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Chaordic Learning Systems: Reconceptualising Pedagogy for the Digital Age

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Abstract

This article focuses on an explorative and experimental project seeking to implement Chaordic Learning Systems (CLS) as a pedagogic approach in Higher Education. We outline a project that embraced technologies of Web 2.0 to show how both physical and virtual spaces can be used to support and develop a strong and dynamic learning community in which staff and students work alongside each other to co-produce learning resources. Drawing on theories of Communities of Practice and Situated Learning a new teaching framework was introduced to a Level 5 undergraduate module (7.5 ECTS credits) that had not, until this project, used both face-to-face and online learning tools to engage students in the critical and discursive debates pertaining to sport and physical culture. We undertook this project with the belief that Higher Education should be concerned with answering the calls of an increasingly digital society for whom learning is not restricted by the physical boundaries of the university or the political landscape within which learning finds itself.

Introduction: communities of practice in the digital age

As part of a Teaching Fellowship for the lead author, based in the Faculty of Health and Life Sciences at Oxford Brookes University and in collaboration with Sheffield Hallam University, the University of Bath and in receipt of Higher Education Academy funding, the authors sought to investigate how a Community of Practice can foster collaborative and engaging learning practices within the digital age through the use of Web 2.0 technologies. As we move through the 21st century, Higher Education will become increasingly dependent upon emerging digital spaces, across multiple co-existing networks. The affordance of new virtual realms of existence will underpin new economies of digital and virtual media (Beer & Burrows, 2007; Castells, 2010a; 2010b; Turkle, 2011; 2012; and Zylinska, 2009). This landscape affords us new collaborative possibilities, increasing connectivity, greater access and engagement across multiple learning spaces and communities. We are in a moment where yet-to-be imagined networks and potentially limitless connective power lie ahead of us and it is this challenge that we sought to address in a Higher Education setting by reimagining the way that Communities of Practice were implemented within an undergraduate degree programme.

Hammersley (2005) cites several examples where Communities of Practice (Wenger, 2002) have been utilised in the learning and training literature (pp. 6 - 7, noting Tailors in Liberia; Midwives in Mexico; the US Navy; Alcoholics Anonymous; Butchers; and Researchers in Artificial Intelligence as just some examples). Drawing on theories of Communities of Practice and Situated Learning (Lave, 1991; Wenger 1998; Wenger, 2000; Wenger et al.,2002) a collaborative learning environment (Stacey, 2007) was introduced to students taking the Global and Cultural Studies module on the Sport, Coaching and Physical Education degree at Oxford Brookes University. Communities of Practice provided a sound framework to use when considering a reconceptualised pedagogy to serve the digital world. Lave and Wenger (1991) discuss the emergent nature of Communities of Practice which seemed to fit our conceptualisation of the myriad ways in which students might learn in the digital age offering, therefore, a highly appropriate choice of theoretical framework upon which to base the design of the module.

Communities of Practice have become a widely integral part of research towards the identity of Web 2.0 learning spaces (Conole, Cook & Ingraham, 2003; Gunawardena et al., 2009), based upon the premise that learning is inextricably tied to the construction of identity through participation in, and relation to, a community (Wenger, 1998). The notion that a Community of Practice is sustained over time by *mutual engagement* in negotiating the meaning of practices within the community, and *joint enterprise* that allows for the enterprise to be cooperatively negotiated, and a *shared repertoire* of communal resources that all members develop over time and space (Wenger, 1998; Wenger, McDermott & Snyder, 2002) spoke to our desired outcomes for the student experience throughout this module.

Higher education: beyond blended learning and communities of practice

Within Higher Education, neoliberal ideologies have led to the influx of corporate values (Giroux, 2005) leaving the student, society, and the purpose of university education accountable only to the *free* market, leaving the academy at a point of crisis (Collini, 2012). These deliberations are crucial in order to understand the role Higher Education plays within western society. According to Giroux (2003), exposure to the free market and neoliberal morals has seen education become no more than training; liberalism turn into vocationalism (Côté & Allahar, 2011); and critical knowledge and social responsibility squashed by specific and instrumental knowledge through a regime of neo-scientific, market aligned truths

(Giroux, 2009; Silk, Bush, & Andrews, 2010). These changes in Higher Education, instigated by global and economic change, have challenged existing understanding of the core functions of universities and therein the academic community.

Barnett (2011) suggests that knowledge has become performative in nature and only knowledge that is directly commodifiable is deemed worthy. Ultimately, and we note Gergen's work (cf. Gergen, 1995) as inspiration for such argument, a positivist approach to the scientific or empirical ways of knowing are privileged over interpretivist, relativist, or constructivist thought. Whilst society meanders into the age of supercomplexity (Barnett, 2000), in which we have seen the emergence of multiple epistemological frameworks and various sets of knowledge (Denzin & Giardina, 2006) it is still noticeable that certain truths are held as privileged over others in research and teaching.

However, Davies (2005) argues that far from a reckless call to armed struggle from the left, what is required is a pedagogy that provides students with a double gaze, enabling them to thrive in the environments they find themselves in. In other words, equip them with the tools for employability, but also facilitate students to challenge authority through intellectual and civil means so when they are "challenged by life's situations they will know how to respond appropriately" (Côté & Allahar, 2011, p. 22) with agency, creativity, a politically charged social responsibility and autonomy.

