Chapter 12
Conclusion: Mobility, Data and Learner Agency in Networked Learning

Nina Bonderup Dohn, Thomas Ryberg, Maarten de Laat, and Petar Jandrić

This book has been structured into three main thematic parts: *Aspects of mobility for networked learning in a global world*, *Use and misuse of algorithms and learning analytics* and *Understanding and empowering learners*. The three parts were preceded by a first chapter reporting on a study of the contribution of the Networked Learning Conference (NLC) to the development of networked learning as an area of scholarship and research. The parts were set in relief by a final chapter humorously reflecting how the field and practice of networked learning research might be characterised through parody of the structure, strategies and tropes in its literature. The two chapters 'flanking' the thematic parts of the book provide a reflective perspective on the development and current state of networked learning.

In this concluding chapter, we pick up on the reflective perspective. Our aim is to point from the present state to issues emerging for the future. We start in the first section with an overview of the focus areas and main claims presented by the chapters in this book. In the second section of the chapter, this overview is used to identify questions, potentials and challenges for future research and practice within networked learning.

N. B. Dohn (✉)
Department of Design and Communication, University of Southern Denmark, Kolding, Denmark
e-mail: nina@sdu.dk

T. Ryberg
Department of Communication and Psychology, Aalborg University, Aalborg, Denmark

M. de Laat
Learning, Teaching & Curriculum, University of Wollongong, Wollongong, NSW, Australia

P. Jandrić
Department of Informatics and Computing, Zagreb University of Applied Sciences, Zagreb, Croatia

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12.1 Summaries of Issues and Perspectives in the Chapters

12.1.1 Intro

The book's first chapter, *Becoming a knowledge community: The epistemic practice of networked learning* by Vivien Hodgson and David McConnell, serves as an 'intro' to the book. It provides a characterisation of the field of networked learning, as represented by NLC, based on a study of participants' perspectives. The study was performed utilising a questionnaire sent to persons with close association with the conference (regular attendants of NLC, conference organizers, contributors to the book series 'Research in Networked Learning'). The aim was to investigate how NLC is viewed—as research, practice and community—from within. Four main themes arose from participants' responses: *a critical space for dialogue and learning, community*, *scholarship* and *developing the practice of networked learning*. These themes emphasise that, in the eyes of the participants, the conference itself enacts the values of networked learning. Hodgson and McConnell conclude that the themes together constitute 'key aspects to the way the NL Conference 'institutionalises' and is a practical accomplishment of networked learning' (Hodgson & McConnell, this volume).

The chapter is significant for the field of networked learning because it bears witness to the 'coming of age' of a community whose participants view themselves as mutually committed to a set of academic values. Upon reflection, however, it also sparks the question whether other knowledge communities might not characterise themselves in similar terms and whether, therefore, the field of networked learning is demarcated primarily by the people who over time have committed themselves to the community and its development, rather than by specific research questions, methods, theories or focus areas. It raises the question whether networked learning is *also* demarcated in terms of academic domain or *only* in terms of the epistemic practice of a community. The relevance of this question is brought to the fore by the fact that a repeated discussion at NLC, involving newcomer and old-timer participants alike, is precisely what characterises networked learning in distinction to other fields.

12.1.2 Aspects of Mobility for Networked Learning in a Global World

Part 1 centres on the first of the book's three central themes: *mobility*. It thus picks up on the issue of *mobility, new forms of openness and learning in the public arena*, identified as an emerging perspective in the last book from NLC (Dohn et al. 2018). The part's two chapters focus in particular on the aspect of mobility, as it appears in the contemporary global economy of higher education and touch more indirectly on the other two aspects through this lens. The chapters offer, respectively, a macro

political perspective on the inequalities of global online higher education and a micro perspective of individual negotiation of identity across geographically and culturally distant practices in today's globalised world.

The part opens with a chapter presented by Bronwen Swinnerton, Taryn Coop, Mariya Ivancheva, Laura Czerniewicz, Neil Morris, Rebecca Swartz, Sukaina Walji and Alan Cliff on *The Unbundled University: Researching emerging models in an unequal landscape*. The authors explore the changing higher education landscape, looking at the effects of financial pressures and market opportunities. Particularly they study the impact which online program management companies (OPM) and other providers have on public-private partnerships through the delivery of unbundled educational services. Unbundling is a process where educational modules are offered in higher education, yet they are developed and managed as individual, independent entities in partnership with educational institutions. Based on their data, the authors explore where these partnerships emerge and how this relates to differentiation in the higher education sector. Using pattern recognition, the authors conclude that OPMs predominantly partner with traditional well-established institutions, reinforcing existing asymmetrical relationships in society and in the higher education sector. The authors find that rather than disrupting education, these partnerships seem to echo and possibly reinforce existing differentiation in higher education. Further development and integration of private-public partnerships raise questions about drivers for change, opportunities to access education, student experience and equity in the educational system.

The significance of this chapter for networked learning centres on two aspects. First, the chapter provides a critical sociological account of the changing higher education landscape which supports the field in engaging further into discussions on equality, student experience and access to education. Of particular interest is the impact of unbundled education on the development or sustainability of (national) educational systems and the tensions that arise from institutional and OPM partnerships in an increasing global educational market. Secondly, the chapter may open up further inquiry into the role of OPMs and other unbundling arrangements in higher education and their impact or ability to drive pedagogical innovation (or not) for networked learning design and delivery. What roles and responsibilities will OPMs have in relation to educational design, what are their agendas/motivations for doing this and how successful will they be in a largely conservative environment?

