantages individuals or groups because they 'are somehow better connected' (Burt 2000, p.3). Burt scans the research literature to conclude (unsurprisingly) that 'information circulates more within than between groups' (p.6) but questions whether 'networks with closure' (in which everyone is similarly and densely connected, and where he suggests 'distrust and character assassination is as strong as its association with trust' [Burt 1999, cited in Burt 2000, p.8]) is an really an ideal source of social capital, and by implication, as a context for diffusion of ideas through learning.

On this basis Burt (2000, p.9) argues that 'Cohesive contacts (contacts strongly connected to each another) are likely to have similar information and therefore provide redundant benefits'. On this basis Burt presents a case for identifying the *holes* in social structure rather than the strong links: what Burt terms *structural holes* in networks. Burt advances an argument that the focus on social capital should be less on tightly networked cliques and more on individuals who are 'skilled in building interpersonal bridges that span structural holes. They monitor information more effectively than bureaucratic control. They move information faster and to more people …'. Burt (2000, p.11) proceeds to make an overt link between the competitive advantage of structural holes, creativity and learning, concluding that 'bridging structural holes enhances an individual's ability to learn - there is an association between structural holes and learning' (Burt 2000, p.26) and that 'people with more bridges', rather than people with more links, do better.

Rogers (1995, pp.309-310) puts the same idea another way.
> An ingrown system is an extremely poor net in which to catch information from one's environment. … [W]eak ties are bridging links … though not a frequent path for the flow of communication messages, the information flowing through them plays a crucial role for individual and for the system.

Rogers summarises a review of the network literature with a generalisation that '*The information-exchange potential of communication networks is negatively related to their degree of (1) communication proximity, and (2) homophily*'. (p.310)

This emphasis on the strategic importance of building 'bridges' between disparate individuals (and by implication, disparate groups), rather than simply strengthening the links between like individuals and like groups is reflected in the distinctions in some of the social capital literature (Putnam 2000) between *bonding* and *bridging* social capital. While 'bonding social capital
> … is useful and important, [it] can be insular. Cross-fertilization may not occur. Groups may turn inward, recycling memes that don't evolve. The countervailing influence is *bridging social capital* which connects dissimilar groups. This stuff is harder to create, but also more valuable.' (Putnam 2002)

There is a case for social capital theory to treat learning, 'not as a matter of individual acquisition of skills and knowledge but as a function of identifiable social relationships' (Field and Schuller 1997, p.17). There is also an argument, advanced by Field and Schuller, and encouraged by recent thinking about bridging social capital

that adult and vocational education researchers, rather than looking at individual agents and measuring their capacity to learn through particular providers,

> … might look at the capacity of society as a whole, or of social units within it, by investigating the nature of relationships between institutions which purport to make up a learning society … [and] ask how far people in different institutions share information, share values, and how far they are able to trust others to pursue common goals. … The more information and values are shared, the more effective the system will be in encouraging adults to learn. (p.17)

So how might networks be employed in adult and vocational learning research?

The foregoing is only a small fragment of the research literature on networks and social capital, which in its entirety is deep and complex in a range of fields. However it provides enough insights to confirm what Fukuyama (1995) suggests, that education is the area where governments probably have the greatest ability to generate human capital. It also reinforces the opening contention that network theory constructs might provide some useful, empirical tools for charting and mapping adult and vocational learning relationships and the social capital arguably associated with its maximum generation in small town and small organisational setting. If we take a network as an 'interconnected group of people who usually have an attribute in common' (Productivity Commission 2003. p.10) it is possible to anticipate a large number of possible network types in communities and learning organisations in which trust and reciprocity are likely to operate effectively with a range of network characteristics (see Stone and Hughes 2002; Productivity Commission 2003, p.13).

Onyx and Bullen (1997) have used survey techniques to test connections between social capital and a small number of regions with apparently rich mutual associations. McQueen and Lyons (2001) have explored mutual forms or organisation as a preliminary step to investigating a possible link between social capital and community regeneration in regional Australia. While their research in regional New South Wales demonstrates the uneven density of mutual organisations ('established by groups of people to provide services that are not available from government or for-profit firms', p.4), hey caution that a high density of such 'mutuals', particularly in shrinking communities, may be more a 'testimony to organisational survival' (p.11). While superficially indicative of high bonding social capital, they stress that a observed high density of mutuals may not necessary be a good thing in a community whose large number of mutual organisations are indicative of 'long suffered, deep divisions along racial, ethnic, religious, political or class lines' (McQueen and Lyons, p.11).

