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Differences in Understandings of Networked Learning Theory – Connectivity or Collaboration?

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Abstract

In this chapter we pursue and discuss a number of pertinent questions raised in a recently published book on Networked Learning Practices. In this book the editors contrast a current trend towards personalisation and individualisation of learning with a focus on mutual interdependency and collaboration amongst networked learners, and ask which directions designers of Networked Learning should take. Related to this, they express concerns with notions of Personal Learning Environments, asking whether these might erode collaborative or communal patterns of interaction and the commonality of experiences among students. We continue these discussions by critically examining recent ideas articulated by researchers promoting the notion of 'connectivism', as this concept has strong relations to the recent popularisation of web 2.0. Terms such as 'connections', 'networks', 'sharing', learner-centric', 'collaboration', 'participation' seem to be shared between Networked Learning theory and connectivism. We argue, however, that there are subtle, but fundamental differences in how these terms are understood, which might have implications for pedagogical orchestrations of networked learning. In particular, we query into different understandings and values around the 'interactional interdependencies' between people, and how we should orchestrate networked learning in Higher Education. In doing so, we provide examples from our own practice to discuss how we might address or dissolve dichotomies, such as between individualisation and collaboration, and how ideas from networked learning and connectivism can inform each other.

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Introduction

With the popularisation of web 2.0 practices and technologies, we have also witnessed a re-vitalisation or renaissance of terms such as collaboration, sharing, dialogue, participation, student centred learning, and the need to position students as producers, rather than consumers of knowledge. These are, however, pedagogical ideals, which have been prominent within research areas such as Networked Learning, CSCL and CMC-research well before the emergence of web 2.0. They even pre-date the Internet and World Wide Web (Jones & Dirckinck-Holmfeld 2009). This dialogical, collaborative perspective, which Weller (2007) characterises as the 'discussion view', has existed and thrived. However, it seems fair to say that the mainstream and institutional uptake of learning technologies has been primarily oriented towards the 'broadcast view, defined by (Weller 2007) as delivering content or resources globally, flexibly and on demand to the individual users.

While many of the pedagogical ideals often associated with web 2.0 may not be entirely new, the mainstream adoption of services such as Facebook, Flickr, and YouTube seems to have created a stronger platform for ideas such as collaboration, sharing and 'user generated content'. In relation to these trends the notion of connectivism has been presented as 'a learning theory for the 21st century', and has been closely linked with the recent technological changes – in particular the pervasiveness of various 'networked technologies' such as email, the web, and more recently, social networking, blogs, RSS and various mechanisms for aggregating and filtering information:

> "Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes, should be reflective of underlying social environments" (Siemens (2005), Introduction section, para 1)

The notion of connectivism has been most vividly explored by George Siemens and Stephen Downes, and the authors make some references to the broader heading of networked learning. In an online paper titled 'A Brief History of Networked Learning' Siemens (2008) makes references to research projects at Lancaster University and the thesis by de Laat (2006). However, there does not seem to be strong awareness of or references to the understanding of networked learning as it is discussed and developed in the (mainly) European community of networked learning research. There seems to be shared interests among the two perspectives

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in concepts such as 'networks', 'connections', social learning and learner-centred pedagogies, but also some differences, which are worth exploring.

While learner-centeredness, social learning, participation and collaboration seem to have become the rhetorical mainstay of web 2.0 pedagogy, we argue there are significantly different interpretations of these terms, and the pedagogies and practices emerging from these diverse understandings. This becomes particularly visible when investigating different conceptual frameworks, such as networked learning, connectivism or more collaboratively oriented pedagogies and theories. In this paper we therefore critically discuss and analyse concepts such as networked learning and connectivism. Equally, we briefly present ideas on personal learning environments (PLEs) as a means to identify some broader educational questions, which we believe are important within Networked Learning research. We draw out some seemingly contradictory concepts, such as personalisation and collaboration, while also providing examples from our own Networked Learning practices to discuss how we might address or dissolve such dichotomies, and how ideas from networked learning and connectivism can inform each other.