In the following chapter called *Distilling complexity through metastability and mobilities: the networked learning of Amara*, Michael Gallagher uses a mobility and metastability framework to explore the complexity of connections and agency that exist within the networked learning practices as experienced by learners. The mobility focus provides an interesting lens to critically describe and demonstrate how these networked practices are enacted, experienced and structured by both the individual and larger structural relationalities outside the individual. Gallagher concludes that more research is needed to uncover how these practices develop and evolve interdependently and which impact (mobile) technology has on shaping them.

The way Gallagher positions a mobility framework to understand the range of connections which learners are confronted with on a day-to-day basis provides a valuable contribution to networked learning. Placing the emphasis on the networked agency of learners is a refreshing reminder when thinking about designing for networked learning. Gallagher's approach connects with the research done by Gourlay and Oliver (2016) and with Dohn's (2014) work on understanding the primary context and its significance for networked learners. These authors point out the relevance of understanding and taking the learner's situation and contextuality into account when designing for and engaging in networked learning practices. Especially from a networked learning perspective it will be interesting to find ways to connect more directly and explicitly with the learners' context and bring this into the frame of shared social learning activity. This will help in making the shift from supply-based education and learning to a more context-focused and demand-driven approach.

12.1.3 Use and Misuse of Algorithms and Learning Analytics

Part 2 addresses the second theme of the book, *data*. It thus explores a theme that until NLC 2018 had been surprisingly under-investigated within the field of networked learning. Despite its increasing prominence within higher education research more broadly, the issue of *learning analytics* and, in general, the use of algorithms are developing areas within networked learning research (Dohn et al. 2018). This part contains three chapters which between them show both potentials and risks of algorithmic analyses for research and learning. They highlight how such analyses can bring to the fore data and processes that would not otherwise be apparent. They also illustrate, however, that this may well be to the expense of hiding other perspectives and/or influencing learners (and teachers) in problematic (e.g. biased) ways.

The part's first chapter is written by Marc Esteve Del Valle, Anatoliy Gruzd, Priya Kumar and Sarah Gilbert. They contribute with a thought-provoking chapter, *Learning in the wild: Understanding networked ties in Reddit*, which illustrates the research potential of algorithmic analysis in an investigation of informal learning processes occurring in the social networking site Reddit. Analysing two Reddit online communities, AskStatistics and AskSocialScience, they empirically investigate the formation of ties amongst their users. Their study shows that informal learning processes in these online communities are affected by two main forces: properties of the network, such as reciprocity and transitivity, on the one hand, and users' individual position within the network, such as being a 'regular' user or a moderator, on the other hand.

This chapter analyses networked learning communities using the exponential random graph models (ERGM), a statistical tool designed to test various network-based hypotheses. This is done by generating a large set of random networks, based on a chosen set of network configurations and node attributes. These random

networks are then compared to an observed network. The chapter's contribution to the field of networked learning is (at least) twofold. Firstly, in relation to its research question, the chapter reveals that informal learning is formed at the intersections of network configurations and individual attributes. Secondly, the chapter represents a methodological contribution by illustrating the usefulness of applying network analytics and concepts based on social network analysis in research of informal networked learning processes.

In *Dashboard literacy: understanding students' response to learning analytic dashboards*, Liz Bennett and Sue Folley explore the graphical interfaces that manipulate and present data about students' learning behaviours. The chapter focuses on student interpretation of and response to dashboard representations of own learning. It is based on a small-scale study and informed by Sutton's (2012) three pillars of feedback literacy: knowing, becoming and acting. Bennett and Folley show that using dashboards should be understood as literacy practice and that such practice is closely related to students' sense of identity and being. Therefore, dashboards should be used with care and acknowledgment of their power to influence not only student learning but also their well-being.

In our age of rampant datafication of education, this work is significant for networked learning in several interconnected ways. First, the chapter shows that various ways of representing data about students, exemplified by dashboards, are far from neutral. Second, and more specifically, relationships between using dashboards and student sense of identity and being, as understood in the chapter, indicate that we need to examine our tools for data representation way beyond the narrow notion of literacy. Third, the chapter offers useful practical recommendations for the design and implementation of dashboards. Fourth, based on the general critical sociocultural approach of networked learning, the relevance of these recommendations for other digital tools is obvious and it should be quite easy to adapt to them.

Whose domain and whose ontology? Preserving human radical reflexivity over the efficiency of automatically generated feedback alone, by Amanda Russell Beattie and Sarah Hayes, reports an autoethnographic account of teaching and learning in relation to automated feedback. Authors make a distinction between 'human feedback' as information arriving directly from a human being and 'non-human feedback' which arrives from automated computer systems. They examine theory and practice of automated feedback in relation to universities and within the context of networked learning theory, challenging the uncritical application of algorithmic processes in teaching and learning. In conclusion they advocate for a radically reflexive interpretation of feedback, which reaches beyond a 'solutionist' view of digital technologies and which allows teachers and students to become co-producers of knowledge.

This chapter is closely linked to some key values of networked learning including but not limited to cooperation and collaboration in the learning processes, self-determination, trust and investment of self in the networked learning processes. With its autoethnographic approach, the chapter shows that automated feedback carries significant human (emotional) investment. The proposed solution, a radically

reflexive interpretation of feedback, significantly contributes to networked learning research by pointing towards the intersections between the automatic and the human, the calculated and the emotional. Offering alternative understandings of automated feedback, it rejects the notion of students as customers and invites academics to treat them as (potential) co-authors. This could be very valuable in teaching and learning of the future.

