Social network dynamics in international students' learning

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Abstract

The potential for the internationalisation of UK HE to bring diverse viewpoints and perspectives into the curriculum has not been fully realised. One of the many obstacles to this may be our lack of understanding of how international students use and build social networks for learning, information sharing and support, and how this impacts on engagement and learning. The literature suggests various ways in which network positions and learning might be associated. In this study we used a range of tools including social network analysis (SNA), observation, interviews and photographic evidence to investigate the social networks developing in a class with a very diverse make up. We wanted to discover how the network develops and what shapes this. We found that the network shape was less immediately visible than might have been anticipated. Programme of study and language were found to have a strong effect on who talked to whom. In class networks were strongly influenced by the timing and character of the assessment, but pre-existing ties outside the classroom were significant for on-going affective support. Isolation in the network tended to be linked to where the person lived and cultural factors. Based on these findings we develop a detailed plan for a curriculum redesign. We propose a more intense and complex form of group work. The topic and approach of the assignment would stress a multi-cultural approach and group make up would be determined by the tutor, based primarily on mixing nationalities. We also propose that students share their products online with wider communities, in some part bringing their external networks into play and visibility in the classroom, certainly giving centrality to network related skills as a classroom issue. In addition, we propose using a social bookmarking tool to minimise isolation of some individuals in the network. Future work will be to implement and evaluate these interventions.

Keywords

Learning, Social Networks, Communities of practice, SNA, Higher Education, internationalisation.

Introduction

The economic importance of international students to UK Higher Education (HE) is well known. Early thinking saw internationalisation as a problem in which students of diverse backgrounds had to be socialised into British academic culture. Internationalisation of the curriculum has now come to be understood as an opportunity to enhance learning experiences through the diversity of viewpoints brought by students themselves. What is less understood is how learning related social networks develop in a cohort of students with multi-national origins, and how this affects learning. Coming from different backgrounds and cultures and speaking different languages might be thought to create particular obstacles to the formation of a class room network. On the other hand if different cultures of learning and network use were better understood, we might be able to maximise the engagement of students. Such an understanding would generate new ideas about appropriate interventions to improve the strength of the learning related network. Indeed, there is potential value that can be brought to learning through connecting the classroom more actively into students' own wider networks, where the diversity of students' connections could be a further asset in the classroom.

This paper discusses the first stage of a study of the character, evolution and use of social networks (SN) in learning context. An initial study was conducted using SNA and qualitative methods to develop an understanding of the role of SN in learning in a particular module on a post graduate course. Among the

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findings of this was a model of factors shaping class room networks, including some indication of who works together and why some students are isolates. Arising from this two interventions are proposed as potentially enhancing the student experience, namely use of social bookmarking and video making as an assessment exercise. Future work will use the same package of research methods to explore the effect of these interventions.

Internationalisation

UK Higher Education is heavily dependent on the income derived from fees paid by international students. The range of choice of courses available to UK students is premised on the cash cow of this influx of students from beyond the UK. Potentially the richness of learning on UK HE courses could also be enhanced through encounters with other cultures, languages and perspectives. Some outcomes are defined by Leask (1999) such as the ability to: Think globally and consider issues from multiple points of view; Recognise inter-cultural issues relevant to professional practice; Appreciate the complex and interacting factors that contribute to notions of culture and cultural relationships; Value diversity of language and culture. Yet marketisation has tended to been the dominant way of thinking about internationalisation (de Vita & Case, 2003). This is unlikely to produce the most satisfying learning experience for international students. Thus producing courses that fully engage with international students' own experiences and perspectives is widely acknowledged to be a priority for curriculum development.

The University of Sheffield, UK has sought to promote active internationalisation of the curriculum through its thinkglobal project (http://www.shef.ac.uk/lets/projects/internat). The authors of this paper saw a potential in one particular module they were teaching to be an opportunity to realize some of the value of internationalisation. The make up of the class was itself already very diverse. The subject matter, broadly the social aspects of computing, lent itself to an explicit focus on global difference, in contrast to more technical topics, which at least on the surface, have a fixed body of knowledge that arguably could be taught in one way, probably in a transmissive mode. We recognised that addressing issues around multi-culturalism is not necessarily easy, either for students or for staff, because it involves challenging assumptions and stereotypes (Boler & Zemblyas, 2003). It has implications for power structures in the class room since it implies recognising students as co-creators of knowledge (Clifford & Joseph, 2005). It also implies engaging in an active reflexive discussion about styles of learning, to explain UK patterns of teaching, while valuing those dominant in other cultures. The notion of diversimilarity points to the need to engage in an active debate to explore complex cultural character of learning as a process (Skelton, 2005).

