ALT-J, Research in Learning Technology
Vol. 12, No. 2, June 2004

Carfax Publishing
Taylor & Francis Group

DISCUSSION

Networks and learning: communities, practices and the metaphor of networks—a commentary

Bruce Ingraham*
University of Teesside, Middlesbrough, UK

In issue 12(1), Jones (2004) in his article 'Networks and learning: communities, practices and the metaphor of networks' sets out to address three inter-related sets of issues:

> … firstly that learning technology needs to take account of the wider debate about networks and secondly that research in this field needs to address the theoretical and practical issues raised by advances in the field of networks. A third point is that the idea of the network acts as a powerful metaphor even if we are able to discount any particular theory generated in its support. The network metaphor can act as a unifying concept allowing us to bring together apparently disparate elements of the field.

I would lend support to all of these; but within the context of the paper, the third, the exploration of the metaphor of networks, does raise some concerns for me. These concerns fall under two related headings. First, I have some concerns about how the technical and mathematical models of networks are used (or not) within this paper to explore 'the wider debate about networks' and to elaborate the network metaphor. Secondly, I have some concerns about the network metaphor itself.

The use of technical and mathematical models of networks

When I initially read the paper I was expecting to see a discussion of one or more mathematical models of the topology of complex networks that could in turn be used

*Centre for Learning and Quality Enhancement, University of Teesside, Middlesbrough, TS1 3BA, UK. Email: Bruce.Ingraham@tees.ac.uk

ISSN 0968–7769 (print)/ISSN 1741–1629 (online)/04/020189–05

DOI: 10.1080/0968776042000216237

to help clarify the loose usage of the network metaphor that is, as the paper demonstrates, applied widely in a range of contexts that are of interest to learning technologists. For example, in introducing his discussion of modelling network topologies, Jones writes, 'The importance of this field of study is that it holds out the prospect of developing mathematical laws of networks that may prove to be robust in describing a broad range of phenomena.' While I admit that the notion of 'developing mathematical *laws*' in the context of any aspect of human behaviour rather alarms me, I am quite convinced that such modelling can serve to illuminate the way the network metaphor is used in other contexts.

To be fair, I don't think the author ever had any intention of explicitly applying the model (Barabasi *et al.,* 2002) he describes in the section on networks in the way I had hoped; and I guess that my hope had more to do with my own narrow and rather under-developed interest in the topology of electronically mediated scholarly argument (Ingraham, 2000). Rather the paper offers us a view of a number of different areas in which a network metaphor is being used and encourages us to examine that metaphor as a way of relating those various areas of discourse. This is perfectly appropriate and the discussion most interesting, but I guess I am still hoping that these remarks will provoke the author into making more explicit use of the model articulated by Barabasi *et al.* (2002) to illuminate the other instances of the network metaphor that he introduces.

This seems particularly important because, having been provoked by Jones (2004) to read the Barabasi paper, it did seem to me to offer a number of interesting potential points of contact with some of the other instances of networks that Jones discusses. For example, the power-law distribution model presented by Barabasi is at least reminiscent of the power relationships at issue within Jones' discussion of the 'Networked Society'. Further, for me at least, the juxtaposition of these two discussions of networks (social and mathematical) was also highly reminiscent of Foucault's (1979) consideration of the power relationship between vertical hierarchies and 'micro-revolutions' that, like Bakhtin's (1984) 'carnavalesque', complicate and undermine authority. In short, as Jones suggests, the power of the network metaphor if linked from one area of discourse to another can at the very least be thought provoking; and I would like to know more about what thoughts it has produced in the author.

However, while this slide from one instantiation of the network metaphor to another supports Jones' contention that '…"networks" provide a useful metaphor through which to focus aspects of research into "online learning"', it also points in the direction of some of my concerns with the respect to the network metaphor itself. As Jones recognizes in his discussion of the ideological baggage that may be associated with it, the network metaphor can be value laden in various ways that, if not carefully handled, may actually undermine its utility to the learning technologist.