Research findings provide compelling evidence of the importance of encouraging student control over the learning process as a whole (Wehmeyer et al., 2000; Zhang et al., 2004). The socially based tools and technologies of the Web 2.0 movement are capable of supporting informal conversation, reflexive dialogue and collaborative content generation, enabling access to a wide raft of ideas and representations therefore speaking more lucidly to Côté and Allahar's notion of the student.

Whilst there are continued advancements of net-based technologies that may place us beyond Web 2.0; the principles of connectivity and user generated content through the means of personal and portable technologies derived from web 2.0 still remain relevant to the existence of digital pedagogies (Chen, Hwan & Yang, 2012). We use Web 2.0 here, as defined by O'Reilly (2005, pp. 1):

> Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it

Used appropriately, these tools can shift control to the learner by promoting learner agency, autonomy, and engagement in social networks that straddle multiple real and virtual learning spaces independent of physical, geographic, institutional and organisational boundaries. The evolution of the World Wide Web from Web 1.0 to Web 2.0 and beyond is creating subtle but profound changes in the ways human beings locate and access information, communicate with and learn from each other (McGloughlin & Lee, 2010). These changes in technology are driving changes in human behaviour, interactions, and knowledge acquisition. The paradigms for learning have already evolved beyond traditional classroom models, to synchronous and asynchronous, interactive, and collaborative learning (Stacey, 2007). However, recent developments in social and collaborative-based technologies are far outpacing the development of theoretical frameworks for their use in education and training (Giedd, 2012).

Pertinent to our reflections in designing the learning environment founded on a Community of Practice model was the challenge by Siemens (2004) that constructivist learning theory was out of touch with current social environments, deemed unacceptable due to the changing face of interaction with the 'other', of which now transcends human-human interactions as depicted by Vygotskian (Hodson & Hodson, 1998; Vygotsky, 1978) social-constructivist philosophies. Rather, learning within the digital age is centred on the ability to access and distribute information (Selwyn, 2011a), collaborate on the production of knowledge (Dede, 2008) and 'browse' the unknown beyond what is currently known (Cochrane & Bateman, 2010).

Connectivism, thought more appropriate for this project, situated learning within four key characteristics, namely:

1. **Learning consists of connected 'nodes'** whereby learning is the connection of nodes that collaboratively expands one's knowledge;
2. **Learning occurs both within and beyond that of the mind** where learning becomes the connection of both living and virtual entities as a platform of information distribution, creation and consumption;

3. **Knowledge is not propositional** so the matter of knowledge is the pattern of nodes that form a collaboration of entities and information sets;
4. **Knowledge is an emergent phenomenon** rather than learning being a product of deliberate engagement, it is a recognition of the emerging patterns of connecting nodes (Clarà & Barberà, 2014; Downes, 2006; Siemens, 2004; 2005a; 2005b; 2006).

The principles of connectivism are more in keeping with the intended outcome of the learning environment sought at the outset of this project, one situated in a collaborative epistemology, where learners become prosumers [producers and consumers] of knowledge (Barr & Tagg, 1995; Jahnke & Norberg, 2013; Kivunja, 2014) rather than merely the consumers of information.

Despite Siemens and Downes persistence, scholars have heavily criticised connectivism as a theory of learning (Clarà & Barberà, 2014; Kerr, 2007; Kop & Hill, 2008). Particular scrutiny has come from Clarà and Barberà (2014), who challenged the theory's inability to explain certain phenomenon of learning; namely that connectivism didn't appropriately address the relationship of student-content-teacher, within its conception.

The western world is characterised by social mobility and diversification of life trajectories, where individuals are expected to have multiple career paths and engage in reskilling at various stages throughout their lifespan. All of this signals a need to reconsider our notions of pedagogy so that learners are envisaged as active participants and co-producers of learning resources rather than passive consumers of content. Learning processes are participatory and social, supportive of personal life goals and needs (Brown et al., 2008), something that we sought to address through the implementation of Chaordic Learning Systems as an approach.

Chaordic learning systems: a call for a theoretical understanding of learning in the digital age

The central mechanism of a Community of Practice is the ability to move from the periphery to the core of a community (Lave & Wenger, 1991) through the positions of the peripheral 'newcomer', 'journeyman', and core dwelling 'old-timer' (Wenger, 1998), by Legitimate Peripheral Participation (Lave & Wenger, 1991). Legitimate Peripheral Participation, as termed by Lave (1991), positions learning as a social phenomenon constructed by experiences within their contextual sphere, which allows a newcomer to negotiate their way through, and into, the community.

Whilst movement is a worthy goal of a Community of Practice, power hierarchies and evolution within such structures require certain individuals to become the 'core-dwelling' old timer, through individual agency or not. The work of Ardichvili, Page and Wentling (2003), Fox (2000), Johnson (2001), Kerno (2008), and Squire and Johnson (2000) illuminate such problems. Firstly, the most pressing issue revolves around power relations at the non-vicarious (ecological) level. Lave and Wenger (1991) suggested that earlier conceptions of Communities of Practice did not rigorously deal with how power operates within such communities. Despite continued theorising (Wenger 1998; Wenger, McDermott & Snyder, 2002), Wenger offers little more than an account of knowledge and power, wherein power is still possessed and exercised (Fox, 2000).

