The role of autocatalysis in learner's networks

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ABSTRACT

We use contemporary studies of human networking roles to propose that idea generation and associated knowledge transfer can occur through autocatalysis in human networks representing industry on a final year module “Creative Action in Organisations” delivered at a UK university to 150 students annually. They are organised typically into tutorials comprising creative learners who network in a simulated industry in the classroom to complete assessments. We see similarity between our simulations with computer generated micro-biological simulations of ‘autocatalysis’ that explain how cellular development in living organisms occurs at the edge of chaos. This paper uses autocatalysis to develop a theoretical explanation of why human networks ‘come alive’ even in classroom simulations, as networks of learners generate blue ocean futuristic ideas, bringing them into the realm of current technological and human capabilities. We explore this through a three year longitudinal study of 24 different industries simulated by creative learners. The contribution of this paper is in the explanation of networking as a part of learning in HE that goes beyond simple group work. In addition to the development of soft skills, HE learners are introduced to communication processes of coping with instability and complexity within industry networks.

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1. Introduction

This paper examines how communities of Higher Education (HE) creative learners collaboratively generate ideas and knowledge transfer processes associated with them. We argue that networking behaviour from a human perspective can be conceptualised using the biological metaphor of autocatalysis, where the process of coming together appears to ignite around a catalyst in the form of a certain idea or person. We adapt the term autocatalysis — defined by Farmer et al. (1986) and Kauffman (2010) as the speeding up of molecular reactions due to a special molecule called a catalyst, in an attempt to explain the processes of interaction between student learners that we have observed in the classroom. What we have witnessed is that students coalesce around an idea — or an individual — as they negotiate the tasks within their learning processes akin to autocatalysis whereby molecules coalesce around a catalyst. What is interesting is that this molecular action is similar to what we observed in our student networks, where some learners act as self-motivated catalysts who pull other learners around them, and this self-organising process results in a better outcome for all learners involved. We emphasise from our

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observations that this is a self-generative process and it takes place without facilitator intervention. We posit that the interaction processes between student learners (as nodes) and their self-generated idea cannot be viewed simply as group development, but more as networking behaviour. Furthermore, the autocatalytic processes can explain the behaviour of students as nodes within networks, who resemble the molecules. Due to the size of the networks of learners (20 students), the level of complexity involved during interactions and the relationship building that takes place — or not — amongst the learners, we cannot view our subjects of research as those simply involved in group work. The level of self-organising is more akin the unstructured networking processes of real life relationships in organisations. Hence theoretically this paper contributes to the development of networking theory in an HE educational setting. Therefore our research question is whether we can test empirically if the networks represented by student learners can exhibit similar behaviour to autocatalysis in nature. And if so, how might this work in our simulated industry networks?

To explore this, we apply networking perspectives based on complexity theory to our communities of learners, in order to illuminate how they develop soft skills during their own dynamic networking interactions. Jackson (2009) defines two sets of skills in management education: those focused on functional disciplines; as well as ‘soft skills’ such as communication, teamwork and problem solving skills. In this paper, we extend this definition by adding networking skills which include networking interactions, relationship building, negotiation and creativity including idea generation. We explore learners’ interactions by assigning each community a simulated industry and tasking them with developing ‘blue ocean’ (Kim and Mauborgne, 2005) futuristic ideas. Blue ocean is a revolutionary concept that challenges contemporary strategy in organisations by allowing the creation of untapped market space (Van Der Merwe, 2005) where competition is made irrelevant by targeting new customer segments. We use this conceptualisation as a core part of the learning experience for students involved in the module. They utilise the blue ocean concept which instigates the development of the ‘soft’ skills-driven networking interactions which result in a novel product or service idea being developed.

We use a longitudinal study and qualitative data collection methods to interpret learners’ perspectives of their soft skills interaction whilst developing their blue ocean ideas. We discovered that some learners more than others are able to catalyse and navigate their community to a preferred blue ocean idea. By proposing that the behaviours of catalysing navigators might be similar to autocatalysis in nature, whereby they seek order out of chaos (Galimov, 2006), we present important facilitating insights to educators involved in soft skills development for creative learners, and illuminate future design possibilities for simulating industry networks. Pedagogic limitations of the process include factional competition accompanying collaboration leading, to low buy – in by some learners – with attendant ethical implications (Salaber, 2014). Methodological limitations are that this is an exploratory educational study requiring further empirical work to substantiate preliminary findings.

The paper is structured as follows. We first present a review of extant literature on autocatalysis, human networks, and delineate between networking and group working behaviours. We then frame the study and provide methodological approaches adopted in this study. Our findings section provides insights about the emergence of the navigator mechanism within the networks of learners, and we illustrate the autocatalytic processes our learners go through using four case examples. In the final part of the paper, we examine our findings and relate them back to the literature. We also provide implications and conclusions.