While previous research has been unable to identify a commonly agreed measure of social capital, it is providing evidence that mutuality *within* organisations (bonding) may be part, but not, in itself, a sufficient measure of a communities ability to adjust to change, and certainly not a good measure of the ability for an individual to learn.

However previous research suggests it should be possible and useful, using a variant of the informant rating method identified by Rogers (1995), Burt's (2000) theorising about structural holes as well as Stone and Hughes' (2002) predictions about the importance of bridging social capital, to use network diagrams generated on site by informed individuals, to identify structural holes where there are opportunities for learning through bridging, and conversely bridging through learning. Similarly, it should also be possible to identify network types (in workplaces, learning

organisations and community settings) that positively affect the propensity to learn across different organisations and contexts as well as characteristics of organisations and individuals that are better able to identify and bridge structural holes in networks.

Formal and informal networks with a potential learning-related function that might be the subjects of such research are very diverse. They include informal personal ties and relationships as well as formal and informal relations with and between institutional systems. One might expect to observe a wide range of network characteristics such as size and extensiveness, density, closure and diversity (ethnic, educational, cultural) that presumably impact on the ability of individuals and groups to learn, and particularly for mutual community organisations and individuals to create the necessary bridges alluded to above in order to build social capital.

The use of network diagrams[2]

Network diagrams (in the form of organisational sociograms of learning-related organisations) were first experienced in research settings by the author during CRLRA[3] (2000a, 2000b) research into the role of vocational education and training (VET) in regions surrounding ten Australian non-metropolitan towns. Network diagram were used as part of that research to reconstruct and conceptualise the inter-relationships between learning organisations within and between separate but contiguous geographic communities. In these early studies the diagrams were developed, retrospectively as a product of the research, and drawn by researchers *after* an extensive round of on-site interviews.

Network diagrams have since been trialed and used with considerable effect by the author on the *'front end'* of research into adult and community education (ACE: Golding 2001a, 2001b, Golding and Rogers 2001), TAFE[4] (Golding and Vallence 2001) and volunteer organisations (Hayes and Golding in progress 2003). In each of these studies, network diagrams have been created by a set of selected, key informants in some ways similar to the key informant method identified by Rogers (1995). Cavaye (2003b) has anticipated future use of variations of the method as a self-management tool in ACE organisation in Victoria, The network diagram technique, further elaborated below has been shown to provide a standard, defensible (and arguably replicable) method to conceptualise, sample and analyse learning organisations and their network interrelationships in communities.

In the research technique outlined below in this paper, the deliberate emphasis is on a small number of diverse informants thoroughly familiar with and embedded within particular systems (after Rogers 1995), who are able to identify the structural holes between learning organisations as well as the organisational relationships between them. This need to account as much for the relationships *that do not exist* among actors in a network was anticipated by Knoke and Kuklinski (1982, p.12). Such 'missing' relationships in local learning networks, while presupposed in deliberate and formal attempts to enhance them (for example through Local Learning and

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[2] Some of the principles involved in the use of network mapping were presented in workshop format to the March 2002 AVETRA Conference in Melbourne.
[3] Centre for Research and Learning in Regional Australia, University of Tasmania.
[4] TAFE: Technical and Further Education.

Employment Networks - LLENs in Victoria), have seldom been the subject of research.

The diverse learning organisations that have been the subjects of the author's research have included TAFE campuses, TAFE departments, corrections education centres as well as adult and Community Education (ACE) providers. In many cases in small rural and remote communities no separate, local adult learning organisation exists beyond the mutual, non-profit organisations. Important 'surrogate' learning organisations in such small community contexts include fire brigades and SES[5] units, and in many very remote contexts, local stores, hotels and Aboriginal community organisations.

The technique has been found in a series of studies between 2000 and 2003 to be a useful tool for analysis, review and evaluation in more than 70 different community-based adult learning settings: four prison education centres, ten providers in two ACE clusters, ten ACE providers, ten TAFE campuses, learning organisations in 20 small and remote Victorian towns and most recently, 20 fire and emergency services organisations in small and remote towns in five Australian states.