First, networks, understood as a collection of nodes and links can be, and too often are, understood to be planer structures. That is, flat two-dimensional, even if infinitely extensible, structures. However, complex networks (whether cyber, social, or biological) are never less than three-dimensional. Understanding this added dimension of complexity can make a significant difference to our understanding of the issues

to be illuminated through the network metaphor. For this reason alone Jones is right to encourage writers on the subject of networked society and learning to be more aware of the technical literature on the topology of networks. The expression 'world-wide *web*' is a case in point. The word 'web' suggests a relatively simple two-dimensional set of nodes and links while 'worldwide' suggests a degree of complexity incompatible with that image. Barabasi *et al.* (2002) offer statistics about the levels of complexity in such systems that are truly daunting; and modelling the topology of cyber space has almost become a form of geographical research in its own right (see Cyber Geography Research[1]).

Concerns about the network metaphor

The metaphor, if not carefully grounded, can lead writers to over simplify the issues under study; and this leads to my second concern about the network metaphor. Jones (and others including Barabasi *et al.*) when talking of social networks treat human beings as 'nodes'.

> Networked learning remains concerned with social process but it sets itself the task of understanding the links between different nodes, the learners, the tutors and the resources that make up a networked learning setting.

My question here is what are the implications of treating tutors and students as nodes? Computers and documents or other artefacts can easily be understood as nodes; and I can see how this might be extended to include concrete socio-political structures. However, tutors and students, as human beings, seem to me to be better understood not as nodes or links, but as link makers.

I accept that tropologically it is possible to abstract a pattern of relationships between a group of individuals that might be usefully described as a network and that in such an abstraction the people might be viewed as nodes. However, such an abstraction is only realised as a network if the people make the links and it is the pattern of links that they make and the 'social process' through they make them that actually constitutes their networking and instantiates a particular instance of a network. Of course their capacity to engage in this process may be to a greater or lesser degree constrained by the physical (or social) infra-structure of network platforms through which they make links, but that is not the same thing as seeing them as nodes.

In order to understand the distinction I am trying to make, let us consider some relatively small subset of a complex but power delimited network for learning—the resources made available to support even a single week's study in most academic disciplines. We can imagine this network of resources as instantiated online or not. It really doesn't matter. In any event, what we will normally have is some core text(s) or activities with which the learner needs to interact. These core texts/activities will be linked to one another in various possible ways and sequences. They will also normally be linked to precursor texts/activities to which the learner may need to return and to subsidiary texts/activities with which the learner *may* or *may not* interact, and which may or may not lead the learner to follow up further references contained within them

and so on (at least potentially, *ad infinitum*). Of course, practical considerations will always limit the play of what Kristeva (1986) called intertextuality, but the real point here is that the path, followed through the potential network of nodes, the set of links made between nodes, is likely to be different for each learner.

If in a networked learning environment we scale this up to include the Internet, the potential variety in the complexity expands infinitely. In effect every URL on the internet can be linked to every other. However, it is the only the links actually made by an individual learner that represent the network of which they are a part and (to some degree) what they have learned from and about that network. To talk about learners in such complex systems as nodes, seems to me to risk unhelpfully over-simplifying the situation by directing attention away from the process of networking and towards a necessarily inaccurate abstract network metaphor. It is in understanding (and, yes, probably directing) this process of exploration, this activity of linking that I, as a pedagogue, am most interested.

I accept that this model is perhaps one of 'networked individualism' (Castells, 1996, 2001), but the fact that networkers may be collaboratively (or otherwise linked) through a network does not, it seems to me make them nodes; and so reducing them, however valuable in understanding the powerful role of network infrastructure in delimiting the learning process, doesn't seem to me to add much to our understanding of the process itself. More helpfully in that respect is perhaps the transactional model of internetworking articulated by Garrison and Anderson (2003). They view higher education as 'a supportive critical community of inquiry' that can be extended in space and time by contemporary network technologies. By focusing on the transaction (linking in this case) their model provides an interesting grounding in research praxis for the study of that activity in such a community; but it could also benefit from a more robust network model or metaphor.