2. Review of the literature

There is some evidence that humans in organisations tend to self-generate multiple possibilities during idea generation, before coalescing around one dominant idea (Schon, 1971; Van de Ven, 1986; Nonaka and Takeuchi, 1995). We start with the premise that human networks are complex adaptive systems at the edge of chaos (Waldrop, 1992: p 292), and hence they behave similarly to other living organisms in nature. To support this assertion, we look in more detail at recent discoveries from computer simulations of biological processes and relate them to human networks simulating industries in a classroom.

3. Autocatalysis in human networks

Auto catalysis is derived from simulated models of primitive metabolisms after Farmer et al. (1986: p 50), who proposed that contemporary living organisms have probably evolved via autocatalytic collaborations, namely ‘coupled catalytic relationships’ Autocatalysis is a self-sustaining process, one that might illuminate how human networks also ‘come to life’ as they cooperate via self-organising relationships (equivalent to autocatalytic reactions) to coalesce around one dominant idea at the expense of several other possibilities.

Is this then the human networking equivalent of what Farmer et al. coined a ‘chemical kinetics’? This is an ongoing kinetic process with its own life-like momentum that naturally selects ‘the most efficient properties of cooperation’ to generate the ‘fittest autocatalytical networks’ — notably ones that have led to the genetic codes of contemporary life such as DNA (1986: p 62). Pascale et al. (2000: p 34) tend to confirm this by citing that organisations possess ‘organisational DNA’ — DNA that evolves with the injection of new ideas as the raw material of regeneration. Similarly, we propose this argument can be expanded to the regeneration of ‘industry DNA’, for instance by using blue ocean strategy in our case. More recently, Galimov (2006) also modelled a ‘navigator’ mechanism in biological simulations where the navigator has a natural tendency to seek order out of chaos. This is similar to the ‘coupling capacity’ in Farmer et al.’s (1986) coupled catalytic relationships — where the navigator ‘plots’ the development of life towards increasingly ordered states of matter despite the general tendency towards
disorder. How might this navigator mechanism apply to human networks, operating within an industry involved in regenerating that industry’s DNA?

3.1. Split (schism) between mainstream and fringe

For Pascale (1999: p 87) humans are ‘the chromosomes’ – namely the ‘genetic material’ – who generate ‘variety’ through ideas, knowledge reordering and new knowledge, and notably those on the front line are the first to interpret ‘emergent’ threats from the environment. In essence, each human actor in a network is an intelligent ‘molecule’ with intentional purpose to generate knowledge by coupling with other ‘human’ molecules similar to the navigator process which, as it forms order out of chaos, enables human actors to respond to environmental threats. In other words, competition for new ideas to gain credibility among the actors is synonymous with biological immunisation when a virus gets neutralised. In human networks, this threat – equivalent to competition – is aimed at the current organisational DNA embedded in the mainstream of the organisation. This argument we propose again also applies to industry DNA. That threat in nature could destroy the current DNA. Yet Pascale continues citing Miller (p 88), that ‘centralisation bogs us down’ due to damping feedback that preserves social order and the current DNA, whereas when warnings from the front line are seen as opportunities by the centre (mainstream), amplifying feedback tends to occur that destabilises current DNA. Trisoglio agrees too that the front line is prime because it represents the ‘fringes’ known to ‘foster the most prolific rate of mutation’ just like its natural equivalents – the ‘verge’ on land ‘between savannah and forest’ or the ‘intertidal zone’ between ocean and land (in Pascale et al., 2000: p 31). Trisoglio continues by lamenting that the key challenge against regenerating or ‘exchanging’ organisational DNA, and we add industry DNA, is that mainstreams all too frequently fail to recognise when the new DNA should not remain on the fringes. This is because the damping feedback blocks the exchange of metaphorical DNA due to the ‘existing social order – equivalent to the body’s immune system’ (p 31, 32). Miller cites this as the ‘HQ versus field schism’, where this split requires bridging by new ‘parallel informal connections’ (in Pascale: p 88). This process is assisted by ‘altered conversations’ (in Pascale: p 91), or as we propose, a translation mechanism. This process supports our key premise that new connections across the split produce a tension between order and disorder that is central to explaining how we might find the navigator mechanism at work in the human networks of our simulated industries.

3.2. In search of the navigation mechanism in human networks

We posit that the ‘navigation’ phenomena is now ‘wielded by the power of human intention’ where companies are ‘self-knowing and intelligent entities’ too, according to Pascale et al. (2000: p 33) that recognise, even anticipate, threats to their survival in advance. Hence, human networks can exercise choice — whereas the rest of nature works on chance by ‘nudging species’ thorough disturbed equilibrium ‘into arenas where chance mutations can thrive’. One way of depicting human networks in industries is through nodes, connections or relationships (Pascale et al., 2000: p 126; Lipnack and Stamps, 1982) where nodes are individuals — intentional and intelligent beings — represented by psychological traits; and connections equate to self-organising informal social relationships between intentional beings — face to face and online. We first turn to ‘nodes’ and explore well-established trait literature amongst individuals; we then look at more recent literature on human ‘connections’ in networks. In both cases, we apply theories to our proposed conceptualisation of the navigator mechanism in human networks.