12.1.4 Understanding and Empowering Learners

Part 3 centres on the third theme of the book, *learner agency*. In so doing, it provides new perspectives to a recurrent theme within NLC, namely, *differences between participants and in participant experiences—and the implications for the practice of online educators* (Dohn et al. 2018). Many aspects of interaction have implications for how participants experience networked learning. The part's four chapters home in on four such aspects, addressing also their potential for empowering learners: *cognitive load* of learning environments, students as co-researchers of *semantic data*, *power* in student communities of practice and the role of *boundary objects* for students traversing between learning practices. Between them, the four chapters thus contribute with insights into individual, social and technical influences on participant experience.

The first chapter is *Understanding and identifying cognitive load in Networked Learning* by Benjamin Kehrwald and Brendan Bentley. It explores how cognitive load theory may be a framework informing networked learning design and understanding of student experience. Cognitive load theory has generally not received much attention in networked learning research and this paper raises some very interesting points about how this framework can be of use to minimise or reduce unnecessary cognitive load in networked learning situations. After identifying areas of cognitive load in common networked learning situations, the authors propose a research agenda on exploring instances of cognitive load, based on technical aspects of networked learning. Suggested research areas for this agenda are: presentation of information and user interface design, research into instructional design and student learning in networked learning practices and research in learning to learn in networked learning. Studying cognitive load experienced by novice learners for example will help the development of networked learning environments.

By connecting cognitive load theory with networked learning, Kehrwald and Bentley's chapter makes an important contribution to networked learning research as this approach has many implications for the design of networked learning environment and the understanding of (lack of) learner activity, depending on cognitive load. Their critical reflection of networked learning environments and suggested research agenda supplement the learner perspectives commonly found within networked learning with more cognitively focused explanations. We hope that this work will inspire a new strand of research within the networked learning community which can integrate cognitive, motivational and social dimensions of learner

experiences by bringing the field of cognitive load theory into the frame of networked learning and vice versa.

In the chapter *Networks of knowledge, students as producers, and politicised inquiry*, Patrick Carmichael and Frances Tracy explore the notion of 'students as producers' through cases investigating the educational potential of semantic web and linked open data. They critically challenge the notion of 'students as producers', framing their criticism from the perspective of an 'excess pedagogy' where 'students can be enabled to transcend the constraints of consumerism by overcoming the limits of what it is to be a student in higher education' (Neary and Hagyard 2010, p. 210). They illustrate 'pedagogies of excess' where students in charge of their own inquiries contribute knowledge artefacts to wider networks. This leads to the argument that students (and teachers) need to develop critical digital and data literacies going beyond a simplistic view of these as marketable competences for future jobs. Rather, students and teachers should become critical consumers and producers of data, knowledge and practices that are shared with wider networks, thus reconnecting with the radical and emancipatory purposes of higher education.

The chapter by Carmichael and Tracy provides a thoughtful critique of the Edumeme 'student as producers'. For as they discuss, this is an ambiguous concept that can cover widely different purposes ranging from students developing valuable competences for employment to the more radical idea of an 'excess pedagogy'. With this concept, the authors align with central values within networked learning such as collective inquiry, relational dialogue, collaboration and the need to develop a critical disposition. The concept of 'excess pedagogy' is thus highly relevant for networked learning, but something that—to our knowledge—has not yet been explored much within networked learning literature. Thus, the chapter with its discussion of an 'excess pedagogy', its analysis and case examples adds to developing a stronger vocabulary and theoretical underpinning to ideas of critical and emancipatory pedagogies.

In the chapter *Stewarding and power in networked learning*, Andrew Whitworth and Lee Webster investigate decision-making in groups and the emergence of negotiated information practices within learning networks. They do so to understand how power is integral to such processes and to shed light on the role of community in networked learning. The study builds on a large corpus of text generated by groups' discussions in a Blackboard forum. This is used to understand how students learn to steward their digital habitat, thus building on and substantiating the notion of stewards and digital habitats as initially developed by Wenger et al. (2009). The analysis sheds light on power as a force working internally in the groups, but equally as a regime instilled by the assessment requirements of the course which the group work is part of. The authors show how difference and diversity emerge across the groups as a result of the ways they adopt and conceptualise technologies.

This chapter speaks readily into the theme of 'learning spaces' that was also raised as an emerging issue in Dohn et al. (2018). Further, as pointed out by De Laat and Ryberg (2018) in the introductory chapter to the same book, the themes of communities of practice and social learning have been recurring and strong themes within networked learning research. However, the chapter by Whitworth and Webster adds further nuance and detail, for one thing by adopting the idea of how

students learn to steward their digital habitats and for another by drawing on analyses of power in the student groups. The analyses of how students take on stewardship in their own groups, while balancing and negotiating power issues arising both internally and externally, are insightful and add greatly to our current knowledge of how (partly) self-directed learners adopt networked technologies into their learning processes. Further, Whitworth and Lee's discussion of how power and external/internal constraints are not only limiting students but also serve as generative forces are important insights in relation to designing for networked learning.

In the chapter *Boundary practices and the use of boundary objects in collaborative networked learning*, Marianne Riis and Lone Dirckinck-Holmfeld explore issues of knowledgeability and identification in design for boundary practice in networked learning. Analysing two cases from an online programme (one set within a 2D virtual learning environment, the other within a 3D virtual world), they study participants' use of boundary objects. With inspiration from the hierarchical typology for boundary objects developed by Carlile (2002, 2004), they identify, in both cases, boundary objects aiming for transfer, translation and transformation. However, certain boundary objects in the 3D environment seem to promote embodied transformation that has implications for the identity formation of the participants. They suggest that boundaries and boundary objects should not only be understood as sociocultural entities, but also as socio-material differences and dependencies. For example, the materiality of the 3D environment and avatars provide new relational and performative opportunities for networked learning.