Networked learning and different understandings of collaboration

In relation to the acclaimed web 2.0 wave of pedagogical transformation there seems to be a slight tendency of overemphasising technological developments as the reason, or vehicle, for pedagogical change. In relation to this we should like to raise the point that we must be careful in ascribing too much power to perceived inert affordances of particular technologies, and focus equally on how the technologies are enacted or taken into use by practitioners (Jones et al. 2006; Suthers 2006). We are convinced that networked learning theory has much to offer to these ongoing discussions, and in the following we take our point of departure in one of the definitions that has become central within the networked learning community:

> "Networked learning is learning in which information and communications (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources." (Goodyear et al. 2004, p.2)

Historically, this definition grew out of a series of projects during the late 1990s and an ESRC Research Seminar Series on the implications of the use of

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networked learning in higher education (Beaty et al. 2010). The seminar series resulted in a manifesto titled 'Towards E-Quality in Networked E-Learning in Higher Education' which was presented at the Networked Learning conference 2002 by the 'E-Quality Network'. As noted by Jones & Dirkcinck-Holmfeld (2009) this definition has proved itself to be remarkably robust over the last 10 years, and has developed considerable force especially within European research where it has been developed through a number of publications, and has been associated with the Networked Learning Conference series since 1998 (Jones & Dirckinck-Holmfeld 2009; Goodyear et al. 2004).

Firstly, this definition of networked learning goes beyond merely denoting 'online learning' or 'e-learning', as it encompasses theoretical assumptions about learning and how to design for learning. The definition stresses the connections *between* people and *between* people and resources, but also points to a certain level of social organisation between learners, tutors and resources i.e. a learning community. However, the notion of a learning community and the strength of the ties or connections between people can differ in various interpretations. Some have criticised notions such as communities of practice (CoP) (Wenger 1998) and the strong focus on 'collaborative learning' within the area of CSCL. They have voiced a concern that these perspectives focus too much on networks composed of strong ties, thus overlooking the value of weak ties between learners (Jones et al. 2006; Jones et al. 2008; Ryberg & Larsen 2008). Simultaneously, proponents of networked learning also argue for learning and collaborative knowledge construction processes organised around focused and intensive negotiations of problems (McConnell 2002; Zenios 2011). Although there are particular values and ideals associated with networked learning, as expressed in the networked learning manifesto (Beaty et al. 2002; Beaty et al. 2010), it does not privilege a particular pedagogical model or ideal in terms of uniformly favouring collaboration or unity of purpose in a community of learners (Jones et al. 2008). However, the ideas of relations and connections suggest that learning is not confined to the individual mind or the individual learner. Rather, learning and knowledge construction is located in the connections and interactions between learners, teachers and resources, and seen as emerging from critical dialogues and enquiries. As such, networked learning theory seems to encompass an understanding of learning as a social, relational phenomenon, and a view of knowledge and identity as constructed through interaction and dialogue. Furthermore, as argued by Jones (2008) this aligns well with social practice, socio-cultural or social learning theories that also situate and analyse learning as located in social practice and interaction, rather than as a phenomenon of the individual mind. In addition, prevalent ideas within (some) interpretations of networked learning are associated with more radical pedagogies, where

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critical reflexivity and dialogue are emphasised as a means to help learners 'recognize, critique and move beyond one's taken-for-granted assumptions – about the world, and about one's professional practice and learning' (Goodyear et al. 2004, p.2). This particular view is also associated with educational values of supporting democratic processes, diversity, inclusion and E-Quality drawing on both Paulo Freire's Critical Pedagogy and social constructionists notions of relational dialogue (Beaty et al. 2010).

In relation to the discussions of types of connections (weak or strong) and modes of interaction, such as collaboration or cooperation (which can be said to be strongly tied or more weakly tied respectively), we find the distinction made by McConnell (2002) useful. Building on the work of Roschelle & Teasley (1995) McConnell distinguishes between distributed *collaborative* and *cooperative* learning. Roughly speaking this refers to whether the work on the task or problem and the outcome is shared (collaborative) or whether individuals engage in discussions with others about their reflections on individual assignments (cooperation). This distinction is also similar to what Suthers (2006) refers to as intersubjective vs. individual epistemologies. We believe there are essential aspects in these distinctions, which can be important to reflect upon. In a recently published book on networked learning (Dirckinck-Holmfeld et al. 2009) Jones & Dirckinck-Holmfeld (2009) discuss the ideas and tensions between strongly-tied collaborations vs. more loosely tied cooperative modes of learning (a question also taken up earlier in (Jones et al. 2006)). They ask whether the internet and broader sociological trends have resulted in a social shift from more cohesive, communal relations towards more dispersed, personalized relations. This they associate with the notion of networked individualism coined by Wellman (2001) and explored by Castells (2001) and they pose the questions:

> "Networked individualism might suggest that we need to take a more critical approach to the theories of education and learning that are based on community and collaboration. The term also suggests that we can do this without ruling out the central place of communication and dialogue in education and learning. […] We argue that a key question for research is whether the Internet will help foster more densely knit communities or alternatively whether it will encourage more sparse, loose knit formations. [...] a significant question is whether designs for networked learning environments should reflect the trend towards networked individualism or serve as a counter balance to this trend, offering opportunities for the development of collaborative dependencies." (Jones & Dirckinck-Holmfeld 2009, pp.6-7)

While we do not view the sociological notion of networked individualism as necessarily opposed to the development of collaborative dependencies within education, we do view an increasing interest in 'personalised learning', personal

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learning environments or networks (PLE & PLN) as a challenge to more collaborative organisations of learning (though we also find that these ideas hold developmental potential and can act as a window of opportunity). This concern, we believe, is equally voiced in Beaty et al's (2010) recent discussions of the networked learning manifesto where they re-iterate the importance of maintaining a focus on E-Quality and explicit educational values:

> "We claim that an updated definition of networked learning should not only refer to being a pedagogy based on connectivity and the co-production of knowledge but also one that aspires to support e-quality of opportunity and include reference to the importance of relational dialogue and critical reflexivity in all of this. Following on from the definition of networked learning we reaffirm the point made in the original Manifesto that policy for networked learning should be based on explicit educational values and research" (Beaty et al. 2010, p.585)

We do not mean to argue that 'personalised learning' or personal learning environments necessarily preclude E-Quality, collaboration, or critical reflexive and relational dialogue. However, we feel it is important to discuss some reservations initially voiced by Weller (2007) and reiterated by Dirckinck-Holmfeld and Jones (2009). They argue that there might be four downsides to Personal Learning Environments:

- Commonality of experience. PLEs may threaten or loosen the shared experience of studying a course.
- Exposure to different approaches. The educational gain of broadening a local and personal experience may be lost. PLEs may encourage a narrow private view that is resistant to change and encourage a 'customer' focus that relies on consumer choice of a educational goods [sic] that are often not appreciated until after the educational experience has taken place.
- Privacy. Personalisation requires the collection of user data and raises serious concerns in terms of privacy and surveillance. It may also have unintended consequences as once it is known that a system is monitored, user behaviour will adapt to the perceived requirements of the monitoring.
- Content focus. The drive behind PLEs is one that emphasises delivery of personalised content at the expense of communication with others (Dirckinck-Holmfeld & Jones 2009, pp.264-265)

While some interpretations of PLEs do seem to be exclusively focused on retrieval of personalised content e.g. through semantic technologies, one can also argue for PLEs as a means to engage in mutual enquiry, reflexive dialogue and self-governed, problem-based and collaborative activities (Dalsgaard 2006).

However, inspired by Dirckinck-Holmfeld & Jones (2009) and Beaty et al. (2010) we wish to raise question such as: will learners' (potentially) highly individualized orchestrations of their learning itinerary (or trajectory) across institu-

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tional boundaries erode commonality of experiences? Does it lead to a 'consumer'-view of education? And how may such orchestrations of education impact educational values such as E-Quality, inclusion, critical reflexivity and relational dialogue? Our point is not to argue that certain technological tools or orchestrations will uniformly shape the educational use. This is equally shaped by the underlying theoretical perspective and values with which we approach the pedagogical and socio-technical design of networked learning – in particular how we view and design for the relational interdependencies between learners. Following Beaty et al. (2010), who refer to the 'Online Hot Seat Seminar' on connectivism hosted by George Siemens and Stephen Downes as pre-events for the Networked Learning Conference 2010, we feel that connectivist principles and views of networked learning have something to offer for our current conceptualisations of learning. However, we should also like to explore more critically the notion of connectivism in relation to the notions of networked learning presented above.