3.3. Trait dyads and triads between different traits

Trait literature points to change champions (Schon, 1963) whose psychological makeup drives them to exhibit certain behaviours as nodes in social systems, that are beneficial to organisations yet not in the job description; and there are five classical trait behaviours that can be seen in the typical human network: idea generators, entrepreneurial champions, project leaders, gatekeepers and sponsors (Roberts and Fusfeld, 1981: p 15)

Ideas generators are often social loners but adept at generating creative solutions to difficult crises and problems — yet are often disinterested and inadequate at promoting themselves and what they know. Entrepreneurial champions are endowed with perseverance and hard-nosed determination. They tend to form dyadic relationships or ‘role couplets’ (Roberts and Fusfeld, 1981: p 19) with idea generators, namely ‘promoter dyads’ that operate in a temporary and expedient reciprocating relationship on the fringe. Project leaders are noted for good people skills and trusted by senior management for budget control and project implementation. Gatekeepers are custodians of the existing social order who usually do not understand the language of new ideas. Hence new ideas must be ‘packaged’ (Smith, 2000: p 271) in suitable language for gatekeepers – as custodians of the mainstream – to facilitate idea implementation. Lastly, Sponsors are enterprising directors who ‘navigate’ bureaucracy informally to enable project leaders to overcome obstacles from gatekeepers. Together, the project leader, gatekeeper and sponsor make up the ‘implementer triad’ in the mainstream.

Trait combinations appear in human networks in a variety of forms. For instance, dyads and triads emerge from interaction about knowledge exchange: simplistically, literature explains how like for like attractions, or opposite attractions contribute to this (Rickards and Moger, 1994). In nature though this coupling is more complex, as opportunistic behaviour can be observed where different molecules temporarily couple as catalysts to form a stronger temporary alliance (until a yet stronger alliance emerges from more autocatalysis). We have identified two combinations that might contribute to our
conceptualisation of the navigating mechanism; the promoter dyad and implementer triad. Kilduff and Tsai (2003) refer to the processes of reciprocity (reactions in chemical terms) and transitivity (‘coupling’ in chemical terms), which are both required to generate and intentionally persuade the implementer triad and promoter dyad to bridge the divide between the mainstream and fringe in the human network. However, in order for these processes to auto-catalyse the ‘translator’ trait is required, and this allows for all the participants within a human network to buy into a common package, which has been framed around the perspectives of both fringe and mainstream. In other words, the new DNA becomes ‘mutually intelligible’ (Smith, 2000: p 271).

We have now considered the combinations of traits that may constitute the nodes driving the navigator mechanism; and pointed to at least two self-organising and emergent trait-coupling relationships. We have also intimated that the auto-catalyser might consist of the ‘translator’ trait, which actors trust, due to a bridging ability between fringe and mainstream within the human network. However, in order to explain this process we turn to recent literature on trust and connections in human networks.

3.4. Connecting role behaviours in human networks

Networking literature has often examined the concept of human networks by looking at the nodes — or actors — hence approaching this through individualistic perspective. Specifically, the work of Krackhardt and Hanson (1993) on the sociology of a ‘trust network’ helps plot connections to individuals most trusted in a network to reveal a marked centrality around just two or three individuals (nodes). Trust in our case relates to emotions associated with fear of ambiguity whilst generating ideas and implementing them, and developing emotional reciprocity that occurs whilst relationship-building during knowledge exchange (Ford and Gioia, 1995: p 330). The different behaviours that are observed in human networks are defined by Cross and Prusak (2002) as: central connectors, boundary spanners, information brokers and peripheral specialists. These concepts delineate sharply from group working and group development literature which also looks at role profiles — however not in a network context.

‘Central connectors’ have the most concentration of relationships inside their own network. Apart from trust, centrality applies to any network ‘value’, notably idea and new knowledge implementation. In contrast, ‘Boundary spanners’ link different networks — and are influential in translating novel information between networks to make it mutually intelligible (Granovetter, 1973; Smith, 2000). For Davenport et al. (2003), boundary spanners are ‘idea practitioners’, ‘almost all’ of whom have ‘other jobs … [and] play their roles somewhat on the margins’ (p 62). Information Brokers ‘irrigate’ information within their own network and can be the spokesperson on behalf of the central connector, as the latter is often too busy. Peripheral Specialists behave according to the trait of the Idea Generator, choosing to be loners on the margins, in order to concentrate on research into new knowledge — and central connectors would rely on information brokers to bring a peripheral specialist to the right meetings. These four roles are built into the simulations and acted out by our communities of learners. Each individual takes on a role, however, they become aware of secondary networking preferences (for instance, a central connector can adopt a boundary spanning role when pushed to link with a wider network): in other words, they wear multiple hats when it comes to roles, and do not engage in fixed informal behaviours. Rather they engage in ‘contextual switching from role to role’ and have ‘multifaceted’ informal capabilities better explained as ‘persona’: notably this persona is not about ‘your predetermined “business DNA”’ (Kelley and Litman, 2006: p 13). Taking on different roles and responsibilities within a network has not been widely developed in group development literature. Due to the complex nature of the behaviours these learners exhibit, we now explore more recent work on networking personas in order to finally identify the complexity behind the navigator mechanism.