Much like the chapter by Whitworth and Webster, the chapter by Riis and Dirckinck-Holmfeld speaks into the theme of learning spaces and in many ways explore similar issues. Both chapters focus on students' appropriation of networked technologies in their learning, but equally on how other entities, such as curricula, avatar-mediation, standards and regulation, are important in shaping practices. Riis and Dirckinck-Holmfeld approach this from the perspective of boundary objects and boundary practices and suggest to adopt a socio-material perspective to better understand, for example, 'the entanglement of material artifacts and the bodily performances of the learners' (Riis and Dirckinck-Holmfeld, this volume). In this way the chapter speaks into the ongoing socio-material turn that we see taking place within the networked learning community (Ryberg and Sinclair 2016) and which we will return to. The chapter, although picking up the term 'virtual', also implicitly problematises this term and suggests that we understand entities such as avatars as socio-material entities, rather than view the virtual/online as a distinct realm of existence disconnected from the material world.

12.1.5 Outro

The final chapter before this concluding one is *Laugh with us, not at us: parody and networked learning* by Christine Sinclair. It serves as an 'outro', adding a further reflective stance to the book's 'intro' provided by Hodgson and McConnell's study of participants' perspectives on NLC (Chap. 1, cf. above). Sinclair's reflective

stance is taken by investigating whether the rhetoric structure, strategies and style of NLC papers are consistent enough despite differences in content to allow a characterisation by parody. She follows Bakhtin in stressing that parody supports recognition of common traits and opens for renewal of these traits through laughter. She humorously identifies a typical structure of an NLC paper and proceeds to reflect on networked learning research—and the degree to which parody is or should be present in it—through filling out each of these generic sections. This leads Sinclair to suggest 'the novel' in its literary sense as a possible metaphor for networked learning: Networked learning as educational development 'attempts to capture the multivoiced nature of contemporary communication' (Sinclair, this volume).

The importance of the chapter for the field of networked learning resides partly in its caringly critical call for reflection on the significance of a (standardised) rhetoric in NLC papers, partly in stimulating questions through this reflection that are similar to the ones raised in the book's 'intro' in Chap. 1. As regards identification of a standardised rhetoric, this on the one hand underlines a common epistemic practice of NLC. On the other hand, it raises the question to which extent format might tyrannise or hollow out content and, further, how one can transgress standardised rhetoric to ensure that relevance of content, not format, is decisive. This leads to the second point, namely, the question, again, whether demarcation of the field of networked learning might first and foremost be a matter of pointing to a community of people and their 'repertoire' (Wenger 1998) of rhetoric actions, rather than a matter of academic domain.

12.2 Emerging Issues for Further Research in Networked Learning

In the first section of this chapter, we summarised the main points of each of the book's chapters and highlighted the new perspectives and insights they provide—individually and together—to the field of networked learning. In this second section, we pick up on some of the points and show how they combine to, on the one hand, provide a characterisation of networked learning today and, on the other hand, to articulate questions and challenges for future research and practice within the field.

12.2.1 Demarcation and Characterisation of the Field of Networked Learning

As discussed, both the 'intro' and the 'outro' chapters (Chaps. 1 and 11) serve to characterise the networked learning field through identifying traits characteristic of its community. Chapter 1 thus highlights the academic values that, according to

participants at NLC, the conference practices as well as preaches. Chapter 11 pinpoints a typical rhetoric structure and style, along with typical rhetoric strategies of NLC papers, indicating part of the 'repertoire' of the community (Wenger 1998). From the chapters emerge a depiction of networked learning as coherent and cohesive at a meta-level, because the community welcomes openness of mind, critical reflection on own and others' presuppositions, involvement in dialogue, interest in (non-specified) theory and a humorous stance. Neither of the chapters, however, characterise the field at the domain level in terms of, e.g. academic focus area, methods, research questions or theories.

This is in part due to the research questions of the two chapters which are not centred on content issues. For the tenth anniversary Networked Learning Conference, De Laat and Ryberg conducted a trend analysis of the conference proceedings treated as a text corpus (De Laat and Ryberg 2018). This actually goes quite a way towards addressing the question of content characterisation: It provides an overview of, amongst others, the learning theories, methodologies and technologies which have been mentioned in the conference papers over the years. In this sense, the chapter serves as an ostensive, pragmatic, extensional delimitation of networked learning—indicating the field by showing what issues the researchers who participate in the conference have *de facto* dealt with. Still, a pragmatic, extensional delimitation of a field does not constitute definition of its intension (i.e. of its meaning). Nor does it relate to the *de facto* work of other research communities which—hypothetically—might have engaged with the same issues as the networked learning researchers. It therefore does not answer the questions which the chapters by Hodgson and McConnell and Sinclair quite naturally prompt: *What is the nature (are the natures) of Networked Learning?* and *(How) does Networked Learning differ domain-wise from other research within the fields of Education and Educational Technology?* These questions, for their part, call for a characterisation of networked learning in terms of, respectively, domain traits (internal characterisation of the research field's intension) and domain demarcations (what distinguishes it from other research fields). As indicated, the challenge to supply this kind of characterisation is a recurrent issue at NLC, posed by both newcomers and old-timers.

The challenge has, of course, been taken up numerous times. Usually, this is done by way of the definition provided by Goodyear et al. (2004)—where this definition is presented either as *answer* to the challenge or as outset for *criticising* or supplementing it. As Jones comments:

> *The … definition, having proved remarkably resilient in a fast changing field, remains a cornerstone for the networked learning conference series in many research studies, edited collections and this book series [the Springer Series on Research on Networked Learning].* (Jones 2015, p. 5)

Arguably, however, the definition has taken on this role more because of the research community than because of its unambiguous domain characterisation of the field of networked learning. The definition was initially crafted in 1998 as part of a successful research proposal in the UK (Carvalho and Goodyear 2014), out of which the Networked Learning Conference series has sprung, with the original grant holders

as core participants in the development of the conference. So in this sense, the story of the definition's persistence may as much be the story of the development of a specific research community—the focus of Hodgson and McConnell's chapter (this volume)—than of the definition's precise demarcation of a field.