Connectivism and Networked Learning

In many ways connectivism seems to align well with networked learning theory, and also challenge ideas around collaboration and tightly knitted communities. The notion of connectivism (Siemens 2005; Siemens 2006) has attracted some attention in recent years. As noted by Kop and Hill (2008) it lives a particularly vibrant and dynamic life in the blogosphere around the blogs-spaces and online publications of especially George Siemens (http://elearnspace.org/ & http://connectivism.ca) and Stephen Downes (http://www.downes.ca) But also it is a (seemingly) dynamic object of enquiry and one of the main topics in the open online course "Personal Learning Environments, Networks and Knowledge" (http://ple.elg.ca/course/moodle/course/view.php?id=3) hosted and organised by Siemens and Downes – and with more than 1800 "participants". The Massive Open Online Course (MOOC) is/was according to Mackness, et al, (2010, p.266) (who participated in the course in 2008) 'a course and a network about the emergent practices and the theory of Connectivism'. Thus, the course is based on the principles and practices of connectivism, which is also (partly) the topic or underlying theoretical perspective of the 'learning event' or 'un-course'.

The reason for mentioning these aspects is that connectivism, in many ways, seems to live and thrive mainly in the outskirts or outside of traditional academic publication and dissemination channels. For one thing, this means that many of the

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papers on connectivism are not peer-reviewed and published in journals, but are disseminated through the webspaces mentioned. Secondly, the underlying view of knowledge and learning in connectivism does to some extent question or render problematic the discussion of such ideas in more traditional academic outlets: Should one engage in the ongoing, (seemingly) dynamic and volatile conversations in the blogosphere, rather than a monological book chapter? We mention this to acknowledge the fact that the proponents of connectivism also seem to be challenging traditional scholarship and urge the scientific community to think about how knowledge is disseminated and shared. Having said that, we also feel that there is great value and continued need for the admittedly more slow-moving critical dissemination and reflection of academic knowledge represented by the traditional academic outlets. For one thing, peer-review processes force authors to take into account any criticism raised by the reviewers, while authors of blogs may choose not to do so. Secondly, peer-review processes should, in principle, ensure that the reviewers hold expert knowledge within the research area, whereas comments on blogs may be of a more diverse nature. In the following we offer a more critical discussion of 'connectivism'.

Connectivism – a new learning theory?

The argument proposed by Siemens (2005; 2006) is that existing theories or paradigms of learning (behaviourism, cognitivism and constructivism) cannot sufficiently explain or account for the fundamentally changed conditions for learning brought about by the changes in the technological landscape e.g. the abundance of information, the increasingly shorter half-life of knowledge, and the need to continuously stay updated with the newest information and resources. Furthermore many information processing tasks can be delegated to technology (or social filtering through networks at different levels of scale). Siemens (2005; 2006) argue that learning rests in the capabilities of forming connections to other people, networks and sources of information and that the capacity to recognize or create useful information patterns are crucial:

> "The starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual [sic]. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed. (Siemens 2005, Connectivism section, para 7)

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Although, this seems to be very similar to some of the ideas expressed in networked learning theory, it also seems to have a much stronger focus on the individual, and the individual's capacity to sift through, filter, find and utilize various networks to retrieve resources and ideas. These can then enhance the individuals' capacity, and thus the whole network's, in a circular process focusing on and returning to (cognitive, neural) operations of the individual. In this sense other persons (who are in themselves personal networks) and networks at different levels of scale seem to become instruments or hubs through which the individual can retrieve updated resources. In our interpretation, it seems that the most fundamental relations are those between an individual and a resource or idea, possibly acquired and filtered through a complex socio-technical network that itself seems to be imbued with a form of (somewhat unexplained or unexplored) agency.

> "Currency of knowledge is the function of a network, and raising the value of skills of network-making. The network becomes a separate cognitive element—it processes, filters, evaluates, and validates new information. If content has a short lifespan (as new information is acquired), then it would logically imply that our education and training systems should not be about content in particular—they should specifically be about current content." (Siemens 2006, p.10)

> "In a connectivist approach to learning, we create networks of knowledge to assist in replacing outdated content with current content. We off-load many cognitive capabilities onto the network, so that our focus as learners shifts from processing to pattern recognition. When we off-load the processing elements of cognition, we are able to think, reason, and function at a higher level (or navigate more complex knowledge spaces)." (Ibid, p.11)

For one thing, we find it problematic that knowledge is equated with content, albeit this is updated or dynamic content. Although, Siemens argue that knowledge and thinking reside outside the head, it does seem to be a very different perspective when compared to social or socio-cultural theories of learning, also because Siemens relate patterns in external networks with neural networks, thus making a reference to neuroscience.