3.5. Networking ‘personas’

Kelley, of IDEO, points to ten personas, five of which could better label the Promoter Dyad, Implementer Triad and Translator trait. The Promoter Dyad (problem solver/promoter) on the fringe resembles the Experimenter and Hurdler personas because the experimenter ‘prototypes’ new ideas continuously, and the hurdler’s perseverance ‘outsmands’ organisational ‘roadblocks’ (p 9, 10). The Implementer Triad in the mainstream resembles either Collaborator or Director personas, as both bring ‘ad hoc’ and ‘eclectic’ teams together, leading from the middle to create new combinations (p 10). The Cross-Pollinator ‘translates’ ideas from other ‘industries and cultures’ (p 10) to make new DNA mutually intelligible, akin to the boundary spanning Translator, after Smith.

4. The study

We will attempt to explore this phenomenon of a navigator mechanism through our longitudinal study of three years on our “Creative Action and Organisations” module, where communities of learners were challenged with generating ‘blue ocean’ strategies (Kim and Mauborgne, 2005), and brought their sometimes futuristic ideas into the realm of current technological and human capabilities. Blue ocean in business terms is unexplored market space where competition does not exist due to the limited value proposition offered by the current industry.

The purpose of this paper is to explain networking as a part of learning in HE that goes beyond simple group work (Analou et al., 2014). In addition to the development of soft skills, HE learners are introduced to communication processes of coping
with instability and complexity within industry networks (Jackson, 2014). For example, what happens when parts of the network realise that the current idea is not fit for purpose? By explaining this through networking roles and personas we were able to see the critical incidents that brought sufficient instability to the network to allow further knowledge re-ordering or search for new idea to take place.

In order to consider these critical incidents, it is vital to first explain the setting. Fig. 1 presents the simple view of the structure of a learning community of 20 students. Each coloured circle represents a typical section of an industry network of about four learners as ‘industry experts’ (Gijseelaers, 1996) which is where we are stimulating emergent properties (Bessant and Tidd, 2007: p 84). The generation and championing of the idea emanates between Sub-network B and C who represent the Mainstream. Throughout the process they prototype the idea with input from external suppliers, channels and customers who are on the fringe in early stages of the process.

The sub-networks self-organise according to their given start roles from customer sub-network (X) through to supplier sub-network (D), and all are involved in one project they select, but represent different industry roles, and hence use different approaches and resources to develop the project. What is important in this structure is the bifurcation of this network into the “mainstream” and the “fringe”. Here the mainstream part of the network will coalesce around the main Blue Ocean business idea near the start of the learning process. However, the data points to much behind the scenes negotiations, mainly outside scheduled tutorial time in a quest to discover the fitness of the Blue Ocean idea. As the business idea develops over a period of several weeks into a prototype ready for assessment, the behind the scenes discussions — or ‘out-of-class’ (Tinto, 1997: 617) interaction — occurs as learners ‘invest’ (Weinreich, 2003) and develop their own industry context and knowledge. As a facilitator, one has to be prepared to empower students to make ‘tutor-less’ (Tinto, 1997; Fear et al., 2003) decisions, yet be available at short notice for corroborative support. Although then despite the facilitator not being present in the majority of the out-of-class interaction, they are kept informed and invited as informal members of student networks in the roles of critical friends and knowledge experts. Hence, what is fundamental to this process is that facilitators relinquish control to students to allow for self-organised emergent processes of learning (Cooper et al., 2004) to evolve as they invest, or don’t invest, into knowledge sharing and context creation. We infer from this that the level of investment by individual students is associated with the navigator mechanism where the network is trying to find the optimum fitness peak for the business idea.

From our three academic years of observations of students involved in this learning process as facilitator-coaches, we can say that approximately one third of networks change their Blue Ocean idea, namely DNA, as a result of the negotiations as navigators mediate de-stabilising tension between the mainstream and fringe, leading to new mutations, namely new iterations of a business idea.

The key change in the behaviours which we observed is linked to the change of roles by individuals from the centre of the network to the periphery and vice versa. From our observations this can be caused by the network ‘going down’ in search for a ‘higher fitness peak’ or idea (Pascale, 1999: p 85); by situations where knowledge re-ordering is required; or when a general search for new knowledge and ideas takes place. In these situations the “navigating mechanism” is kicked off by either one individual or a pair, who are involved in spanning boundaries between the mainstream and the fringe.

Just like in any form of human activity, there is a tendency towards centrality around a few key people with others left on the fringe. The fringes in this structure (See Fig. 1), i.e. the residual DNA, are those whose ideas were not taken on board. These individuals and parts of the industry network seem to be disassociated, and either fight to re-join the mainstream by planting a ‘seed of doubt’ regarding the fitness of the currently promoted Blue Ocean idea, or choose not to engage. In the former case a

A, B, C, D, X represent different student ‘expert’ networks that in combination represent an industry network

Fig. 1. Structure of the industry network.
peripheral individual will attempt to gate-crash the mainstream and try to dominate. Is this another example of the navigator mechanism in action?