An immense amount of useful evidence based, practical advice about internationalising the curriculum in general has been produced in the last decade but this does not tend to address issues around social network creation.

Social Networks and Learning

Within transmissive or instructivist models of learning the specific dynamics of relations between students would not be considered directly relevant to learning. Learning is a cognitive process. Again within some constructivist thinking, the central concern is learning as a constructive mental process occurring at an individual level. However, an increasingly influential way of looking at learning is social constructivism, which see learning as a social process, both between the tutor and the student, and between students. Here interaction and social network connections are an important aspect of the learning process. Within this perspective there are a number of different emphases which we explore through contrasting the view within community of practice literature (Wenger, 1999) and that of those using Social Network theory, here Haythornthwaite (2005; 2008). Both Wenger and Haythornthwaite adopt a view of learning as social. Wenger's perspective focuses on the learning in communities of practice, defining learning to be a fundamentally "social phenomenon, which reflects our social nature to be able to learn"(1999, p. 3). Haythornthwaite discusses learning from a social network perspective describing learning as "a social network relation" in which, learners exchange, share, deliver, and receive different experiences (2005, p. 1).
Wenger central interest is the naturally occurring learning embedded in organizations as learning networks and the importance of individuals' position in these learning networks. Wenger and Lave's (1991) Legitimate

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Peripheral Participation (LPP) theory , for example, is a social theory of learning that stresses the need to be an active participant in communities of practice (CoP) in order to acquire the knowledge and become in a central position of the network. By this analytical view of social learning, Lave and Wenger classify people in the network according to the knowledge and experience they have. The old-timers who are more knowledgeable occupy the central position in the learning network, and the newcomers who are less experienced occupy the peripheral position. The social practice in the community is what newcomers need in order to gain the experience and knowledge to move to the central of the learning network by the time. At the same time interaction between peripheral participants is recognised as a significant learning process. Wenger (1999) also recognises the importance of boundary spanners when learning is between communities. Thus the community of practice literature recognises a number of learning processes, linked to network configurations and dynamics. Dynamics between masters at the core of the practice; between such core participants and peripheral participants; among peripheral participants themselves and by boundary spanners across community borders are all recognised as having some role in learning. Nevertheless, the very term community of practice perhaps emphasises the importance of strong, sustained interaction in a cohesive community.

Haythornthwaite argues that "learning is predicated on the interaction between individuals" (2008, p. 1), she argues that the more interaction there is in a network, the more people learn from each other and from being in a learning network. Hence, in order to understand learning we need to understand the different patterns of interaction in the learning network. For Haythornthwaite the main components of the learning network are the different relations that learners create by collaboratively interacting with each other. These relations could in addition to learning, be friendship, advice and support relations (2002a). Sharing more than one relation creates strong ties and sharing one direct or indirect relation maintains weak ties which may evolve to strong ties by time (2002b). She argues that a learning community needs both of these ties because of the different resources they bring to the community which entails the sustainability and the connectedness of this community. Strong ties are important for personal support and weak ties are important for the diversity of resources they have. The interaction patterns of individuals in the network shape the learning network. For example, a learning network will be a more cohesive network (the network is connected as everyone in the network can reach any other member of the network) if everyone in the network are interacting with each other creating different kinds of relations, on the other hand if some individuals are not communicating with others in the network, this might result to be an isolate in the network (not connected to any one in the network).

Both Haythornthwaite and Wenger stress the importance of the social practice or interaction among people in the network as a key in order to build and sustain these learning networks. On the other hand, for Haythornthwaite the individuals who are in the centre of the social network are not central because they are more knowledgeable, but simply because they have more relations with others in the network. Also, those who are at the boundaries (weak ties) are considered to have an important position that strengthens the network by the different learning resources they can bring from other networks they are connected to. This is less stressed in Wenger's thought which does seem to privilege strongly cohesive networks. Haythornthwaite is less clear about the importance of the range of positions people might have in their learning network.