Looking to the definition itself, it states that networked learning is

> *...learning in which information and communications technology (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. 1)

On the face of it, the definition may seem to do the job of providing a domain characterisation of networked learning. Thus, apparently it specifies ICT as a crucial domain trait—which of course raises the question of domain demarcation from other ICT-focused approaches to learning such as e-learning, online learning, technology-enhanced learning (TEL) and computer-supported collaborative learning (CSCL). Proponents of the definition stress, however, that '[t]he key term in this definition is *connections* and the emphasis is on the interactions between people mediated by technology and between people and resources' (Jones 2015, p. 5) (cf. also Carvalho and Goodyear 2014; McConnell et al. 2012). This does provide some domain demarcation—at least by way of emphasis—from e-learning, online learning and TEL, though not so clearly from CSCL. On the other hand, it prompts the question what would then—at least in technology-rich countries—*not* count as networked learning today: Here, it is difficult to find situations where no ICT is involved in 'prompting' learners' connecting to one another, if only in the form of mobile texting each other to arrange when to meet.

The question is reinforced by statements to the effect that pure interaction with online materials is not sufficient to count as networked learning (Carvalho and Goodyear 2014; Jones 2015). It is further buttressed by considering that 'information and communications technology' is not well-defined. Nowadays, we take it unreflectively as referring to 'something with a computer'—or, depending on context, a mobile phone, a tablet, a GPS, a coffee machine/watch/lamp/any artefact connected to the Internet. This is clearly vague at best. If we try to circumvent the vagueness by insisting that what is of interest is technology that supports *information [sharing] and communication*, then, conversely, any technology that does this will fall within the remit. As Hansen (2018) points out: '... consider the medieval times... The lectern... was and is clearly a communication technology used to promote more of the connections mentioned in the definition' (p. 50). Chalk (Jones 2015), clay tablets (Carvalho and Goodyear 2014), and upside-down beer crates also work to this effect. Once one realises that recurring figures within the community of networked learning today (including at least one of the co-chairs, cf. De Laat 2012) do not view mediation by computers or the like even as a necessary condition for networked learning, the door to the claim that it is hard to find an example of learning that does not count as networked learning (Hansen 2018) is driven wide open. Upon realising this, one might be tempted to give up on providing a domain characterisation and accept a pragmatist community delimitation: 'Networked learning is what the community of

researchers who identify themselves with the community take it to be'. The trend analysis provided by De Laat and Ryberg (2018) could then be taken to depict this 'what' and its development over the years.

This would be going too far, however. There is no doubt that the field of networked learning has evolved in the 20+ years since the research proposal and the first NLC. Technological possibilities have evolved, the interests of researchers have shifted, and newcomers to the community have introduced new perspectives that worked to modify the conference's focus as they became old-timers. The overview provided by De Laat and Ryberg (2018) clearly illustrates this. But that does not mean that domain characterisations of intension are not possible. They may turn out to be partly in plural, though—designating a *set* of approaches—rather than a single perspective. This is as it should be—that is part of evolving academic practice.

In the concluding chapter to the previous book springing from the Networked Learning Conference (Dohn et al. 2018), we pointed to five different understandings of 'networked learning' emerging in our community. We explicated how they differed from each other in (A) the *type* of network they focus on, (B) how they view the network as *supportive of learning* and (C) what it means for learning to be *networked*. We identified the five approaches based on their view of (A) as:

1. The 'network' is one of both ICT infrastructure and social relationship (the original focus of the definition in Goodyear et al. 2004).
2. The 'network' is a network of people (exemplified by De Laat 2012).
3. The 'network' is a network of situations or contexts (e.g. Dohn 2014).
4. The 'network' is one of ICT infrastructure, enabling connections across space and time (e.g. Swinnerton et al., this volume).
5. The 'network' is one of human and in-human actants in symmetrical relationship to each other (e.g. Fox 2005).

Within each of these five approaches, it is possible to provide a definition of networked learning which serves to characterise it on its own terms and to distinguish it from the others (for approach 4, this requires a further characterisation of the role social justice plays in the approach's take on learning). In providing these definitions, we also draw on Dohn (2018) who discusses the role of networked learning in the networked world of today, pinpointing six interrelated senses in which the world of today may be said to be networked.

1. 'Networked learning' is learning from, through and with other people, where one is separated in time and/or space from these other people and where communication with them is mediated by digital information and communication technology. Learning is thus networked in the double sense of coming into being through ICT-mediated connections with other people.
2. 'Networked learning' is learning from and through other people and the access they provide to learning opportunities, including new ideas, ways of participating in practice and co-development of new practices.

3. 'Networked learning' is learning through connecting between situations and the occasion this connecting presents to resituate knowledge and skills from known situations to new ones.
4. 'Networked learning' is learning mediated by digital information and communication technology, where the situations of learning are separated in time and/or space. Typically, adherents of this definition will stress that a social-critical reflective perspective on learning situations is a necessary characteristic of this approach, too. That is, to be a 'networked learning study', one must focus on issues of social justice, empowerment, democratisation, etc. within the field of learning mediated by digital information and communication technology.
5. 'Networked learning' is any and all learning, because every instance of learning can be viewed as the result of concrete socio-material entanglement of physical, virtual and human actants. In other words, this approach requires that one takes a certain systemic, socio-materially informed approach to learning (cf. below).