This has led to a significant breakdown in relation to newcomers struggling to understand the mechanisms involved with Legitimate Peripheral Participation (Ardichvili, Page & Wentling, 2003; Fox 2000), and a lack of confidence, relative to their group standing, in what they think, feel or cognate. Ardichvili, Page and Wentling (2003) suggest a key constraint of a newcomers integration and engagement as a legitimate member of a Community of Practice is limited for fear of being wrong, irrelevant, or not having earned the right (Roberts, 2006).

Thus, the system still privileges the knowledge old-timers deem valuable, due to their significantly larger agency by virtue of the core and periphery divide - the very situation Communities of Practice seeks to avoid. Power, as it is conceptualized within Communities of Practice, lacks the conceptual rigor to dismantle the hierarchical system of traditional education (Fox, 2000), without plunging the system into complete 'chaos', in the organizational sense of the word. Thus, Communities of Practice through their original conception of the term can only be either hierarchically ordered, despite joint enterprise and mutual engagement, or completely chaotic; lacking in leadership, direction or structure (Kerno, 2008; Roberts, 2006). Because power is handled as an aspect of identity, built in relation to one's position in the community (Wenger, 1998), there is an ambiguity and disingenuous nature to their attempted empowering of those at the periphery (Fox, 2000).

Presenting a chaordic learning system

A Chaordic Learning System, here, is used to signify the abundant *chaos* of the digital world where connections are layered beyond the physical realm and *order* within the parameters of an education structure where the student adopts the role of prosumer (Barr & Tagg, 1995;

Jahnke & Norberg, 2013; Kivunja, 2014). The connected nature of the learning environment (Siemens, 2007; 2008) is an integral part of a Chaordic Learning System and allows a more comprehensive discussion pertaining to power and knowledge in education.

The existence of power relationships in chaotic and complex systems exist at the micro-level (Miller & Page, 2009). Power is transcendent, dynamic and negotiating in its position within a Chaordic Learning System and becomes a relation between partners, at both the individual and collective level. Most notably, the relational role of power is to govern and manage others behaviour by responding to the behaviour of 'others' both in actions that have been done, or might be done in the future. In Van Eijnatten's (2003; 2004) influential work on Chaordic Systems, emergent leadership was highlighted as a similarly flexible concept to that of Foucault's notion of power in that it 'is everywhere' and 'comes from everywhere' so neither has structure or agency (1998, pp. 63). Leadership is not inherited or given to a single individual but is a role that can be acted upon by any number of independent agents. Van Eijnatten notes it as a "complex responsive process" (pp.442) whereby individuals take responsibility in response to certain circumstances.

Chaos determines a lens through which educators can observe an unfolding reality (Thietart & Forgues, 1995) offering an ecological interpretation of the emerging eco-system (learning environment); therefore, affording the perception of agent behaviour (student/other) on a global scale which allows for analysis of collaborative and representative interactions. Rather than chaos and order being two conflicting properties, chaos is seen as a product of an ordered system; and order a product of complex chaotic behaviour. Van Eijnatten (2004), and Van Eijnatten and Putnik (2004) progressively introduced learning organisations within business through a chaordic systems model. In fact, both papers cited explicitly discussed how a chaordic system is a framework to understand human interaction through complex realities (Kira & Eijnatten, 2008). Rather than that of an ill-structured community, Senge (1990, pp. 3) described the role of learning organisations as a structure, process or network, "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together".

The maintenance of both chaos and order (a Chaordic Learning System) is the product of a metastable system that encourages fluctuation and therefore new leadership, power dynamics and knowledge construction are all possible (Miller & Page, 2009). A system poised with a

single state is, therefore, static and does not allow for new realities (knowledge) due to its unresponsive relationship with the environment.

A defining property of a Chaordic Learning System is that of self-organisation; where complex interactions are an instinctive process of any system poised at the edge of chaos. Self-organisation (a theory from the physical sciences and mathematics) suggests complex agents are able to maintain actions towards a state of equilibrium that will maintain the system's stability (Bak, 1996). The human system is acted upon by a large number of constraints (cf. Newell, 1986) where actions, thoughts and behaviours are processed mutually in response to the agent's experiences, affordances and dispositional task. An inherent property of a systems' self-organising capacity is to conform towards the required pattern in order to achieve success - rather, in the digital age - the prosumer will engage with the virtual network in an attempt to localise and aggregate knowledge in a co-adaptive (Sockett & Toffoli, 2012) manner in order to achieve a state of knowing (i.e. collaboration of content, engagement with peers).

Method: invoking a chaordic learning system (environment)

Google+ was used as the main teaching and learning environment, requiring students to engage as active participants and co-producers of the learning resources, rather than passive consumers of content. They were encouraged to find and share relevant resources and use them to debate and explore key questions with their peers; face to face sessions were then designed to respond to, and exploit, the student-generated content. Much of the online activity took place outside of formal timetabled hours.