> "Learning is the process of creating networks (see Figure 2) [Authors: see original for the figure]. Nodes are external entities which we can use to form a network. Or nodes may be people, organizations, libraries, web sites, books, journals, databases, or any other source of information. The act of learning (things become a bit tricky here) is one of creating an *external network* of nodes—where we connect and form information and knowledge sources. The learning that happens in our heads is an *internal network (neural)*. Learning networks can then be perceived as structures that we create in order to stay current and continually acquire experience, create, and connect new knowledge (external). And learning networks can be perceived as structures that exist within our minds (internal) in connecting and creating patterns of understanding." (Siemens 2006)

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Even though the filtering mechanisms are moved outside the individual's head, it is not entirely clear to us, whether this represents a re-location of a basic 'cognitivist information processing' metaphor dispersed into a socio-technical network, or a basic 'constructivist perspective' where the notion of e.g. schema is replaced with the metaphor of a network. Also, we are fundamentally concerned with the somewhat unproblematic way in which internal and external network are equated, and we wonder what the relations are between the two 'realms' or if they are the same (without wanting to re-iterate complex discussions around dualism)? We wonder whether the relations or comparisons are meant metaphorically or a as a more 'realist notion' (that they do functionally compare and interact)? Following from this we would ask whether it is fruitful (in either sense) to equate basic neuronal transmission or 'the connecting' of electrical impulses with the insanely complex landscape of bodies, tables, computers, laws, regulations and the huge number of social and physical artefacts that mediate our engagement with the 'world' and others? We wonder whether the metaphor or concept clouds more complex socio-technical and socio-cultural relations that interact with and mediate how knowledge is produced, and regulate our access to and relations with books, journals, web sites and the whole (socio-technical) network where the knowledge content flows and is produced? In relation to this, Siemens (2006) notes that:

> "Additionally, it is important to acknowledge that learning is much more than exposure to content. Social, community, and collaborative approaches to learning are important." (Siemens, 2006)

However, we wonder whether notions such as 'a network becomes a separate (self-organising?) cognitive element' and a strong focus on the flow of (updated) knowledge content renders invisible the processes by which these objects are produced, say through dialogues, negotiation of meaning, regulations, social practices and physical, bodily interaction with digital and analogue resources? And what becomes of notions such as power, voice, access and inclusion? We remain uncertain of whether concepts such as 'communities', 'negotiation of meaning', 'dialogues' 'groups', 'social practice' and 'collaboration' have a more significant role in the notion of 'connectivism', or whether they are considered temporary, fleeting, analytically less important hubs or stations in a self-organising knowledge flow of an autonomous network? Likewise, we remain uncertain of the fundamental epistemology of connectivism, and we are unsure of where it is located in terms of other existing theories. We are not sure whether connectivism, as argued by Siemens (2005; 2006), constitute an entirely new view of relations between world and learner, and ask whether it might fall within or between existing perspectives. This can be fruitfully discussed by highlighting distinctions made be-

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tween a socio-cultural and socio-constructivist perspective (Dillenbourg et al. 1996). Whereas the socio-constructivist approach understands groups (or collaboration) as consisting of individual and relatively independent cognitive systems, which exchange messages through social interaction, the socio-cultural perspective suggests that groups or collaboration can be understood as a single cognitive system with its own properties. Thus, in a socio-constructivist view (primarily inspired by Piaget) individual cognition is strengthened, matured or catalysed by social interaction, but the cognitive development remains tied to the mental operations of the individual, and has its own logic relative to the existing mental apparatus of the individual. In a socio-cultural view (inspired by Vygotsky) the focus is on social practice, artefacts and how individual cognition and cognitive structures are seen as formed by/forming the social, cultural world. These are also what Suthers (2006) refer to as individual epistemologies vs. intersubjective epistemologies.

