

REFLECTING ON RESEARCH PRACTICE: A RETROSPECTIVE MEANS OF FRAMING FUTURE LEARNING

Dolene Rossi

Central Queensland University & University of Southern Queensland

ABSTRACT

Here, the author reflects on a social network analysis (SNA) conducted as part of an investigation of learner interaction and knowledge construction in online environments. Further methodological and educational applications of SNA are identified, with the potential to enhance inductive research design and future educational practice within online discussions.

KEYWORDS

Learner interaction – social network analysis – inductive research design

INTRODUCTION

If research and practical experience are to come together in some significant mutually fruitful relationship then educators must critically examine how research can contribute directly to the problems of teaching. (Nuthall, 2004, p. 274)

Online learning environments present an educational domain unique in their potential for interaction, participation and collaboration (Kumpulainen & Mutanen, 2000) and universities are increasingly adopting computer mediated environments for teaching and learning purposes. The question of how learners interact in computer supported, group based learning has received increasing research attention (Strijbos, Martens, & Jochems, 2004). Yet we remain remarkably ignorant about the dynamics and processes of group interaction and how these relate to student learning (Kumpulainen & Mutanen, 1999). As educators, if we are to promote learning through interaction in online courses we must be able to identify and understand how learners interact within online discussions. Within this paper the author reflects on the preliminary findings of SNA, conducted as part of a larger research study investigating learner interaction and knowledge construction in online environments. While distinctions have been drawn between reflection on and in action (Schon, 1983), the focus within this paper is reflection on research practice, which involves retrospective reflection on past practice. The purpose is to elucidate potential applications of educational research in teaching to enhance and frame future learning.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Views of learning have changed in ways that have affected educational research and practice.

Current perspectives emphasise the social and situated nature of learning and there is renewed interest in social constructivist theories. Within this paradigm learning is situated in but not limited to social interaction and involves the transmission, construction, transaction and transformation of knowledge in a continuing and complex interplay (John-Steiner & Mahn 1996). Research literature regarding the importance of interaction in education, especially in web-based distance learning, is extensive (Picciano, 2002). Although interaction is considered the key to the co-construction of knowledge and cognitive change, learner contributions, within online discussions, may lack interactivity even when students are encouraged to respond to each other (Davis & Rouzie, 2002). This is thought to be due to the nature of the online learning environment, which is computer mediated, text-based and time dependent (Gunawardena *et al.*, 2001). It is also argued that interaction and learning may not occur if the social structure of the course permits passive compliance. Proponents of this view emphasise that two-way interaction is not an inherent part of technology and maintain that the results of interaction are tied to instructional design (Chou, 2002). Similarly, if interaction is too interactive it may overwhelm the capabilities of some learners which may also be detrimental to the construction of knowledge (Levin, 2005). Despite the number of studies examining the concept of interaction, there is a lack of definitional consensus (Beuchot & Bullen, 2005); confusion arises because the term "interaction" is used interchangeably with "interactivity". Su, Bonk, Magjuka, Lui and Lee (2005) differentiate between the two, suggesting that, while interaction is process orientated and focused on dynamic actions, interactivity is feature orientated and emphasises system characteristics or the degree of interaction. Thus interactivity could be interpreted as the level of user participation. Indeed, Henri (1992) identifies interaction and participation as two separate dimensions within the learning process.

Vygotsky conceptualised development as the transformation of socially shared activities into internalised processes and believed that by internalising the effects of working with others learners acquire useful strategies and crucial knowledge (John-Steiner & Mahn, 1996) which may be applied in future learning situations. The underlying assumption within current literature and the premise of Vygotsky's theoretical framework, which underpins this study, is that learning is a dynamic, interdependent, intrapersonal and interpersonal process. Consequently each interaction and learning event has the potential to contribute towards and potentially extend the learner's knowledge and understanding and the outcomes (knowledge, understanding and skill) become tools to be applied in multiple and diverse situations. Thus learning, which is based on previous experience and shared knowledge, may be viewed as a continuum and a continuous, lifelong activity.

METHODOLOGY

The purpose of this study was to identify and understand how learners interact within a large asynchronous discussion group. A "social network" is defined as a group of collaborating entities that are related to one another; each participant is called an actor and depicted as a node within a graph. Social network analysis (SNA) is a method of mapping and measuring relationships and flows between people and groups; it provides a visual and mathematical analysis based on the way actors are connected, in order to identify underlying patterns in interactions (Scott, 2000; Wasserman & Faust,

1994). Relations between actors are illustrated as lines or links between corresponding nodes, which may be directional or non-directional (Aviv, Erlich, Ravid, & Geva, 2003). Social networks are generally single mode and describe ties between pairs of actors; affiliated networks have two modes and consist of a set of actors and a set of events (Wasserman & Faust, 1994). The rationale for studying affiliated networks is congruent with the principles of the theoretical framework as both acknowledge the interdependence between individuals and their social connections. Actors in affiliated networks are brought together through their joint participation in "social events". In this study the actors are learners engaged in online activities which constitute educational events.