The challenge is to provide traits and demarcations that cut across these different approaches, inclusive enough to embrace them all and precise enough to delimit the field from other fields. We view the comprehensive answer to this challenge as a task for future research papers but would like to propose some tentative suggestions.

Firstly, the different senses of network are united in an *underlying formal approach* where nodes and edges of the network can be represented in a mathematical model (Hansen 2018). Though this is often not an explicit focus for authors, our suggested definitions for the five approaches all hinge on the formal characterisation of a network in terms of nodes and edges.

Secondly, viewing learning as networked is a methodological stance which focuses on *relationships* between phenomena and on depicting and explaining learning in terms of these relationships. This contrasts with a methodological individualism which seats explanations in attributes of the individual (Hansen 2018). More specifically, Haythornthwaite and De Laat (2012) point out that taking a relational approach to learning entails focusing on questions such as *who learns what from whom, what kinds of interactions happen between people who learn together, which direction do resources flow, how frequently do learning interactions happen and how important are they for the people involved*. The conspicuousness of the relational approach varies, though, with some authors explicitly stating it as a defining characteristic (e.g. Jones et al. 2005) and others taking the relational perspective as outset for asking more individually focused questions. Kehrwald and Bentley's analysis (this volume) of the cognitive load of networked learning environments is an example of the latter.

Thirdly, the different approaches to networked learning all give priority to a *focus on learners, learning and design for learning*, rather than to the technology itself with which learning is facilitated.

Finally, as technology and practice have both developed, it is becoming increasingly arbitrary to restrict investigation of networked learning to communication within specific ICT-mediated online environments—'virtual learning spaces'. Quite

generally, learning and education have become postdigital (Jandrić et al. 2018) in the sense that digital resources, media and spaces are integrated parts of all learning spaces, not special ones sometimes added to physical learning spaces or chosen as special 'delivery modes'. Learners move in and across such hybrid physical-virtual spaces and negotiate their many interdependent practices in so doing. Accordingly, the interest in learners' connections with resources and with each other, articulated as anchorage points for networked learning in the definition from 2004 by Goodyear et al., is increasingly being pursued in the hybrid spaces in and across which learners engage, rather than in specific ICT-mediated online environments. Gallagher's exploration (this volume) of networked learning practices from a mobility point of view provides an interesting example. He illustrates how these practices should be viewed in a larger networked context so that even though individual agency is important, the interrelated dependencies through larger structures mean that the networked learner is never disconnected, but constantly multitasks across diverse learning spaces.

12.2.2 The Socio-Material Turn

Echoing the previous section, it seems hard to point at learning within higher education or professional development which does not in some way or another involve digital technologies (at least in technology-rich countries). Far back seem the days where we 'went online', 'surfed the web for information' or engaged with exotic 'virtual communities'. Digital technologies and the Internet, or what we perhaps should rather term 'connectivity', are pervasive in everyday life (in parts of the world): in the home, in education, at work and in transit. This, we would argue, underpins the socio-material turn which the field of networked learning seems to be undergoing at the moment. With this turn, there is an increased interest in 'hybrid' environments, materiality and place (Carvalho et al. 2017), and, as touched upon in the previous section, the question becomes pertinent whether networked learning even needs to be technology-mediated. There is an increased interest in networked learning (in senses 2, 3 and 5 above) taking place as campus learning, informal learning and learning on the move, as well as in issues such as transfer, boundaries and boundary crossing connected with these different learning arenas. Gallagher's chapter (this volume) illustrates the complex shifts which learners must accomplish to navigate a multitude of learning arenas. Furthermore, we see an increased focus on entanglements between 'the digital' and a range of nondigital phenomena (material as well as non-material), such as curricula, standards and guidelines, and other wider systemic influencers. This is highlighted in the chapters by Whitworth and Lee and by Riis and Dirckinck-Holmfeld.

By saying that networked learning is experiencing a socio-material turn, we do not necessarily mean that researchers are explicitly adopting socio-material or (post)-actor-network theories (though many do). Rather, we are pointing to wider

shifts in attention occurring over the years in the networked learning community. In the following we suggest and discuss four aspects around which these shifts revolve:

- The *educational contexts* of networked learning (from formal higher education and professional development to learning in 'the cracks')
- The *places* of networked learning (from 'here' to everywhere)
- The *technologies* of networked learning (from institutional technologies to learner-directed habitats)
- The *agencies* of networked learning (shifting boundaries between humans and technology)

In terms of *educational contexts*, networked learning has from its outset been focused particularly on higher education and professional development. This perspective has over the years widened to include *'research in education and organisations spanning formal and informal learning settings'* (http://networkedlearningconference.org.uk/). Particularly, the interest in 'informal learning' (see, e.g. Esteve Del Valle et al., this volume) and learning happening outside or in 'the cracks' of formal education seem to be on the rise, as noted by De Laat and Ryberg (2018):

> Through their connectivity and use of mobile devices, learners become even more aware that they are learning all the time and that they through their contributions are not only consumers of knowledge but indeed creators of knowledge. Using Twitter, Facebook and other social media, a lot of our learning takes place in the 'wild' and therefore increasingly outside of traditional educational institutions. (De Laat and Ryberg 2018, p. 18)

But even within the bounds of the formal education system, we see the move towards flexibility of learning and the subversion of rigidly defined full educational programmes. The flexibility is institutionalised—for good and for bad—in the unbundling of modules into independent entities from which learners can pick and choose to compile their own education, tailored to their interests and needs (cf. Swinnerton et al., this volume).