In our understanding of Siemens' ideas it seems that the individual nodes in the network grow by their 'own logic' (aka their unique social network or constellation of connections), thus acting as relatively independent nodes, which however affect others and the network as a whole (that appears to be an independent cognitive unit). However, we are uncertain whether this indeed represents a novel approach or is an extension of e.g. a socio-constructivist approach or individualist epistemology with a different vocabulary, and with some additional terms and thinking adopted from the field of 'distributed cognition' (Hutchins 1995). It is not clear to us, what is the role of dialogues, collaboration, social practice or mutual construction of knowledge or how well connectivism can account for (or is interested in) such patterns of learning. It seems to be a more individualized or personalized perspective on learning than e.g. networked learning theory. Although there are many authors who challenge notions of strongly tied communities, concepts such as communication, dialogue and mutual construction of knowledge seem to be more central within networked learning theory. This difference is also reflected in online postings where Siemens expresses a discomfort with the term 'collective intelligence', and argues instead for the term 'connective intelligence':

> "For reasons of motivation, self-confidence, and satisfaction, it is critical that we can retain ourselves and our ideas in our collaboration with others. Connective intelligences permits this. Collective intelligence results in an over-writing of individual identity" (Siemens (2008), Collective Intelligence? Nah. Connective Intelligence section, para 3)

As discussed by Mackness et al. (2010) connectivism seems to emphasise and value the autonomy of the learners and cooperative (networked) interdependencies over more strongly tied, collaborative dependencies, such as groups (which

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Downes (2007) argue are exclusionary vehicles that foster conformity and rule out diversity (potentially resulting in walled-in echo-chambers).

> "It has been suggested by Downes and Siemens that the whole idea of an educational course needs to be reconceived (Siemens, 2009b) from the traditional, closed group, highly structured course, where students are dependent on tutors, to open networks of self-directed learners. […] Downes (2007a, 2008, 2009b) has suggested that the key characteristics of an online course using connectivist principles are autonomy, diversity, openness, and connectedness and interactivity. 'Autonomy' allows learners maximum choice of where, when, how, with whom and even what to learn. 'Diversity' ensures that learners are from a sufficiently diverse population to avoid group-think and 'echo-chambers' (McRae, 2006)." (Mackness et al. 2010, p.267)

In this sense, the notion of 'learner-centeredness' seems to become strongly equated with individual freedom or autonomy over any form of organisation or dependency between learners. We do agree that highly structured courses, where cohorts of students are herded through a predefined set of learning goals and materials provided only by teachers and tutors can be problematic. We also agree that group-thinking and echo-chambers can potentially produce alienation and exclusion (Ferreday & Hodgson 2008). However, we think that the relatively radical individualist focus might be in danger of overlooking positive aspects of collaborative or communal learning processes, and we do not agree that such orchestrations of learning necessarily preclude learner autonomy or diversity. In the following we shall discuss this through illustrating our own orchestrations and continued development of learning practices at Aalborg University. We do not mean to go into details about any particular setups, systems or courses; rather we try to describe the pathways and lines of thinking we are pursuing and developing.

The Aalborg PBL model – Our Networked Learning Practice

The foundational pedagogy of Aalborg University (AAU) is a project based, problem oriented approach at times referred to as the Aalborg PBL-model (Kolmos et al. 2004) or problem-oriented project pedagogy (POPP) (Dirckinck-Holmfeld 2002). It represents a strongly tied, collaborative organisation of learning, where students are mutually dependent on each other, throughout a whole semester; but also represents a high degree of learner freedom. The problem-oriented project pedagogy was the institutional pedagogical foundation for establishing Aalborg University (1974) and Roskilde University Center (1972) in Denmark. In the late eighties it also became the basis for open online education programs and research within online learning (see also other chapters in this book).

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At that time the approach represented a radical pedagogical turn where the focus shifted from a model based on delivery of information and knowledge towards a more critical, experientially based pedagogy. The approach emphasises learning as knowledge construction, collaboration in groups and problem-orientation (Dirckinck-Holmfeld 2002). The main pedagogical principles revolve around problem-orientation, project work, inter-disciplinarity, and participant controlled learning. The entire learning process is formed around the students' own enquiry into scientific and social problems. Thus, the model emphasises learner freedom and participant control when it comes to defining and working with their problem. However, as students are dependent on each other in their project groups and projects are produced throughout each semester, students cannot individually follow their own pace. To understand and find a solution to the problem, the students go through different stages of systematic investigations: preliminary enquiries, problem formulation, theoretical and methodological considerations, investigations, experimentation and reflection (Dirckinck-Holmfeld 2002). In Aalborg University each semester is therefore organized around approximately 50% course work and 50% project work in groups, where students collaborate on writing their semester project. The students work closely together for an extended period of time (4 months), on formulating, identifying and 'solving' their problem, and write a final project report. A continued research effort has been to identify ways in which to support and develop this pedagogical model (for on-campus, as well as for off-campus students) through experimenting with various technologies, learning environments and tools. There has been a strong focus on how to support groups in virtual environments, by providing them with e.g. shared file spaces, calendars and other tools to support coordination and collaboration. This has drawn specifically on CSCL and CSCW (Computer Supported Cooperative Work) research (Tolsby et al. 2002; Tolsby 2009; Dirckinck-Holmfeld 2002). In these efforts, we have also been inspired and challenged by the notion(s) of networked learning. In particular, we have been inspired by notions of strong and weak ties in learning, the growing educational interest in web 2.0 (e.g. social networks and personal learning environments), but also ideas expressed in a 'connectivist' approach (Ryberg & Larsen 2008; Ryberg et al. 2010). These lines of thinking have particularly raised our awareness about interaction *between* groups, *between* students (and researchers) on the same or across semesters, as well as connections *between* educational programme and the wider world of resources and researchers.