The project was evaluated via content analysis of the Google+ community artefacts; in-depth interviews with students; and facilitator observations, using theory from Chaordic Learning Systems to guide our thematic exploration. The aim of the study was to explore how the connective, democratic, interactive and constantly accessible qualities of Web 2.0 can be used to engage students in their own learning and contribute to their development as digital citizens within a Chaordic Learning System. A multi-method approach was used to triangulate data from the learner and teacher perspectives; as well as the co-produced artefacts generated during the course (including virtual seminar recordings, twitter feeds, You Tube videos and conference proceedings) which were analysed and combined with data gathered during individual and group-based interviews conducted with a sample of the cohort.

gathered during individual and group-based interviews conducted with a sample of the cohort.

With institutional ethical approval, 12 undergraduate Sport, Coaching and PE students were purposively sampled (Flick, 2009; Patton, 2002) from a cohort that had taken part in the Global and Cultural Studies module over two academic sessions (2013-15). For students to meet the criteria for participation in the study they needed to have taken part in, and passed, the 2nd year undergraduate module and be able to fairly reflect on their experiences on the module as it compared to other study experiences. Students were invited to take part in either focus groups or one-to-one interviews. In total, 12 students joined the focus groups and 8 were individually interviewed (pseudonyms used). The questions for both the group and individual interviews were designed by the research team who are trained in a range of qualitative and quantitative research methods. Mindful of Porst's (2000, cited in Flick, 2011) '10 commandments' of question wording, a pilot interview was designed and administered on a sample of students at the lead author's institution.

Findings

Data were content analysed and coded by the research team using Lichtman's (2005) approach to the 3 C's of data analysis (coding - categorising - conceptualising). To ensure data credibility and being mindful as to not to become prematurely locked into codes that were 'carved in stone' (Henderson, 2006), the researchers independently coded raw data themes (i.e. quotes or paraphrased excerpts signifying an important point or thought) in order to characterize each student's response to their views on experiences of using e-learning tools and being co-producers of knowledge in a Chaordic Learning System. Once raw data responses had been coded, the analysis moved inductively from specific data and raw themes to a lower and higher order categorisation of these data, based on groups of like responses and common themes of generality in order to elicit clear notions of student experiences. The research team reached consensus on the categorization of themes through discussion and revisiting the raw data over a 6-week period (Sparkes, 1998).

Analysis of the semi-structured focus group data resulted in 57 raw data themes (coding) representing the 12 students' articulation of the experiences of taking part in a module. These were organised into 10 lower-order themes (categorising) and, subsequently,

into the following 3 higher-order themes (conceptualising) which form the basis of the discussion pursuant to these data:

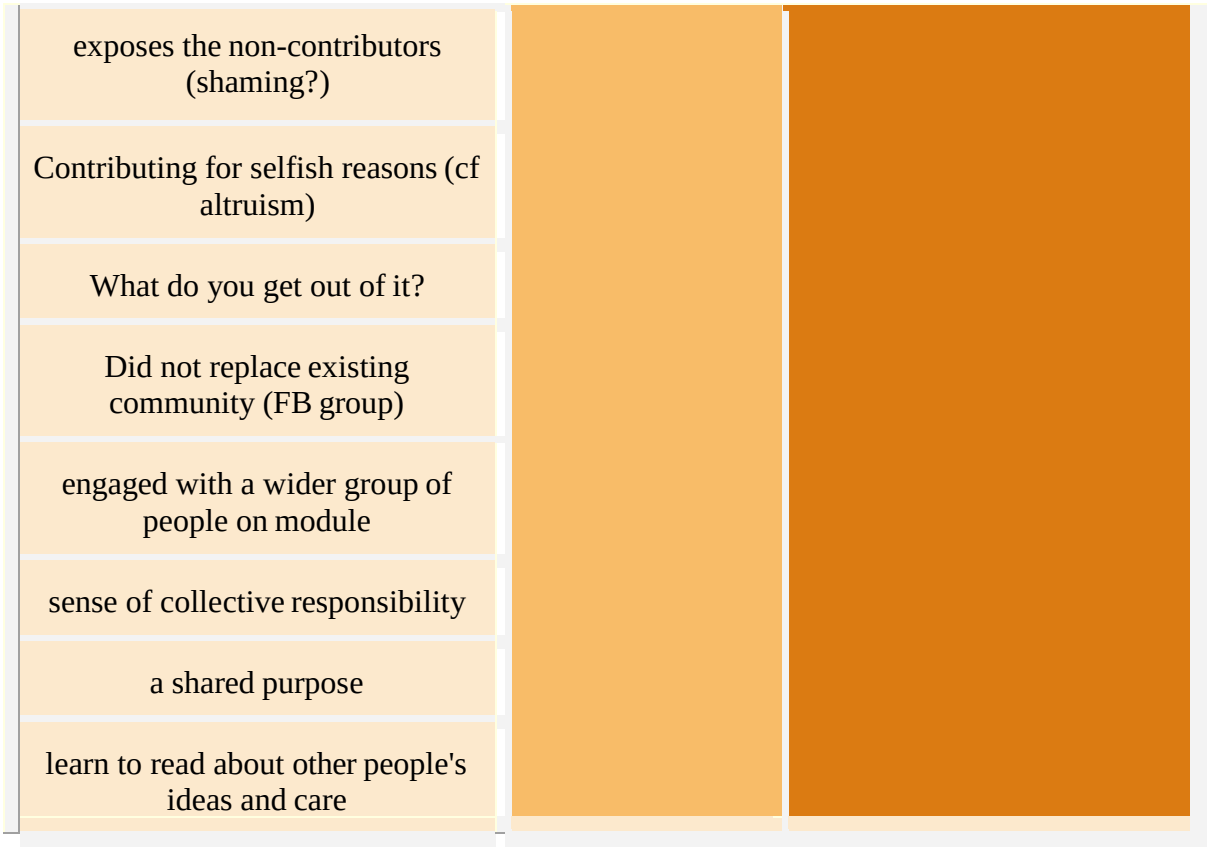
- **The experience of 'un-structure' and the student experience**;
- **Perceptions of the tools and the challenges/benefits**;
- **The emergence of a new type of community / Students as prosumers of knowledge**.