5. Methodology

This paper is based on data collected over a period of 18 months from final year undergraduate student participants, who have chosen the module “Creative Action in Organisations” as an elective. The module was designed by the facilitators using scaffolds (Sawyer, 2006) based on concepts of creativity, networks, climates, and Blue Ocean (Amabile, 1996; Amabile et al., 1996; Cross and Prusak, 2002; Ford and Gioia, 1995; Kim and Mauborgne, 2005). The module aims to enable students to ‘see in new ways’ by engaging learners in experiential learning activities set within cross-cultural settings where their ‘soft skills’ (negotiation, networking, building relationships with others) are being stretched. Students are placed within individual networks with assigned responsibilities as represented in Fig. 2 below. The learning takes place within an industry network context, where students are tasked with the development of a novel idea, and by gradually negotiating this idea, it gets accepted by all the learners. Thus the key learning outcome from this module is to develop communication and networking skills aimed at simulating real business situations. The student participants have been observed in their tutorials, namely learning communities of 20, who were assigned 5 different learning networks, as presented in Fig. 2 below.

Each cohort of students of over 150 annually was split into 9 industry networks, represented by tutorials. Methodologically we place this research into the qualitative field, as we chose focus groups as a method of data collection, which were taped and transcribed verbatim. The focus groups were conducted at different points of network development, hence we present data from two cohorts of students, who contributed at the beginning, the middle and the end of the process.

In the first focus group with 12 learners across the cohort from different industry networks we asked them about their perception of why they joined the module on Creative Action in Organisations; their attitudes and understanding of leadership within their networks — and also for leader-less networks; competition between parts of the network, and problems with buying-in to the ideas; and which networks developed over the course of the module. The participants also raised the issue of teachers and facilitators within the process and the role they should play. Finally we had a discussion on the changes in the behaviours that are expected from learners when involved in the creative process.

The middle focus group with 14 participants from the new cohort was set around the conflict between individuals, roles and ideas, particularly with assessments in mind. The role of idea champions and differences in networking behaviours amongst learners, as well the relationships that are generated as a result of buy-in were explored. The notion of centrality was also explored, as by this time in the process the learners could see the emergence of stronger personalities for creativity.

The final focus group with 12 learners was all about leadership, as this issue emerged as the dominant category that students wanted to discuss in more detail, as a concept of driving the networks to common purpose, as well as blocking progress. This focus group shed light on conflicts caused by diversity; supreme effort required to make late buy-ins happen; and the unfair distribution of workloads in tutor-less environments.

The data then was analysed for content using Nvivo and manually. The purpose of this analysis was to derive themes and patterns within the data, that would explain to us the processes of idea development within different industry networks. An interpretive schema was developed to describe the initial observation of learners involved in the creative action process, their feelings towards their self-generated confusing interactions associated with knowledge development within their individual networks, their attitude towards the emergent leaders in their networks and the conflict between competing ideas. Themes were developed through iterations of the data with reference to broader contexts. We were able to see the similarities and differences within and across the sub-networks of themes and patterns that we devised, and these are presented in the next sections of the paper. The focus groups, although purposive, consisted of learners representing different roles and behaviours within the networks, hence being part of the mainstream and the fringe. Additionally, as facilitators, we used notes, anecdotal and written feedback, and videos of assessments, which allowed us to develop our concepts about networks and learners’ behaviour, as well explain the emergence of the navigator mechanism. The organisation and structuring of the data around common themes enabled the building of theoretical constructs, where the similarities and difference of learners’ interactions and participation in the creative learning process were explored. Having conducted the focus groups with multiple

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**Fig. 2.** Structure of the learning communities.
respondents this allowed us to provide a stronger base for theory building (Yin, 1994) and we generalise our findings in the next section back to theory (Eisenhardt, 1989; Eisenhardt and Graebner, 2007).

6. Emergence of the navigator mechanism

In this section of the paper we explain the emergence of the navigator mechanism which has been conceptualised from focus group data, and to illustrate this concept we present four cases of role changing behaviour amongst learners. When looking at the mainstream and the fringe within each whole industry network we observed the tendency of individuals from both sides to re-organise themselves around a new central connector (leader championing new idea), as the mainstream accepted the knowledge reordering process which just took place, and hence the mutation of the current DNA that takes place. To conceptualise how this process of ‘autocatalysis’ might work with the help of the proposed navigation mechanism, we now look at this process in more detail by focussing on four critical incident situations, which are illustrated and explained below. We supplemented our focus group data with videos recorded as part of the assessment through presentations and role-plays, as well as observations together with student feedback documentation to develop an understanding of what happened in the classroom.

