The International Journal of Management Education 12 (2014) 271–282

Contents lists available at ScienceDirect

The International Journal of Management Education

journal homepage: www.elsevier.com/locate/ijme

The role of autocatalysis in learner's networks

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A R T I C L E I N F O

Article history:
Received 12 May 2014
Received in revised form 6 August 2014
Accepted 9 September 2014
Available online 20 September 2014

Keywords:
Creativity
Networks
Learning
Autocatalysis
Simulation

A B S T R A C T

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.

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 leaning 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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http://dx.doi.org/10.1016/j.ijme.2014.09.001

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