Table 1: Coded data from interviews and virtual artefacts

Raw Data (Emerging Themes)	Lower Order Themes	Higher Order Themes
Giving students freedom to choose	(Un)structure	The experience of 'un-structure' and student experience
Need to see the destination/endpoin		
Space for enjoyment		
Variety		
Initial bewilderment		
Frustration at not getting things done		
Going off tangent feels like a bad thing		
Too much chaos results in disengagement		
Anger	Student Experience (Feelings and Emotion)	
Fear		
Joy		
Excitement		
Brave		

A multimedia resource depository/encyclopaedia	Google + Community	Perceptions of the tools and the challenges/benefits
Images very important		
Looks/feels like Facebook - familiar		
Permanence of posting - exposing?		
People interacting, not talking over each other		
supportive, collaborative		
good way of organising groups		
Bridging networks		
Information sharing		
Lecture becomes more available/accessible	Using Twitter	
Did not like it being public		
felt like an add-on		
don’t use twitter in daily life		
An adventure (but the point at which you choose your assessment stops the adventure)	Engagement in ‘Extra’ Work	
Extra work		
Competition		
Waste of time if it is not your assessment topic		
Work you'll never use again		

Pop up notifications constant, immediate reminder	Bring Your Own Device (BYOD)	
Feels odd using your phone in class		
Makes it possible to engage at different levels - dip in and out		
Someone to pick up momentum	Lecturer Input	The emergence of a new type of community / Students as prosumers of knowledge
Someone who holds the right answer		
Important to explain the teaching approach/philosophy		
Sense that the student owes some kind of duty		
transferable critical skills	Learning Gain	
seeing other people's perspectives		
application of theory		
recognising important of online communication skills		
Not seen as a resource for assessment	Assessment	
perceived non-alignment between activities and assessment		
not valued because not part of assessment		
pockets rather than the whole	Engagement in Community	
a desire to share and help		
sense of belonging to a group		



The experience of unstructure and the student experience

Students were asked to reflect on the structure of the curriculum, thinking about their journey throughout the semester and how it compared to their experiences on other modules;

> I didn’t feel as though it was that messy…I didn’t go 'God, they don't know what they are doing (Rebekkah, p.7)

Some students were very receptive to the idea of flipped classes and allowing the contributions in the online spaces to shape the content of lectures;

> …better than just saying 'this is what we are doing today, and we will stick to this’ (Ben, p.1)

However, some students noted that the freedom of an online space was too chaotic, leading to a sense of bewilderment;

> 'sometimes it was a bit too chaotic…there wasn't really any structure. We couldn't really see where…well we didn't really know where we were going' (Ben, p.1)

> 'it kind of gets, it's more confusing, I guess, because so many topics are being thrown in at once, rather than, say, like every week have a certain area…'(Thomas, p.2)

Several students tried to articulate what structure/scaffolding was needed to support chaos;

> Just that I would like a bit more guidance sometimes, then I think that is probably because of the way we…umm…well the way we are taught to learn (Ben, p.1)

> 'We still want that little bit of structure' (Rebekkah, p.7)

> 'there was sort of a lot going on but it was, we still had the deadlines and things like that, do you know what I mean, we had set times where we knew what you had to do and when' (Thomas, p3)

A noticeable void of the research findings within Web 2.0 pedagogies is the lack of clarity in the role of the teacher/ lecturer/ facilitator (Car-Chellman, Dyer & Breman, 2000; Hase, 2009). The need for a 'content moderator' proved to be a useful conception to most students' perceptions of the learning experience and integral to a Chaordic Learning System to effectively operate.

Students expressed very clearly that the role of the teacher was to pick up the pace and to include the work (in any online discussions) that the students had completed in face to face interactions. As argued by Stuckey and Smith (2004), in order for a Community of Practice to be successful a required characteristic is that of leadership and moderation of the virtual community platform; without this key facilitator, the community may spiral towards failure as the system becomes too stable through disengagement, or decays into unsubstantiated chaos through a lack of direction. Whilst the authors accept that Communities of Practice have played a pivotal role in the organisation of learning communities in certain settings, it is perhaps ill-fitting to the complex nature of engaging in both face-to-face and virtual spaces within the same moment.