The particular usefulness of network diagrams

Network diagrams drawn by key informants at the initial site visit, have been found to be particularly useful in the adult, community and vocational learning settings outlined above for a number of research-related purposes. These network maps involve delineating the key sites for learning and the main learning organisations in geographic localities and regions. They have proved invaluable in research studies of small towns for identifying sample populations of informants in learning organisations and communities. They have allowed the teasing out of complexities and inter-relationships (and particularly lack of relationships) within and between learning organisations; identifying and conceptualising linkages (or lack of linkages), collaboration, blockages and competition between and within learning organisations; and identifying how organisations are seen by participants to be interacting prior to more detailed research and interview.

Quite apart from their value to researchers, network diagrams have provided an opportunity for staff within these organisations to identify, map, document, benchmark and improve networks for evaluation and quality assurance purposes. Network mapping and follow up focus group interviewing for the specific purposes of *qualitative auditing*[6] were also used during 2001 at Bendigo Regional Institute of TAFE as part of the Institute's quality assurance process. This 'qualitative audit' process (Golding and Vallence 2001; Golding 2002) was developed as an alternative to quality assurance through random survey and other quantitative analysis.[7]

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[5] SES: State Emergency Services.

[7] The use of this technique as a critical part of a quality assurance program has been called 'qualitative audit' by the author. The term derives from the definition of qualitative as 'pertaining to quality' and the etymology of audit in the Latin term *auditus*, to hear. Network diagrams are used as a means of evaluating and benchmarking networks and identifying informants for interview, literally to 'hear about quality'.

RESEARCH METHOD

The use of network diagrams

While the relationships between a particular organisation (such as a learning organisation) and other organisations have been found to be complex, even in a relatively simple settings, these complex relationships can often be discussed, conceptualised and portrayed quite simply by a wide range of informants in the form of a network diagram. The commoner relationships, and the ones found to be most useful by the author, are essentially in four categories[8]:

- *collaborative:* where organisations work together or relate positively in some way. These collaborations are usefully conceptualised as having varying strengths: eg strong, normal and weak by lines of varying thickness.
- *competitive:* where organisations are deliberately or otherwise engaged in some form of contest (e.g. for students or resources)
- *blocked:* where organisations are in some way deadlocked in their relationship, typically through a current or previous falling out, typically over personalities, of unsettled demarcation over 'learning territory' or related to a dispute over a particular, past incident
- *non-existent or minimal*: where organisations, sometimes with a closely related function, avoid contact or choose not to associate or collaborate.

Beyond this basic network diagram a number of other elaborations have been developed by trial and error. In its simplest form, a participant, usually an informant with a good knowledge of (or responsibility for) a particular local learning organisation (eg a particular TAFE campus, ACE provider, enterprise) is selected as an initial informant to create the network diagram. The informants are invited by the researcher to represent their own learning organisation as a circle in the centre of a large (say A3) sheet of plain paper. The informants are then asked to consider and add 'links' between their own learning organisation and other organisations) using the schema suggested in the diagram that follows.

Key for Basic Network Diagrams

Local learning organisation being studied or where interviews are to take place

Other organisations (particularly other *learning* organisations)

Strong collaborative link

'Normal' collaborative link

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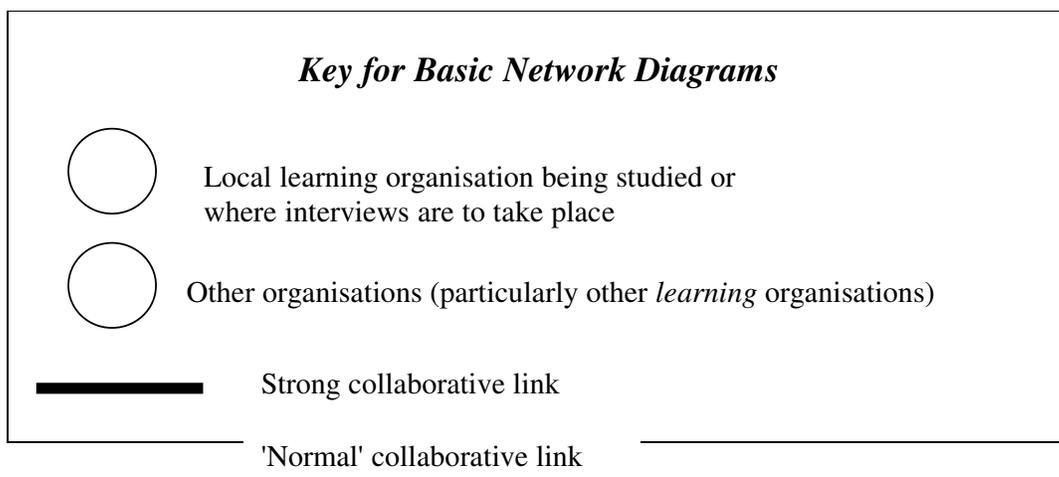
[8] It is possible to postulate other types of links. In some cases there can be more than one type of relationship between organisations (eg there can be collaboration with some programs and competition with others). It is also possible for one organisation or informant to disagree about the nature of their relationship. For example one informant might describe a particular link as 'collaboration' and an informant from other party to might describe it, looking from another direction, as 'competition'.