This body of literature stresses the importance of social interaction and networks in learning. It relates different qualities and chances of learning to different network positions. But there are many unanswered questions. It is difficult to translate it simply to formal learning contexts, where it is difficult to say which processes are most relevant. Some learning may be most successful at what may appear to be the centre of the community, where the tutor, as old hand, interacts with the class. LPP would stress also learning among students. If we think in terms of the richness of the boundary spanning position, it may be those who most actively engage wider community contacts in learning that learn the most. Centrality in the network may not predict the best performance in marks or, much more difficult to measure or study, learning. Typically these issues have been most actively researched in online learning.

Background of the study

The particular groups of students studied in this research were post graduate taught students on a module entitled "Information Systems and Society". This first semester module explores mutual shaping of society and

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ICTs through topics such as online community, Internet censorship and the digital divide. Assessment for the first cohort was in the form of a group work presentation, delivered about half way through the semester (intended to offer early feedback on academic and information literacy related skills) and an individual essay, submitted at the end of the Semester. The module is a compulsory module for students on two programmes, Information Systems and Information Systems Management, both typically studied full time over one year. Information systems is the study of the development and implementation of information systems, often ICT based systems, within their organisational context, emphasising issues related to information, people, IT and the business environment. In addition a few students on other programmes of study enrolled in the module. The first cohort was around 30 in number, representing eight different countries. Being a quite diverse group they were an appropriate to explore social network formation.

Methods

Research questions

Our research questions were developed to address the relatively sparse literature exploring the nature of the relation between social networks and learning, particularly in the context of internationalisation. The research questions for the study as a whole were: How do the social networks of international students evolve in a formal learning context? What are the factors that shape the social networks of a learning group? What types of teaching intervention that have a positive impact on the learning network?

SNA and qualitative methods

Social network analysis is an approach to the study of society that focuses on the pattern of interaction among network actors rather than their characteristics (Wasserman & Faust, 1994). Social network analysis can be used to reveal the structure of networks, and the position of each individual in the social structure (Scott, 2000, p.38). SNA is considered to be good method because it offers a visual presentation of the network as well as quantitative measures of social structures (van Duijn & Vermunt, 2006, p. 1).

Social Network Analysis (SNA) and qualitative methods were combined in this research (Taha, et al., 2009). A printed questionnaire was a primary source of data. Based on Haythornthwaite's (2008), questionnaire were designed to capture the evolution of the different types of relations students have in a learning network such as work, information, friendship and social support networks. It was distributed four times: at the beginning of the semester to study the initial network status; and again in weeks 3, 10 and 12. Observation was conducted by attending the classes and practical sessions for the module observing changes in the students' network and recording them as field notes. The first questionnaire data showed some problems in terms of accuracy and response levels, mainly because students were not able to recognize the names of their colleagues in the class, and because of the instability of the class membership. Observation was helpful in identifying these problems. This led to the use of individual photos being associated with student names in the later questionnaires. These photos were taken weekly in the idea of using them as an additional source of data on the hypothesis that students who sit next to each other or close to each other have a relationship.

The questionnaire data had been improved by these means but was far from offering a complete picture and clearly it was not possible to observe every change in the students' network, especially as in a learning group many changes happen outside the class. Also observation has a level of subjectivity. So interviews were used to collect more data in order to clarify questionnaire and field notes results and get more data about students' social networks and their evolution, filling in the gaps arising from informant accuracy and recall. Sixteen, 30 minute to hour-long, semi-structured, face-to-face interviews were conducted between weeks 7 and 12. This gave a much more complete picture of the forces shaping the observed patterns in the network. photos were used as an elicitation tool in the interviews. Yet interviewing everyone in the class was not practical and interviews are not so good for capturing change over time, for example. As a result, integrating these various methods was a successful way to collect social network data in this specific context (reference anonymised), off setting the inherent limitations of each individual method. One of our objectives in the research was to design a package of

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research methods that would best fit fluid class room situations, with a minimum of effort for the class and the researcher. Where questionnaires provided some basic network data, differentiating different types of contacts, and improved by using individual photos. Class photos used to sample some aspects of the network, and gather data more frequently than would be practical with a questionnaire. Observation used to check the relative accuracy of questionnaire data and to identify isolates and Interviews filled in the gaps and "the story" of the factors shaping the network. Anonymised performance and evaluation data were additional sources of information for the study.