Furthermore, there are also many opportunities for learning in the 'wild' or in 'the cracks' even within the generally bundled formal educational programmes offered in-house in higher education. Learners can more easily find additional or alternative sources for their learning, consult MOOC courses, find lectures or tutorials on streaming video services and steward personal or shared 'digital habitats' as explored by Whitworth and Lee (this volume). Further, as Carmichael and Tracy (this volume) note, learners can also—within formal courses—be empowered to engage with and contribute their knowledge artefacts to wider networks, or formal courses can invite external participants into the ongoing conversations (which was one of the ideas behind the first cMOOCs in 2008). This idea is explored as hybrid course designs in a new volume in the Research in Networked Learning series, focusing on networked professional learning (Littlejohn et al. 2019).

These changes are intimately connected to the *places* for networked learning, and as noted in the citation from De Laat and Ryberg (2018), learning is less tightly bounded to specific places or 'heres', such as the campus, the library, the workplace

or the home. Rather, engaging with other learners, course materials and informal learning opportunities can happen 'everywhere' and connectivity allows and offers new opportunities also for how to embed mobility into formal education (Gallagher and Ihanainen 2016). This is not to suggest that learning becomes 'placeless' or takes place in a 'cyberspace' disconnected from social and material contexts, but rather that learning is potentially distributed across different places, bounded and affected by what those places afford, as explored, e.g. by Timmis and Williams (2016).

Another shift, we argue, is a shift from institutionally provided *technologies* to learner-directed habitats. While institutionally provided technologies, such as virtual learning environments, digital exam systems and the myriad of other administrative tools in educational institutions, are important for both learners and teachers, it is also clear that both students and teachers can seek out and work with multiple tools and resources outside the institution. Students in online or campus programmes are not strictly dependent on the institution to provide, for example, spaces for sharing files, systems for collaborative writing or videoconferencing tools for them to meet and discuss. As discussed by Whitworth and Lee and by Esteve Del Valle et al. (this volume), there are multiple technologies and online spaces available outside the institution, and students can steward their own 'constellations of technologies' (Ryberg et al. 2018). Often, they are able to draw on a much more complex ecology of technologies than what is provided by the institution (Caviglia et al. 2018).

Finally, we would suggest that there is also a shift in the *agencies* of networked learning which more specifically have to do with shifting boundaries between humans and technology. While networked learning has always been concerned with technology mediation, the agency of the intermediary link between learners, between learners and the resources they access and between learners and teachers/facilitators is becoming more complex. Dashboards and automated feedback as explored by Bennett and Folley and Beattie and Hayes (this volume) are deriving and processing data through difficult-to-grasp artificial intelligence and machine learning algorithms. The operations involved are well beyond the expertise of the vast majority of teachers, students and researchers to really understand and see through. While learning technologies have never been pedagogically neutral, the biases, implicit pedagogies and underpinning assumptions have become increasingly complex, black-boxed and inaccessible to critical inspection over the last decades. As illustrated in the chapters by Bennett and Folley and by Beattie and Hayes (this volume), this leads to non-transparent agency of technology and a diffusion of responsibility away from teachers and learners. The shift in agency can, however, equally be investigated from a more playful and experimental perspective, as exemplified by Ross (2017). Here, a Twitter chatbot was used as part of a MOOC (the E-learning and Digital Cultures Massive Open Online Course [EDCMOOC]) to explore and reflect on the changing agencies and boundaries between humans and technology. No matter whether we explore such changing agencies and boundaries through playful experimentation and/or critical enquiry, this is an important area for future research within networked learning. It raises questions such as how the changing relations between humans and technology transform the experience and meaning of being a teacher or a student (and perhaps also of being a chatbot) as well

as how the black-boxing of technology can be circumvented to empower learners and teachers alike. Such questions have become all the more pressing with the advent of so-called intelligent and adaptive technologies that mediate between learners and between learners and teachers.

Drawing together these four aspects of shifts in *educational contexts, places, technologies and agencies*, we wish to point out that the boundaries between the digital and analogue and between the online and offline have become increasingly messy and distributed in time and space—and with them the whole landscape of learning. With a biological metaphor we could think of these shifting boundaries as ecotones. Ecotones are:

> [...] a transition area between two biomes. It is where two communities meet and integrate. It may be narrow or wide, and it may be local (the zone between a field and forest) or regional (the transition between forest and grassland ecosystems). An ecotone may appear on the ground as a gradual blending of the two communities across a broad area, or it may manifest itself as a sharp boundary line. The word ecotone was coined from a combination of eco(logy) plus -tone, from the Greek tonos or tension – in other words, a place where ecologies are in tension. (https://en.wikipedia.org/wiki/Ecotone)

Ecotones can thus be marked by sharp divides, but equally as more organic, messy blends. Perhaps rather than thinking in terms of sharp divides between online/offline, digital/analogue and formal/informal, we can empirically explore various ecotones of networked learning, where different ecologies meet, bridge or cross boundaries between *educational context, places, technologies and agencies*.

12.2.3 Evolving Forms of Networked Learning Design and Assessment

Returning to the question of what characterises the research focus of networked learning across the different understandings of the field, at least one further common trait can be identified which cuts across the focus on technologies or social connections as the 'networking' aspect of networked learning: a keen pedagogical interest in designing for networked learning activity (Hodgson et al. 2014). This interest surfaces in attention to the underpinning principles and values for networked learning, with many researchers probing pedagogical implications and innovation for networked learning design. This significant work is continued in the present volume in chapters drawing on analytics as well as (new) learning theory and learning contexts to reflect on and inspire designs for networked learning and assessment.