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- - - - - - - - - - - - -      Weak link


●━━━━━━━━━●      Competition


◆━━━━━━━━━◆      Blockage
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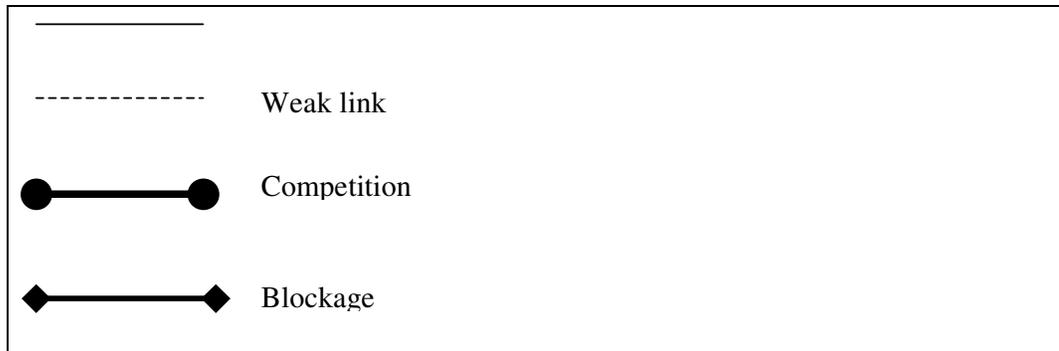
It is important to stress that network diagrams are individual and different from each other, because they are created by individuals with different roles within organisations and with different ideas about network relationships. They present, in a simplified form, and from an individual perspective[9], links that are typically quite complex. It is possible to enhance the diagrams in a number of ways as summarised below. The usefulness of these and other elaborations depend on the purpose of using network diagrams.

The network diagrams are created using a schema that allows identification not only of *bonding social capital,* essentially contained within organisations and communities, and *bridging social capital,* reaching outside and beyond communities. Social capital and diffusion network theories suggests that strong communities, including learning communities, should not only network and pull together (i.e. have strong *bonding* social capital), but also have strong and collaborative external links (*bridging* social capital) to ensure a flow or diffusion of ideas from 'outside' and an awareness of change beyond communities.

It is possible to think about and create different network diagrams that identify a range of relationships that are either internal, external or both as they apply to learning organisations. There may be network links within an organisation (eg between teaching departments or service areas on one site), links beyond the organisation and across sites (eg to extended campuses), links to other organisations within the town or neighbourhood and/or links to other organisations outside of the town.

If the object of a study involves parts of a large learning organisation (eg a TAFE), internal links would be those relationships inside the organisation and possibly to extended campuses. External links would be those relationships beyond the organisation. If a particular neighbourhood, suburb, learning town, small or remote community is the focus of a particular study, internal links would within those areas. Relationships to organisations, towns or communities beyond that might be regarded as external links.