Crucial to that though was the need for reflection after the session;

> I guess during it, it all just felt a bit like you were just all over the place and nothing had really gone in, but I think it was after, when you think oh, ok, that makes sense (Ben, p.1)

Several students highlighted that the success of the approach depended on the relevance of the activities to the final assessment. Had they not been able to see the benefits of the discussions and interactions to the final assessment they would have felt resentful;

> I would have been a bit peeved off if it had felt fluffy and nothing to take to my essay' (Adam, p.1)

In the author's conception of a Chaordic Learning System student autonomy is encouraged but within a form of order, to promote behaviour that is deterministic and that aligns with the structure of the module. Originating from Hock (1996), the term Chaord is derived from any self-organising, nonlinear and adaptive dynamical system that is embodied within characteristics of both chaos and order (Van Eijnatten & Putnik, 2004). Due to the nature of its heterogeneous behaviours, the chaos that inevitably unfolds is ordered within the parameters of the system; rather, the behaviour is never completely random and stochastic, but also never completely predictable and linear. Importantly in a Chaordic Learning System, the facilitative role of the educator is to maintain order by way of affording enough agency within the given structure. This may come through the design of assessments, distribution of certain learning materials to guide further study, or to moderate and question user generated content. An example of this is seen in Figure 1, where students were asked to discuss images that were powerful in sport and physical culture online (chaos), but then present them in the seeming safety of the lecture room (structure).

Figure 1: Powerful images conference: ‘being safe inside’

Perceptions of the tools and the challenges/benefits

Students were invited to use a range of different technologies and social media tools throughout the module. When interviewed, they were asked to reflect on the different tools and discuss how they impacted on the learning experience, both as an individual and as part of a community.

Many students did not respond enthusiastically to the use of Twitter. For them, it was a new social media tool and they didn’t see the benefits when compared with other tools that they were familiar with in their everyday lives;

> 'To be honest I have just never been a Twitter person. This is just personal preference. I have just never really understood it because I have always just had Facebook. I understand the concept of it, but I just…it was too much for me' (Rose, p.4)

Figure 2: Tweeting ‘The outside world’

These students were much more willing to engage with Google+, because they were already familiar with Google platforms, already had accounts and liked the fact that it looked like Facebook;

> I just felt it was engaging because it was all connected with everything else and you could post things and share things. It was just really simple (Rose, p.5)

Repeated references were made by students to the strength of Google+ being its capacity to include images. Rebekkah talks about how looking for images helped her to make links between her life and her studies; this was for her an important emotive experience;

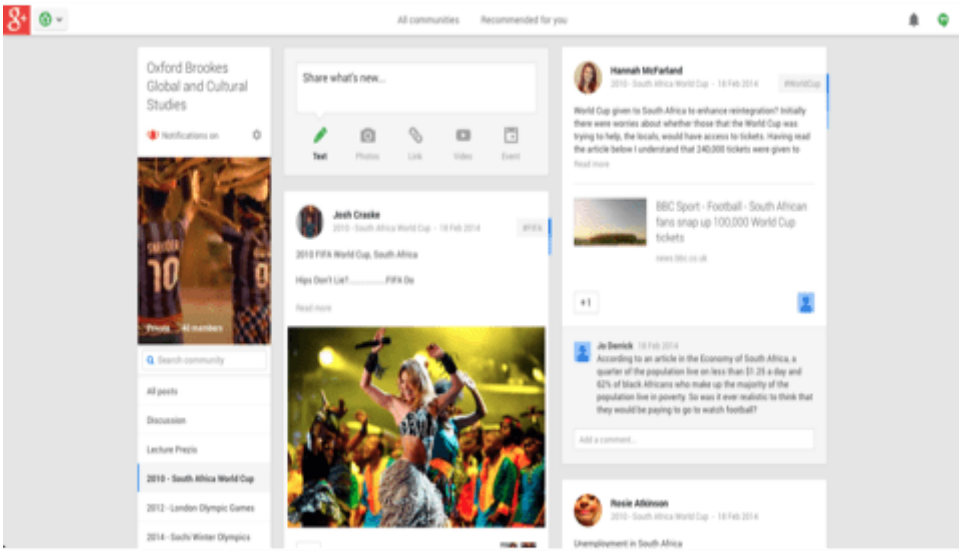
> I wasn’t just finding a picture (Rebekkah, p1)

The fact that tweets are public and permanent meant that it was, for many, an 'unsafe' place to post their opinions. There was also a sense that voices were not connected - it was not an easy platform on which to have a group discussion. Platforms like Twitter generate a greater form of agency, giving fewer opportunities for the moderation of content, and consequently a more open platform. The increased chaos that may derive from open social network platforms appeared to remove the collaborative experiences that had been experienced in the Google+ format.