In order to illustrate some of the key events in terms of role and persona ‘switching’ amongst individuals, and as a result the changing of the main Blue Ocean idea, we look at four critical cases we have observed. These cases represent the processes within individual circles from Fig. 1 — namely in sub-networks of customers, marketers, main Headquarters of the company launching the Blue Ocean idea, product designers and suppliers. Apart from temporarily assigned leadership roles, network members selected their own networking roles without tutor intervention. These roles tended to settle down as in a social network to specific support roles required to deliver assessments depending on their skill sets. We will use quotes from the focus groups to illustrate the change in roles observed, that we propose is as a result of the “navigation mechanism” that takes over with the aim to re-defined the current learners’ network in search of optimum fitness.

7. Case 1

7.1. Initial brainstorm and emergence of mainstream forces pushing centrality in the network

In this case the key idea generator (P1) in Fig. 3 is pushed through social obligation to take the central connector role and hence become the mainstream opinion leader. This particular observation takes place in the first session with students, and what we see is that the person who best understands the Blue Ocean idea tends to be pushed into the leadership role; and hence becomes the representative of this smaller network in a larger one presented in Fig. 1. This also means that this person may potentially become the overall leader of the larger industry network.

A quote from the focus group confirms the emergence of the mainstream, as well as illustrates the rationale for a particular person to become the network leader:

“… you bring the idea forward, and people automatically assume you’re the overall leader as well as the [sub-network] leader and no one actually made any suggestions. Just because I came up with the idea they thought … we’ll let him do it. Others then rely on you and don’t put much effort into the work.” [P1]

In order to ensure that tasks are carried out by the sub-networks and by the overall network, P1 will need to develop a rapport with other learners in his network as well as other leaders in a larger industry network via direct communication illustrated in Fig. 3, and these individuals will trust his/her judgement. On a number of occasions we have observed that these overall leaders were involved in keeping the current DNA of the sub-network in a stable position, or keeping the status quo.

“You feel the opposition, but you are the person who came up with an idea, and you don’t want to upset anyone” [P1]
This example illustrates the process of a leader emerging and as a result the mainstream emerging in the large industry network.

8. Case 2

8.1. Scouting into the fringe by the mainstream

This example takes place when the industry network feels that the current Blue Ocean idea is not something they want to work on. Fig. 4 illustrates how the leader P2 did adopt an almost subterfuge role by infiltrating the fringe in order to scout for a better idea (search for highest peak). This process is similar to management by ‘walking about’ (Peters, 2004) where P2 has to change persona and networking behaviour from central connector to more of a boundary spanner to operate on the fringe; to listen and collect as much information as possible; and then return back to the mainstream with the revised or completely new idea. Hence, the diminished yellow circle around P2 on the fringe and full yellow as the central connector. We support this with a quote from the focus group discussion:

"I think you forget that your [sub-network] seems open minded; your [sub-network] has very quickly accepted this doesn’t have to happen but I think, I mean there’s definitely one member in my [sub-network] and one member in the opposite [sub-network], it seems like they’re in the opposite [sub-network], who definitely still don’t understand completely the idea that it doesn’t have to work, don’t have to do it, we’re not going to go and sell it.”[P2]

Looking at this example, it is clear that in order to ensure that everyone is involved in the development of the Blue Ocean idea, the leader P2 has to go out and understand the flaws within the current idea from the point of view of the periphery. Hence the leader goes on a scouting trip for a better idea which will be accepted by the network. Here the role of the participant P2 changes from being a Central Connector to a Boundary Spanner. In order for the new idea to gain credibility, this idea needs “translation”. The individual has to come back and hard-sell this new idea in order to navigate it into the mainstream and create a new DNA for the mainstream.

"we had a chat and it took me ages to get it across to my [sub-network] what it was and I still don't think they've really got it. I still don't think a couple of them get it.”[P2]

The reason why the Central Connector keeps their role is because they already have centrality or social credibility, which allows them to translate and be heard regarding why the change is needed and they can do it better than say a new idea generator.

9. Case 3

9.1. Gate-crashing of the mainstream by the fringe

Following the previous example of scouting, there might be an alternative path whereby in reverse, the new idea is navigated into the mainstream by a person from the fringe trying to usurp the current central connector and their credibility. If the tension between the parts of the network leads to amplifying behaviour and confusion, because the social structure gets upset and voices of those on the periphery were not heard, then a new central connector can emerge from the fringe and change the connections.

"We had quite a weak team; we didn’t really say anything or make any decisions and then we had another guy that came into our [sub-network] late, who actually had some quite good ideas, which changed the dynamics of the [sub-network]. Now all of a sudden, you're finding that people are trying to brush up what they never used to care about.”[P2]
This process is illustrated in Fig. 5, where we can see the redistribution of relationships around the newly emerged central connector. In this critical example, when the mainstream tries to hold on to the idea which the fringe in the network sees as a weak idea, the learners in the fringe start a revolution and throw away the current idea and navigate a new idea to replace the weak idea. How this is done represents a competitive alternative featured in networking rather than the collaboration the leader experienced with the fringe members who improved by giving away their ideas in the previous case. However, Fig. 5 represents a situation where the original leader P2 is unable to use social context to defend their position of power and centrality due to the weak idea. This team dynamic shows that even the strongest leaders may fall when a higher fitness peak is sought by a network. This is where the new central connector P3 gains credibility and is pushed into leadership to drive the new idea forward. Now P2 either collaborates with the new leader or alternatively, changes to a peripheral role.