In many towns and regions it is useful in the creation of the network diagrams to know and respect the widely understood geographical nature of network relationships,

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[9] The rationale for inviting leaders, managers and coordinators to draw network diagrams is that the diagrams that they create incorporate their particular vision of organisational relationships. Where there is a need for such a diagram to represent a wider organisational view, it is possible to invite a team of other informants within the same part of the organisation to comment on and make changes to a copy of the original diagram.

both in the local neighbourhood and beyond it. For example if one is undertaking learning organisation research in the city of Bendigo (central Victoria), it is useful to consider relationships with learning organisations in other towns or cities in particular directions from Bendigo and to approximately preserve these directions in the network diagram. For example on the network diagram shown below, informants would place circles representing Echuca-based learning organisations within the separate space delineated north of Bendigo, and for relationships with Maryborough and Melbourne-based organisations to be represented in areas to the south west and south respectively.
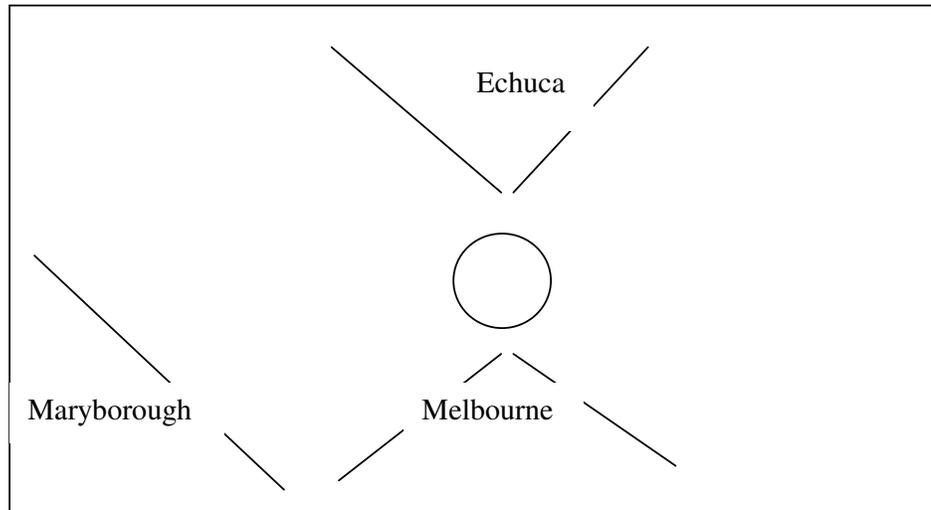
As informants are drawing a line on a diagram it has been found to be productive to get them talk about what the link means and to record directly that on the diagram. For example they might say: "This strong link is associated with our shared facility"; "This competition is about contested government funding" or "This blockage goes back to our falling out in 1996." On the network diagram, the strong linkage, competition and blockage lines drawn would have written along them 'shared facility', 'government funding' and '1996 falling out' respectively.

To some extent, the diagrams informants draw about adult learning organisations are limited by how the informants perceive learning and learning organisations. It has therefore been found useful in generating consistent and comparable diagrams to give informants drawing the network diagram a standard prompt from two lists. One list identifies types of learning and learning organisations that are of particular interest for the researcher (e.g. accredited, on the job, community owned and managed, formal, non-formal, for profit). Another list identifies other types of learning organisations (surrogate learning organisations including 'mutuals' of McQueen and Lyons 2001) that may or may not be found locally (eg organisations providing services for older people, primary schools, fire service organisations, Aboriginal organisations, ACE providers, particular enterprises).

 It has been found to be particularly useful to identify and put on the diagram organisations within communities and localities that do *not* have relationships with the informer's own organisation. For example if a particular TAFE has no relationship

with a particular local secondary college, it is of particular interest and importance to document that college's isolation if future collaboration and networking is seen as desirable.

Some tentative generalizable findings

The use of network diagrams by the author in research across a wide range of adult and vocational learning in 70 different contexts has led to a number of tentative, generalisable findings as summarised in point form below.