Participants and procedure

Participants were enrolled in an undergraduate, online, health communications course at a regional university in Australia. The course, which was core within the Bachelor of Health Promotion degree, was an elective in several different programs offered by the university. Ethical clearance was granted by the university's human ethics committee. 21 students completed the course and were invited to participate in the study; one learner did not participate. Data were organised into 12 networks, each reflecting one academic week within the course. Nodes were created for each learner, the course coordinator and activities within each network (see Table 1). InFlow (Krebs, 2005), a computer software program was used to illustrate and analyse the affiliated networks within the course.

Networks	Wk 1	Wk 2	Wk 3	Wk 4	W 5	W 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12
Drawn nodes	26	25	23	24	24	24	24	22	24	24	26	26
Active participants	19	16	18	18	19	17	16	19	17	18	18	16
Link strength	1	1	1	1	1	1	1	1	1	1	1	1
Link count	43	35	32	51	63	46	37	52	45	36	54	47
Link strength	2	2	2	2	2	2	2	2	2	2	2	2
Link count	5	8	5	3	10	27	11	7	7	7	6	7
Link strength	3	3		3	3	3	3	3	3	3	3	3
Link count	1	1		1	3	6	2	2	1	3	1	2
Link strength		4		4		4	4				4	
Link count		1		2		1	1				1	
Potential links	552	380	380	420	462	380	342	380	380	420	506	420
Actual links	49	45	37	57	76	80	51	61	53	46	62	56
Density	9%	12%	10%	14%	16%	21%	15%	16%	14%	11%	12%	13%

Table 1 Overview of participant interaction and measures of density throughout the 12 week term

N.B.

*Nodes = active participants, non-active participants and activities

* Link strength = number of messages from one participant to another or from one participant in response to activity (value 1-4)

* Link count = total number of actual links (includes symmetrical and asymmetrical posts)

Prominence	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12
Prestige (in)	C-Co-rd	C-Co-ord	Jenny	Fiona	Jenny	Fiona Jenny	Jenny	Fiona	Rena	Belinda	Ruth	Fiona
Centrality (out)	Belinda, Fiona, Kelsie	Alaine	Alaine	Emily	Jenny	Emily	Fiona Jenny	Jenny	Jane	Jane	Fiona	Jenny

Table 2 The most prominent participants from week 1 to week 12

RESULTS

The links between nodes in this study are directional. Valued relations between nodes can measure the strength, intensity or frequency of the connection among actors and between actors and events. In Table 1 link strength relates to the number of messages from one learner to another or from one learner in response to the weekly activity. Throughout the course link strength within the large group ranged from 1-4. Analysis indicates that the greatest range and levels of learner interaction occurred in weeks 2, 4, 6, 7 and 11.

Density

A graph can have only so many links, the maximum possible being determined by the number of nodes; density is the proportion of possible links that are actually present. The most prolific weeks in terms of density are weeks 5, 6, 7 and 8. From the author's experience, this finding is typical of learner participation during an academic course and consistent with the work of Levin (2005), who has found levels of interaction greatest between one third and one quarter of the way through online discussions.

Prominence

A primary use of graph theory in SNA is the identification of the "most important" or most prominent actors in the social network. Prominent actors are extensively involved in relationships with other actors and are identified through their ties or links. Two types of prominence are measurable: prestige and centrality. In directional relations those with the highest in-degree are prestigious, while those who have the highest out-degree are central. Predictably, the most prestigious nodes each week were learning activities. The most prominent actors, differentiated by prestige and centrality, are identified in Table 2. Prominence in weeks 1, 6 and 7 was shared.

DISCUSSION

The intended function of SNA within this study was illustration of interactions among learners

engaged in online activities. Upon reflection, SNA may also offer a methodological means of identifying and justifying the selection and subsequent analysis of data. Density identifies the most interactive weeks within this course to be 5, 6, 7 and 8. This information is augmented by relational data which indicate that the greatest variation on link strength occurs in weeks 2, 4, 6, 7 and 11. When a historical perspective is sought, the analysis of transcripts from weeks 2, 6 and 11 may offer significant developmental insights about learner interaction during the academic term.

Measures of prominence may also have educational applications. For example, within this course 25% of total marks were awarded for learner participation in online activities. The assessment of participation and interaction was undertaken by the course coordinator using marking criteria and an author list view of messages posted to the discussion. By contrast, measures of prominence, via SNA, may offer a less subjective and more reliable indication of both the level and the influence of learner interaction in online environments. Further, once identified, prominent actors could be allocated to particular online groups to facilitate and or promote learner interaction.

Reflecting on research practice the author has enhanced her understanding of SNA and identified additional methodological applications. SNA may also have pragmatic educational applications as it affords a means of structuring and evaluating learner participation and interaction in online discussions. For this educator, success lies in identifying a means of applying research in teaching practice to frame and potentially enhance future learning.

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Wk 11	Wk 12
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