We are affiliated with one of the most student-rich on-campus programmes at Aalborg University (Humanistic Informatics) which recently raised the uptake of students from 90 to 200 students pr. semester. The doubling has to some degree

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lessened their experience of interactions with, and knowledge of, 'the other' students. Although lectures/workshops and seminars are sometimes organised in 'groups' of 30-40 students, teachers and supervisors (particularly those dealing with 1-2 semesters students) were worried that students would only meet each other and their teachers, in either the tightly knitted project groups of 3-5 students, during traditional lectures or in the learning management system (used mainly for announcements, course descriptions and slides). From a pedagogical perspective our concern was (and remains) that the underlying AAU values of active, critical, dialogical and participant controlled learning become associated almost exclusively with the project work, and where the other half of the students' time and work load will take place in physical and virtual spaces tailored for mass-customised education and management. In addition, we have concerns whether this also affects students' 'commonality of experience' and their development of a professional identity or their ongoing processes of 'becoming' various types of practitioners of 'Humanistic Informatics'.

We have therefore become increasingly interested in exploring and designing learning environments that are not only aimed at mutually, dependent collaboration in tighly-knitted groups, but also tools and environments that seek to leverage the interaction and transparency *between* groups (Ryberg et al. 2010; Dalsgaard & Paulsen 2009). Likewise, we are pursuing and experimenting with technologies which can (potentially) leverage and support emerging types of large-scale interactions. We have so far been experimenting with the open source systems Elgg and Mahara (which are personal learning environments or e-portfolio systems) in combination with other tools. These experiments go beyond small-group interactions and instead attempt to harness the values of larger, diffuse groups (e.g. wiki-writing, twitter-streams, online bookmark-sharing, collective note-taking). In relation to this, we find the ideas and distinctions proposed by Dron & Anderson (2007) valuable. They suggest that we can distinguish between three levels of social aggregations which they term: the group, the network and the collective (Dron & Anderson 2007) – these can, from a network perspective, all be characterised as 'networks' although differently tied and at variable levels of scale. Groups are more tightly knit social constellations and often mutually engaged in working with a common problem, project or task (such as a project group at AAU). Networks entails more fleeting membership structures and boundaries, are emergent rather than designed, and do not necessarily revolve around a particular task. Finally, the collective has an even looser and more emergent structure with no sense of conscious membership or belonging. Collectives are aggregations of individuals' uncoordinated actions from which e.g. tag-clouds, recommendation systems or page-

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ranking systems emerge. In particular, web 2.0 technologies have amplified and rendered the latter two levels of social aggregation visible. We agree with Dalsgaard (2006) who argues that students' (self-chosen and managed) personal tools can support interaction across these different levels of social aggregation. In this way, we would argue for designs and research which aim to combine or bridge these different social architectures, rather than seeing them as oppositions, dichotomies or internally contradictory. A focus on collaborative work does not preclude a simultaneous focus on facilitating the individual student's gradual development of a personalised (and shared) set of bookmarks or references (e.g. on delicious.com or diigo.com). Their creation of personalised social networks which may include researchers, other students and friends from inside or outside the institution could become valuable resources for other students in their group/semester cohort.