“In We ended up changing our idea because the first one, like people agreed with it, everyone agreed with it and then they weren’t sure what they were agreeing with”[P3]

In Fig. 5 we see how P3 person from the fringe has to hard-sell the idea to all the participants, and by doing so the centrality within the network moves to this P3 person who started the change. Notably, P2’s erstwhile centrality is pushed to the margin along with the weak idea.

10. Case 4

10.1. Deliberate avoidance from being the central connector

Fig. 6 shows the critical incident where the navigator mechanism is put into action. This is an example where a dyad emerges between the current leader P2 and another person on the fringe who potentially is recognised by the centre as socially inept yet high on creative problem solving. This individual is P4 who reciprocates on problem solving but shies away from centrality and responsibility for the network. This person in essence represents our notion of ‘hidden centrality’ which may not necessarily be perceived by all members of the network. This strong dyadic relationship is what we also link with navigation within the network, which is consultative in nature yet decisive and a compelling force that coagulates the network around a strong idea, moreover constantly modified for higher fitness. In some cases, this could be a triadic relationship with two P4s supporting the central connector P2. Such high level commitment can rarely be observed in educational settings, but is documented in management literature and referred to as ‘high performance teams’ (Ensley et al., 2003; Katzenbach and Smith, 1993). This case shows how a navigation mechanism can plot a successful way forward by hidden centrality emerging around the real leader P2 and the support system from P4.

What we observed over three years with our networks of learners, is that in some cases the leaders that are known to the industry network P2, and that represent the sub-network roles in the mainstream, may not be the key people that lead the sub-networks, hence our concept of hidden centrality.

We have evidence to suggest that in some situations the reason why the network operates well has nothing to do with the person that generated the idea and hence was pushed into the leadership role. The hidden centrality within the network allows for those that do not want to be known as the leader to shine, and use their skills in managing the network under the umbrella of the leader.

As one leader said at the focus group:

“but who do I talk to? They know who the leader is … me … but they don’t know that it is Joe that does most of the work …”[P2]

The second in command [P4] did most of the leading in a network by:

“I did not want to be a leader … but I swear I had to explain not only what our group was actually doing but I had to explain the module to the [sub-network] two or three days before, even leader did not know! What’s interesting is,
once that happened and once I finally made sure that everyone was clear what was going on, they grasped it and then everything went well, but they still all came to me to clarify things, so I was sort of doing about 80% of the work...

These four cases illustrate some of the properties required for the navigation mechanism proposed in the paper to start, and in some cases complete, the transformation of the idea and as a result the mainstream DNA of the industry network. We now conclude this paper by not only looking at what has been discovered in this study, but also by identifying areas for future research.

11. Discussion and implications

In this paper, we have contributed an explanation of networking as a part of learning in HE that goes beyond simple group work for the development of soft skills. We have shown how HE learners' soft skills were developed by introducing them to communication processes of coping with instability and complexity within industry networks, and proposed the notion that they experienced processes akin to autocatalysis, nature’s way of biological brainstorming for higher ‘fitness peaks’ (Farmer et al., 1986; Pascale et al., 2000). However, this notion represents a gap in educational literature on collaborative learning. Using this autocatalysis metaphor, we were able to observe the actors, akin to molecules, that forge stronger DNA which in our study relates to the gradual development of an optimum blue ocean industry concept learners themselves generate and perfect through complex coupling processes they themselves catalyse. What this means is that those actors involved in the perfection process display autocatalytic behaviour in that they are able to modify their persona for the greater good of the network. This allows them to achieve the higher fitness peak, although this may take several iterations. We argue that this process of perfection of an idea in a network is driven by the navigator mechanism: self organising, collaborative and competitive, shared leadership-driven and coalescing around one central idea which sets up the dominant context of the network. As presented in our four cases, we were able to see manifestations of the navigator mechanism in action when learners chose to involve us. However, further research may allow exploration of different learning scenarios where the navigator mechanism was engaged without tutor involvement. As peripheral observers, we were able to see the positive as well as negative effects of the dominant context emerging which resulted in winners and losers, namely those in the inner circle and those on the periphery whose ideas were lost in the competitive battle. This process shows they actually experienced the adverse effects of co-opetition and associated build up of tension across the network. However, the navigation process exhibits mediating behaviours concerning this tension between periphery and mainstream, because as in nature, the potential for ongoing renewal of the blue ocean concept lies on the fringe, after Trisoglio.