- Network diagrams are excellent for conceptualising the (often complex) structural, sectoral and/or geographic discontinuity between communities or organisations: for example between rural towns or between ACE or TAFE providers in a particular region. A particularly interesting extreme example involves the typically limited and necessarily circumscribed links between a prison education centre and organisations on 'the outside'.
- All network diagrams are individual and different in that they reflect the attitudes, roles, perspectives and relationships of the person drawing them. They are most effectively and efficiently drawn from the perspective of an informant who is well informed at the centre in their own organisation. Having said that, networks can be replicated for informants with similar attitudes, roles, perspectives and relationships.
- Links between like services and sectors are typically strongest other than where disrupted by competition or jealousies related to service provision, resources and personnel.
- Local learning networks typically include only a geographical neighbourhood or a particular town. Potential learners are unlikely to learn in an organisation or sector which does not already form part of their personal or professional network or which is beyond their immediate social distance.
- Women are relatively skilled and experienced at operating within and particularly across diverse and diffuse networks. Young people are often much less cognisant of the existence of network structures, and particularly of their place or role in those networks, than older people.
- There is a tendency within tightly controlled and managed organisations for like individuals to come to quick and consistent agreement about network relationships and to create similar network diagrams that reflect an organisation's agreed strategic direction. Conversely, network informants in loosely coupled and informal organisations tend me more diverse and to reflect their own personal links.
- Network diagrams created by experienced managers, facilitators and coordinators who live and work in the same context over long time frames are more complex and extensive that those generated by more inexperienced, new informants who live and work in different communities. For this reason, there is good reason to regard networks and an ability to extend them as a critical organisational and personnel resource.
- Some network diagrams tend to emphasise directive, functional and command relationships (for example between and within fire service and SES organisations). Other diagrams, particularly those drawn in very small towns and organisations, tend to strongly reflect friendship and family relationships.
- A link between a particular organisation and another can be fluid over time and be related to a specific transaction. (For example a link between a particular TAFE

and ACE organisation for funds might be competitive. At other times the link (eg for equipment) might be collaborative. As other times, for particular staff it might be blocked. Some TAFE staff may have no links with the ACE organisation, while others may have strong links).

- Formal, new organisational networks are not always the most effective networks, particularly if they cut across existing informal or historic networks or if they extend beyond the normal social or community distance of network participants.
- Individuals in different organisations sometimes characterise the same links between their organisations in quite different ways since they are looking from a different (and sometimes opposite or opposing) perspective.
- Network diagrams that are drawn by a well-informed participant, prompted by the same person/researcher, using a standard organisational checklist, drawn to an agreed and clearly identified network theme (eg adult learning; fire and emergency services; health) and which preserve geographical (neighbourhood and regional) relationships are easiest to compare, interpret and replicate.
- Network diagrams have limited use in interpretation if one only takes account of strong and bridging links. Identifying weak , blocked or missing links (structural holes) in networks and particularly missing bridging or external links are of particular importance in identifying ways to improve the reach of learning organisations.
- The presence of blockages between organisations is usually a sign of mistrust and can be particularly debilitating. Blockages are particularly associated with extreme forms of market competition, and in smaller communities with conflicting roles or personalities.
- Given that network diagrams have individual authors they can be difficult to ethically report without standard research ethics safeguards similar to those that apply to interview data.

A summary of these generalisable points is provided in the conclusion after a brief discussion of some strengths and limitations of network theory generally and network diagrams in particular.

Discussion of strengths and limitations of network diagrams

Network diagrams drawn in learning organisations and small town contexts draws on a rich and diverse tradition of research into networks. The technique has some theoretical relationship to existing research techniques such as sociograms developed before the development of social capital theory and before the recently postulated relationship between social capital and learning networks. Many educators would be familiar with the long-standing practical use of class-based sociograms to determine inter-relationships between individual learners within small groups to assist in managing and enhancing relationships between groups and individuals in schools. The use of somewhat similar diagrams to determine, study and enhance relationships between adults in learning organisations in community contexts in small and remote towns appears to be much less common.

Given that social capital is now generally accepted as referring to 'social relations of mutual benefit characterised by norms of trust and reciprocity' (ABS 2000: following Winter 2000), network diagrams appear to have particular application to social capital

research. Network diagrams, and more particularly the network relationships[10] they very effectively represent, collectively presuppose the phenomenological constructs associated with relationships: particularly to networks ('working together as a system'), trust, reciprocity ('give and take'), collaboration (working together) and shared norms (s ways of behaving that are considered socially acceptable).

What all these social capital and learning phenomena have in common is that they each assume the presence of (and a mutually beneficial relationship with) at least one other party. They are therefore impossible to discuss and conceptualise without taking account of and positively accommodating for other parties, in this case between adult and vocational learning organisations. As Beckett and Helme (2001, p.13) point out, the indicators of social capital developed by ABS (2000)

> … are not only quantifiable, but are also relational. That is they target a connection between the individual and the wider setting, and they do so in a way that the data about *the quality of engagement* (or perhaps *immersion*) in the community could be derived.