However, where students had engaged with the tool, they reported thinking about it in a different way. Where before they had seen it as place to share mundane parts of daily life, it now became a forum for engaging with people they never imagined they would; in this sense it brought their learning alive and made them feel more connected as learners;

> 'So, you are not just using tweeting to say, 'I ate some cereal this morning'. Like, I can have conversations, like I have had a chat with Ian Renshaw on Twitter and that is insane…Matthew Said retweeted my tweet yesterday…I hadn't even thought about that; using Twitter for that' (Rebekkah, p.2)

Figure 3: Google+ community



All students concurred they were active and busy throughout the week, not just at allocated timetable slots or study periods. By moving the learning process beyond the classroom, it affords new layers of collaboration and constant engagement with material. The use of social media-based tools encapsulates the creation and consumption of knowledge in a very different way to that of traditional education praxis (Selwyn, 2011b);

> Yeah that's what made it, what hooked me. With the fact that I could be talking about something in a lecture and then I would go outside and be like 'Oh my God, that just happened!'. …And then you start analysing things and people get really bored of you because you, all you talk about is social theory. That was kind of my life! (Rebekkah, p.3)

It was also noted that engagement with a multitude of platforms supported their learning beyond that of the module content and towards becoming digital citizens;

> Developing digital capabilities were expressed in a number of ways...but awareness of the possibility to be misinterpreted online (Rose, p.1)

The removal of formal and prescriptive engagement fosters the emergence of affordances that Higher Education students experience in their everyday lives, leading to a constant engagement with the learning process. Several commented on the fact that reminders and notifications from the apps (Twitter and Google+ in particular) told them when other students were posting and encouraged them to keep engaging throughout the week. The role of the learner is evidently changing (Cochrane, 2014), citizens of the digital age have experienced rapid progressions in technology, placing them at the forefront of digital affordances (Greenhow, Robelia & Hughes, 2009). Yet, education practices continue to be governed by traditional, well-rehearsed and safe methods (Beetham & Sharpe, 2013; Bennet, Maton & Kervin, 2008) that do not encourage the realms of communication and collaboration fostered by young people in the current world.

The more experienced students spoke clearly about the ways their independence in learning developed during their time at university, suggesting that this kind of teaching model needs to be introduced incrementally to students. One student spoke very clearly about the transition from 1st to 3rd year study and how students are not ready to accept that they are co-creators of knowledge until the third year. So, in year one;

> I learn from going to a lecture because lecturers know more than me…You're supposed to be the one with knowledge and I am supposed to absorb the knowledge from you'

In year two, there is a thirst for learning in a more interesting or engaging way,

> …but I am at uni and I am here to learn, and you know more than me so stand at the front and teach me. Oh, but in a nonlinear way please!

In year three, stability is found

> …you are more like, oh, I understand what is going on! (Rebekkah, p.1)

The student's perception of education notably falls in line with the current societal space that Higher Education exists within given that students believe they are paying for a service and

should therefore draw a ‘product’ from this (Olssen & Peters, 2005). The path of the student mirrors the articulation of finding stability in a chaotic system; a journey described by many of the participants, but it is the role of connectivism and producing their own artefacts, within the simultaneous structure of a lecture series, that defines the move beyond distance or blended learning approaches towards that of a Chaordic Learning System.

The emergence of a new type of community/students as ‘prosumers’ of knowledge

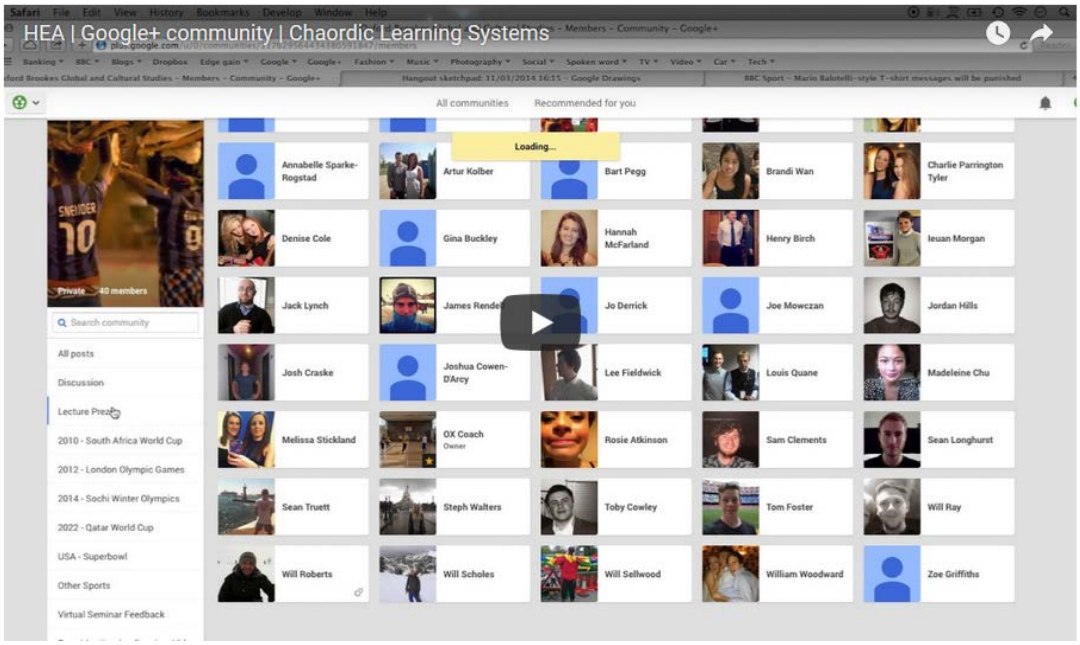
Many students commented that they enjoyed the work they did as part of the module, but there were mixed expressions of the amount and nature of the work students were asked to do (especially the work outside of the classroom);