Findings

Visibility of the network

Lecturers' perception of the learning network may be that the network is visible, in the sense that students who are attending every class and are vocal in class discussion also occupy a central position in the network, and those who do not attend classes are assumed to be isolates, having few or no connections. Applying freeman's degree centrality using UCINET SNA software (Brogattie, Everett & Freeman, 2002) and comparing the results with the fieldnotes observation and the photos revealed a different picture for this class. The centrality measure of the class showed no particular student in the central position of the network, rather it changed over time. However, those who were found to be in the centre of the network seemed to be not central in terms of attendance and participation. Ironically, some students who did not attend classes and some who were not vocal were in the central position of the network. Further, comparing centrality in the work network and the performance of students in central position revealed another unexpected result. This showed that the performance of those who were in the central position was not the best in the class. This result is not straightforward to interpret, because performance cannot be equated with learning. However, taken together these results suggest that the learning network was relatively invisible in the classroom, which indicates that the teachers' view of the network is different from the real network or at least that of the students.

Network Evolution: Relations in Learning Networks

In the SN questionnaires students were asked about four different relations to try and capture a picture of different types of relation and their evolution over time. These relations, based on Haythornthwaite (2008), were work, friendship, giving/asking information and giving/ receiving personal support. Work relation for example, was identified by asking about who participants "worked with in module assignments". In order to study the changes in students' position in the work network and the shape of the network evolved by the end of the semester, a cohesion measure was applied. Higher network cohesion suggests more interaction among people in the network. In the work network, cohesion was not steadily increasing, but there was a change in the cohesiveness of the work network over the semester. This seemed to be mainly driven by the coursework of the module. For example, network cohesion significantly increased between week 2 and week 7, seemingly as a result of the group coursework was to be submitted by week 7. The cohesion of the work network decreased between week 7 and week 12 as students did not have any group work assignment; instead they had an individual assignment that was due to be submitted in week 12.

Network evolution was also shaped by various factors such as whether they spoke the same language and programme of study. This might be because the choice of the groups for this module was left to students and therefore pre-existing networks tended to be reinforced. The sociograms of the work network - (Figure: 1) shows these factors (the nodes represent individuals in the network and each shape represents a different programme of study) as student from the same programme of study were clustering in the working network. Some groups, however, were not of the same programme of study.

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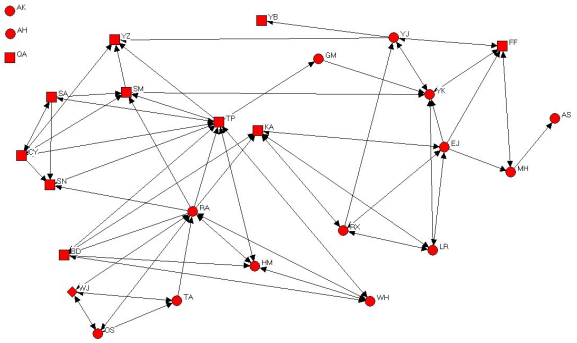

Figure 1: week12- work network by programme of study

Friendship relation was defined as socializing with each other (like having coffee, going parties and/ or any other social activity). The evolution of the friendship network, showed different pattern compared to the work network. The cohesion of the friendship network steadily increased. This implied that the ties are getting stronger among individuals in the learning network. The sociogram of the friendship network at week12 (Figure 2) shows that students speaking same language were clustering in the same groups (The nodes represent individuals in the network and each shape represents one country).

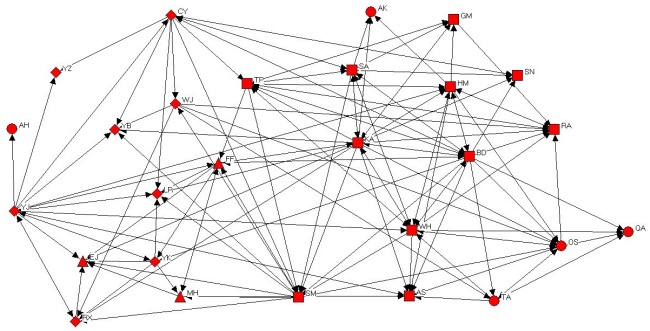

Figure 2. week 12- friendship network by language

The other relations that students were asked to identify were giving/asking for information and personal support. These relations were found to be embedded within the work and the friendship networks. Students were found to rely heavily on their previous network (outside the class) for information and advice and for personal support as well.