It is this the nature and strength of this relational element (or lack of it) that networks diagrams in community settings have been found to essentially capture.
By contrast some other theories about relationships (eg competition and conflict theory) assume that it is possible and even desirable for organisations to act unilaterally in their own best interests. In some smaller towns and communities organisations have tended to work together for the 'common good'. There is a general perception in such communities that the development (and in some cases imposition) of competition policy in thin markets (in education, but also in welfare and labour market programs) during the 1990s led to a loss of trust and collaboration and therefore a diminution of social capital. In many instances there has been a belated recognition that competition (eg clients or learners) in 'thin' education markets is not necessarily desirable, economically rational or sustainable, and that attributes associated with social capital (eg trust, co-operation and collaboration) are important to cultivate and value, particularly in learning environments.

It is important to note before summarising and concluding that network diagrams, like all other social and phenomenological contracts, are value-laden. Though the act of subjectively selecting key informants in small communities and organisations to (together or separately) create a network diagram is cost and time saving at the possible expense of a higher order of validity, in many small communities and organisations creating randomised surveys with large numbers of informants are impossible. While the use of network diagrams as described might be criticised in that it presupposes the value of networks and social capital to learning at an organisational level, it can be argued that much learning (formal, non-formal and informal) is also dependent on and enhanced by social capital intra-organisationally. In effect, attributes associated with social capital (trust reciprocity, collaboration, networks) are valued personally as well as within organisations and also in the conventional classroom setting between teachers and learners.

CONCLUSION

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[10] Most informants describe these network relationships as 'links'.

This brief paper has only briefly outlined some ways of using network diagrams determined from extensive research experience with the technique. The intention has been to explore some of the underpinning theoretical constructs and present a small number of tentative, generalisable findings based on experience of recent use of the diagrams in research. These studies of organisational networks in vocational and adult education have provided new insights into the importance of bonding, and particularly bridging social capital in adult and community learning contexts. Network diagrams as described above are easily applicable and transferable to a wide range of learning contexts and functions including but not restricted to research. The diagrams are accessible and understandable to, and in effect *the* network fingerprint *of*, particular organisations at a point in time from a particular informant's perspective. There is ample research evidence that the diagrams can and do change over time. A simple change: such as a change in manager or coordinator can have a significant effect on an organisation's networks and therefore its effectiveness as a learning organisation. Importantly, the smaller an organisation, community or network setting, the bigger the likely impact of a small change on its network relationships.

In conclusion, it is difficult without a full knowledge of a network informant's role or context, to confidently use a network diagram *in isolation* to qualitatively or quantitatively compare or characterise one organisation or context in relation to another. The individual nature of many network diagrams in small organisations and remoter towns and their typically close relationship with the networking skills and effectiveness (or otherwise) of a manager, coordinator or facilitator makes them difficult to objectively score, quantitatively analyse or report other than in broad terms.

Consistent with some of the early research findings on networks, the *absence* of particular links (or presence of blockages) can often as revealing as the presence of other links. The presence of strong links within an organisation or community is not enough to identify a healthy and sustainable learning organisation. Network diagrams need to be analysed in their totality, which necessarily means taking positive account of the bridging links that extend beyond the organisation, into the community and into other networks and towns. In general terms, a learning organisation with strong and diverse links through its manager, coordinator or facilitator both inside a local community and beyond it is most effective and sustainable. If it is an adult learning organisation, its effectiveness is further enhanced by a wide network reach - across education sectors, age, gender, socioeconomic status and in the case of VET organisations into enterprises and workplaces. Network diagrams, in summary, are particularly useful for identifying structural holes (Burt 2002) in learning networks and also ways they might be bridged.

Despite the identified limitations, network diagrams are particularly useful for quickly, efficiently and in a replicable, ethically defensible manner of establishing initial context (main organisations, stakeholders, relationships) with key informants in a site early in a research cycle. Network diagrams have proved most effective in the smallest towns and organisations where survey data would not be feasible. They become invaluable as the levels of organisational and functional informality increase and as the level of organisational complexity and ambiguity increase. In this sense they are particularly useful in adult, community and vocational organisations located

beyond the major cities[11]. Network diagrams work very well in the most loosely-coupled organisations, with overlapping roles and memberships typical of small towns . Used in conjunction with other data they are excellent for identifying organisations and individuals for follow up interviews and for summarising data in the writing up phase.

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