> It is one of the modules that I can probably say I actually enjoyed doing the work for, it didn’t feel like much of a chore (Thomas, p.1)

> There'd be no point in me trying to do extra work if we don’t really use it… (Ben, p.2)

Figure 4: A student makes their own youtube video and posts to community

Figure 5: The emergence of a "new" community, *the student experience*



Where learners were able to express themselves on multiple mediums it fostered emergent communities working towards similar goals, Google+ was a good space for working with groups and for having discussions;

> …there is no people talking over each other, it's just like you leave a comment then its all there, sort of people are talking and listening to each other like that sort of way, so it's a good way to discuss things' (Thomas, p.4)

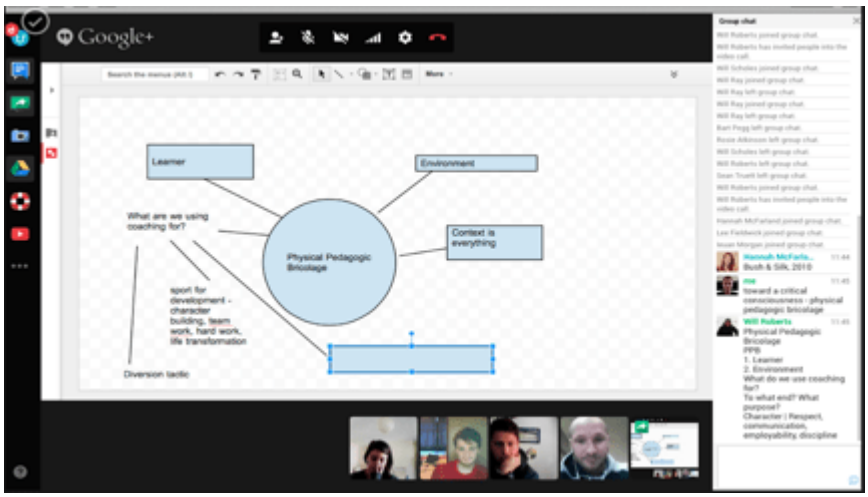
Whilst the digital platform acted as a space within which to foster discussion, the contribution to these platforms remained a collective responsibility, student perceptions of this were positive;

> if there was no input from us..., everyone was kind of sat there, waiting for Will to talk and nothing came from it because people were sat there… It needs to be invested in by us (Ben, p.3)

Barr and Tagg (1995) called for a shift of the role of the learner from information consumer, to learner as knowledge constructor for which the term ‘prosumer’ has been adopted. Within the digital sphere this conception becomes highly attractive to theorists as the 'prosumer' is the coupling of the learner as the producer of content and knowledge, whilst also assuming the role of consumer of knowledge.

There is a clear collective responsibility fostered across the learning community. Each learner became responsible not just on an individual level, but as a collective of individuals with shared interests. Within complex systems, behaviour is directed towards aggregated goals, much like schools of fish or flocks of birds. Each agent in the system can be defined as a holon, present in a multi-agent system where each individual aggregates towards numerous holonic sub-systems. Each holon has a pre-defined structure and identity, but collaborates towards a higher order system (Fischer et al., 2003). For a holon to maintain itself, and for an effective system, it is crucial for chaos and order to co-exist to create determinant behaviour where a collection of holons will contribute towards the same goal (Fischer, 1999). Dynamic systems (humans) can therefore only thrive autonomously through rich connectivity and collaboration, maintained by structured and ordered organisation that allows for enough free exploration, collaboration and engagement of the learning process (Giret & Botti, 2004; van Eijnatten, 2001).

Figure 6: Google Hangout



Conclusion

As argued in this article, in order for self-regulated learning to come to fruition, students need not only to be able to choose and personalise what tools and content are available, but also to have access to the necessary scaffolding to support their learning. We have outlined three concepts, which were evident from the data; that of

- **The experience of 'un-structure' and the student experience**;
- **Perceptions of the tools and the challenges/benefits**;
- **The emergence of a new type of community/Students as prosumers of knowledge**.

These new communities, where students are determined as both producers and consumers of knowledge are based on connectivity and collaboration. Importantly, there is still a need for a facilitator, or knowledgeable other, in this environment to facilitate the journey that the 'others' in the system (students in this case) are likely to encounter. Connectivity, where learning consists of connected 'nodes' is essential to the collaboration and expansion of knowledge, with learning occurring both within and beyond the singular mind accounting for the connected and virtual digital space that is more prevalent in Higher Education today. Importantly, we argue that knowledge is not propositional, as the socially constructed space that it emerges from is key, given the connected learning environment we espouse as a way forward in Higher Education. We recognise that whilst this was an experimental learning design, it does have merit for further investigation in each of the three concepts that arose from the project. What is clear, though, is that a more collaborative and connected approach to pedagogy in the digital age is required, one that harnesses the yet-to-be imagined and potentially limitless connective power ahead of us and it is our burgeoning networked society that will form the vehicle of collaboration; the mechanism through which the authors imagine a society that is founded upon values of collaboration, togetherness, moral citizenship, critical pedagogy and shared knowledges.

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