Isolated individuals

In social network terms, an individual is called an isolate when he/she is not connected to anyone in the network. Isolated students affect the connectedness of the whole network and make it less cohesive. In the research, isolates were identified by a number of different methods. Observation and photos, for example identified the isolated students- by those who were not frequent attendees of the classes, this agrees with the lecturer point of view for the isolates. They were also discovered by the social network questionnaire and even by interviews, some interviewee describe another isolated student as "loners" Factors such as where a student was living, and having different culture and language were the main influences creating isolation. Also starting the programme late was another factor, which both meant they were disconnected and because the distribution of groups had already been made when they arrived led to all the isolates being in one group.This also affected their performance. Smoking as well was one factor that made students to be isolates in the class network, at the

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same time was a connecting factor among people who share this practice. However, those who were isolates in the class might be not isolates in other social circles. In both CoP and SN theories, identifying isolates students is important in a learning network, not just for the benefit of the student themselves but also because they are disconnecting the network as a whole.

Discussion

The study produced three main findings. The first was that the network visible in the classroom was not the same as that reported by students. The lecturer may assume he or she is central, and that those that attend and participate in class most are central learners. This did not appear to be the case in this class. The second finding was network cohesion did not simply increase over time. A number of networks were apparent among class members, support networks showed continuity with pre-existing networks, the friendship and work related networks were rather different in shape. For a number of reasons some students were isolates.

The class did not display many of the features of a community of practice. Although much of the learning in a community of practice occurs through peripheral participants interacting with each other, one would expect a more important role for the teacher, as an old hand. Essentially one would expect the teacher to be at the core. Rather than a strongly cohesive network as usually pictured in community of practice writing, there were a number of fragmented groups. The work, friendship and support networks were rather different in shape. The latter mostly linking to people beyond the classroom. Implicitly within community of practice theory one senses that the networks are expected to converge. For Haythornthwaite good learning occurs when interactions and networks are overlaid. Again, there were a significant number of isolates.

Yet the class was not simply a failing class. Module evaluations were very positive. It is difficult to demonstrate learning, but most students did well in the course assessment. We could argue that considerable progress was made at this early stage in the course to create a successful group. Creating a strong community of practice, among a very diverse group, which comes together temporarily for one semester, that was actually in two separate programmes, is a tall order.

Nevertheless, our findings about the main factors influencing network cohesion did suggest a number of interventions to address specific issues around isolation and cohesion of the work network. One intervention that was proposed was to extend the group work to the end of the module, since finishing the group work before the end of the semester had a dramatic dampening effect on network cohesion. We also explored the use of the social bookmarking tool, Diigo (www.diigo.com), to provide an online channel of communication in the groups, but one which produced an archive of material that isolates could be engaged through. We also proposed introducing a more intensive group work exercise, and setting up the groups on the basis of self consciously mixing nationalities to break down the tendency of cliques to form based on common language.

Conclusion

The purpose of this paper has been to describe an investigation of class room network dynamics and to explore the findings' implications for pedagogic practice. We were inspired by the opportunity to realize many of the benefits of the internationalisation agenda, in terms of a major learning outcome being respect for and understanding of other cultures. Following authors such as Wenger and Haythornthwaite we see social interaction and network positions as linked to learning, though in a complex way. Some types of learning may be associated with interactions at the core of a network, but significant learning also occurs through weak ties. In order to explore the working of these processes in a specific context, a range of data collection tools, including SN questionnaires, interviews and observation, were employed to explore both the character and underlying shaping forces in the classroom network. We found that the real network among learners is relatively invisible in the classroom. People who are quite central to the work related network may be little active in the class or even low attenders. Less surprisingly, it was found that by choice students tend to choose to work with others from the same programme and national background.

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Arising from this we proposed to explore a number of ways to enhance network interactions. A social bookmarking tool was supported to increase whole class interactivity in a way that was impossible within the online learning system, and include isolates. A new group task requiring deeper group interaction was designed. Groups were defined by the tutor on the basis primarily of seeking to maximise the national diversity of the groups. The assessment task was defined in terms of exploring diverse experiences for an imagined diverse audience, and elements of group work were maintained right to the end of the semester. One element of the assessment explicitly sought to encourage students to leverage wider networks, so maximising learning through boundary spanning roles. By the time that this paper is presented we hope to be able to report on some of the findings from these new classroom activities as well as suggesting a practical package of SN research tools that can be used to explore such processes in other learning contexts. Measuring the impact of our changes will be hard, because the class is now quite different and of course contains different individuals. There is no simple equation between marks or evaluation scores and learning. Our package of social network measures may help us explore what happened more fully.

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