Here again the model articulated by Barabasi and his colleagues (2002) is suggestive. This model contains concepts of clustering and replication that, as Jones cites, argue that networks are '… far from random, but … evolve following robust self-organizing principles and evolutionary laws…' (Barabasi *et al.,* 2002). Although I am not mathematician enough to be certain, I think the Barabasi model of replication is mathematically discreet from the self-replicating mathematics of fractals, but still it is nonetheless reminiscent of fractal development and this may hint at a way of modelling the networking rather than the network.

The growth patterns of fractals have proven particularly interesting in describing complex and chaotic natural systems (Gleick, 1987) and they might prove a valuable alternative for modelling the topology of networking. Joël de Rosnay (1995), for example, has used such an approach for what he sees as the symbiotic relationship between humanity and modern communication systems. If one focuses attention on the activity, on the 'social process', we may find that the topology of cyber relationships is rhizoid rather than racinated. In their seminal study, *Rhizome,* Deleuze and Guattari (1976) exploit a play on the French word '*racine*' which means root. However, *racine* is also the root for racination (thinking) and allied to our English word rational. Rational thought they argue is typically bifurcating like the roots of

plants. It spreads out rather like a network. This they compare with an alternative model, the rhizome. Rhizomes rather than spreading out, fold back on and through themselves in complex patterns of growth that are reminiscent of fractals and, perhaps provide a better image of (metaphor for) the three-dimensional pattern of linking and relinking that typifies internetworking.

Conclusion

Perhaps neither the image of the rhizome nor the mathematical model of fractals will prove adequate to the task of providing a truly robust description of networking. However, in applying any such metaphor, I think it is important to distinguish between the physical instantiation of a network, whether in the wiring of a computer network or in social structures, and the actual activity of internetworking, which may prove to be less susceptible to either the topology or the tropology of the image of network. In any event, I hope these remarks serve to reflect just how valuable I think Jones' paper is in offering up a direction for future inquiry. Working to develop better models of the topology of the networks and using such models to investigate and ground the metaphor of the network can only improve our understanding of learning, whether networked online or through other social structures.

Notes

1. Cyber Geography Research http://www.cybergeography.org/

References

Bakhtin, M. (1984) *Rabelais and his world* (Bloomington, IN, Indiana University Press).

Barabasi, A-L., Dezso, Z., Ravasz, E. Yook S-H. & Oltvai, Z. (2002) *Scale-free and hierarchical structures in complex networks*. Available online at: http://www.nd.edu/~networks/PDF/Proceeding%20Sitges2004.pdf

Castells, M. (1996) *The information age: economy, society and culture volume 1. The rise of the network society* (Oxford, Blackwell).

Castells, M. (2001) *The Internet galaxy: reflections on the Internet, business, and society* (Oxford, Oxford University Press).

Deleuze, G. & Guattari, F. (1976) *Rhizome* (Paris, Les Editions de Minuit).

De Rosnay, J. (1995) *L'homme symbiotique*, in French (Paris, Seuil); (2000) *Symbiotic man*, in English (London, McGraw-Hill). Available online in French at: http://csiweb2.cite-sciences.fr/derosnay/articles/livjr.html

Foucault, M. (1979) *Discipline and punish*: *the birth of the prison* (New York, Random House).

Garrison, D. R. & Anderson, T. (2003) *E-learning in the 21st century* (London, RoutledgeFalmer).

Gleick, J. (1987) *Chaos* (London, Penguin).

Ingraham, B. (2000) Scholarly rhetoric in digital media, *Journal of Interactive Media in Education,* http://www-jime.open.ac.uk/00/ingraham/ingraham-t.html

Jones, C. (2004) Networks and learning: communities, practices and the metaphor of networks, *ALT-J,* 12(1), 81–93.

Kristeva, J. (1986) Word, dialogue, and the novel, in: T. Moi (Ed.) *The Kristeva reader* (New York, Columbia University Press).