In terms of learning theory, Kehrwald and Bentley (this volume) explore the potential of cognitive load theory to improve networked learning design and assessment. As indicated, this is an under-researched area in the networked learning community. In their chapter, they demonstrate how cognitive load theory can be a useful framework to facilitate focus on offloading unnecessary cognitive load from the learners so that they can focus more strongly on learning tasks at hand. Their work

may open up a new stream of pedagogical research on designing networked learning environments, instructional design and learner activities. This work is of particular interest when considering the changing student profile in higher education (Ortagus and Tanner 2019). Students in higher education are no longer predominantly novice learners in the age bracket of 18–25, studying full time and able to invest in learning to learn or engage in networked learning practices. Instead, many learners nowadays have to manage other work-life aspects and balance these with their ability to study. In consequence, they have less time to study and/or stretch their education over a longer timeframe, distribute costs and integrate learning with professional needs and opportunities. Reducing cognitive load to improve learners' experience and their chances of success is a key area to focus on for this target group.

Design may also be informed from forms of networked learning in other contexts. Esteve Del Valle et al. (this volume), for example, explore informal learning in the wild by looking at social network patterns and how participation and learning relationships shape the development of networked learning. Such studies of spontaneous learning in online communities are increasingly showing promise by providing knowledge about people's intentions, abilities and ways of learning. Participation in informal online learning may change people's opinion about learning and, importantly, also their approaches to and expectations of learning. These changes from learning experiences in the wild may well be carried over to expectations of learning in formal and non-formal settings as well. It is therefore of the upmost importance that studies outside of the formal educational context are carried out and that their findings are introduced into the broader discourse on teaching, learning and learning design. For instance, based on social network analysis, Esteve Del Valle et al. conclude that learning is affected by network properties such as reciprocity and transitivity as well as learner roles in the network. These insights are highly relevant for formal education as well. Gaining more knowledge about how these properties influence participation and learner success also in formal learning situations will facilitate design for development of digital skills and literacies. This in turn is important to support people's potential to engage in lifelong learning as well as their ability to collaboratively solve problems and create knowledge relevant to their interests and learning goals.

Another development is the increased use of data to inform decisions about learning and design (Viberg et al. 2018). Learning analytics is an emerging field in education, showing promise as regards the use of organisational and learner data to increase our awareness of learner engagement and behaviour. This may further help inform design to improve learner experience. Visualisation techniques are currently being researched to provide feedback about student learning. Here, the provision of dashboards has been a popular approach to channel feedback information to both the learner and the teacher. Use of dashboards may certainly impact the facilitation of learning but, as Bennett and Folley (this volume) point out, it also has consequences in terms of learners' ability to use and reflect on this information. Good use of dashboards is dependent on the learner's ability to process, assess and act upon the feedback that they receive. It is not only about raising awareness. It is also about stimulating literacy practices that enable students to develop meta-learning skills to

change their approach to learning. The authors point out that 'institutions need to work with students to develop their personal and reflective processes to enhance the way that dashboards are interpreted' (Bennett and Folley, this volume). The adoption of dashboards requires great care. Not only may it have a negative effect on students' well-being and self-efficacy, it can also add to an already high cognitive load.

Aspects of feedback are further researched and criticised by Beattie and Hayes (this volume). In their chapter they critically scrutinise forms of (automated) feedback and especially how machine-generated feedback is applied in education to the extent that it may push out human engagement with it. They rightly point out that as technology becomes deeper integrated into our lives, we need to be careful and, in particular, to be aware that feedback may not have a causal relationship with learning or follow a predefined path. Similar to the chapter by Bennett and Folley they argue that reflection on feedback practices are needed if literacies, agency and empowerment are to be supported based on assessment of learning. On the other hand, if utilised with reflective awareness, increased feedback can provide a way to improve self-critical navigation of learning. This may empower students to become more successful and self-determined in shaping their networked learning practices, as illustrated in Gallagher's chapter on mobilities (this volume).

12.3 Concluding Remarks

The aim of this chapter has been to draw out insights concerning the central themes of the book, i.e. the themes of *mobility*, *data* and *learner agency* in networked learning. In the first section, we pointed out how each of the chapters in the book's three sections dealt with one (or more) of these themes. This served to highlight different contemporary takes of the networked learning community on the themes. In combination with the 'intro' and the 'outro' chapters, which pinpoint networked learning research practice, the chapters thus provide a characterisation of the field of networked learning today, as seen through the lens of the book's three themes. In the second section of the conclusion, we have identified a set of issues emerging out of the community's work with these themes: *demarcation and characterisation of the field of networked learning*, *the socio-material turn* and *evolving forms of networked learning design and assessment*.

Looking to the next conference in the Networked Learning Conference series which takes place in Kolding, Denmark, in May 2020, the themes of the present book resonate in the Call for Papers' suggested topics, as do also the emerging issues pointed at in this conclusion (cf. http://www.networkedlearning.aau.dk/nlc2020/call-for-papers/). Amongst the topics are thus *Learning on the move, places and spaces for networked learning* (echoing *mobility* and *the social-material turn*); *Roles of learning analytics, big data, and artificial intelligence in Networked Learning* (echoing *data* and *evolving forms of assessment*); *Networked learning literacy and agency* (echoing *learner agency*); and *Situating networked learning*

historically systematically, conceptually, etc. (echoing *Demarcation and characterization of the field of Networked Learning*). Further topics such as *learning at scale, in the wild and across boundaries* and *transfer and transformation of knowledge, practice and networked learning* also take up threads discussed in the book's chapters. We look forward with excitement to the next conference—and to the book of selected papers following it—for the continued conversation about this book's perspectives.

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