In terms of educational implications, facilitating this process where some learners get inadvertently marginalised presents operational and ethical challenges, not only for tutors and learners who would have to reflect on potential underperformance, but also for institutional concerns where the competitive nature of HE has certain expectations on graduate performance levels. So, what can we learn from this? Firstly, tutors as peripheral observers can only join learner networks by invitation, which alters normal tutor control status. Secondly, tutors are often pulled into networks at short notice to mediate and counsel those who are marginalised; or to encourage good decisions to be built upon. This means that tutors become coaches or critical friends, who need to be approachable and accessible, which is not always possible in educational settings. Thirdly, when learners are put under contextual pressures of network-building, they exhibit surprisingly positive, even out of character, behaviours like those shown in the Cases 3 and 4 in particular. These behaviours present important future research opportunities into how they might navigate their networks to coalesce around an idea with dominant contextual potential. As the cases have illuminated, learners are quite capable of altering their normal personas in order to forge new connections that might improve their concept. We relate these connecting behaviours educationally with ability of learners to communicate by using intuitive processes of filtering information and sensing the scope for reciprocation and transitivity. In this environment, learners themselves share pressure and build on ideas, involve and refer to other relevant members in the endless complexity of network building, driven by this reciprocity and transitivity. Case 4 is a critical example of hidden centrality achieved by
reciprocity invisible to all actors in the network, yet it coalesced learners around a dominant contextual idea. In the absence of restrictions, learners themselves break the boundaries, particularly by displaying unusually high commitment beyond the brief, with adult-like initiatives one might normally only observe in real work situations.

Going back to our biological metaphor of autocatalysis, what can be learnt educationally is that networking relies far more on soft skills and interaction, than does group work, because networking entails processes of relationship building, severely challenged by the contentions of conflicting ideas. Without imposition of sub-network leaders, as would be normal in group work, learners create their own learning context, which in effect prepares them for real work situations. The outputs that are achieved as a result of the freedom given to learners to drive their networks and context creation themselves, exceeds expectations a tutor might have when the same students learn through other pedagogic methods.

12. Conclusion

In conclusion, this paper explains how networking can contribute to learning in HE that goes beyond simple group work. It shows how HE learners can develop soft skills by introducing them to communication processes requiring they cope with instability and complexity within industry networks. Whilst in nature organisms survive bacterial and virus infections by reproduction — whereby DNA constantly renews its immune system to reach a higher fitness peak — the case of renewing ‘industry DNA’ is more complicated by the structures of vested interest borne of human intentionality to preserve the current DNA that ‘works’ (if it ain’t broke, don’t fix it). This prevents self-organised renewal of its immune system to reach higher fitness peaks, because the mainstream tends to resist new ideas such as a blue ocean — seeing them as viruses to be blocked. This is where the damping mechanism instils equilibrium: in industry terms this means as Pascale (1999: p 86) cites ‘stable equilibrium equals death’.

Imagine however, nascent human networks with no superimposed hierarchy, namely our simulated industry networks with no hierarchical start conditions in the classroom. So what persona, representing the ‘genetic material’ of our posited navigator mechanism, might generate destabilising ‘variety’ through ideas, knowledge reordering and new knowledge? Over the last three years, we have observed autocatalysis occur in eight out of twenty four different industries of networking learners after a perfectly workable blue ocean idea has already been generated. This is due to networks self-organising to seek a higher fitness peak after the network became intentionally de-stabilised by some of the actors or nodes, either from the mainstream or from the fringe. From our research we propose that the navigator mechanism consists of the persona that combines boundary spanning behaviour with a high level of trust within the network. This persona has a high ability to translate new and re-ordered knowledge to all actors in the network, and interprets this knowledge in a mutually acceptable frame for all actors whether at the fringe or in the mainstream.

As the dyads and triads reformatulate, as we observed, unfortunately, for some of those involved in the process of re-defining the DNA of the industry network, their roles become redundant. This process challenges facilitators of the module in terms of casualties of the process, just as in Case 3 — ‘Gate-crashing the Mainstream by the Fringe’ — because as a result engagement can cease. In the modern classroom this is amplified by the cross-cultural nature of these communities of learners, and has implications of major support mechanisms being required by the facilitators to ensure a satisfactory learning experience. This will be a focus of the future study based on the data collected so far.

A more critical question that arises from this research, apart from ethical and other considerations, is linked to whether the networking experience is a valuable learning medium. The feedback from the students confirms this is a valuable skill for both employment and self-employment at this final undergraduate level, however not everyone enjoys the learning experience. From the facilitators’ perspective, it is evident that the key intangible skill learnt on this module is the ability to understand the complexity of the personas that individuals exhibit whilst generating new knowledge and re-ordering old knowledge; as well as the challenges of translating the tension which suddenly emerges between fringe and the mainstream. A part of this complexity can be explained by the proposed navigator mechanism, however further research is needed to establish our concept in empirical terms in educational research.

This paper’s useful and innovative contribution is to our understanding of the importance and nature of networking as opposed to group working amongst learners. By employing the concept of autocatalysis, we have been able to unpick the complex networking processes students undergo when working creatively in a less structured educational setting. By allowing students to take charge of their own learning through staging autocatalytic conditions, we are getting a step closer to understanding the powerful nature of networking as well as the complexity of creating climates conducive to stimulating creative outputs from facilitators’ perspective.

References