In this way we aim to offer students personal tools for construction, presentation, reflection and collaboration, while also facilitating the sharing and exchange of various resources across different levels of social aggregation (the group, the network and the collective). Thus we want to place the individual learner in the centre, by enabling them to create and maintain a personal presence, so that students, over time, may develop a stronger sense of a professional identity as a student of humanistic informatics – not only through participation in project groups, but rather through engaging in a variety of settings (inside and outside of the university) and across different levels of social aggregation. Therefore, an aim is to support the individual students' creation of personal learning trajectories, where they can connect to communities, networks and resources of their own interest, while simultaneously belonging to smaller project groups and communities (such as a semester) as places to make sense of the diversity of experiences and resources.

We feel that connectivist principles and lines of thinking are valuable additions to our existing organisations of learning, but we would equally argue that there are some values in more collaborative orchestrations of learning, which we should retain. Connectivism provides an interesting and fresh view on how knowledge artefacts flow in complex social or personalised networks – particularly at levels of aggregation outside the exclusive control of the individual (the collective), and in the intersections between multiple contexts. This is a relatively uncharted area, as many studies within CSCL and Networked Learning concern e.g. a particular course or a relatively well defined network of participants. In this sense the notion of connectivism highlight the value of weak ties, which is also increasingly being

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explored within networked learning. However, while connectivism provides us with a sense of how updated content might flow in complex variably tied and scaled networks, it leaves us with few, or unclear, analytic and theoretical notions in terms of how people make sense of and use these resources in actual practice. In this regard the research areas of networked learning and CSCL have much to offer in terms of understanding and analysing how people in variably scaled networks, whether strongly or weakly tied, make sense of, negotiate and critically reflect on 'updated content' in order to create knowledge and learning.

In this way, we think that a fruitful avenue for research and networked learning practices lies in exploring diverse orchestrations of learning arrangements, by maintaining an openness and variance in terms of the types of connections, relations and interdependencies we promote.

Concluding remarks

While the mainstream interpretations of web 2.0 highlight terms such as 'social', 'learner centred', and 'collaborative' our purpose has been to identify and make visible the subtle differences glossed over by such generic terms.

We have argued that there are some underlying theoretical differences in how various perspectives, such as connectivism and networked learning perceive relations between the individual and the social, and how they view cognition and learning. In relation to this, we have raised some critical, more theoretically oriented questions concerning the notion of connectivism, and while we believe there are some valuable insights in connectivism, we also have some reservations or uncertainties in relation to the underlying theoretical perspective. Most importantly we are unsure whether concepts such as 'communities', 'negotiation of meaning', 'dialogues' 'groups', 'social practice' and 'collaboration' are glossed over and forgotten. We are concerned whether notions of networks as separate self-organising cognitive elements, and the strong focus on the flow of (updated) knowledge content renders the processes by which these objects are produced invisible. This, in our view, would severely understate the importance of dialogues, negotiation of meaning, regulations, social practices and physical, bodily interaction with digital and analogue resources. In addition we ask whether the relatively radical individualist focus is in danger of overlooking positive aspects of collaborative or communal learning processes.

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Such underlying differences in perspective can lead to different preferences in terms of interactional dependencies (e.g. collaborative, cooperative or more individualised learning strategies), but also in terms of how various levels of social aggregation (groups, networks and collectives) might be promoted, valued or enacted in particular organisations for networked learning. We believe that the emergence of more dispersed networked technologies and 'collective' or 'connective' patterns of interaction hold interesting opportunities for expanding existing designs for e.g. project and problem oriented pedagogy or collaborative learning - but without excluding the value of more tightly knitted interactional dependencies.

Following from this, networked learning environments can be designed and shaped in different ways depending on the underlying view of cognition, learning and types of interactional dependencies preferred. They can be designed as constellations of technologies where the individuals freely form and control their learning processes by connecting to others for inspiration or resources across the various levels of aggregation. However, learning environments can equally be designed as platforms for strongly tied collaborative work and dependencies with a greater level of transparency between the groups and between the groups and external resources and materials.

In this way, we would not argue that 'networked individualism' or notions of personal learning environments necessarily leads to or encourage more individualised, consumer-oriented provisions of education. However, we feel that we should remain conscious of the more subtle ways in which we understand ideas such as collaboration, participation, and connections in our designs for networked learning arrangements. In particular, as different theories and perspectives that (perhaps) underpin our designs might encompass, invoke or promote certain interactional dependencies and underlying views of the relations between individuals.

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